Proteome rearrangements after auditory learning: high-resolution profiling of synapse-enriched protein fractions from mouse brain

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SUPPLEMENTAL MATERIAL

Table S1a. MIAPE-compliant MS-description for label-free MS proteomics	
Classification	**Definition**
1. General features — (a) Global descriptors	
Responsible person	T. Kähne, PhD, Institute of Exptl. Internal Medicine, University Magdeburg, Leipziger Str. 44, 39120 Magdeburg, Germany
Instrument manufacturer, model	Thermo Scientific, LTQ Orbitrap Velos Pro Mass Spectrometer
Customisations	no customisations
1. General features — (b) Control and analysis software	
Software name and version	XCalibur 2.2 LTQ Tune Plus 2.7
Switching criteria (tandem only)	10 of the most abundant precursor (TOP10) active exclusion after 2 spectra, release after 3 min precursor intensity threshold: 500 counts charge state: > 2, single charged excluded
Isolation width (global, or by MS level)	Isolation with: 1.0 m/z
Location of 'parameters' file	not supplied
2. Ion sources — (a) Electrospray Ionisation (ESI)	
Supply type (static, or fed)	Fed by nano-HPLC (EASY-nLC Ultra, Thermo Scientific)
Interface manufacturer, model	Nanospray Flex, Thermo Scientific
Sprayer type, coating, manufacturer,	Coated PicoTip Emitters (FS360-20-10-D), New Objective, USA
Relevant voltages where appropriate (tip, cone, acceleration)	positive mode Emitter-voltage: 2100 V
Whether in-source dissociation performed	no
Other parameters if discriminant for the experiment	Passive spray, without nebulising gas source heating: 280°C
3. Post-source component — (c) Ion rap	
Final MS stage achieved	MS^2 (CID)
Gas type and pressure (bar)	Helium, 10^{-6} bar
Collision energy	normalized collision energy: 35% activation time: 10ms

Table S1b. MIAPE-compliant MSI-description for label-free MS proteomics

Classification	Definition
1. General features — (a) Global descriptors	
Responsible person	T. Kähne, PhD, Institute of Exptl. Internal Medicine, University Magdeburg, Leipziger Str. 44, 39120 Magdeburg, Germany
Software name, version and manufacturer	Proteome Discoverer 1.4, Thermo Scientific Sequest HT Mascot 2.1, Matrix Science, UK PEAKS Studio 7.0, Bioinformatics solutions Progenesis LC-MS, Nonlinear Dynamics/Waters
Customisations	no customisations
Availability of the software	inhouse licensed
Location of the files generated	Data are available via ProteomeXchange with identifier PXD003089
2. Input data and parameters – (a) input data	
Description and type of MS data	Original format: raw data in .raw
Availability of MS data	Data are available via ProteomeXchange with identifier PXD003089
2. Input data and parameters – (b) input parameters	
Database queried	Uniprot/Swissprot
Taxonomical restrictions	Mus
Description of tool and scoring scheme	
Specified cleavage agent(s)	Trypsin
Allowed number of missed cleavages	2
Additional parameters related to cleavage	min. peptide length: 6 max. peptide length: 144
Permissible amino acids modifications	fixed: Carbamidomethyl (C) variable: Oxidation (M) Phospho (Y, T, S)
Precursor-ion and fragment-ion mass tolerance for tandem MS	Precursor ion tolerance: 5 ppm Fragment ion tolerance: 0.6 Da
Thresholds; minimum scores for peptides,proteins	Defined by FDR calculation (FDR<1%) (Percolator 2.04)
3. The output from the procedure – (c) quantitation for selected ions	
Quantitation approach (e.g. 4plex-iTRAQ, ICAT, cICAT, COFRADIC)	label free
Quantity measurement	calculation by peak area and intensity
Data transformation and normalization technique	Progenesis LC-MS alignment Retention time tolerance: 30 s Accepted charge states: 10
Number of replicates (biological and technical)	6 biological, 3 technical each
Acceptance criteria (including	Acceptance of a quantified protein by at least 3

measure of errors)	different quantifiable peptides and p<0.05
Results from controls (when described)	All protein levels have been calculated relative to naïve controls (level set to 1)
4. Interpretation and validation	
Assessment and confidence given to the identification and quantitation (description of methods, thresholds, values, etc.)	Assessment by Proteome Discoverer 1.4 Confidence: based on false discovery rate (FDR) calculation by Percolator 2.04 algorithm (set to < 1%) Phospho-site determination was performed by phosphoRS 3.0 Quantification: algorithms provided by PEAKS Studio 7.0 and Progenesis LC-MS
Results of statistical analysis	statistic analysis provided by PEAKS Studio 7.0 and Progenesis LC-MS (based on modified t-test)
Inclusion/exclusion of the output of the software are provided (description of what part of the output has been kept, what part has been rejected)	Inclusions for label free quantification: p<0.05 confident sample number >4 fold change threshold: >1.5

Table S1c. MIAPE-compliant MS-description for MRM

Classification	Definition
1. General features — (a) Global descriptors	
Responsible person	T. Kähne, PhD, Institute of Exptl. Internal Medicine, University Magdeburg, Leipziger Str. 44, 39120 Magdeburg, Germany
Instrument manufacturer, model	Thermo Scientific, LTQ Orbitrap Velos Pro Mass Spectrometer
Customisations	no customisations
1. General features — (b) Control and analysis software	
Software name and version	XCalibur 2.2 LTQ Tune Plus 2.7
Switching criteria (tandem only)	Multi Reaction Monitoring precursor intensity threshold: 500 counts
Isolation width (global, or by MS level)	Isolation with: 1.0 m/z
Location of 'parameters' file	not supplied
2. Ion sources — (a) Electrospray Ionisation (ESI)	
Supply type (static, or fed)	Fed by nano-HPLC (EASY-nLC Ultra, Thermo Scientific)
Interface manufacturer, model	Nanospray Flex, Thermo Scientific
Sprayer type, coating, manufacturer,	Coated PicoTip Emitters (FS360-20-10-D), New Objective, USA
Relevant voltages where appropriate (tip, cone, acceleration)	positive mode Emitter-voltage: 2100 V
Whether in-source dissociation performed	no
Other parameters if discriminant for the experiment	Passive spray, without nebulising gas source heating: 280°C
3. Post-source component — (c) Ion rap	
Final MS stage achieved	MS^2 (CID)
Gas type and pressure (bar)	Helium, 10^{-6} bar
Collision energy	normalized collision energy: 35% activation time: 10ms
Orbitrap	Resolution 60.000
precursor list	m/z RTmin RTmax CE last m/z 365.23451 48.00 56.00 35.0 1200.00000 "" 368.21104 50.00 58.00 35.0 1200.00000 "" 408.72346 40.00 48.00 35.0 1200.00000 "" 411.75086 40.00 48.00 35.0 1200.00000 "" 418.23725 55.00 63.00 35.0 1200.00000 "" 435.72143 55.00 63.00 35.0 1200.00000 "" 439.72197 40.00 48.00 35.0 1200.00000 "" 440.71923 42.00 50.00 35.0 1200.00000 "" 448.25343 25.00 33.00 35.0 1200.00000 "" 450.25089 40.00 48.00 35.0 1200.00000 "" 460.25838 34.00 42.00 35.0 1200.00000 "" 462.76109 42.00 50.00 35.0 1200.00000 "" 463.75273 55.00 63.00 35.0 1200.00000 "" 465.75380 32.00 40.00 35.0 1200.00000 "" 466.28219 59.00 67.00 35.0 1200.00000 "" 468.72639 46.00 54.00 35.0 1200.00000 ""

474.76671	58.00	66.00	35.0	1200.00000	""
483.72504	54.00	62.00	35.0	1200.00000	""
488.73148	58.00	66.00	35.0	1200.00000	""
499.74871	33.00	41.00	35.0	1200.00000	""
500.77112	65.00	73.00	35.0	1200.00000	""
506.72620	29.00	37.00	35.0	1200.00000	""
509.78001	39.00	47.00	35.0	1200.00000	""
511.26928	67.00	75.00	35.0	1200.00000	""
512.27711	45.00	68.00	35.0	1200.00000	""
512.74003	36.00	44.00	35.0	1200.00000	""
515.22286	31.00	39.00	35.0	1200.00000	""
524.26948	52.00	60.00	35.0	1200.00000	""
528.78784	36.00	44.00	35.0	1200.00000	""
546.76964	63.00	71.00	35.0	1200.00000	""
550.29837	61.00	69.00	35.0	1200.00000	""
553.76096	55.00	63.00	35.0	1200.00000	""
554.75453	38.00	46.00	35.0	1200.00000	""
557.79259	66.00	74.00	35.0	1200.00000	""
563.30419	41.00	49.00	35.0	1200.00000	""
576.81660	69.00	77.00	35.0	1200.00000	""
577.86081	78.00	86.00	35.0	1200.00000	""
584.34585	58.00	66.00	35.0	1200.00000	""
584.83987	70.00	78.00	35.0	1200.00000	""
592.82274	42.00	50.00	35.0	1200.00000	""
600.25350	48.00	56.00	35.0	1200.00000	""
606.30078	63.00	71.00	35.0	1200.00000	""
607.82803	47.00	55.00	35.0	1200.00000	""
622.34264	60.00	68.00	35.0	1200.00000	""
630.29114	49.00	57.00	35.0	1200.00000	""
630.81257	33.00	41.00	35.0	1200.00000	""
642.31696	81.00	89.00	35.0	1200.00000	""
642.84535	70.00	78.00	35.0	1200.00000	""
643.86374	68.00	76.00	35.0	1200.00000	""
644.33823	61.00	69.00	35.0	1200.00000	""
663.83244	66.00	74.00	35.0	1200.00000	""
670.90541	92.00	100.00	35.0	1200.00000	""
728.34946	59.00	82.00	35.0	1200.00000	""
736.34097	26.00	49.00	35.0	1200.00000	""
810.49017	83.00	106.00	35.0	1200.00000	""
810.87504	80.00	88.00	35.0	1200.00000	""
868.40704	45.00	69.00	35.0	1200.00000	""
889.95723	74.00	82.00	35.0	1200.00000	""
893.94125	58.00	81.00	35.0	1200.00000	""
898.41030	73.00	81.00	35.0	1200.00000	""
924.98872	74.00	98.00	35.0	1200.00000	""
933.95637	87.00	110.00	35.0	1200.00000	""
1040.97855	72.00	95.00	35.0	1200.00000	""
1057.00784	80.00	104.00	35.0	1200.00000	""
1063.07860	84.00	92.00	35.0	1200.00000	""
1072.53657	76.00	99.00	35.0	1200.00000	""
1140.07933	75.00	99.00	35.0	1200.00000	""
1177.07233	62.00	85.00	35.0	1200.00000	""
1214.68357	119.00	142.00	35.0	1200.00000	""
1295.19777	81.00	104.00	35.0	1200.00000	""

Table S1d. MIAPE-compliant MSI-description for MRM

Classification	Definition
1. General features — (a) Global descriptors	
Responsible person	T. Kähne, PhD, Institute of Exptl. Internal Medicine, University Magdeburg, Leipziger Str. 44, 39120 Magdeburg, Germany
Software name, version and manufacturer	Skyline 3.1.0.7382
Customisations	no customisations
Availability of the software	freeware, open source
Location of the files generated	no public availability
2. Input data and parameters – (a) input data	
Description and type of MS data	Original format: raw data in .raw
Availability of MS data	Locally stored (SQL-based Server), no public availability
2. Input data and parameters – (b) input parameters	
Database queried	Uniprot/Swissprot
Taxonomical restrictions	Mus
Description of tool and scoring scheme	
Specified cleavage agent(s)	Trypsin
Allowed number of missed cleavages	2
Additional parameters related to cleavage	min. peptide length: 6 max. peptide length: 144
Permissible amino acids modifications	fixed: Carbamidomethyl (C) variable: Oxidation (M)
Precursor-ion and fragment-ion mass tolerance for tandem MS	Precursor ion tolerance: 10 ppm Fragment ion tolerance: 0.6 Da
MRM precursor and transition list	**sp|Q5SQX6|CYFP2_MOUSE** *Cytoplasmic FMR1-interacting protein 2 OS=Mus musculus GN=Cyfip2 PE=1 SV=2* R.NAFVTGIAR.Y [49, 57] 474.7667++ F [y7] - 763.4461+ (rank 2) V [y6] - 616.3777+ (rank 1) T [y5] - 517.3093+ (rank 3) K.TVEVLEPEVTK.L [110, 120] 622.3426++ L [y7] - 815.4509+ (rank 3) E [y6] - 702.3668+ (rank 1) P [y5] - 573.3243+ (rank 2) **sp|Q02248|CTNB1_MOUSE** *Catenin beta-1 OS=Mus musculus GN=Ctnnb1 PE=1 SV=1* K.ATVGLIR.N [508, 514] 365.2345++ V [y5] - 557.3770+ (rank 1) G [y4] - 458.3085+ (rank 2) I [y2] - 288.2030+ (rank 3)

	sp|Q62108|DLG4_MOUSE *Disks large homolog 4 OS=Mus musculus GN=Dlg4 PE=1 SV=1* K.IIPGGAAAQDGR.L [98, 109] 563.3042++ P [y10] - 899.4330+ (rank 1) A [y5] - 546.2630+ (rank 2) G [y2] - 232.1404+ (rank 3) K.NTYDVVYLK.V [233, 241] 557.7926++ Y [y7] - 899.4873+ (rank 1) D [y6] - 736.4240+ (rank 2) Y [y3] - 423.2602+ (rank 3) **sp|Q9Z2Y3|HOME1_MOUSE** *Homer protein homolog 1 OS=Mus musculus GN=Homer1 PE=1 SV=2* K.FGQWADSR.A [73, 80] 483.7250++ W [y5] - 634.2944+ (rank 1) A [y4] - 448.2150+ (rank 3) S [y2] - 262.1510+ (rank 2) K.SQNEQEAFR.S [326, 334] 554.7545++ N [y7] - 893.4112+ (rank 1) Q [y5] - 650.3257+ (rank 2) E [y4] - 522.2671+ (rank 3) **sp|Q8CHH9|SEPT8_MOUSE** *Septin-8 OS=Mus musculus GN=Sept8 PE=1 SV=4* R.HYELYR.R [295, 300] 440.7192++ Y [y5] - 743.3723+ (rank 2) E [y4] - 580.3089+ (rank 1) L [y3] - 451.2663+ (rank 3) K.EFLSELQR.K [331, 338] 511.2693++ S [y5] - 632.3362+ (rank 1) E [y4] - 545.3042+ (rank 2) L [y3] - 416.2616+ (rank 3) **sp|Q80UG5-3|SEPT9_MOUSE** *Isoform 3 of Septin-9 OS=Mus musculus GN=Sept9* K.ADTLTLEER.V [436, 444] 524.2695++ T [y5] - 647.3359+ (rank 1) L [y4] - 546.2882+ (rank 3) E [y3] - 433.2041+ (rank 2) **sp|Q4ACU6-9|SHAN3_MOUSE** *Isoform 8 of SH3 and multiple ankyrin repeat domains protein 3 OS=Mus musculus GN=Shank3* R.STSMQDTVR.E [180, 188] 512.7400++ S [y7] - 836.3931+ (rank 1) Q [y5] - 618.3206+ (rank 2) D [y4] - 490.2620+ (rank 3) R.GPLASPAFSPR.S [536, 546] 550.2984++ A [y8] - 832.4312+ (rank 3) S [y7] - 761.3941+ (rank 2) P [y6] - 674.3620+ (rank 1)

sp|Q8BYI9-2|TENR_MOUSE *Isoform 2 of Tenascin-R OS=Mus musculus GN=Tnr*

R.SPPTSASVSTVIDGPTQILVR.D [492, 512]
1063.0786++
I [y10] - 1111.6470+ (rank 2)
D [y9] - 998.5629+ (rank 3)
G [y8] - 883.5360+ (rank 1)

sp|O88935|SYN1_MOUSE *Synapsin-1 OS=Mus musculus GN=Syn1 PE=1 SV=2*

R.TSVSGNWK.T [328, 335]
439.7220++
V [y6] - 690.3570+ (rank 1)
S [y5] - 591.2885+ (rank 2)
G [y4] - 504.2565+ (rank 3)
K.MTQALPR.Q [413, 419]
408.7235++
Q [y5] - 584.3515+ (rank 1)
A [y4] - 456.2929+ (rank 2)
P [y2] - 272.1717+ (rank 3)
R.QASISGPAPTK.A [565, 575]
528.7878++
S [y7] - 657.3566+ (rank 1)
G [y6] - 570.3246+ (rank 2)
P [y3] - 345.2132+ (rank 3)

sp|Q8CHC4|SYNJ1_MOUSE *Synaptojanin-1 OS=Mus musculus GN=Synj1 PE=1 SV=3*

R.VTSTEFISLR.V [97, 106]
576.8166++
S [y8] - 952.5098+ (rank 1)
F [y5] - 635.3875+ (rank 3)
S [y3] - 375.2350+ (rank 2)
R.ALLTTGSLR.V [494, 502]
466.2822++
L [y7] - 747.4359+ (rank 1)
T [y6] - 634.3519+ (rank 2)
G [y4] - 432.2565+ (rank 3)
K.VTFAPTYK.Y [777, 784]
463.7527++
F [y6] - 726.3821+ (rank 1)
A [y5] - 579.3137+ (rank 2)
P [y4] - 508.2766+ (rank 3)
R.AGVISAPQSQAR.V [1198, 1209]
592.8227++
S [y8] - 844.4272+ (rank 2)
A [y7] - 757.3951+ (rank 3)
P [y6] - 686.3580+ (rank 1)

sp|P61979|HNRPK_MOUSE *Heterogeneous nuclear ribonucleoprotein K OS=Mus musculus GN=Hnrnpk PE=1 SV=1*

K.IILDLISESPIK.G [207, 218]
670.9054++
S [y6] - 660.3563+ (rank 2)
S [y4] - 444.2817+ (rank 1)
K.IDEPLEGSEDR.I [422, 432]
630.2911++
P [y8] - 902.4214+ (rank 1)
G [y5] - 563.2420+ (rank 2)

	sp|Q8R081|HNRPL_MOUSE *Heterogeneous nuclear ribonucleoprotein L OS=Mus musculus GN=Hnrnpl PE=1 SV=2* K.SDALETLGFLNHYQMK.N [549, 564] 933.9564++ T [y11] - 1351.6827+ (rank 3) G [y9] - 1137.5510+ (rank 1) N [y6] - 820.3770+ (rank 2) **tr|B1AQX9|B1AQX9_MOUSE (p140cap)** *SRC kinase-signaling inhibitor 1 OS=Mus musculus GN=Srcin1 PE=1 SV=1* R.DAFMDHLK.S [80, 87] 488.7315++ F [y6] - 790.3916+ (rank 2) M [y5] - 643.3232+ (rank 1) D [y4] - 512.2827+ (rank 3) K.LQLQNQESVR.A [707, 716] 607.8280++ L [y8] - 973.5061+ (rank 1) Q [y7] - 860.4221+ (rank 3) N [y6] - 732.3635+ (rank 2) R.TEAELSMR.V [722, 729] 468.7264++ A [y6] - 706.3552+ (rank 1) L [y4] - 506.2755+ (rank 3) S [y3] - 393.1915+ (rank 2) R.LLEETQAELLK.A [966, 976] 643.8637++ E [y9] - 1060.5521+ (rank 1) E [y8] - 931.5095+ (rank 2) T [y7] - 802.4669+ (rank 3) **sp|Q9Z1B3-2|PLCB1_MOUSE** *Isoform B of 1-phosphatidylinositol 4,5-bisphosphate phosphodiesterase beta-1 OS=Mus musculus GN=Plcb1* R.NDSIPQEDFTPDVYR.V [198, 212] 898.4103++ P [y11] - 1366.6274+ (rank 1) T [y6] - 750.3781+ (rank 3) P [y5] - 649.3304+ (rank 2) K.SPVEFVEYNK.M [581, 590] 606.3008++ E [y7] - 928.4411+ (rank 2) F [y6] - 799.3985+ (rank 1) E [y4] - 553.2617+ (rank 3) **sp|P60202|MYPR_MOUSE** *Myelin proteolipid protein OS=Mus musculus GN=Plp1 PE=1 SV=2* K.LIETYFSK.N [45, 52] 500.7711++ E [y6] - 774.3668+ (rank 1) T [y5] - 645.3243+ (rank 2) Y [y4] - 544.2766+ (rank 3) R.QIFGDYK.T [98, 104] 435.7214++ F [y5] - 629.2930+ (rank 3) G [y4] - 482.2245+ (rank 1) Y [y2] - 310.1761+ (rank 2)
3. The output from the procedure – (c) quantitation for selected ions	
Quantitation approach (e.g. 4plex-iTRAQ, ICAT, cICAT, COFRADIC)	label free
Quantity measurement	calculation by peak area of transitions

Data transformation and normalization technique	normalization by TIC
Number of replicates (biological and technical)	6 biological, 4 technical each
Acceptance criteria (including measure of errors)	
Results from controls (when described)	All protein levels have been calculated relative to naïve controls (level set to 1)
4. Interpretation and validation	
Assessment and confidence given to the identification and quantitation (description of methods, thresholds, values, etc.)	Assessment and Confidence was calculated in Skyline
Results of statistical analysis	statistic analysis provided by Skyline and MStats package

Table S2. Antibodies used for Western Blot verification

Antigen	Company	Species	Clone	Dilution
Disks large homolog 2	NeuroMab	mouse	N18/30	1 : 500
Glutamate receptor ionotropic, NMDA 2B	NeuroMab	mouse	N59/20	1 : 500
Glutamate receptor 2	NeuroMab	mouse	L21/32	1 : 500
Heterogeneous nuclear ribonucleoprotein L	Aviva	rabbit	-	1 : 500
Homer protein homolog 1	SYSY	rabbit	-	1 : 1000
Neuromodulin	SYSY	rabbit	-	1 : 1000
Neurofascin	NeuroMab	mouse	L11A/41	1 : 500
Phosphatase and actin regulator 1	Acris	rabbit	-	1 : 500
Adducin 1 (Alpha)	LIN	mouse	22f	1 : 500
Septin-11	Abcam	rabbit	-	1 : 1000
Septin-9	Acris	rabbit	-	1 : 500
SH3 and multiple ankyrin repeat domain protein 3	Bethyl Laboratories	rabbit	-	1 : 1000
SRC kinase-signaling inhibitor 1	Thermo	rabbit	-	1 : 250
Syntaxin-binding protein 1 (munc 18)	BD Biosciences	mouse	31/Munc18	1 : 500
anti-rabbit Alexa Fluor® 790	Dianova	goat	-	1 : 20 000
anti-mouse IRDye® 790	LI-COR	goat	-	1 : 20 000
anti-mouse IRDye® 680	LI-COR	goat	-	1 : 20 000
anti-mouse IgG-HRP	Santa-Cruz	goat	-	1 : 8 000
anti-rabbit IgG-HRP	Santa-Cruz	goat	-	1 : 8 000

Table S3. Proteins showing abundance changes in the SJ-enriched samples from different brain regions of mice 24 h after FMTD training.*

Uniprot id.	Protein name	AC AV/NV	*p*	FC AV/NV	*p*	HIP AV/NV	*p*	STR AV/NV	*p*
Cytoskeleton, scaffolding, ECM, cell adhesion									
Cytoskeleton/actin-associated proteins									
E9Q9C2_MOUSE	Actin-binding LIM protein 1	0,90	n.s.	0,58	4.61E-04	0,29	4.43E-04	0,99	n.s.
ABLM2_MOUSE	Actin-binding LIM protein 2	0,55	n.s.	0,82	n.s.	0,45	1.05E-03	1,00	n.s.
Q8K232_MOUSE	Adducin 1 (Alpha)	0,93	n.s.	0,42	n.s.	0,88	n.s.	0,50	3.82E-02
Q8C0Y2_MOUSE	Adducin 2 (beta)	0,98	n.s.	0,57	1.50E-03	0,94	n.s.	0,80	n.s.
ACTN2_MOUSE	Alpha-actinin-2	1,25	n.s.	0,94	n.s.	2,28	1.16E-04	0,91	n.s.
ANK2_MOUSE	Ankyrin-2	0,81	n.s.	0,51	n.s.	1,08	n.s.	0,55	1.15E-02
Q545R0_MOUSE	Catenin (Cadherin associated protein), alpha 1	1,05	n.s.	32,60	8.09E-07	0,49	5.25E-03	0,93	n.s.
COR1B_MOUSE	Coronin-1B	0,60	n.s.	1,89	n.s.	5,10	1.75E-02	3,38	n.s.
CTTB2_MOUSE	Cortactin-binding protein 2	0,91	n.s.	0,28	1.05E-04	1,02	n.s.	0,58	n.s.
CT2NL_MOUSE	CTTNBP2 N-terminal-like protein	1,96	n.s.	0,16	8.65E-04			1,09	n.s.
CYFP2_MOUSE	Cytoplasmic FMR1-interacting protein 2	0,67	3.37E-02	0,38	1.22E-03	1,60	2.97E-03	0,64	1.77E-02
O89054_MOUSE	Cytoskeletal beta-actin	0,85	n.s.					0,40	4.34E-02
DEMA_MOUSE	Dematin	1,28	n.s.	0,99	n.s.	1,81	3.24E-03	1,09	n.s.
EZRI_MOUSE	Ezrin	1,47	n.s.	0,55	n.s.	0,63	2.84E-03	1,26	n.s.
FMNL2_MOUSE	Formin-like protein 2	0,09	3.01E-04	0,15	n.s.	1,32	n.s.	0,94	n.s.
PHAR1_MOUSE	Phosphatase and actin regulator 1	1,16	n.s.	0,18	5.70E-04	0,08	1.46E-06	0,38	2.44E-03
SPTB2_MOUSE	Spectrin beta chain, non-erythrocytic 1	0,85	n.s.	0,58	1.01E-03	0,93	n.s.	0,64	3.46E-03
WASF1_MOUSE	Wiskott-Aldrich syndrome protein family member 1	1,05	n.s.	0,32	6.67E-07	0,79	n.s.	0,69	n.s.
Cytoskeleton/microtubule-associated proteins									
Q9Z326_MOUSE	BUB3-interacting and GLEBS motif-containing protein ZNF207	1,00	n.s.	1,31	n.s.	1,15	n.s.	3,30	7.67E-03
Q3TAS8_MOUSE	Dihydropyrimid.inase-like 3					0,11	4.21E-02	3,64	n.s.
DPYL2_MOUSE	Dihydropyrimid.inase-related protein 2	0,61	n.s.	0,71	n.s.	2,96	6.37E-07	0,91	n.s.
DYN3_MOUSE	Dynamin-3	1,06	n.s.	0,39	9.48E-06	0,73	n.s.	0,49	1.49E-02
MAP1A_MOUSE	Microtubule-associated protein 1A	0,39	1.36E-03	0,49	1.08E-04	1,48	n.s.	0,78	n.s.
MAP1B_MOUSE	Microtubule-associated protein 1B	0,99	n.s.	0,72	n.s.			0,61	4.79E-03
MAP1S_MOUSE	Microtubule-associated protein 1S	1,03	n.s.	0,47	4.78E-04	0,97	n.s.	0,55	9.44E-03
MTAP2_MOUSE	Microtubule-associated protein 2	1.05	n.s.	0.47	4.39E-04	1.29	n.s.	0.79	n.s.
MAP4_MOUSE	Microtubule-associated protein 4	0,94	n.s.	2,67	7.94E-04	0,96	n.s.	0,70	n.s.
MAP6_MOUSE	Microtubule-associated protein 6	0,85	n.s.	0,40	5.94E-05	0,82	n.s.	0,66	1.20E-02
RMDN3_MOUSE	Regulator of microtubule dynamics protein 3	0,69	n.s.	1,16	n.s.	1,04	n.s.	3,19	2.84E-04
TBB2A_MOUSE	Tubulin beta-2A chain	0,62	4.02E-02	0,83	n.s.	1,49	n.s.	0,87	n.s.
TBB3_MOUSE	Tubulin beta-3 chain	1,10	n.s.	1,11	n.s.	1,53	2.14E-03	1,03	n.s.
Cytoskeleton/intermediate filament-associated proteins									
AINX_MOUSE	Alpha-internexin	1,03	n.s.	1,03	n.s.	1,35	n.s.	1,84	2.12E-04
Q3V2C6_MOUSE	Desmin	0,68	n.s.	0,61	n.s.	1,70	1.13E-02	0,86	n.s.
LMNB1_MOUSE	Lamin-B1			1,17	n.s.	0,08	3.25E-06	0,40	1.07E-03
LMNB2_MOUSE	Lamin-B2	1,41	n.s.	0,29	1.61E-03	0,15	1.84E-08	0,57	5.73E-03
Q80TQ3_MOUSE	MKIAA0845 protein	0,66	n.s.	0,64	n.s.	0,86	n.s.	0,55	1.85E-03
NFM_MOUSE	Neurofilament medium polypeptid.e	0,78	n.s.	0,36	2.51E-07	1,00	n.s.	0,60	7.24E-03
B3RH23_MOUSE	Prelamin-A/C	1,05	n.s.	1,26	n.s.	2,13	2.01E-05	1,68	n.s.

Uniprot id.	Protein name	AC AV/NV	AC p	FC AV/NV	FC p	HIP AV/NV	HIP p	STR AV/NV	STR p
Scaffolding and adaptor proteins									
Q3UZT7_MOUSE	catenin (cadherin-associated protein), beta 1, 88kDa	0,95	n.s.	0,42	1.78E-04	0,82	n.s.	0,61	3.24E-02
CNKR2_MOUSE	Connector enhancer of kinase suppressor of ras 2	0,50	n.s.	0,26	4.40E-06	0,78	n.s.	0,51	n.s.
DLG2_MOUSE	Disks large homolog 2	1,35	n.s.	0,38	6.17E-07	1,11	n.s.	1,09	n.s.
DLG4_MOUSE	Disks large homolog 4	0,99	n.s.	0,34	2.25E-06	0,91	n.s.	0,78	n.s.
DLGP4_MOUSE	Disks large-associated protein 4	0,53	1.48E-02	0,76	n.s.	1,14	n.s.	1,04	n.s.
HOME1_MOUSE	Homer protein homolog 1	1,20	n.s.	0,89	n.s.	1,64	1.92E-04	1,44	n.s.
HOME3_MOUSE	Homer protein homolog 3					1,55	1.29E-02		
E9Q6L9_MOUSE	Leucine-rich repeat-containing protein 7	0,74	n.s.	0,44	3.13E-03	1,03	n.s.	1,13	n.s.
MPP3_MOUSE	MAGUK p55 subfamily member 3	7,81	n.s.	0,07	n.s.	0,22	2.75E-03		
PCLO_MOUSE	Protein piccolo	1,15	n.s.	0,47	4.22E-04	1,14	n.s.	1,16	n.s.
E9Q5D6_MOUSE	Ran-binding protein 9	0,71	n.s.	0,21	1.44E-03	1,37	n.s.	0,21	n.s.
SEP11_MOUSE	Septin-11	1,22	n.s.	1,03	n.s.	1,81	3.36E-04	0,82	n.s.
SEPT2_MOUSE	Septin-2	0,99	n.s.	0,96	n.s.	1,69	4.99E-03	1,11	n.s.
SEPT5_MOUSE	Septin-5	1,09	n.s.	1,26	n.s.	2,02	6.19E-05	1,04	n.s.
SEPT6_MOUSE	Septin-6	1,40	n.s.	0,94	n.s.	1,68	1.60E-03	0,89	n.s.
SEPT8_MOUSE	Septin-8	1,18	n.s.	1,02	n.s.	1,96	3.00E-05	1,15	n.s.
SEPT9_MOUSE	Septin-9	1,56	n.s.	0,64	4.40E-04	0,46	1.63E-03	0,57	6.90E-03
SHAN3_MOUSE	SH3 and multiple ankyrin repeat domains protein 3	0,91	n.s.	0,43	3.67E-04	1,70	1.92E-02	1,74	1.17E-02
WDR37_MOUSE	WD repeat-containing protein 37	1,02	n.s.	0,80	n.s.	1,99	1.55E-02	0,98	n.s.
Extracellular matrix components									
CO4A2_MOUSE	Collagen alpha-2(IV) chain			0,60	n.s.	1,45	n.s.	0,64	1.77E-02
CO6A6_MOUSE	Collagen alpha-6(VI) chain					2,66	2.02E-03		
FBLN5_MOUSE	Fibulin-5			0,60	n.s.	2,97	1.40E-02		
HPLN4_MOUSE	Hyaluronan and proteoglycan link protein 4	1,63	2.18E-02	0,64	n.s.	1,36	n.s.	0,99	n.s.
F8VQ43_MOUSE	Laminin subunit alpha-2			0,81	n.s.	0,06	9.59E-04	1,64	n.s.
F8VQJ3_MOUSE	Laminin subunit gamma-1	0,78	n.s.	0,41	6.32E-04	0,80	n.s.	0,70	n.s.
Q4FJX7_MOUSE	Lcn7 protein					1,93	4.40E-02	0,91	n.s.
MFAP1_MOUSE	Microfibrillar-associated protein 1					0,32	6.07E-05		
TENR_MOUSE	Tenascin-R	0,50	n.s.	0,35	3.40E-07	1,16	n.s.	0,57	6.79E-03
Cell adhesion molecules									
CTND2_MOUSE	Catenin delta-2	0,51	8.81E-03	0,37	4.09E-04	0,82	n.s.	0,78	n.s.
CNTN1_MOUSE	Contactin-1	0,78	n.s.	0,51	3.12E-04	1,16	n.s.	0,82	n.s.
ADA11_MOUSE	Disintegrin and metalloproteinase domain-containing protein 11					0,11	4.16E-08		
ADA22_MOUSE	Disintegrin and metalloproteinase domain-containing protein 22	0,82	n.s.	0,45	7.18E-04	0,69	n.s.	0,68	n.s.
ADA23_MOUSE	Disintegrin and metalloproteinase domain-containing protein 23	0,72	n.s.	0,41	3.56E-05	0,40	6.31E-07	0,68	n.s.
FIBB_MOUSE	Fibrinogen beta chain	2,37	n.s.	1,20	n.s.	2,06	9.68E-05	0,83	n.s.
G3UYZ1_MOUSE	Immunoglobulin superfamily member 8	0,81	n.s.	0,62	2.94E-03	0,38	1.36E-10	0,49	1.95E-04
Q2KHL7_MOUSE	Intercellular adhesion molecule 5	0,32	4.00E-02			2,62	n.s.		
B8QI35_MOUSE	Liprin-alpha 3	0,39	3.32E-03	0,43	n.s.	1,02	n.s.	1,26	n.s.
B7ZN02_MOUSE	MCG55337			0,50	n.s.			0,61	2.17E-02
Q80YU5_MOUSE	Myelin oligodendrocyte glycoprotein			0,43	n.s.	0,51	3.02E-04	1,96	n.s.
A2AFG7_MOUSE	Neural cell adhesion molecule L1	3,63	n.s.	0,61	n.s.	0,37	1.23E-02	0,91	n.s.
NFASC_MOUSE	Neurofascin	0,13	n.s.	0,38	1.24E-03	1,04	n.s.	0,66	n.s.
Q9Z1B1_MOUSE	OL-protocadherin	0,78	n.s.	0,41	1.78E-03	1,19	n.s.	1,03	n.s.
Q3UVV3_MOUSE	oligodendrocyte myelin glycoprotein	0,70	n.s.	0,41	1.67E-05	0,96	n.s.	0,67	n.s.
Q3TYL3_MOUSE	opioid. binding protein/cell adhesion molecule-like			1,03	n.s.	2,09	3.67E-04	1,05	n.s.

Uniprot id.	Protein name	AC AV/NV	AC p	FC AV/NV	FC p	HIP AV/NV	HIP p	STR AV/NV	STR p
NUMB_MOUSE	Protein numb homolog			0,05	1.16E-04	0,06	n.s.	0,39	n.s.
PTPRS_MOUSE	Receptor-type tyrosine-protein phosphatase S	0,53	3.37E-03	0,41	n.s.	0,90	n.s.	0,58	1.10E-02
Endocytosis, Exocytosis, Trafficking									
Presynaptic vesicle proteins									
SYN1_MOUSE	Synapsin-1	1,16	n.s.	0,28	2.40E-08	0,93	n.s.	0,66	5.43E-03
SYN2_MOUSE	Synapsin-2	1,07	n.s.	0,96	n.s.	0,15	6.44E-11	0,69	n.s.
SV2A_MOUSE	Synaptic vesicle glycoprotein 2A	0,20	9.35E-03	12,28	n.s.	0,93	n.s.		
Endocytose/exocytose									
AMPH_MOUSE	Amphiphysin	1,29	n.s.	0,55	n.s.	0,55	3.23E-03	0,54	2.55E-03
AP2A1_MOUSE	AP-2 complex subunit alpha-1	0,83	n.s.	0,28	2.22E-09	0,92	n.s.	0,49	1.26E-04
AP2A2_MOUSE	AP-2 complex subunit alpha-2	0,80	n.s.	0,33	5.27E-09	1,02	n.s.	0,48	5.52E-04
AP2B1_MOUSE	AP-2 complex subunit beta	0,78	n.s.	0,43	1.48E-04	1,03	n.s.	0,53	2.31E-03
AP3B2_MOUSE	AP-3 complex subunit beta-2	0,50	n.s.	0,23	2.32E-04	0,99	n.s.	0,45	2.16E-02
Q9D9Z4_MOUSE	ATPase, H+ transporting, lys.l 42kDa, V1 subunit C1	1,31	n.s.	0,56	n.s.	0,57	1.79E-02	2,13	n.s.
DYN1_MOUSE	Dynamin-1	1,94	1.61E-02	0,40	8.43E-04	0,83	n.s.	0,58	9.86E-03
Q6P1Y9_MOUSE	Exocyst complex component 1	0,70	n.s.	0,31	4.63E-05	0,84	n.s.	0,62	n.s.
EXOC2_MOUSE	Exocyst complex component 2	0,80	n.s.	0,33	5.02E-05	0,89	n.s.	0,82	n.s.
Q8K0E2_MOUSE	Exocyst complex component 3	0,65	3.89E-02	0,38	3.21E-04	1,25	n.s.	0,68	n.s.
E9PZ92_MOUSE	Exocyst complex component 5	0,74	n.s.	0,14	n.s.	0,47	n.s.	0,12	2.10E-02
JKIP3_MOUSE	Janus kinase and microtubule-interacting protein 3	0,75	n.s.	44,82	9.84E-07	0,60	7.91E-03	0,46	n.s.
BIN1_MOUSE	Myc box-dependent-interacting protein 1	1,26	n.s.	0,59	n.s.	0,58	3.44E-02	0,44	1.64E-03
E9Q7S0_MOUSE	Synaptojanin-1	0,38	4.53E-04	0,47	2.19E-03	1,05	n.s.	0,64	n.s.
Q3UI39_MOUSE	synaptosomal-associated protein, 91kDa	0,06	9.53E-03	0,98	n.s.	0,90	n.s.	0,95	n.s.
Q3TPT3_MOUSE	synaptotagmin I	0,82	n.s.	1,19	n.s.	1,31	n.s.	2,27	4.29E-05
E9PZA8_MOUSE	Synaptotagmin-7	1,08	n.s.	0,78	n.s.	0,62	n.s.	0,63	1.09E-02
SNPH_MOUSE	Syntaphilin	1,12	n.s.	0,80	n.s.	0,45	3.37E-06	1,81	n.s.
STXB1_MOUSE	Syntaxin-binding protein 1	1,15	n.s.	1,03	n.s.	1,88	1.48E-06	1,05	n.s.
VPP1_MOUSE	V-type proton ATPase 116 kDa subunit a isoform 1	0,89	n.s.	0,78	n.s.	0,58	1.57E-05	1,19	n.s.
VATA_MOUSE	V-type proton ATPase catalytic subunit A	1,39	n.s.	0,91	n.s.	0,07	1.36E-12	1,43	n.s.
VATH_MOUSE	V-type proton ATPase subunit H	1,24	n.s.	0,79	n.s.	0,65	1.03E-03	1,08	n.s.
Membrane trafficking proteins									
ABCD3_MOUSE	ATP-binding cassette sub-family D member 3			0,31	n.s.	0,05	2.30E-02	0,20	n.s.
CPNE4_MOUSE	Copine-4					1,52	3.55E-03		
CPNE7_MOUSE	Copine-7					2,11	1.05E-03		
Proteins involved in transport processes									
Q8CC13_MOUSE	adaptor-related protein complex 1, beta 1 subunit	0,76	n.s.	0,27	4.63E-05	0,89	n.s.	0,57	n.s.
Q6P6I3_MOUSE	ATPase, H+ transporting, lysosomal V1 subunit B1	1,51	n.s.	0,84	n.s.	0,49	3.02E-02	1,65	n.s.
DC1I1_MOUSE	Cytoplasmic dynein 1 intermediate chain 1	1,11	n.s.	0,48	n.s.	0,66	1.40E-02	0,81	n.s.
Q3TFE8_MOUSE	karyopherin (importin) beta 1	0,57	n.s.	0,39	6.85E-04	0,93	n.s.	0,67	n.s.
D3YXZ3_MOUSE	Kinesin light chain 2			0,30	n.s.	0,12	4.20E-03	0,70	n.s.
E9QPE7_MOUSE	Myosin-11			5,75	2.00E-07	0,91	n.s.	1,00	n.s.
NU160_MOUSE	Nuclear pore complex protein Nup160	0,03	1.55E-02					0,43	n.s.
Q3UL43_MOUSE	nucleoporin 155kDa	0,14	7.91E-04	0,35	n.s.	1,43	n.s.	0,44	n.s.
PACS1_MOUSE	Phosphofurin acid.ic cluster sorting protein 1	0,91	n.s.	0,37	1.18E-04	0,95	n.s.	0,57	2.69E-03
Q80ZX0_MOUSE	Protein Sec24b	0,17	5.61E-03	0,55	n.s.	0,60	n.s.	0,66	n.s.

Uniprot id.	Protein name	AC AV/NV	AC p	FC AV/NV	FC p	HIP AV/NV	HIP p	STR AV/NV	STR p
RP3A_MOUSE	Rabphilin-3A	0,84	n.s.	0,54	1.47E-03	0,65	1.12E-03	0,80	n.s.
Q3TN39_MOUSE	Solute carrier family 3 (amino acid. transporter), member 2			0,48	n.s.	0,31	n.s.	0,32	3.47E-02
TOIP1_MOUSE	Torsin-1A-interacting protein 1			0,18	n.s.	0,10	6.10E-03		
TPPC9_MOUSE	Trafficking protein particle complex subunit 9	0,80	n.s.	0,44	8.91E-04	0,86	n.s.	0,69	n.s.
SC6A1_MOUSE	Sodium- and chlorid.e-dependent GABA transporter 1			0,90	n.s.	0,55	1.09E-02		
D3YZ62_MOUSE	Unconventional myosin-Va	0,94	n.s.	0,51	n.s.	1,45	n.s.	0,55	4.34E-02
E9Q174_MOUSE	Unconventional myosin-VI	0,24	n.s.	0,21	n.s.	1,28	n.s.	0,54	1.14E-02
Q8BWV2_MOUSE	vacuolar protein sorting 16 homolog (S. cerevisiae)	0,35	3.05E-02	0,43	n.s.	0,86	n.s.	0,35	n.s.
Q3TC98_MOUSE	vacuolar protein sorting 39 homolog (S. cerevisiae)	0,90	n.s.	0,39	2.01E-03	1,00	n.s.	0,58	n.s.
NSF_MOUSE	Vesicle-fusing ATPase	0,50	5.62E-03	0,25	3.84E-08	0,83	n.s.	0,45	9.35E-04
S39A7_MOUSE	Zinc transporter SLC39A7	0,22	1.25E-02			0,64	2.43E-02		

Protein modification/degradation (without kinases/phosphatases)

Uniprot id.	Protein name	AC AV/NV	AC p	FC AV/NV	FC p	HIP AV/NV	HIP p	STR AV/NV	STR p
PRS8_MOUSE	26S protease regulatory subunit 8	1,05	n.s.	0,48	1.37E-03	0,73	n.s.	0,76	n.s.
PSMD1_MOUSE	26S proteasome non-ATPase regulatory subunit 1	0,83	n.s.	0,36	3.02E-04	0,79	n.s.	0,45	3.84E-03
PSMD6_MOUSE	26S proteasome non-ATPase regulatory subunit 6	0,79	n.s.	0,46	7.31E-04	1,20	n.s.	0,75	n.s.
Q3UDQ7_MOUSE	AFG3 ATPase family member 3-like 2 (S. cerevisiae)	0,88	n.s.	0,44	2.75E-03	0,92	n.s.	0,92	n.s.
YMEL1_MOUSE	ATP-dependent zinc metalloprotease YME1L1	0,84	n.s.	1,19	n.s.	2,18	n.s.	8,75	2.72E-02
HEXB_MOUSE	Beta-hexosaminid.ase subunit beta	1,11	n.s.	0,93	n.s.	1,97	2.17E-03	1,39	n.s.
Q3TPL4_MOUSE	calpain 5			0,45	n.s.	0,04	4.80E-07	0,52	3.49E-02
Q08EB5_MOUSE	CLIP-associating protein 2	0,60	n.s.	0,35	3.10E-03	0,98	n.s.	0,95	n.s.
Q5RKP4_MOUSE	Dolichyl-diphosphooligosaccharid.e--protein glycosyltransferase subunit 1			0,80	n.s.	0,39	2.21E-04	0,74	n.s.
RBP2_MOUSE	E3 SUMO-protein ligase RanBP2	0,57	n.s.	0,70	n.s.	1,79	n.s.	0,58	7.18E-03
FBX41_MOUSE	F-box only protein 41	0,90	n.s.	0,47	2.92E-03	0,95	n.s.	0,80	n.s.
NXN_MOUSE	Nucleoredoxin					1,77	3.81E-02		
NUMBL_MOUSE	Numb-like protein	1,06	n.s.	0,17	4.32E-04	0,24	2.93E-04	0,45	4.03E-03
Q3TXV1_MOUSE	Proteasome (macropain) 26S subunit, non-ATPase, 2	0,69	n.s.	0,32	2.54E-06	0,95	n.s.	0,50	2.40E-02
Q3U5M8_MOUSE	Proteasome (macropain) 26S subunit, non-ATPase, 3	0,72	n.s.	1,09	n.s.	3,65	5.35E-03	0,87	n.s.
PGLT1_MOUSE	Protein O-glucosyltransferase 1	1,01	n.s.	0,83	n.s.	2,30	1.75E-02	0,95	n.s.
TCPR1_MOUSE	Tectonin beta-propeller repeat-containing protein 1	0,73	n.s.	0,37	2.07E-03	0,75	n.s.	0,66	n.s.
TRAF3_MOUSE	TNF receptor-associated factor 3	1,00	n.s.			2,11	2.33E-03	2,78	n.s.
Q3TDT0_MOUSE	Tripartite motif-containing protein 3	0,92	n.s.	0,42	1.76E-03	0,93	n.s.	0,69	n.s.
D3YXA6_MOUSE	Tripartite motif-containing protein 46	0,73	n.s.	0,42	2.62E-03	1,17	n.s.	0,62	n.s.
TPP2_MOUSE	Tripeptid.yl-peptid.ase 2	0,43	3.27E-03	0,16	3.78E-06	1,22	n.s.	0,44	7.93E-03

DNA and RNA Binding/Transcription/Translation

Nucleic acid.-binding proteins

Uniprot id.	Protein name	AC AV/NV	AC p	FC AV/NV	FC p	HIP AV/NV	HIP p	STR AV/NV	STR p
E9QNN1_MOUSE	ATP-dependent RNA helicase A	0,35	7.16E-06	0,57	n.s.	1,70	6.84E-04	0,98	n.s.
B9EKE9_MOUSE	ATP-dependent RNA helicase DDX3X	0,48	n.s.	0,12	2.74E-07	0,45	4.29E-05	0,48	1.03E-02
DHX36_MOUSE	ATP-dependent RNA helicase DHX36	0,47	1.14E-02	0,33	n.s.	0,91	n.s.	0,37	n.s.
F120A_MOUSE	Constitutive coactivator of PPAR-gamma-like protein 1	0,67	n.s.	0,33	6.15E-04	1,37	n.s.	0,68	n.s.
Q14DP0_MOUSE	D330045A20Rik protein					1,66	7.48E-03		
Q5U222_MOUSE	Ddx5 protein	1,38	n.s.	1,47	n.s.	1,73	1.58E-04	0,91	n.s.
Q5BKP5_MOUSE	DEAD (Asp-Glu-Ala-Asp) box polypeptid.e 50	0,75	n.s.	0,23	n.s.	0,47	n.s.	0,31	2.06E-03
Q3UI30_MOUSE	EWS RNA-binding protein 1	0,65	n.s.	0,43	2.02E-04	0,71	n.s.	0,70	n.s.
B7ZW94_MOUSE	Family with sequence similarity 120, member C	0,44	7.62E-04	0,80	n.s.	1,50	n.s.	1,04	n.s.
FWCH1_MOUSE	FLYWCH-type zinc finger-containing protein 1	1,47	n.s.	0,19	1.53E-03	0,46	n.s.		
Q571F9_MOUSE	GTPase activating protein (SH3 domain) binding protein 1			1,75	n.s.	3,20	n.s.	4,87	7.06E-04

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
Q3TF40_MOUSE	non-POU domain containing, octamer-binding	1,29	n.s.	1,03	n.s.	2,30	n.s.	1,67	1.07E-02
NOP56_MOUSE	Nucleolar protein 56			0,73	n.s.	0,16	8.30E-03	0,86	n.s.
NOP58_MOUSE	Nucleolar protein 58			0,83	n.s.	0,38	4.98E-04	0,64	n.s.
DDX17_MOUSE	Probable ATP-dependent RNA helicase DDX17	0,90	n.s.	0,29	2.13E-03	0,54	2.19E-03	0,44	4.52E-03
FA98A_MOUSE	Protein FAM98A	1,11	n.s.	0,75	n.s.	1,96	7.28E-03	1,16	n.s.
Q3U6A2_MOUSE	RNA binding motif protein 14	1,41	n.s.	0,22	1.00E-04	0,21	1.49E-10	0,45	6.40E-04
E9QPI5_MOUSE	Sister chromatid. cohesion protein PDS5 homolog A	0,25	4.29E-02	0,48	n.s.	1,65	n.s.	1,05	n.s.
DX39B_MOUSE	Spliceosome RNA helicase Ddx39b	2,03	n.s.	1,39	n.s.	1,85	n.s.	1,81	9.66E-04
Q6P5E5_MOUSE	Structural maintenace of chromosomes 3	0,34	1.18E-02	0,35	n.s.	1,28	n.s.	1,13	n.s.
Q6PGG8_MOUSE	Tdrkh protein			0,30	n.s.	0,11	8.41E-04	0,92	n.s.
B2RUG7_MOUSE	Zinc finger RNA binding protein	1,19	n.s.	0,26	5.21E-07	1,01	n.s.	0,70	4.54E-02
Transcription regulators									
API5_MOUSE	Apoptosis inhibitor 5	1,07	n.s.	1,54	n.s.	2,24	1.80E-03	1,87	n.s.
BCLF1_MOUSE	Bcl-2-associated transcription factor 1	0,17	2.10E-02	0,39	n.s.	0,61	n.s.	0,77	n.s.
H2AY_MOUSE	Core histone macro-H2A.1	0,74	n.s.	0,80	n.s.	0,57	7.00E-03	1,09	n.s.
ZN326_MOUSE	DBIRD complex subunit ZNF326	1,11	n.s.	0,22	1.84E-04	0,34	2.41E-03	0,55	n.s.
Q0P6B2_MOUSE	Far upstream element (FUSE) binding protein 1	1,56	n.s.	0,11	2.18E-09	0,18	3.61E-08	0,35	3.85E-05
A1L3S7_MOUSE	Gatad2b protein			0,32	n.s.	0,09	4.55E-03	0,55	n.s.
Q3UJL1_MOUSE	general transcription factor IIIC, polypeptid.e 4, 90kDa	1,08	n.s.	0,81	n.s.	0,31	7.66E-03	0,64	n.s.
B2RTM0_MOUSE	Histone H4	1,15	n.s.	0,94	n.s.	1,13	n.s.	2,95	1.19E-03
HABP4_MOUSE	Intracellular hyaluronan-binding protein 4	0,47	n.s.	1,14	n.s.	1,70	9.35E-03	1,51	n.s.
A0PJT4_MOUSE	Leucine zipper, putative tumor suppressor 1	0,82	n.s.	0,11	1.11E-05			0,37	n.s.
MTA2_MOUSE	Metastasis-associated protein MTA2	1,24	n.s.	0,47	n.s.	0,43	2.99E-02	0,61	n.s.
Q571L5_MOUSE	MKIAA4065 protein	1,28	n.s.	0,62	n.s.			0,61	2.72E-02
MYEF2_MOUSE	Myelin expression factor 2	0,86	n.s.	1,69	n.s.	1,88	3.28E-03	2,39	7.06E-05
Q3UPK1_MOUSE	myeloid./lymphoid. or mixed-lineage leukemia			0,14	1.00E-06				
LYRIC_MOUSE	Protein LYRIC	0,95	n.s.	0,10	3.72E-05	0,46	1.06E-03	0,85	n.s.
SCAI_MOUSE	Protein SCAI	1,10	n.s.	0,76	n.s.	1,59	5.86E-03	1,17	n.s.
ASH2L_MOUSE	Set1/Ash2 histone methyltransferase complex subunit ASH2	0,51	n.s.	0,38	n.s.	0,57	4.08E-03		
SMRD1_MOUSE	SWI/SNF-related matrix-associated actin-dependent regulator of chromatin subfamily D member 1	1,54	3.61E-03	0,69	n.s.	1,10	n.s.	1,56	n.s.
TCF25_MOUSE	Transcription factor 25	0,84	n.s.			0,33	1.32E-03		
PURB_MOUSE	Transcriptional activator protein Pur-beta	0,40	n.s.	0,75	n.s.	0,46	1.84E-02	0,67	n.s.
Q3U046_MOUSE	Yes-associated protein 1	1,25	n.s.	0,51	n.s.	0,84	n.s.	0,57	1.96E-02
RNA-processing and transport									
ATX2L_MOUSE	Ataxin-2-like protein	0,55	n.s.	0,30	6.53E-05	1,54	n.s.	0,73	n.s.
CELF2_MOUSE	CUGBP Elav-like family member 2	1,68	1.76E-02	0,82	n.s.	1,39	n.s.	0,90	n.s.
FUBP2_MOUSE	Far upstream element-binding protein 2	1,09	n.s.	0,39	2.26E-06	0,75	n.s.	0,51	2.29E-03
FXR1_MOUSE	Fragile X mental retardation syndrome-related protein 1	0,56	n.s.	0,21	1.56E-04	0,39	1.27E-05	0,33	n.s.
Q8CFQ9_MOUSE	Fusion, derived from t(1216) malignant liposarcoma (Human)	0,77	n.s.	1,31	n.s.	3,95	3.17E-06	1,55	4.28E-02
DKC1_MOUSE	H/ACA ribonucleoprotein complex subunit 4	1,01	n.s.	1,15	n.s.	1,89	4.08E-03	1,17	n.s.
HNRPK_MOUSE	Heterogeneous nuclear ribonucleoprotein K	0,78	n.s.	1,00	n.s.	2,12	8.11E-06	1,88	4.28E-04
G5E924_MOUSE	Heterogeneous nuclear ribonucleoprotein L	0,83	n.s.	1,53	n.s.	2,02	2.38E-05	1,13	n.s.
HNRPM_MOUSE	Heterogeneous nuclear ribonucleoprotein M	0,98	n.s.	0,22	8.91E-08	0,35	3.76E-10	0,49	7.50E-04
Q3U8W9_MOUSE	heterogeneous nuclear ribonucleoprotein R	0,83	n.s.	0,46	n.s.	0,70	n.s.	0,64	3.41E-02
HNRL2_MOUSE	Heterogeneous nuclear ribonucleoprotein U-like protein 2	1,07	n.s.	0,39	1.17E-03	1,03	n.s.	0,68	n.s.
G3XA10_MOUSE	Heterogeneous nuclear ribonucleoprotein U, isoform CRA_b	1,04	n.s.	0,36	2.63E-05	0,70	n.s.	0,58	4.35E-03
HNRPC_MOUSE	Heterogeneous nuclear ribonucleoproteins C1/C2	1,19	n.s.	0,67	n.s.	0,40	1.32E-02	0,73	n.s.

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
KHDR1_MOUSE	KH domain-containing, RNA-binding, signal transduction-associated protein 1			1,94	n.s.	0,01	1.00E-06	0,47	n.s.
E9PV22_MOUSE	Leucine-rich repeat-containing protein 47	0,08	n.s.	3,28	n.s.	0,32	7.28E-04	0,49	1.10E-02
Q8C292_MOUSE	Lysine--tRNA ligase	1,48	n.s.	0,36	n.s.	0,41	6.38E-03	0,90	n.s.
MATR3_MOUSE	Matrin-3	0,96	n.s.	0,20	1.16E-03	0,71	n.s.	0,15	2.12E-02
E9QB02_MOUSE	Methionine--tRNA ligase, cytoplasmic	0,97	n.s.	0,35	4.04E-04	0,87	n.s.	0,76	n.s.
Q8BP60_MOUSE	nuclear RNA export factor 1			1,12	n.s.	0,10	1.15E-03		
E9PWY9_MOUSE	Phenylalanine--tRNA ligase alpha subunit	1,65	n.s.	1,26	n.s.	1,94	3.40E-03	1,28	n.s.
Q8BN32_MOUSE	poly(A) binding protein, cytoplasmic 1	2,05	n.s.	0,23	1.08E-04	0,29	1.04E-05	0,36	6.78E-03
Q3UX16_MOUSE	poly(A) binding protein, cytoplasmic 4 (inducible form)	1,08	n.s.	0,08	1.63E-04	0,51	n.s.		
PRP19_MOUSE	Pre-mRNA-processing factor 19	1,16	n.s.	0,93	n.s.	1,82	1.07E-02	0,94	n.s.
RENT1_MOUSE	Regulator of nonsense transcripts 1	0,85	n.s.	0,44	n.s.	1,37	n.s.	0,48	2.26E-02
RMXL1_MOUSE	RNA binding motif protein, X-linked-like-1	1,29	n.s.	0,85	n.s.	1,52	1.35E-03	0,99	n.s.
RBM26_MOUSE	RNA-binding protein 26	0,33	2.31E-02	0,25	n.s.			1,22	n.s.
Q3UAI4_MOUSE	splicing factor 3b, subunit 2, 145kDa	0,50	1.91E-02	1,06	n.s.	1,52	n.s.	1,83	n.s.
SFPQ_MOUSE	Splicing factor, proline- and glutamine-rich	0,96	n.s.	0,48	4.61E-04	0,90	n.s.	0,63	7.83E-03
TR150_MOUSE	Thyroid. hormone receptor-associated protein 3	0,42	1.62E-02	0,68	n.s.	0,85	n.s.	0,49	n.s.
LCMT2_MOUSE	tRNA wybutosine-synthesizing protein 4			0,40	1.93E-03				
Q3TJ01_MOUSE	tRNA-splicing ligase RtcB homolog	0,98	n.s.	0,78	n.s.	1,68	1.19E-02	0,94	n.s.

Protein synthesis

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
RL4_MOUSE	60S ribosomal protein L4	1,37	n.s.	0,85	n.s.	1,77	1.26E-05	0,93	n.s.
ANS1B_MOUSE	Ankyrin repeat and sterile alpha motif domain-containing protein 1B	0,87	n.s.	1,23	n.s.	1,89	3.20E-03	1,85	n.s.
ANS1B_MOUSE	Isoform 2 of Ankyrin repeat and sterile alpha motif domain-containing protein 1B OS=Mus musculus GN=Anks1b	1,50	n.s.	0,82	n.s.	2,03	2.87E-03	1,54	n.s.
EF1A2_MOUSE	Elongation factor 1-alpha 2	1,56	1.06E-02	1,03	n.s.	1,21	n.s.	1,06	n.s.
EF1D_MOUSE	Elongation factor 1-delta	1,00	n.s.	0,39	1.37E-03	0,96	n.s.	0,34	n.s.
EF1G_MOUSE	Elongation factor 1-gamma	1,55	1.33E-02	0,96	n.s.	1,69	8.02E-04	1,19	n.s.
D3YVN7_MOUSE	Elongation factor Tu	0,49	5.89E-03	0,57	n.s.	1,22	n.s.	0,55	4.05E-03
EIF2A_MOUSE	Eukaryotic translation initiation factor 2A			1,96	n.s.	7,46	9.91E-07		
SYIC_MOUSE	Isoleucine--tRNA ligase, cytoplasmic	0,04	8.61E-04					0,86	n.s.
LARP1_MOUSE	La-related protein 1	0,27	8.89E-04	0,23	n.s.	1,21	n.s.	0,99	n.s.

Signal transduction

Ion channels, receptors

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
Q3TV47_MOUSE	ATPase, Na+/K+ transporting, beta 1 polypeptid.e	0,77	n.s.	1,68	n.s.	1,43	n.s.	1,92	8.79E-05
CKAP4_MOUSE	Cytoskeleton-associated protein 4	0,92	n.s.	1,11	n.s.	2,28	8.93E-04	1,20	n.s.
GRIA2_MOUSE	Glutamate receptor 2	0,64	n.s.			0,64	1.22E-02	0,95	n.s.
G3X9V4_MOUSE	Glutamate receptor ionotropic, NMDA 2B	0,87	n.s.	0,86	n.s.	1,19	n.s.	1,81	6.67E-03
E9Q9Q9_MOUSE	Latrophilin-1	0,42	4.23E-03	0,47	n.s.	1,03	n.s.	0,55	n.s.
KCNA2_MOUSE	Potassium voltage-gated channel subfamily A member 2	0,57	n.s.	0,43	n.s.	0,50	4.02E-03	1,19	n.s.
KCNQ2_MOUSE	Potassium voltage-gated channel subfamily KQT member 2	0,78	n.s.			0,64	1.55E-02		
GP112_MOUSE	Probable G-protein coupled receptor 112			0,54	n.s.	1,82	2.79E-02		
RET_MOUSE	Proto-oncogene tyrosine-protein kinase receptor Ret							0,25	1.51E-02
AT1A1_MOUSE	Sodium/potassium-transporting ATPase subunit alpha-1	0,45	1.85E-03	1,47	n.s.	0,90	n.s.	1,32	n.s.
AT1A3_MOUSE	Sodium/potassium-transporting ATPase subunit alpha-3	0,57	4.03E-02	1,03	n.s.	0,84	n.s.	1,13	n.s.
CACB1_MOUSE	Voltage-dependent L-type calcium channel subunit beta-1	0,84	n.s.	2,00	n.s.	0,84	n.s.	0,15	2.25E-02
CACB2_MOUSE	Voltage-dependent L-type calcium channel subunit beta-2	0,84	n.s.	0,41	n.s.	0,66	4.24E-02	0,64	n.s.

Kinases/phosphatases and regulators

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
AKAP5_MOUSE	A-kinase anchor protein 5	0,37	8.99E-05	0,32	5.64E-04	1,70	n.s.	1,94	2.68E-03

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
ABI1_MOUSE	Abl interactor 1	1,12	n.s.	1,10	n.s.	2,08	7.06E-05	1,96	3.25E-03
Q3TQ02_MOUSE	Alkaline phosphatase			0,28	n.s.	0,31	3.72E-03		
AAK1_MOUSE	AP2-associated protein kinase 1	0,67	n.s.	0,29	4.69E-09	1,04	n.s.	0,41	7.14E-05
KCC2B_MOUSE	Calcium/calmodulin-dependent protein kinase type II subunit beta	1,14	n.s.	0,78	n.s.	2,50	5.86E-03	1,69	n.s.
KAP3_MOUSE	cAMP-dependent protein kinase type II-beta regulatory subunit	2,13	n.s.	0,61	n.s.	1,15	n.s.	1,60	3.43E-02
KC1D_MOUSE	Casein kinase I isoform delta	1,45	n.s.	0,79	n.s.	2,19	7.35E-03	0,84	n.s.
CDK17_MOUSE	Cyclin-dependent kinase 17	0,82	n.s.					7,49	4.54E-03
CDKL5_MOUSE	Cyclin-dependent kinase-like 5	1,09	n.s.	0,36	n.s.	0,48	2.01E-02	0,58	n.s.
Q3UEQ1_MOUSE	inositol polyphosphate-4-phosphatase, type I, 107kDa	0,64	n.s.	0,58	1.67E-04	0,83	n.s.	0,55	n.s.
MAST1_MOUSE	Microtubule-associated serine/threonine-protein kinase 1	0,65	n.s.	0,31	1.20E-04	1,22	n.s.	0,84	n.s.
MINK1_MOUSE	Misshapen-like kinase 1	0,25	n.s.	0,31	4.39E-05	0,88	n.s.	0,65	n.s.
Q6ZQK4_MOUSE	MKIAA0044 protein	1,10	n.s.	0,89	n.s.	1,59	2.34E-02	0,97	n.s.
Q80XU2_MOUSE	Neuronal proto-oncogene tyrosine-protein kinase Src	1,42	n.s.	1,10	n.s.	1,73	2.07E-03	1,81	n.s.
KPCB_MOUSE	Protein kinase C beta type			0,12	n.s.	0,42	1.48E-06		
AUXI_MOUSE	Putative tyrosine-protein phosphatase auxilin			0,16	3.48E-04	0,53	n.s.		
RIMB2_MOUSE	RIMS-binding protein 2	0,48	6.79E-03	0,46	n.s.	1,38	n.s.	0,98	n.s.
E9QMP6_MOUSE	Serine/threonine-protein kinase MARK2	0,96	n.s.	0,34	1.51E-06	0,96	n.s.	0,59	n.s.
TAOK2_MOUSE	Serine/threonine-protein kinase TAO2	0,10	9.66E-03	0,48	n.s.	1,00	n.s.	0,50	n.s.
2AAA_MOUSE	Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform	1,03	n.s.	1,16	n.s.	2,04	7.05E-05	1,59	n.s.
PP2BA_MOUSE	Serine/threonine-protein phosphatase 2B catalytic subunit alpha isoform	0,76	n.s.	1,43	n.s.	2,01	1.70E-03	2,39	n.s.
Q8R378_MOUSE	Shoc2 protein	0,32	n.s.	3,36	n.s.	4,67	3.40E-03		
NSMA2_MOUSE	Sphingomyelin phosphodiesterase 3			0,69	n.s.	0,45	4.71E-02	0,96	n.s.
B1AQX9_MOUSE	SRC kinase-signaling inhibitor 1	0,62	8.34E-03						
B2RQ80_MOUSE	Tnik protein			0,32	6.05E-05	0,75	n.s.	0,55	n.s.
Q8C907_MOUSE	Vac14 homolog (S. cerevisiae)	0,38	3.69E-03	0,39	n.s.	0,93	n.s.	0,20	n.s.
GTPases and regulators									
Q5F258_MOUSE	ARF GTPase-activating protein GIT1	0,87	n.s.	0,37	2.31E-04	0,65	n.s.	0,64	n.s.
AGAP2_MOUSE	Arf-GAP with GTPase, ANK repeat and PH domain-containing protein 2	0,42	2.20E-05	0,31	5.65E-07	1,20	n.s.	0,72	n.s.
H3BL41_MOUSE	Arf-GAP with SH3 domain, ANK repeat and PH domain-containing protein 1	0,91	n.s.	0,38	1.80E-03	1,14	n.s.	0,70	n.s.
Q3UH27_MOUSE	ArfGAP with SH3 domain, ankyrin repeat and PH domain 2	1,00	n.s.			1,00	n.s.	2,50	1.87E-05
PSD1_MOUSE	PH and SEC7 domain-containing protein 1	0,89	n.s.	0,69	n.s.	1,59	3.13E-02	0,91	n.s.
PKP4_MOUSE	Plakophilin-4	0,79	n.s.	0,33	2.16E-03	1,19	n.s.	0,66	n.s.
Q0VAV5_MOUSE	RAS protein activator like 2	0,61	1.48E-02	0,45	n.s.	1,21	n.s.	0,68	n.s.
RGRF1_MOUSE	Ras-specific guanine nucleotid.e-releasing factor 1	0,27	5.69E-03	0,44	n.s.	1,57	n.s.	1,18	n.s.
SYGP1_MOUSE	Ras/Rap GTPase-activating protein SynGAP	0,61	4.44E-03	0,65	n.s.	1,27	n.s.	1,24	n.s.
RHG39_MOUSE	Rho GTPase-activating protein 39	0,54	3.83E-02	0,43	1.82E-03	1,12	n.s.	0,83	n.s.
RHG44_MOUSE	Rho GTPase-activating protein 44	1,33	n.s.	0,48	n.s.	1,13	n.s.	1,76	5.00E-02
H3BJU7_MOUSE	Rho guanine nucleotid.e exchange factor 2	1,00	n.s.	0,43	1.96E-03	0,96	n.s.	0,72	n.s.
Ca^{2+} binding proteins									
ANX11_MOUSE	Annexin A11					0,61	1.28E-02		
CAMKV_MOUSE	CaM kinase-like vesicle-associated protein			0,33	n.s.	0,06	8.73E-05	0,45	n.s.
Q3UYN2_MOUSE	Copine-6					2,26	6.21E-08		
Receptor ligands, 2nd messengers, lipid.s regulation									
PLCB1_MOUSE	1-phosphatid.ylinositol 4,5-bisphosphate phosphodiesterase beta-1	0,40	1.26E-02	0,46	n.s.	1,40	n.s.	1,65	n.s.
Q3V117_MOUSE	ATP-citrate synthase	0,72	n.s.	0,22	1.48E-04	0,88	n.s.	0,60	n.s.
IL11_MOUSE	Interleukin-11					1,74	3.71E-02		
LGI1_MOUSE	Leucine-rich glioma-inactivated protein 1	1,14	n.s.	1,12	n.s.	1,27	n.s.	1,64	1.47E-03

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
ACSL3_MOUSE	Long-chain-fatty-acid.--CoA ligase 3	0,81	n.s.	0,18	6.84E-04	0,26	n.s.	0,27	n.s.
Q3U2X5_MOUSE	Monoamine oxid.ase type A; Amine oxid.ase [flavin-containing] A	2,15	n.s.	1,45	n.s.	1,03	n.s.	4,09	8.07E-07
AOFB_MOUSE	Monoamine oxid.ase type B; Amine oxid.ase [flavin-containing] B	1,20	n.s.	1,01	n.s.	0,99	n.s.	1,88	4.23E-03
Chaperones and heat shock proteins									
CH60_MOUSE	60 kDa heat shock protein, mitochondrial	0,74	n.s.	0,55	n.s.	1,18	n.s.	1,73	4.83E-02
Q542X7_MOUSE	Chaperonin subunit 2 (Beta), isoform CRA_a	0,79	n.s.	0,55	9.35E-04	0,95	n.s.	0,70	n.s.
DJC11_MOUSE	DnaJ homolog subfamily C member 11	0,46	n.s.	1,30	n.s.	1,67	1.95E-02	6,85	n.s.
HS12A_MOUSE	Heat shock 70 kDa protein 12A	0,72	n.s.	0,21	1.93E-09	0,61	1.50E-03	0,66	n.s.
Q3TEK2_MOUSE	heat shock 70kDa protein 8	1,41	n.s.	0,31	2.79E-04	0,16	2.89E-10	0,81	n.s.
GRP75_MOUSE	Stress-70 protein, mitochondrial	2,03	n.s.	0,09	3.24E-04	0,27	6.41E-04	0,41	1.42E-02
TCPA_MOUSE	T-complex protein 1 subunit alpha	0,71	n.s.	0,94	n.s.	1,42	n.s.	1,91	9.25E-04
Q3U4U6_MOUSE	T-complex protein 1 subunit gamma	0,56	6.18E-03	2,78	n.s.	1,42	n.s.	1,75	2.46E-03
TCPQ_MOUSE	T-complex protein 1 subunit theta	0,76	n.s.	0,68	n.s.	1,37	n.s.	1,74	1.95E-03
TCPZ_MOUSE	T-complex protein 1 subunit zeta	0,73	n.s.	1,31	n.s.	0,88	n.s.	2,55	2.38E-05
Regulatory proteins									
GRIN1_MOUSE	G protein-regulated inducer of neurite outgrowth 1	1,32	n.s.	0,59	n.s.	1,35	n.s.	1,61	2.37E-02
NEUM_MOUSE	Neuromodulin	1,41	n.s.	0,79	n.s.	1,17	n.s.	1,94	1.64E-02
A3KGE4_MOUSE	Noelin	1,02	n.s.	0,35	1.48E-03	0,62	1.85E-02	0,60	n.s.
ALBU_MOUSE	Serum albumin	0,65	n.s.	1,00	n.s.	13,64	4.84E-06	0,57	n.s.
Mitochondria and/or energy metabolism									
ODO1_MOUSE	2-oxoglutarate dehydrogenase, mitochondrial	1,41	n.s.	0,19	1.52E-03	0,52	n.s.	1,27	n.s.
Q3TYL9_MOUSE	2',3'-cyclic nucleotid.e 3' phosphodiesterase	0,91	n.s.	0,66	n.s.	1,40	2.73E-05	1,06	n.s.
Q8C605_MOUSE	6-phosphofructokinase	0,49	n.s.	0,37	9.73E-05	0,84	n.s.	0,45	n.s.
THIL_MOUSE	Acetyl-CoA acetyltransferase, mitochondrial	0,99	n.s.	0,82	n.s.	1,70	1.04E-04	0,91	n.s.
ACON_MOUSE	Aconitate hydratase, mitochondrial	0,59	n.s.	0,46	1.58E-03	0,74	n.s.	0,74	n.s.
ACAD9_MOUSE	Acyl-CoA dehydrogenase family member 9, mitochondrial	0,77	n.s.	2,27	n.s.			2,66	8.39E-03
ADT1_MOUSE	ADP/ATP translocase 1	0,60	n.s.	0,65	n.s.	1,10	n.s.	0,40	1.32E-03
K6PL_MOUSE	ATP-dependent 6-phosphofructokinase, liver type	0,65	n.s.	0,29	2.31E-06	0,78	n.s.	0,31	n.s.
K6PF_MOUSE	ATP-dependent 6-phosphofructokinase, muscle type	0,65	n.s.	0,41	2.72E-03	1,17	n.s.	0,52	7.11E-03
ATAD3_MOUSE	ATPase family AAA domain-containing protein 3	0,41	n.s.	1,79	n.s.	4,99	1.14E-07	1,76	n.s.
CMC1_MOUSE	Calcium-binding mitochondrial carrier protein Aralar1	0,71	n.s.			0,12	1.17E-10	1,11	n.s.
QCR1_MOUSE	Cytochrome b-c1 complex subunit 1, mitochondrial	2,04	1.08E-02	1,00	n.s.	0,81	n.s.	1,61	2.39E-04
QCR2_MOUSE	Cytochrome b-c1 complex subunit 2, mitochondrial	1,48	n.s.	0,90	n.s.	0,88	n.s.	1,82	6.35E-05
Q9D881_MOUSE	Cytochrome c oxid.ase subunit 5B, mitochondrial			0,68	n.s.	1,55	9.59E-03	1,35	n.s.
ODP2_MOUSE	Dihydrolipoyllysine-resid.ue acetyltransferase component of pyruvate dehydrogenase complex, mitochondrial	0,75	n.s.	1,30	n.s.	2,12	7.67E-06	2,12	1.09E-06
Q3TT11_MOUSE	hydroxysteroid. (17-beta) dehydrogenase 4	0,75	n.s.	0,64	n.s.	1,04	n.s.	0,66	3.57E-02
LETM1_MOUSE	LETM1 and EF-hand domain-containing protein 1, mitochondrial	0,73	n.s.	0,39	3.49E-04	0,89	n.s.	0,66	n.s.
ODB2_MOUSE	Lipoamid.e acyltransferase component of branched-chain alpha-keto acid. dehydrogenase complex, mitochondrial	2,05	6.37E-03	0,43	n.s.			1,44	n.s.
MCCA_MOUSE	Methylcrotonoyl-CoA carboxylase subunit alpha, mitochondrial	1,18	n.s.	0,25	1.56E-04	0,53	n.s.	0,40	n.s.
Q80TT4_MOUSE	MKIAA0719 protein			0,69	n.s.	0,28	1.38E-07	0,80	n.s.
Q3UIQ2_MOUSE	NADH dehydrogenase (ubiquinone) Fe-S protein 1, 75kDa	0,93	n.s.	0,37	5.83E-05	0,42	2.94E-09	0,87	n.s.
NDUAA_MOUSE	NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 10, mitochondrial			0,56	n.s.	0,37	1.82E-03	1,01	n.s.
NDUBB_MOUSE	NADH dehydrogenase [ubiquinone] 1 beta subcomplex subunit 11, mitochondrial					0,38	1.39E-03		
NU3M_MOUSE	NADH-ubiquinone oxid.oreductase chain 3			0,36	n.s.	0,02	8.77E-03		
B2RXT3_MOUSE	Ogdhl protein	0,95	n.s.	0,47	9.77E-04	0,81	n.s.	0,80	n.s.
PTCD3_MOUSE	Pentatricopeptid.e repeat domain-containing protein 3, mitochondrial	0,68	n.s.	0,31	2.04E-04	0,72	n.s.	0,46	n.s.

Uniprot id.	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*
PCCA_MOUSE	Propionyl-CoA carboxylase alpha chain, mitochondrial	1,12	n.s.	0,23	2.22E-07	0,39	3.48E-03	0,52	n.s.
Q3U995_MOUSE	solute carrier family 25 (phosphate carrier), member 3	1,02	n.s.	1,00	n.s.	0,83	n.s.	0,61	6.24E-03
ECHA_MOUSE	Trifunctional enzyme subunit alpha, mitochondrial	0,58	2.04E-02	0,29	9.95E-06	0,83	n.s.	0,47	8.04E-04
Glial proteins									
Q8BR89_MOUSE	aquaporin 4			1,06	n.s.	0,37	2.19E-03		
GLNA_MOUSE	Glutamine synthetase	1,00	n.s.	0,66	n.s.	1,87	4.85E-05	1,05	n.s.
MYPR_MOUSE	Myelin proteolipid. protein	0,51	2.11E-02	0,56	2.45E-03	0,66	4.04E-05	0,50	1.05E-04
Small molecule biochemistry									
NT5D3_MOUSE	5'-nucleotid.ase domain-containing protein 3	1,13	n.s.	0,60	n.s.	1,73	2.69E-02		
H7BX88_MOUSE	Carnitine O-acetyltransferase			2,14	n.s.	5,56	3.94E-02	2,97	n.s.
NEUA_MOUSE	N-acylneuraminate cytid.ylyltransferase	1,09	n.s.	1,40	n.s.	1,64	1.76E-03	0,89	n.s.
Others/unknown									
B7ZNV9_MOUSE	6330439K17Rik protein	1,08	n.s.	0,15	1.12E-04				
SWAHA_MOUSE	Ankyrin repeat domain-containing protein SOWAHA					0,09	8.63E-06		
B5TVM6_MOUSE	Lisch-like isoform 4			1,55	n.s.	0,13	7.57E-03		
G3X9V7_MOUSE	MCG19133, isoform CRA_b	0,43	5.94E-03	0,38	n.s.	0,90	n.s.	0,65	n.s.
E9Q7R9_MOUSE	Protein Cfap43		n.s.			1,91	7.26E-03		
SOGA3_MOUSE	Protein SOGA3	0,64	n.s.	0,56	n.s.	0,94	n.s.	0,57	4.69E-02
E9Q6P5_MOUSE	Protein Ttc7b	0,60	1.69E-02	0,43	n.s.	0,83	n.s.	0,68	n.s.
Q8C660_MOUSE	RIKEN cDNA 1810008A18, isoform CRA_a							0,31	1.94E-02
B2KF52_MOUSE	Uncharacterized protein C6orf106 homolog							0,63	2.39E-02
CI172_MOUSE	Uncharacterized protein C9orf172 homolog	1,49	n.s.	0,44	1.64E-03	1,04	n.s.	0,52	n.s.
WDR7_MOUSE	WD repeat-containing protein 7	0,69	n.s.	0,48	9.25E-04			0,38	n.s.

* Mice (set 1a, see Materials and methods) trained on the FMTD task (AV group, *n*=6) and the corresponding naive control mice (NV group, *n*=6) were decapitated 24 h after completion of the training session. Tryptic peptides of SJ-enriched samples were prepared from the auditory cortex (AC), frontal cortex (FC), hippocampus (HIP), and striatum (STR) and analysed using nanoLC-MS/MS. Proteins with abundance ratios (AV/NV) of >1.5 and <1/1.5 at p<0.05 were considered as significantly up- (red) and down-regulated (green), resp.; n.s. - not significantly regulated; missing values - not reliably quantified. The deduced proteins were assigned to functional categories using SynProt (http://www.synprot.de). Artefacts (human keratins) and duplicates were removed. Note: due to losses during SJ preparation and/or nanoLC-MS/MS, the numbers of individual animal data sets were diminished for AC to *n*=4 per group and for FC to *n*=5 in the AV group.

Table S4. Phosphopeptides and deduced proteins showing abundance changes in the SJ-enriched samples from different brain regions of mice 24 h after FMTD training.*

Uniprot ID	Protein name	AC		FC		HIP		STR		Phosphopeptides	Phosphosites
		AV/NV	*p*	AV/NV	*p*	AV/NV	*p*	AV/NV	*p*		
Cytoskeleton, scaffolding, ECM, cell adhesion											
Cytoskeleton/actin-associated proteins											
SPTB2_MOUSE	Spectrin beta chain, non-erythrocytic 1			15.1	2.25E-05			0.3	n.s.	RPPS^{P}PDPNTK	S-2102
Cytoskeleton/intermediate filament-associated proteins											
VMAC_MOUSE	Vimentin-type intermediate filament-associated coiled-coil protein					0.4	1.80E-04			DQMIQQLQPRADLLQDIT^{P}R	T-108
Scaffolding and adaptor proteins											
DLG2_MOUSE	Disks large homolog 2	2.3	3.00E-02	1.0	n.s.	1.1	n.s.	1.5	1.00E-02	AIS^{P}LEGEPR	S-414
DLGP3_MOUSE	Disks large-associated protein 3			11.7	1.00E-07					HAS^{P}EPQPGPR	S-712
SRBS2_MOUSE	Sorbin and SH3 domain-containing protein 2	2.9	1.00E-03	1.0	n.s.			1.5	2.60E-02	RGS^{P}LPDNSILHR	S-829
Cell adhesion molecules											
LRRT2_MOUSE	Leucine-rich repeat transmembrane neuronal protein 2			2.1	3.51E-03			1.5	n.s.	HNHIT^{P}ALER	T-74
TROAP_MOUSE	Tastin					0.5	5.10E-06			SLDQENQDPRT^{P}PAQKPPR	T-49
Endocytosis, Exocytosis, Trafficking											
Endocytose/exocytose											
AMPH_MOUSE	Amphiphysin	3.4	3.00E-02	7.1	7.10E-04	1.3	n.s.	0.9	n.s.	AALPAGEGGS^{P}PEGAK	S-500
AP3B2_MOUSE	AP-3 complex subunit beta-2			2.4	9.25E-03					AFY^{P}GS^{P}EEDEAKGPGS^{P}EEAATAALPA	Y-270, S-272, S-282
Membrane trafficking proteins											
OSBP2_MOUSE	Oxysterol-binding protein 2					0.4	1.30E-05			ASPELAMPSPLQSTVGSLPVT^{P}KPES^{P}K	T-140, S-144
Proteins involved in transport processes											
ACATN_MOUSE	Acetyl-coenzyme A transporter 1							2.0	4.37E-03	IGFS^{P}AADAVTGLK	S-326
AAA1_MOUSE	Asc-type amino acid transporter 1			1.8	5.79E-03					RDS^{P}DMAS^{P}HIQQPGGHGNPGP	S-5, S-9
KIF15_MOUSE	Kinesin-like protein KIF15			1.3	n.s.			0.3	2.00E-03	T^{P}NY^{P}IEYFLEAMLFFK	T-412, Y-414
D3YWN4_MOUSE	Protein Dnah6					0.6	1.00E-02			EIQDVT^{P}IVS^{P}ACAPPGGGRNPVTPR	T-652; S-655
SCAM3_MOUSE	Secretory carrier-associated membrane protein 3			1.6	2.64E-03			0.5	n.s.	KLS^{P}PTEPR	S-78
E3UVT9_MOUSE	Solute carrier family 4 sodium bicarbonate cotransporter member 7 variant NBCn1-K			1.4	3.58E-02	0.4	6.90E-04			GES^{P}PLS^{P}LLLSHLLPSSR	S-263, S-266
ASPC1_MOUSE	Tether containing UBX domain for GLUT4							0.6	6.00E-05	CMSRASGSPPLLPAPDPVS^{P}LESEPIAEDGALGPPEPIQGT^{P}AQPVK	S-507, T-528
Protein modification/degradation (without kinases/phosphatases)											
ZFAN5_MOUSE	AN1-type zinc finger protein 5					1.6	1.70E-02			NVPVAALPVTQQMT^{P}EMSISR	T-102
DPEP2_MOUSE	Dipeptidase 2			0.3	4.85E-03					LGMMVDLSHVS^{P}DAAAR	S-265
MAGE1_MOUSE	Melanoma-associated antigen E1					0.1	1.30E-05			GASRPPAVSAGLNTAMS^{P}ITASEGPNSPVPPTAPK	S-119
Q8C4F9_MOUSE	Ring finger protein 13, isoform CRA_e					0.4	4.70E-04			FKKATHAST^{P}VINCI	T-239
SAM9L_MOUSE	Sterile alpha motif domain-containing protein 9-like					0.4	2.80E-04			DTSLFVREGAS^{P}S^{P}K	S-344, S-345
DNA and RNA Binding/Transcription/Translation											
Nucleic acid-binding proteins											
EOCZ29_MOUSE	G patch domain-cont. protein 2			0.6	1.61E-02					KSSGAPPSMLS^{P}APGPGSNKR	S-36
Transcription regulators											
SUZ12_MOUSE	Polycomb protein Suz12			0.3	4.00E-05					MAPQKHGGGGGGGS^{P}GPSAGS^{P}GGGGFGGSAAAVAAAASGGK	S-14, S-20
SUZ12_MOUSE	Polycomb protein Suz12					0.6	1.80E-02			MAPQKHGGGGGGGSGPSAGSGGGGFGGS^{P}AAAVAAAASGGK	S-28
RNA-processing and transport											
MATR3_MOUSE	Matrin-3			2.1	6.00E-04					DLSAAGIGLLAAAT^{P}QS^{P}LS^{P}MPAS^{P}LGR	T-33, S-35, S-37, S-41
G3BP2_MOUSE	Ras GTPase-activating protein-binding protein 2			1.1	n.s.			1.6	2.00E-03	SAT^{P}PPPAEPASLPQEPPK	T-227

Uniprot ID	Protein name	AC AV/NV	AC *p*	FC AV/NV	FC *p*	HIP AV/NV	HIP *p*	STR AV/NV	STR *p*	Phosphopeptides	Phosphosites
Signal transduction											
Ion channels, receptors											
DRD1_MOUSE	D(1A) dopamine receptor							0.5	9.90E-03	IQPVTHSGQHS^{P}T^P	S-445, T-446
ITPR2_MOUSE	Inositol 1,4,5-trisphosphate receptor type 2			3.6	8.27E-05			0.5	n.s.	STVTVNT^{P}IDLGSK	T-1829
OPN4_MOUSE	Melanopsin	1.5	n.s.	0.6	n.s.			1.8	2.00E-04	TPKVPGPS^{P}TCRPMK	S-467
NTRK3_MOUSE	NT-3 growth factor receptor			0.2	3.57E-04					GPVAVIS^{P}GEEDS^{P}AS^{P}PLHHINHGIT^{P}T^{P}PS^{P}S^{P}LDAGPDTVVIGMTR	S-472, S-477, S-479, T-489, T-490, S-492, S-493
RET_MOUSE	Proto-oncogene tyrosine-protein kinase receptor Ret					0.4	1.90E-02			LQYT^{P}VVATDRQTR	T-486
T2R40_MOUSE	Taste receptor type 2 member 40					0.3	7.30E-04			IIGLMPRLLSLSVLVSFS^{P}LS^{P}SFFSK	S-154, S-156
Q5R1A4_MOUSE	TRDV2-2	0.7	8.00E-03							QQGGQVTLVILQEAY^{P}KQYNAT^{P}LNR	Y-73, T-79
VGFR2_MOUSE	Vascular endothelial growth factor receptor 2							2.1	4.37E-03	MVDAAVHADSGT^{P}T^{P}LQLT^{P}SCLNGSGPVPAPPPTPGNHERGAA	T-1338, T-1339, T-1343
Kinases/phosphatases and regulators											
AAK1_MOUSE	AP2-associated protein kinase 1	1.3	n.s.	2.5	1.30E-05	1.8	3.20E-02	0.7	n.s.	VGSLT^{P}PPS^{P}S^{P}PK	T-658, S-661, S-662
SRC_MOUSE	Neuronal proto-oncogene tyrosine-protein kinase Src			16.7	1.20E-06					RRS^{P}LEPSENVHGAGGAFPASQTPSK	S-17
PI51C_MOUSE	Phosphatidylinositol 4-phosphate 5-kinase type-1 gamma	1.4	n.s.	1.3	n.s.	0.8	n.s.	0.1	9.00E-03	T^{P}QS^{P}SGQDGRPQEEPHAEDLQK	T-552, S-554
KPCA_MOUSE	Protein kinase C alpha type			1.5	2.89E-03					VIS^{P}PSEDR	S-319
PP6R2_MOUSE	Serine/threonine-protein phosphatase 6 regulatory subunit 2			1.5	3.62E-03					NVPGLAAPS^{P}S^{P}PT^{P}QK	S-669, S-670, T-672
D3Z6W2_MOUSE	Tyrosine-protein phosphatase non-receptor type					2.3	1.00E-02			MGLIQT^{P}PDQLRFSYMAIIEGAK	T-261
GTPases and regulators											
G3X960_MOUSE	MCG5982							2.6	2.00E-02	RHRPCAQGT^{P}VLLPT^{P}IFR	T-350, T-355
Q8VCK0_MOUSE	Rapgef6 protein	0.5	2.00E-03			1.5	6.60E-04			TVTSSTDKGLIVY^{P}CVT^{P}S^{P}PK	Y-421, T-424, S-425
TB22A_MOUSE	TBC1 domain family member 22A							1.9	1.91E-02	TTEPEPEPQPIAEPPVPPS^{P}GDLR	S-134
Ca^{2+} binding proteins											
G3UX57_MOUSE	Calmodulin	0.5	1.80E-02			1.5	3.40E-02			T^{P}NLGEKLT^{P}DEEVDEMIR	T-1, T-8
CSTN2_MOUSE	Calsyntenin-2					0.6	1.00E-02			S^{P}SVVPS^{P}IAT^{P}VVIIIS^{P}VCMLVFVVAMGVYR	S-830, S-835, T-838, S-844
TMM64_MOUSE	Transmembrane protein 64					0.1	5.60E-06	0.7	n.s.	SLVLVCVLAALCFAS^{P}LALVR	S-137
Receptor ligands, 2nd messengers, lipids regulation											
BMP4_MOUSE	Bone morphogenetic protein 4			0.3	7.52E-04					IPGNRMLMVVLLCQVLLGGASHAS^{P}LIPETGK	S-25
Regulatory proteins											
NDRG4_MOUSE	Protein NDRG4			1.9	1.88E-02			1.0	n.s.	RLS^{P}GGAVPSASMTR	S-298
Mitochondria and/or energy metabolism											
CP2DQ_MOUSE	Cytochrome P450 2D26					0.6	1.90E-02			FADIVPTNLPHMT^{P}S^{P}R	T-381, S-382
Small molecule biochemistry											
A2ALT5_MOUSE	Adenosylhomocysteinase							0.6	1.00E-02	IAGCLHMTVET^{P}AVLIET^{P}LVALGAEDHAAAAIAK	T-60, T-66
FAAH1_MOUSE	Fatty-acid amide hydrolase 1					0.5	7.50E-03			SPGGS^{P}S^{P}GGEGALIGS^{P}GGSPLGLGTDIGGSIR	S-217, S-218, S-227
Q5SVR6_MOUSE	Leukotriene C4 synthase							1.9	1.00E-02	DEVALLAT^{P}VTLVGVLLQGDLCTK	T-10
MAT2B_MOUSE	Methionine adenosyltransferase 2 subunit beta			3.0	1.92E-05					LEESAVT^{P}VMFDK	T-198
Others/unknown											
LYPD4_MOUSE	Ly6/PLAUR domain-containing protein 4			4.8	1.18E-02					EGCEETVVFIET^{P}GT^{P}S^{P}K	T-70, T-72, S-73
D3YZ21_MOUSE	Protein D430041D05Rik	5.3	1.80E-02	1.0	n.s.	2.1	n.s.			NVT^{P}AS^{P}DEEEGAGLFDSAGK	T-897, S-899
E9Q326_MOUSE	Protein Oas1h					0.4	4.50E-05			LDKFIEGHLLGDIT^{P}FLTELR	T-33
THYG_MOUSE	Thyroglobulin	0.6	4.00E-03							LQLEDIS^{P}VGSLPDLYSIER	S-1376

* Mice (set 1a, see Materials and methods) trained on the FMTD task (AV group, n=6) and the corresponding naive control mice (NV group, n=6) were decapitated 24 h after completion of the training session. Tryptic peptides of SJ-enriched samples prepared from the auditory cortex (AC), frontal cortex (FC), hippocampus (HIP), and striatum (STR) were subjected to TiO_2 chromatography, and the resulting phosphopeptide-enriched fraction was analysed using nanoLC-MS/MS. Phosphopeptides with abundance ratios (AV/NV) of >1.5 and <1/1.5 at p<0.05 were considered as significantly up- (red) and down-regulated (green), resp.; n.s. - not significantly regulated; missing values - not reliably quantified. The deduced proteins were assigned to functional categories using SynProt (http://www.synprot.de). Note: due to losses during SJ preparation and/or nanoLC-MS/MS, the numbers of individual animal data sets were diminished for AC to n=4 per group and for FC to n=5 in the AV group.

Table S5. Verification of the regulation of selected proteins.

Uniprot ID	Protein name	Brain area	Label free MS AV/NV [a] (*cf.* Table S3)	Verification				
				Method	AV/NV [b]	*p* [b]	*n* (AV)	*n* (NV)
CYFP2_MOUSE	Cytoplasmic FMR1-interacting protein 2	AC	0.67	MRM	0.76	0.129	9	9
CYFP2_MOUSE	Cytoplasmic FMR1-interacting protein 2	STR	0.64	MRM	0.51	**0.021**	4	5
CYFP2_MOUSE	Cytoplasmic FMR1-interacting protein 2	HIP	1.60	MRM	1.76	0.144	9	11
DLG2_MOUSE	Disks large homolog 2	FC	0.38	WB	0.35	0.334	3	3
G3X9V4_MOUS	Glutamate receptor ionotropic, NMDA 2B	STR	1.81	WB	1.54	0.086	4	4
GRIA2_MOUSE	Glutamate receptor 2	HIP	0.64	WB	0.52	0.054	4	4
HNRPK_MOUSE	Heterogeneous nuclear ribonucleoprotein K	STR	1.88	MRM	1.26	0.486	5	5
HNRPL_MOUSE	Heterogeneous nuclear ribonucleoprotein L	HIP	2.02	WB	1.97	**0.014**	4	4
HNRPL_MOUSE	Heterogeneous nuclear ribonucleoprotein L	HIP	2.02	MRM	1.68	**0.007**	10	10
HOME1_MOUSE	Homer protein homolog 1	HIP	1.64	MRM	1.74	**0.016**	8	11
HOME1_MOUSE	Homer protein homolog 1	HIP	1.64	WB	1.80	0.056	4	4
MYPR_MOUSE	Myelin proteolipid protein	AC	0.51	MRM	0.67	0.080	7	7
MYPR_MOUSE	Myelin proteolipid protein	HIP	0.66	MRM	0.69	0.133	9	10
NEUM_MOUSE	Neuromodulin	STR	1.94	WB	1.26	0.633	5	5
NFASC_MOUSE	Neurofascin	FC	0.38	WB	0.58	**0.006**	4	4
PHAR1_MOUSE	Phosphatase and actin regulator 1	FC	0.18	WB	0.60	0.092	4	4
PHAR1_MOUSE	Phosphatase and actin regulator 1	HIP	0.08	WB	0.81	0.240	4	4
PLCB1_MOUSE	1-phosphatidylinositol 4,5-bisphosphate	AC	0.40	MRM	0.56	**0.008**	4	4
Q8K232_MOUS	Adducin 1 (Alpha)	STR	0.50	WB	0.43	**0.032**	5	5
SEP11_MOUSE	Septin-11	HIP	1.81	WB	1.55	**0.016**	5	5
SEPT8_MOUSE	Septin-8	HIP	1.96	MRM	1.39	0.224	10	11
SEPT9_MOUSE	Septin-9	STR	0.57	MRM	0.57	0.070	3	4
SEPT9_MOUSE	Septin-9	STR	0.57	WB	0.59	**0.004**	5	5
SEPT9_MOUSE	Septin-9	FC	0.64	WB	0.63	**0.030**	4	4
SHAN3_MOUSE	SH3 and multiple ankyrin repeat domain protein 3	HIP	1.70	MRM	1.14	0.667	11	10
SHAN3_MOUSE	SH3 and multiple ankyrin repeat domain protein 3	HIP	1.70	WB	2.33	0.142	4	4
SHAN3_MOUSE	SH3 and multiple ankyrin repeat domain protein 3	STR	1.74	WB	2.36	0,099	4	4
SRCIN1_MOUSE	SRC kinase-signaling inhibitor 1	AC	0.62	MRM	0.91	0.662	8	8
SRCIN1_MOUSE	SRC kinase-signaling inhibitor 1	AC	0.62	WB	0.13	0.050	3	3
STXB1_MOUSE	Syntaxin-binding protein 1 (munc 18)	HIP	1.88	WB	1.93	**0.048**	4	4
SYN1_MOUSE	Synapsin-1	STR	0.66	MRM	0.51	**0.012**	5	5
SYNJ1_MOUSE	Synaptojanin-1	AC	0.38	MRM	0.81	**0.044**	8	8
TENR_MOUSE	Tenascin-R	STR	0.57	MRM	0.75	**0.046**	5	4

Mice of set 2a (AV, trained; NV, naïve; see Materials and methods) were killed 24 h after the first FMTD training session. SJ-enriched samples prepared from auditory cortex (AC), frontal cortex (FC), hippocampus (HIP) and striatum (STR) were analyzed using Western blot (WB) and/or Multi Reaction Monitoring (MRM) (for details, see Figure S3 and Tables S1c, S1d, S2). ([a]) Protein abundance ratios determined in mice of set 1a by label-free LC-MS/MS as shown in Table S3. ([b]) Protein abundance ratios and related *p*-values determined in the verification experiment; in bold: $p<0.05$, significant difference between the protein abundances of AV and NV (Student's two-sided *t*-test for unpaired comparisons).

Table S6: Data for single enrichment analysis with GeneCodis (supplemental information to Fig. 5).*

Gene Ontology – Biological Process (GeneCodis)	Brain region	No. of Proteins	Uniprot ID	Significance
transport	AC	9	EXOC3, SV2A, AT1A1, AT1A3, NSF, NU155, NU160, QCR1, S39A7	7,63018E-03
	FC	18	**AP3B2**, EXOC3, AP2A2, ITPR2, AP1B1, AP2B1, AAA1, NSF, FUBP2, VPS39, RP3A, EXOC1, IMB1, AP2A1, NDUS1, EXOC2, SCAM3, TRIM3	2,95482E-04
	HIP	24	VATA, GRIA2, KCNQ2, VATB2, KCNA2, DC1I1, OSBP2, CACP, NDUBB, NDUAA, CACB2, RP3A, NXF1, SC6A1, ALBU, ABCD3, NDUS1, CMC1, VPP1, VATH, STXB1, VATC1, S39A7, AQP4	2,00358E-05
	STR	21	**AP3B2**, MPCP, G3BP1, ACATN, DX39B, AP2A2, EXOC5, QCR2, ADT1, AP2B1, SYT7, AT1B1, NSF, CACB1, FUBP2, SYT1, 4F2, RBP2, AP2A1, QCR1, G3BP2	1,57663E-06
protein transport	AC	4	EXOC3, NSF, NU155, NU160	2,40906E-02
	FC	14	**AP3B2**, EXOC3, AP2A2, AP1B1, AP2B1, NSF, VPS39, RP3A, EXOC1, IMB1, AP2A1, EXOC2, **SCAM3**, TRIM3	4,62966E-07
	STR	7	**AP3B2**, AP2A2, EXOC5, AP2B1, NSF, RBP2, AP2A1	8,17579E-03
intracellular protein transport	FC	9	**AP3B2**, AP2A2, AP1B1, AP2B1, VPS39, RP3A, IMB1, AP2A1, SCAM3	8,22408E-07
	STR	6	**AP3B2**, AP2A2, AP2B1, AP2A1, ASPC1, DRD1	4,77199E-04
transmembrane transport	AC	4	SV2A, AT1A1, AT1A3, S39A7	1,85151E-02
	HIP	7	KCNQ2, KCNA2, SC6A1, ABCD3, CMC1, S39A7, AQP4	4,06668E-02
ion transport	HIP	10	VATA, GRIA2, KCNQ2, VATB2, KCNA2, CACB2, VPP1, VATH, VATC1, S39A7	6,46319E-03
ion transmembrane transport	AC	3	AT1A1, AT1A3, S39A7	3,01049E-02
ATP hydrolysis coupled proton transport	HIP	5	VATA, VATB2, VPP1, VATH, VATC1	2,80000E-05
proton transport	HIP	5	VATA, VATB2, VPP1, VATH, VATC1	2,98153E-03
potassium ion transport	AC	3	AT1A1, AT1A3, NSF	1,57610E-02
vesicle-mediated transport	FC	7	**AP3B2**, AP2A2, AP1B1, AP2B1, NSF, VPS39, AP2A1	1,04810E-04
	STR	5	**AP3B2**, AP2A2, AP2B1, NSF, AP2A1	3,37006E-03
exocytosis	FC	3	EXOC3, EXOC1, EXOC2	1,90880E-02
	STR	3	EXOC5, PI51C, MYO5A	1,76113E-02
endocytosis	AC	2	SYNJ1, DYN1	3,65651E-02
	FC	8	**AP3B2**, AP2A2, AP1B1, SYNJ1, DYN3, **AAK1**, AP2A1, DYN1	2,34501E-06
	STR	8	**AP3B2**, BIN1, AP2A2, PI51C, DYN3, **AAK1**, AP2A1, DYN1	8,44157E-07
positive regulation of endocytosis	AC	1	AMPH	3,98135E-02
	HIP	2	BIN1, AMPH	1,33859E-03
	STR	3	BIN1, AMPH, ADDA	4,38364E-04
mRNA processing	AC	3	PLCB1, CELF2, RBM26	2,54908E-02
	FC	5	HNRPU, PABP1, HNRPM, FUBP2, SFPQ	1,79294E-02
	HIP	7	DDX5, PABP1, HNRPK, HNRPM, PRP19, HNRPC, HNRPL	5,95742E-03
	STR	8	DX39B, HNRPU, PABP1, HNRPK, NONO, HNRPM, FUBP2, SFPQ	5,85786E-05
RNA splicing	FC	5	HNRPU, PABP1, HNRPM, FUBP2, SFPQ	7,44213E-03
	HIP	6	DDX5, PABP1, HNRPK, HNRPM, PRP19, HNRPC	6,85054E-03
	STR	8	DX39B, HNRPU, PABP1, HNRPK, NONO, HNRPM, FUBP2, SFPQ	1,28858E-05
mRNA transport	AC	2	NU155, NU160	1,95198E-02
	STR	4	DX39B, FUBP2, RBP2, G3BP2	1,20623E-03
translation	AC	4	EF1A2, SYIC, EFTU, EF1G	8,33620E-03
	HIP	5	EIF2A, RL4, SYK, SYFA, EF1G	4,04802E-02
ribosome biogenesis	HIP	3	NOP58, NOP56, DKC1	3,35168E-02
positive regulation of transcription from RNA polymerase II promoter	HIP	9	HEXB, MTA2, RBM14, PP2BA, HNRPK, IL11, ABLM1, ABLM2, ASH2L	3,08202E-02
positive regulation of gene expression	FC	5	BMP4, MYPR, CNTN1, SRC, CTNB1	4,08857E-03
translational elongation	AC	3	EF1A2, EFTU, EF1G	3,62822E-03
protein folding	STR	5	TCPQ, TCPG, CH60, TCPA, RBP2	1,02146E-03
protein polymerization	HIP	3	FIBB, SEPT2, TBB3	7,28528E-03
protein heterooligomerization	FC	3	SEPT9, CTNA1, CTNB1	1,95249E-02
	HIP	3	SEPT9, CTNA1, SEP11	4,48230E-02
	STR	2	SEPT9, CTNB1	4,35208E-02
protein homooligomerization	HIP	5	SC6A1, GLNA, DPYL3, THIL, AQP4	3,79672E-03
cell adhesion	AC	5	PLCB1, CYFP2, PTPRS, HPLN4, CTND2	8,65228E-03
	FC	11	OMGP, CYFP2, CTNA1, TENR, ADA23, NFASC, PKP4, CNTN1, CTND2, SRC, CTNB1	4,27517E-05
	HIP	8	FBLN5, CYFP2, CSTN2, CTNA1, ADA23, TROAP, CO6A6, SRC	1,62200E-02
	STR	5	CYFP2, TENR, PI51C, PTPRS, CTNB1	3,01304E-02
adherens junction organization	FC	3	NUMB, NUMBL, SRC	3,32155E-05
	HIP	2	NUMBL, SRC	7,87851E-03
	STR	1	NUMBL	3,69673E-02
integrin-mediated signaling pathway	HIP	3	ADA11, ADA23, MYPR	4,43106E-02
metabolic process	AC	7	TPP2, ODB2, AT1A1, ECHA, AT1A3, NSF, DYN1	2,85007E-02
	FC	15	MCCA, TPP2, SYN1, DDX17, ACLY, ACON, ECHA, NSF, DYN3, ODO1, ACSL3, INP4A, PCCA, AUXI, DYN1	6,51317E-03
	HIP	18	HEXB, ODP2, DDX17, SYN2, DC1I1, PP2BA, FAAH1, ATAD3, RNF13, NSMA2, DYH2, PGLT1, PPBT, PCCA, NT5D3, VATH, THIL, VATC1	8,48127E-03
	STR	15	G3BP1, ODP2, TPP2, SYN1, DDX17, ECHA, RENT1, NSF, MYO5A, DYN3, KIF15, ACAD9, DHB4, DDX50, DYN1	2,16456E-03
ATP catabolic process	AC	3	AT1A1, AT1A3, NSF	2,47494E-02
	HIP	6	VATA, DDX5, DDX17, VATB2, DYH2, VATH	6,74839E-04
	STR	6	DX39B, DDX17, AT1B1, RENT1, NSF, DDX50	2,59383E-03
GTP catabolic process	AC	5	EF1A2, AGAP2, EFTU, TBB2A, DYN1	2,10366E-04
	FC	3	AGAP2, DYN3, DYN1	4,02548E-02
	STR	3	EFTU, DYN3, DYN1	2,87313E-02
positive regulation of GTPase activity	AC	3	PLCB1, AGAP2, AMPH	1,40723E-02
	FC	3	AGAP2, AMPH, GIT1	4,79980E-02
	STR	5	BIN1, ASAP2, AMPH, RHG44, TB22A	3,46845E-03
regulation of catalytic activity	FC	7	PSMD1, PSMD2, ARHG2, MAT2B, VPS39, TNIK, MINK1	2,40952E-04
cellular protein metabolic process	AC	1	TCPG	4,90524E-02
	STR	4	TCPQ, TCPG, CH60, TCPA	4,23502E-05
fatty acid metabolic process	STR	3	KAP3, ECHA, DHB4	2,45167E-02
oxidation-reduction process	STR	6	LTC4S, ECHA, AOFB, ACAD9, AOFA, DHB4	3,41382E-02
ATP metabolic process	HIP	3	VATA, VATB2, NDUS1	7,97026E-03

proteolysis	FC	6	AFG32, TPP2, DPEP2, ADA23, ADA22, PRS8	3,46038E-02
	STR	5	TPP2, CAN5, QCR2, YMEL1, QCR1	4,54277E-02

cellular process	STR	3	MAP1B, ABI1, CTNB1	3,20154E-03
apoptotic process	STR	5	RMD3, CYFP2, MAP1S, ANK2, CTNB1	3,92024E-02
negative regulation of apoptotic process	FC	5	LYRIC, BMP4, AGAP2, CTNA1, CTNB1	2,88091E-02
Wnt receptor signaling pathway	FC	3	MARK2, TNIK, CTNB1	4,95316E-02
positive regulation of I-kappaB kinase/NF-kappaB cascade	FC	3	LYRIC, EF1D, CTNB1	2,40632E-02
response to drug	AC	3	AT1A1, ECHA, AT1A3	1,27271E-02
phosphorylation	FC	9	MARK2, NTRK3, MAST1, **AAK1**, TNIK, MINK1, GIT1, CNKR2, SRC	7,56844E-03
	HIP	9	RET, CDKL5, KC1D, KCC2B, CN37, **AAK1**, MPP3, KPCB, SRC	4,07984E-02
protein phosphorylation	FC	7	MARK2, NTRK3, MAST1, **AAK1**, TNIK, MINK1, SRC	2,67433E-02
	HIP	9	RET, CDKL5, EIF2A, KC1D, KCC2B, **AAK1**, CAMKV, KPCB, SRC	1,65443E-02
protein autophosphorylation	FC	6	MARK2, NTRK3, **AAK1**, TNIK, MINK1, SRC	4,25870E-04
	HIP	4	CDKL5, KCC2B, **AAK1**, SRC	4,64334E-02

cytoskeleton organization	FC	3	ABLM1, MAST1, TNIK	2,66738E-02
actin cytoskeleton organization	AC	3	AGAP2, FMNL2, TAOK2	8,41953E-03
negative regulation of microtubule depolymerization	AC	1	MAP1A	4,72450E-02
	FC	4	ARHG2, CLAP2, MAP2, MAP1A	3,77000E-05

multicellular organismal development	FC	9	MARK2, NUMB, BMP4, NTRK3, NDRG4, NUMBL, ZFR, FXR1, CTND2	2,38530E-02
nervous system development	FC	4	NUMB, NTRK3, NUMBL, TNIK	3,92382E-02
	HIP	5	RET, KCC2B, NUMBL, DPYL2, DPYL3	4,98383E-02
	STR	4	RET, NEUM, NUMBL, AINX	3,47373E-02
forebrain development	FC	5	NUMB, BMP4, NUMBL, SRC, CTNB1	1,97945E-04
	STR	2	NUMBL, CTNB1	4,09167E-02
cell differentiation	FC	6	MARK2, BMP4, NTRK3, TPPC9, FXR1, CTNB1	3,73908E-02
	STR	5	BIN1, NEUM, RMD3, AINX, CTNB1	4,87229E-02
axonogenesis	FC	4	AFG32, NUMB, NUMBL, MAP2	4,42913E-03
	STR	3	NUMBL, PI51C, MAP1B	2,45167E-02
positive regulation of neuron projection development	FC	2	MARK2, LRRC7	4,50710E-02
	HIP	3	RET, KCC2B, DPYL3	3,31380E-02
muscle organ development	HIP	3	DESM, FXR1, LMNA	2,67115E-02
cell proliferation	STR	3	KAP3, YAP1, CTNB1	3,55125E-02
regulation of cell proliferation	STR	3	YAP1, EZH2, CTNB1	3,65207E-02
cell division	HIP	6	SEPT5, SEPT9, SEP11, SEPT2, SEPT6, ANX11	2,94176E-02
cell cycle	HIP	12	CDKL5, CALM, SEPT5, SEPT9, KHDR1, NSMA2, SEP11, SEPT2, SEPT6, SEPT8, SRC, ANX11	3,45887E-04

learning	AC	3	SYNJ1, AMPH, CTND2	1,36728E-03
	FC	3	SYNJ1, AMPH, CTND2	4,45135E-03
	HIP	2	AMPH, SC6A1	4,79900E-02
	STR	3	KAP3, AMPH, DRD1	3,23961E-03
locomotory exploration behavior	FC	3	SHAN3, DLG4, TENR	9,91713E-05
	STR	2	SHAN3, TENR	3,65909E-03
positive regulation of synaptic transmission, glutamatergic	FC	2	SHAN3, TENR	1,71098E-02
	HIP	2	SHAN3, GLNA	3,57379E-02
	STR	3	SHAN3, TENR, DRD1	8,04159E-04
synapse organization	FC	3	TENR, NFASC, CTNB1	8,23059E-04
	STR	3	TENR, MYO5A, CTNB1	8,04159E-04
synaptic transmission	STR	3	MYO5A, CTNB1, DRD1	2,74847E-02

* The list details Gene Ontology (GO) terms referring to biological processes, which were used to generate the network in Fig. 5. For the analysis the combined data of synaptic protein and phosphopeptide abundances (Tables S3 and S4) were used. Criteria for selection were at least 3 assigned proteins in at least one brain region per given biological process. GO terms are grouped according to functional relations. The number of protein elements identified for each biological process is indicated per brain region and UniProt-Identifiers are provided (without "_MOUSE"-suffix). Underlined UniProt-Identifiers were detected only in the phosphopeptide-enriched fraction, bold and underlined UniProt-IDs were detected in both fractions.

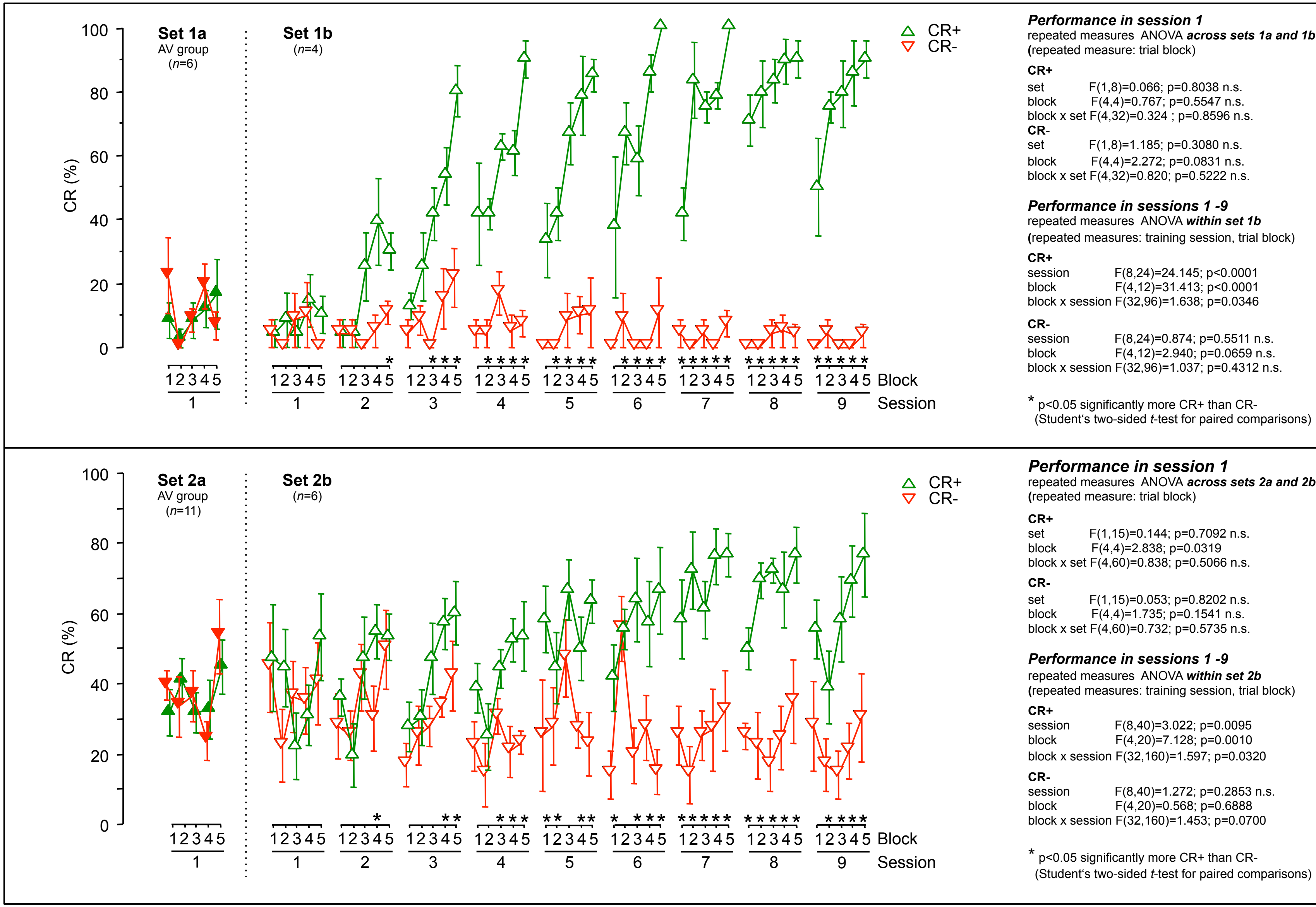


Figure S1. Performance in the FMTD paradigm. Mice of sets 1a and 2a (see Materials and methods) were trained for one session and killed 24 h later for protein analytical purposes. Mice of sets 1b and 2b were trained for one session along with sets 1a and 2a, respectively, and for additional eight sessions to monitor learning and memory performance. For data analysis, each training session was subdivided into five blocks of trials. Shown are group means ± s.e.m. of the relative frequencies of correct conditioned responses (CR+) and false alarms (CR-), *i.e.*, hurdle crossings in response to CS+ and CS-, respectively. Note: the mice trained for analytical purposes and the corresponding mice trained for behavioral assessment performed similarly in session 1, implying comparable acquisition performance; starting in session 2, the mice of sets 1b and 2b performed more CR+ than CR-, indicating FMTD memory.

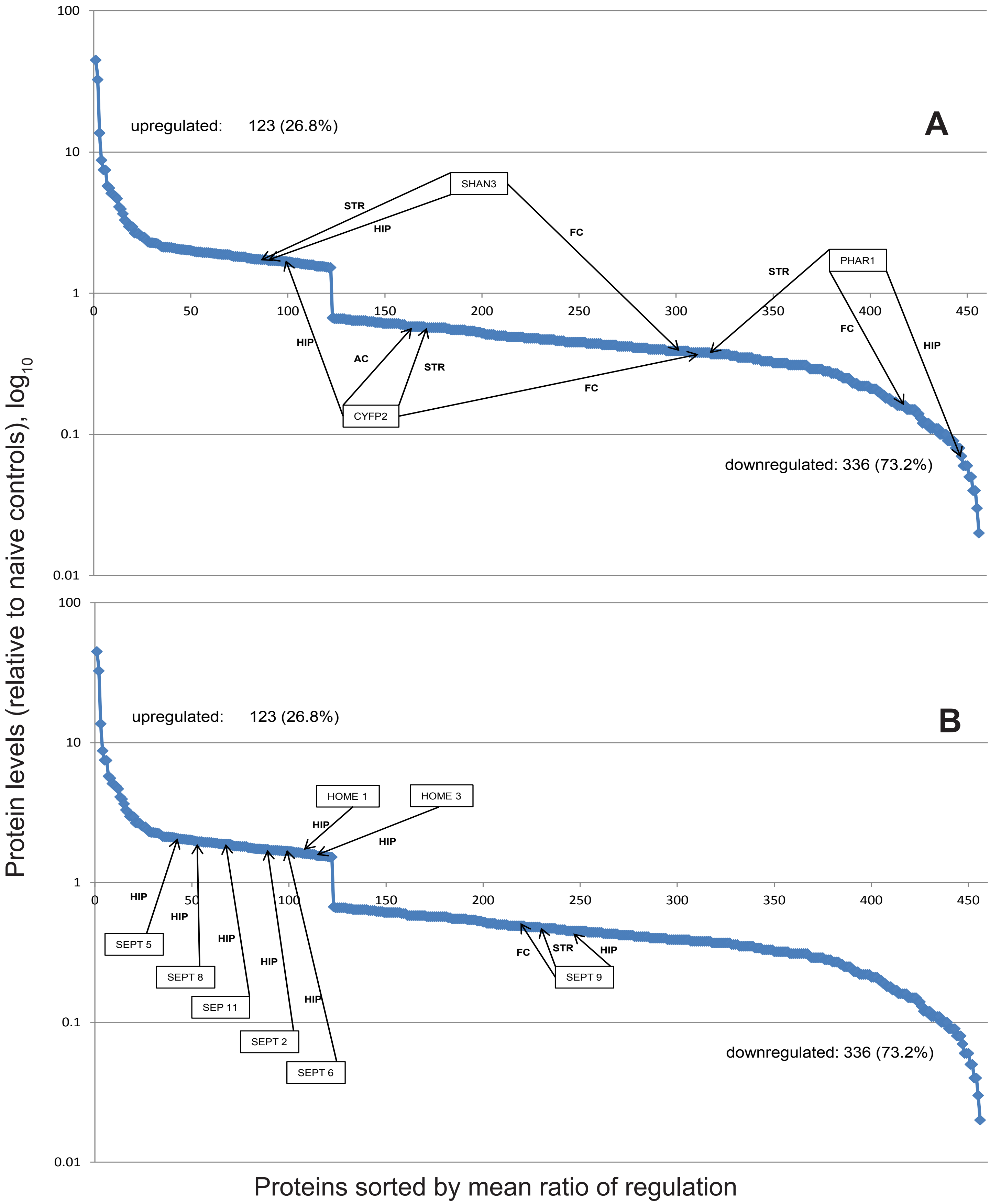


Figure S2: Differential regulation of synaptic protein abundance in analyzed brain regions. The mean AV/NV ratios of proteins with significantly FMTD training-regulated synaptic abundance from all examined brain regions have been plotted against ratio size. The numbers and percentages of up- and down-regulated proteins are indicated. Arrows in (A) indicate the plot-points for SHANK3, CYFP2 and PHAR1/Phactr1, arrows in (B) those of Septin- and Homer-family proteins on the curve. AC, auditory cortex; FC, frontal cortex; HIP, hippocampus; STR, striatum.

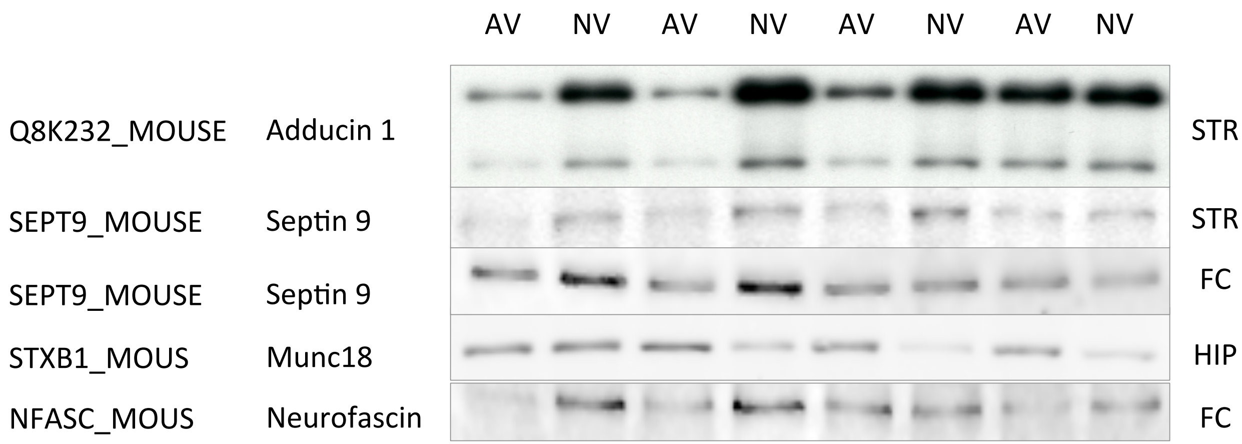
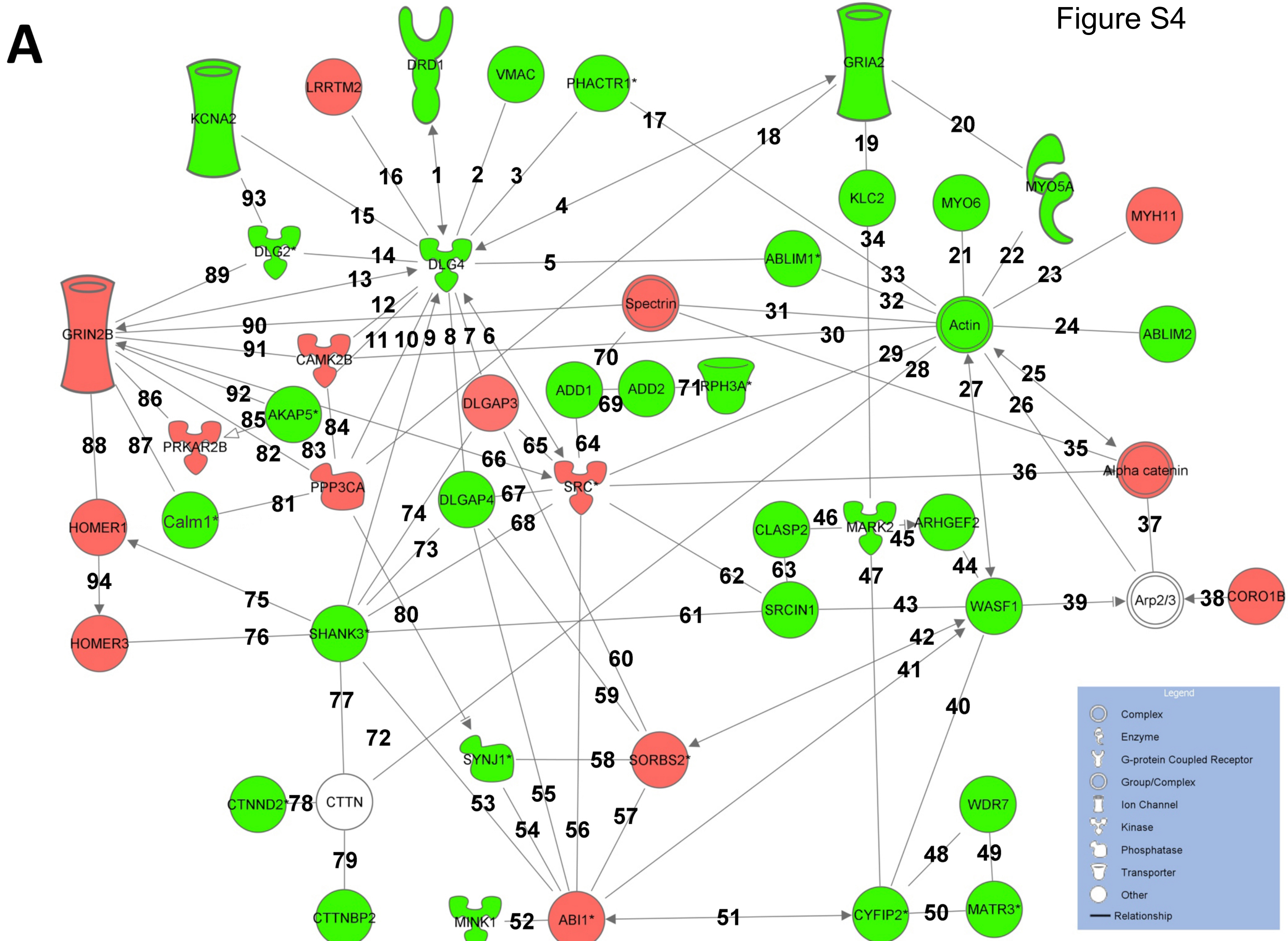


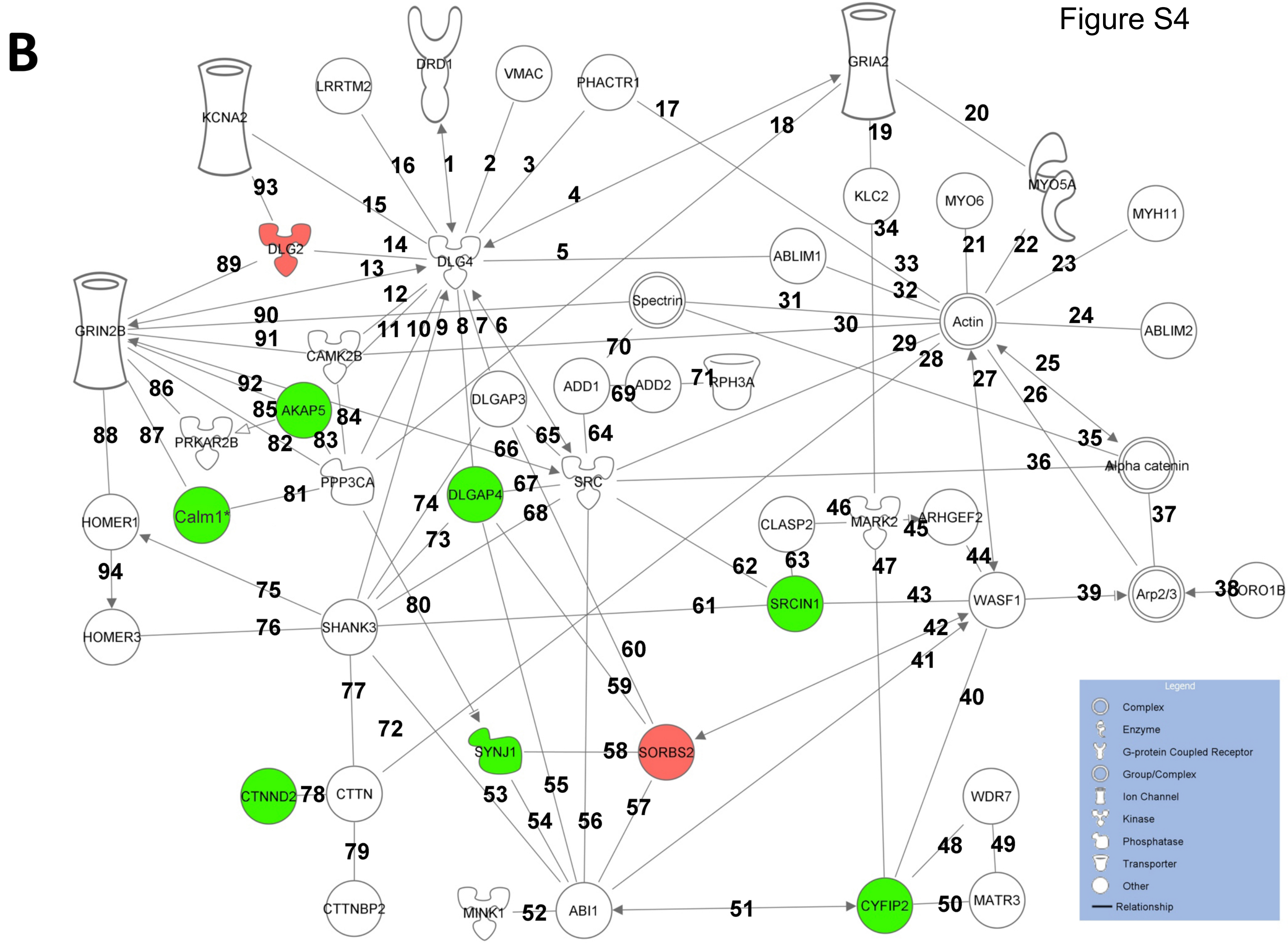
Figure S3: Verification of the regulation of selected proteins by Western blot analysis. Representative blots are shown exemplarily; for quantitative results of all validated protein regulations, see Table S5. Mice of set 2a (AV, trained; NV, naïve; see Materials and methods) were killed 24 h after the first FMTD training session. SJ-enriched samples prepared from auditory cortex (AC), frontal cortex (FC), hippocampus (HIP) and striatum (STR) were carefully normalized, fractionated by SDS-PAGE and blotted onto PVDF membranes. Candidate proteins selected from Table S3 were probed with appropriate antibodies (*cf.* Table S2), and immunoreactive bands were detected using ECL (for SRCIN1, Adducin 1) or fluorescence techniques. The Serva Lightning Red fluorescent dye was used as loading control for final normalization.

Figure S4



AC_FC_HIP_STR

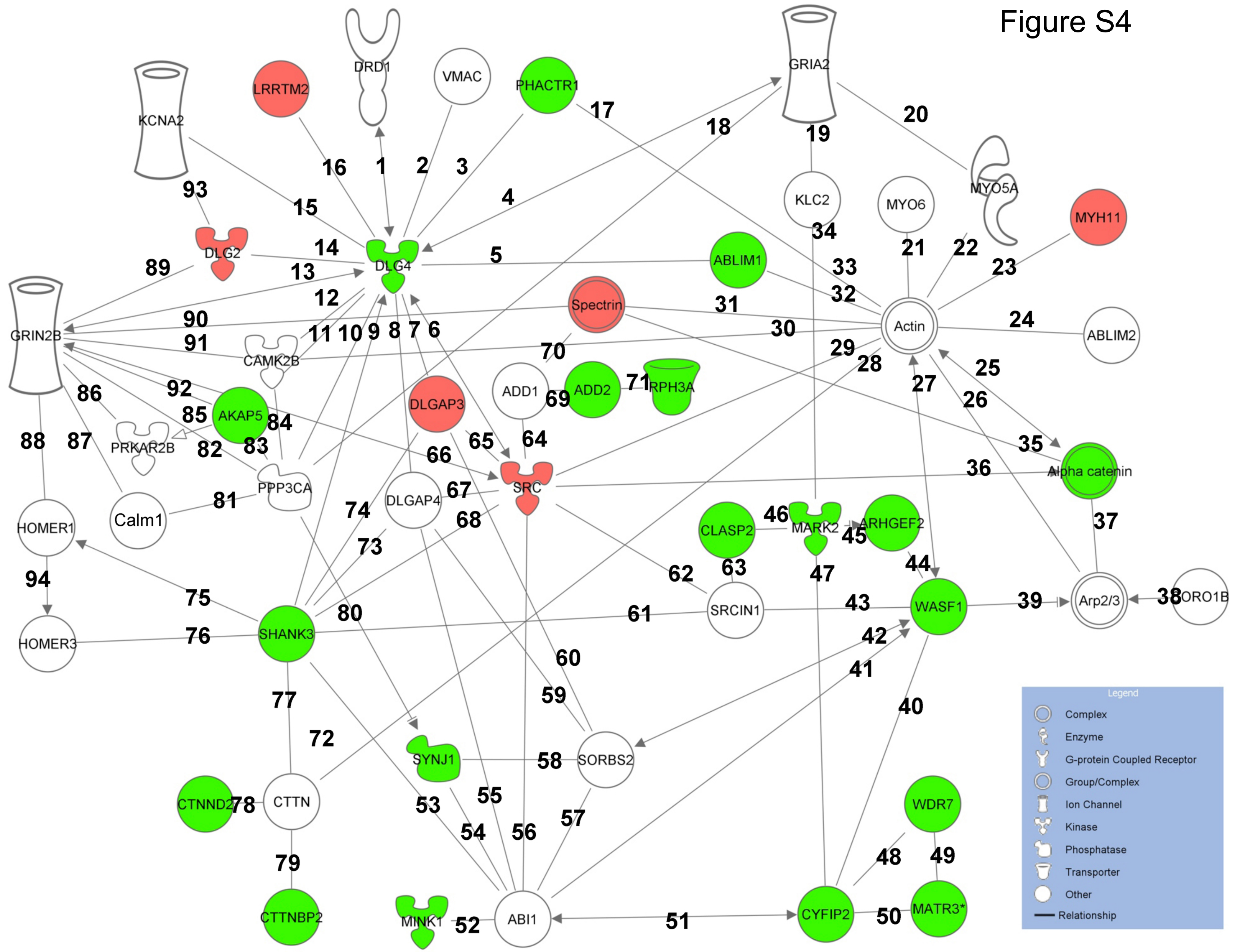
Figure S4


B
KCNA2
LRRTM2
DRD1
VMAC
PHACTR1
GRIA2
DLG2
DLG4
GRIN2B
CAMK2B
Spectrin
ABLIM1
KLC2
MYO6
MYO5A
MYH11
Actin
ABLIM2
ADD1
ADD2
RPH3A
DLGAP3
AKAP5
PRKAR2B
PPP3CA
SRC
Alpha catenin
DLGAP4
Calm1*
HOMER1
HOMER3
CLASP2
MARK2
ARHGEF2
SRCIN1
WASF1
Arp2/3
CORO1B
SHANK3
SYNJ1
SORBS2
CTNND2
CTTN
CTTNBP2
MINK1
ABI1
CYFIP2
WDR7
MATR3
Legend
Complex
Enzyme
G-protein Coupled Receptor
Group/Complex
Ion Channel
Kinase
Phosphatase
Transporter
Other
Relationship

AC

C

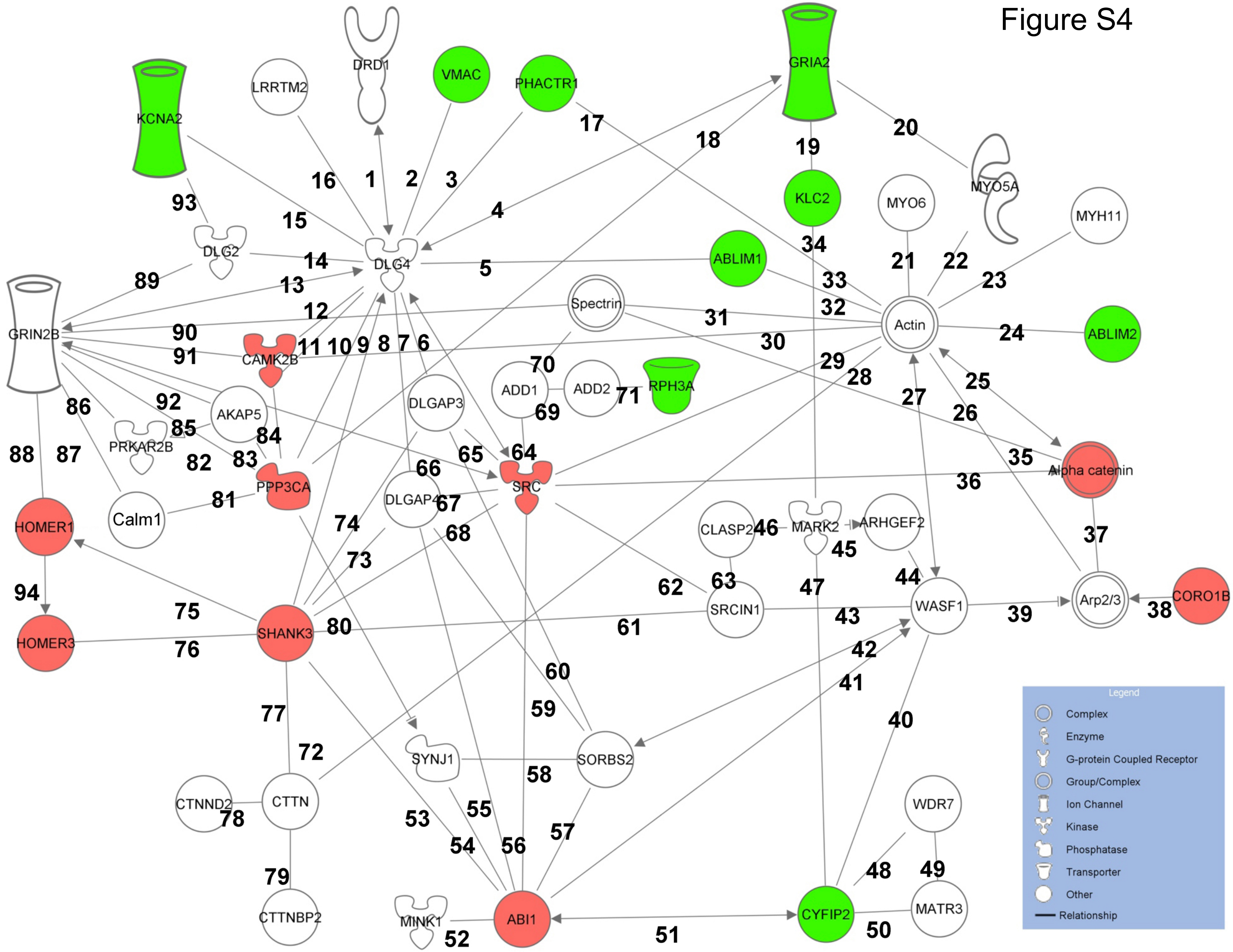
Figure S4



FC

D

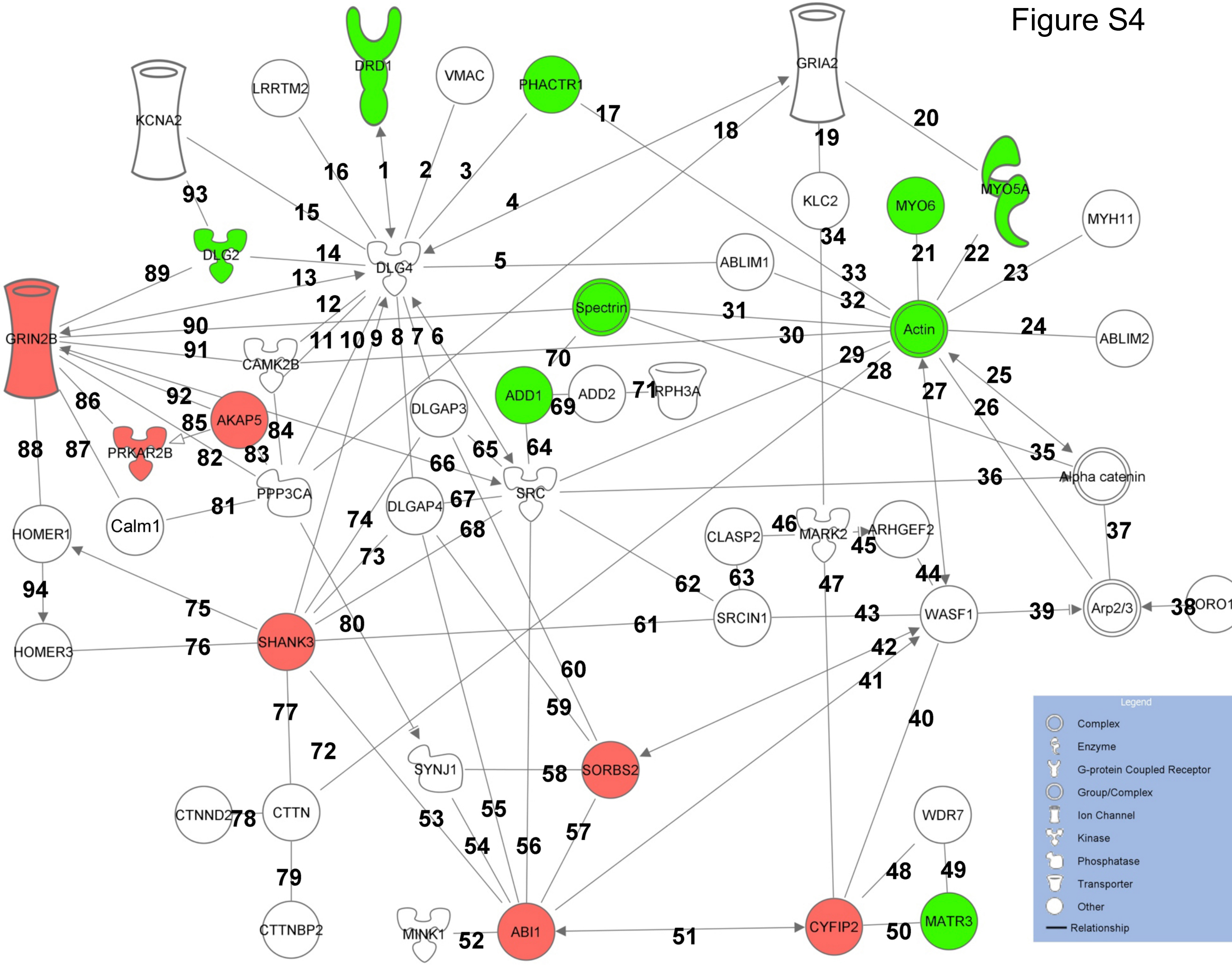
Figure S4



HIP

Figure S4

E



STR

Figure S4. Regional differences in the modulation of synaptic protein networks. Proteins of the subsynaptic cytomatrix linked to the actin-associated cytoskeleton that are regulated 24 h after FMTD training in the various brain regions were analyzed. The protein network is based on Ingenuity Pathway Analyses of networks “cellular assembly and organization” and “cell morphology”. (A) Summary picture: network integrating changes in all analyzed brain regions. Proteins with changes in more than one brain region are indicated by an asterisk. (B-E) Regulation of network components in AC (B), FC (C), HIP (D) and STR (E). Red, down-regulation; green, up-regulation; white, no significant regulation. Numbers refer to the relation of two proteins as specified in the text for download (see below). The following abbreviations are used: (see next page)

Abbreviation	Description	UniProt Accession
ABI1	abl-interactor 1	ABI1_MOUSE
ABLIM1	actin binding LIM protein 1	ABLM1_MOUSE
ABLIM2	actin binding LIM protein family, member 2	ABLM2_MOUSE
ADD1	adducin 1 (alpha)	ADDA_MOUSE
ADD2	adducin 2 (beta)	ADDB_MOUSE
AKAP5	A kinase (PRKA) anchor protein 5	AKAP5_MOUSE
Alpha catenin	Catenin, alpha1	Q545R0_MOUSE
ARHGEF2	Rho/Rac guanine nucleotide exchange factor (GEF) 2	ARHG2_MOUSE
Arp2/3	Arp2/3 Actin-related protein complex	ARPxx_MOUSE
Calm1	calmodulin 1	CALM_MOUSE
CAMK2B	calcium/calmodulin-dependent protein kinase II beta	KCC2B_MOUSE
CLASP2	cytoplasmic linker associated protein 2	CLAP2_MOUSE
CNTN1	contactin 1	CNTN1_MOUSE
CORO1B	coronin, actin binding protein, 1B	COR1B_MOUSE
CTNND2	catenin (cadherin-associated protein), delta 2	CTND2_MOUSE
CTTN	cortactin	SRC8_MOUSE
CYFIP2	cytoplasmic FMR1 interacting protein 2	CYFP2_MOUSE
DLG2	discs, large homolog 2 (Drosophila)	DLG2_MOUSE
DLG4	discs, large homolog 4 (Drosophila)	DLG4_MOUSE
DLGAP3	discs, large (Drosophila) homolog-associated protein 3	DLGP3_MOUSE
DLGAP4	discs, large (Drosophila) homolog-associated protein 4	DLGP4_MOUSE
DRD1	dopamine receptor D1	DRD1_MOUSE
GRIA2	glutamate receptor, ionotropic, AMPA 2	GRIA2_MOUSE
GRIN2B	glutamate receptor, ionotropic, N-methyl D-aspartate 2B	NMDE2_MOUSE
HOMER1	homer scaffolding protein 1	HOME1_MOUSE
HOMER3	homer scaffolding protein 3	HOME3_MOUSE
KLC2	kinesin lightchain 2	KLC2_MOUSE
LRRTM2	leucine rich repeat transmembrane neuronal 2	LRRT2_MOUSE
MARK2	MAP/microtubule affinity-regulating kinase 2	MARK2_MOUSE
MATR3	matrin 3	MATR3_MOUSE
MINK1	misshapen-like kinase 1	MINK1_MOUSE
MYO5A	myosin VA (heavy chain 12, myoxin)	MYO5A_MOUSE
MYO6	myosin VI	MYO6_MOUSE
PHACTR1	phosphatase and actin regulator 1	PHAR1_MOUSE
PPP3CA	protein phosphatase 3, catalytic subunit, alpha isozyme	PP2BA_MOUSE
PRKAR2B	protein kinase, cAMP-dependent, regulatory, type II, beta	KAP3_MOUSE
RPH3A	rabphilin 3A	RP3A_MOUSE
SHANK3	SH3 and multiple ankyrin repeat domains 3	SHAN3_MOUSE
SORBS2	sorbin and SH3 domain containing 2	SRBS2_MOUSE
Spectrin	spectrin beta-chain, non-erythrocytic 1	SPTB2_MOUSE
SRC	SRC proto-oncogene, non-receptor tyrosine kinase	SRC_MOUSE
SRCIN1	SRC kinase signaling inhibitor 1	SRCN1_MOUSE
SYNJ1	synaptojanin 1	SYNJ1_MOUSE
WASF1	WAS protein family, member 1	WASF1_MOUSE
WDR7	WD repeat domain 7	WDR7_MOUSE

Assignment of relationships #1-94

(see next page)

Relation 1:

Ingenuity Relationships

localization [2]

• PSD-95 [DLG4] protein decreases localization of human D1R [DRD1] protein to cell surface from 293t cells.

Experiment Type: immunofluorescence

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 5;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• PSD-95 [DLG4] protein decreases localization of human D1R [DRD1] protein to cell surface from 293t cells.

Experiment Type: cell surface biotinylation

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 5;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

protein-protein interactions [7]

• In 293t cells, C-terminal domain from human D1R [DRD1] protein is necessary for binding of PSD-95 [DLG4] protein and human D1R [DRD1] protein.

Experiment Type: immunoprecipitation immunoblot

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 5;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• Binding of PSD-95 [DLG4] protein and mutant human D1R [DRD1] protein (N-terminal truncation 1-333) occurs in lysate from 293t cells.

Experiment Type: pulldown assay

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• Binding of mouse Dlgh4 [Dlg4] protein and a protein fragment (218-273) from human D1R [DRD1] protein occurs in lysate from mouse brain.

Experiment Type: pulldown assay

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• Binding of mouse Dlgh4 [Dlg4] protein and a protein fragment (117-139) from human D1R [DRD1] protein occurs in lysate from mouse brain.

Experiment Type: pulldown assay

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• Binding of mouse Dlgh4 [Dlg4] protein and mutant human D1R [DRD1] protein (N-terminal truncation 1-333) occurs in lysate from mouse brain.

Experiment Type: pulldown assay

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• In 293t cells, N-terminal domain from PSD-95 [DLG4] protein is necessary for binding of PSD-95 [DLG4] protein and human D1R [DRD1] protein.

Experiment Type: immunoprecipitation immunoblot

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• Binding of PSD-95 [DLG4] protein and human D1R [DRD1] protein occurs in 293t cells.

Experiment Type: immunoprecipitation immunoblot

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

regulation of binding [2]

• In 293t cells, N-terminal domain from PSD-95 [DLG4] protein is necessary for binding of PSD-95 [DLG4] protein and human D1R [DRD1] protein.

Experiment Type: immunoprecipitation immunoblot

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

• In 293t cells, C-terminal domain from human D1R [DRD1] protein is necessary for binding of PSD-95 [DLG4] protein and human D1R [DRD1] protein.

Experiment Type: immunoprecipitation immunoblot

PMID: 17369255 Zhang J, Vinuela A, Neely MH, Hallett PJ, Grant SG, Miller GM, Isacson O, Caron MG, Yao WD. Inhibition of the dopamine D1 receptor signaling by PSD-95. J Biol Chem. 2007 May 25;282(21):15778-89. Epub 2007 Mar 16.

Source: Ingenuity Expert Findings

Relation 2:

Ingenuity Relationships

• Binding of mouse PSD-95 [Dlg4] protein and mouse AI662250 [Vmac] protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

Relation 3:

Ingenuity Relationships

protein-protein interactions [2]

• Binding of mouse Dlg4 protein and human PHACTR1 protein occurs.

PMID: 20467438 Arbuckle MI, Komiyama NH, Delaney A, Coba M, Garry EM, Rosie R, Allchorne AJ, Forsyth LH, Bence M, Carlisle HJ, O'Dell TJ, Mitchell R, Fleetwood-Walker SM, Grant SG. The SH3 domain of postsynaptic density 95 mediates inflammatory pain through phosphatidylinositol-3-kinase recruitment. EMBO Rep. 2010 Jun;11(6):473-8. Epub 2010 May 14.

Source: BIOGRID

• Binding of rat Dlg4 protein and human PHACTR1 protein occurs.

Experiment Type: peptide array analysis

PMID: 20467438 Arbuckle MI, Komiyama NH, Delaney A, Coba M, Garry EM, Rosie R, Allchorne AJ, Forsyth LH, Bence M, Carlisle HJ, O'Dell TJ, Mitchell R, Fleetwood-Walker SM, Grant SG. The SH3 domain of postsynaptic density 95 mediates inflammatory pain through phosphatidylinositol-3-kinase recruitment. EMBO Rep. 2010 Jun;11(6):473-8. Epub 2010 May 14.

Source: INTACT

Relation 4:

Ingenuity Relationships

localization [3]

• Acute inactivation of active PSD-95 [DLG4] protein decreases localization of rat GluR2 [Gria2] protein to cell surface from primary culture hippocampal neurons of 18-19 day-old embryonic rat.

Experiment Type: fluorescence microscopy

PMID: 23342049 Yudowski GA, Olsen O, Adesnik H, Marek KW, Bredt DS. Acute inactivation of PSD-95 destabilizes AMPA receptors at hippocampal synapses. PLoS One. 2013;8(1):e53965. Epub 2013 Jan 16.

Source: Ingenuity Expert Findings

• Acute inactivation of active PSD-95 [DLG4] protein decreases localization of rat GluR2 [Gria2] protein to cell surface from primary culture hippocampal neurons of 18-19 day-old embryonic rat.

Experiment Type: fluorescence microscopy

PMID: 23342049 Yudowski GA, Olsen O, Adesnik H, Marek KW, Bredt DS. Acute inactivation of PSD-95 destabilizes AMPA receptors at hippocampal synapses. PLoS One. 2013;8(1):e53965. Epub 2013 Jan 16.

Source: Ingenuity Expert Findings

• Mouse PSD-95 [Dlg4] protein is necessary for localization of mouse GluA2 [Gria2] protein to synapse from developing primary culture cortical neurons of 15 day-old embryonic mouse.

Experiment Type: immunoblot

PMID: 23486974 Murata Y, Constantine-Paton M. Postsynaptic density scaffold SAP102 regulates cortical synapse development through EphB and PAK signaling pathway. J Neurosci. 2013 Mar 13;33(11):5040-52.

Source: Ingenuity Expert Findings

protein-protein interactions [4]

• Binding of mouse Dlg4 protein and mouse Gria2 protein occurs.

Experiment Type: affinity chromatography

PMID: 15883194 Fukata Y, Tzingounis AV, Trinidad JC, Fukata M, Burlingame AL, Nicoll RA, Bredt DS. Molecular constituents of neuronal AMPA receptors. J Cell Biol. 2005 May 9;169(3):399-404.

Source: BIOGRID

• Binding of human DLG4 protein and human GRIA2 protein occurs.

Experiment Type: affinity chromatography

PMID: 16990550 Fukata Y, Adesnik H, Iwanaga T, Bredt DS, Nicoll RA, Fukata M. Epilepsy-related ligand/receptor complex LGI1 and ADAM22 regulate synaptic transmission. Science. 2006 Sep 22;313(5794):1792-5.

Source: BIOGRID

• Binding of mouse PSD-95 [Dlg4] protein and mouse Gria2 protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

• Binding of mouse Psd-95 [Dlg4] protein and mouse Glur2 [Gria2] protein occurs in mouse brain.

Experiment Type: co-immunoprecipitation

PMID: 15883194 Fukata Y, Tzingounis AV, Trinidad JC, Fukata M, Burlingame AL, Nicoll RA, Bredt DS. Molecular constituents of neuronal AMPA receptors. J Cell Biol. 2005 May 9;169(3):399-404.

Source: Ingenuity Expert Findings

Relation 5:

Ingenuity Relationships

protein-protein interactions [3]

• Binding of mouse Ablim1 protein and mouse PSD-95 [Dlg4] protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

• Binding of mouse Ablim1 protein and mouse PSD-95 [Dlg4] protein in mouse forebrain occurs.

Experiment Type: immunoprecipitation immunoblot

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

• Binding of mouse Ablim1 protein and mouse Dlg4 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: INTACT

Relation 6:

Ingenuity Relationships

localization [1]

• Binding of PSD-95 [DLG4] protein and NR2 [GRIN2B] protein increases recruitment of SRC protein.

PMID: 15336977 Bezprozvanny I, Hayden MR. Deranged neuronal calcium signaling and Huntington disease. Biochem Biophys Res Commun. 2004 Oct 1;322(4):1310-7.

Source: Ingenuity Expert Findings

protein-protein interactions [9]

• Binding of rat Dlg4 protein and mouse Src protein occurs.

Experiment Type: pulldown assay

PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.

Source: MINT

• Binding of rat Dlg4 protein and mouse Src protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.

Source: MINT

• Binding of mouse Psd-95 [Dlg4] protein and mouse Src protein occurs in synaptosomes from mouse brain.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 9892651 Tezuka T, Umemori H, Akiyama T, Nakanishi S, Yamamoto T. PSD-95 promotes Fyn-mediated tyrosine phosphorylation of the N-methyl-D-aspartate receptor subunit NR2A. Proc Natl Acad Sci U S A. 1999 Jan 19;96(2):435-40.
Source: Ingenuity Expert Findings
• Binding of mouse PSD-95 [Dlg4] protein and mouse Src protein in lipid rafts from mouse cerebral cortex occurs.
Experiment Type: affinity precipitation, immunoblot
PMID: 20554866 Delint-Ramirez I, Fernández E, Bayés A, Kicsi E, Komiyama NH, Grant SG. In vivo composition of NMDA receptor signaling complexes differs between membrane subdomains and is modulated by PSD-95 and PSD-93. J Neurosci. 2010 Jun 16;30(24):8162-70.
Source: Ingenuity Expert Findings
• Binding of rat Dlg4 protein and mouse Src protein occurs.
Experiment Type: ELISA
PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.
Source: MINT
• Association of PSD-95 [DLG4] and Src occurs.
PMID: 9892651 Tezuka T, Umemori H, Akiyama T, Nakanishi S, Yamamoto T. PSD-95 promotes Fyn-mediated tyrosine phosphorylation of the N-methyl-D-aspartate receptor subunit NR2A. Proc Natl Acad Sci U S A. 1999 Jan 19;96(2):435-40.
Source: Ingenuity ExpertAssist Findings
• Original Sentence: PSD-95 also associated with other Src-family PTKs, Src, Yes, and Lyn.
Binding of rat Dlg4 protein and mouse Src protein occurs.
Experiment Type: pulldown assay
PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.
Source: INTACT
• Binding of rat Dlg4 protein and mouse Src protein occurs.
Experiment Type: ELISA
PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.
Source: INTACT
• Binding of rat Dlg4 protein and mouse Src protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.
Source: INTACT

Relation 7:
Ingenuity Relationships
protein-protein interactions [5]
• Binding of rat Dlg4 protein and rat Dlgap3 protein occurs.
Experiment Type: two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: INTACT
• Binding of human DLG4 protein and human DLGAP3 protein occurs.
Experiment Type: two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: BIOGRID
• Binding of a protein fragment (463-605) from rat SAPAP3 [Dlgap3] protein and a protein fragment (534-724) containing a guanylate kinase domain from rat Psd95 [Dlg4] protein occurs in yeast.
Experiment Type: yeast two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: Ingenuity Expert Findings
• Binding of mouse PSD-95 [Dlg4] protein and mouse Dlgap3 protein in mouse forebrain occurs.
Experiment Type: tandem affinity purification
PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.
Source: Ingenuity Expert Findings
• Binding of a protein fragment (430-724) containing a guanylate kinase domain and a SH3 domain from rat Psd95 [Dlg4] protein and a protein fragment (463-605) from rat SAPAP3 [Dlgap3] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: Ingenuity Expert Findings

Relation 8:
Ingenuity Relationships
protein-protein interactions [5]

• Binding of a protein fragment (370-617) from rat SAPAP4 [Dlgap4] protein and a protein fragment (534-724) containing a guanylate kinase domain from rat Psd95 [Dlg4] protein occurs in yeast.
Experiment Type: yeast two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Dlgap4 protein in mouse forebrain occurs.
Experiment Type: tandem affinity purification
PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.
Source: Ingenuity Expert Findings

• Binding of a protein fragment (370-617) from rat SAPAP4 [Dlgap4] protein and a protein fragment (430-724) containing a guanylate kinase domain and a SH3 domain from rat Psd95 [Dlg4] protein occurs in yeast.
Experiment Type: yeast two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and human DLGAP4 protein occurs.
Experiment Type: two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: BIOGRID

• Binding of rat Dlg4 protein and rat Dlgap4 protein occurs.
Experiment Type: two-hybrid assay
PMID: 9115257 Takeuchi M, Hata Y, Hirao K, Toyoda A, Irie M, Takai Y. SAPAPs. A family of PSD-95/SAP90-associated proteins localized at postsynaptic density. J Biol Chem. 1997 May 2;272(18):11943-51.
Source: INTACT

Relation 9:
Ingenuity Relationships
expression [2]

• Rat Prosap2 [Shank3] protein increases expression of rat PSD-95 [Dlg4] protein in primary culture hippocampal neurons from 18 day-old embryonic rat.
Experiment Type: immunofluorescence
PMID: 23100419 Arons MH, Thynne CJ, Grabrucker AM, Li D, Schoen M, Cheyne JE, Boeckers TM, Montgomery JM, Garner CC. Autism-associated mutations in ProSAP2/Shank3 impair synaptic transmission and neurexin-neuroligin-mediated transsynaptic signaling. J Neurosci. 2012 Oct 24;32(43):14966-78.
Source: Ingenuity Expert Findings

•Rat Prosap2 [Shank3] protein increases expression of rat PSD-95 [Dlg4] protein in primary culture hippocampal neurons from 18 day-old embryonic rat.
Experiment Type: immunofluorescence
PMID: 23100419 Arons MH, Thynne CJ, Grabrucker AM, Li D, Schoen M, Cheyne JE, Boeckers TM, Montgomery JM, Garner CC. Autism-associated mutations in ProSAP2/Shank3 impair synaptic transmission and neurexin-neuroligin-mediated transsynaptic signaling. J Neurosci. 2012 Oct 24;32(43):14966-78.
Source: Ingenuity Expert Findings

protein-protein interactions [2]

• Binding of rat Dlgh4 [Dlg4] protein and rat Shank3 protein occurs.
PMID: 10527873 Boeckers TM, Winter C, Smalla KH, Kreutz MR, Bockmann J, Seidenbecher C, Garner CC, Gundelfinger ED. Proline-rich synapse-associated proteins ProSAP1 and ProSAP2 interact with synaptic proteins of the SAPAP/GKAP family. Biochem Biophys Res Commun. 1999 Oct 14;264(1):247-52.
Source: BIND

• Binding of rat Dlgh4 [Dlg4] protein and rat Shank3 protein occurs.

Experiment Type: co-immunoprecipitation

PMID: 15531608 Pagel P, Kovac S, Oesterheld M, Brauner B, Dunger-Kaltenbach I, Frishman G, Montrone C, Mark P, Stümpflen V, Mewes HW, Ruepp A, Frishman D. The MIPS mammalian protein-protein interaction database. Bioinformatics. 2005 Mar;21(6):832-4. Epub 2004 Nov 5.

Source: MIPS

Relation 10:

Ingenuity Relationships

• Binding of mouse PSD-95 [Dlg4] protein and mouse Ppp3ca protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

Relation11:

Ingenuity Relationships

protein-protein interactions [10]

• Binding of human AKAP79 [AKAP5] protein and PSD-95 [DLG4] protein in HEK 293 cells occurs.

Experiment Type: co-immunoprecipitation, immunoblot

19535604 Robertson HR, Gibson ES, Benke TA, Dell'Acqua ML. Regulation of postsynaptic structure and function by an A-kinase anchoring protein-membrane-associated guanylate kinase scaffolding complex. J Neurosci. 2009 Jun 17;29(24):7929-43.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of human AKAP79 [AKAP5] protein and a protein fragment containing a mutant SH3 domain (p.W470A) from rat Psd-95 [Dlg4] protein is the same as binding of human AKAP79 [AKAP5] protein and a protein fragment containing a SH3 domain from rat Psd-95 [Dlg4] protein.

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of human AKAP79 [AKAP5] protein and a protein fragment containing a SH3 domain from rat Psd-95 [Dlg4] protein is greater than binding of human AKAP79 [AKAP5] protein and a protein fragment containing a mutant SH3 domain (p.L460P) from rat Psd-95 [Dlg4] protein.

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: Ingenuity Expert Findings

• Binding of human AKAP79 [AKAP5] protein and rat Psd-95 [Dlg4] protein and NR2B [GRIN2B] protein occurs in Cos-7 cells.

Experiment Type: co-immunoprecipitation

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: Ingenuity Expert Findings

• Binding of human AKAP79 [AKAP5] protein and rat Psd-95 [Dlg4] protein occurs in a system of purified components.

Experiment Type: pulldown assay

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: Ingenuity Expert Findings

• Binding of mutant human AKAP79 [AKAP5] protein (p.X316* or 316-End) and PSD-95 [DLG4] protein in HEK 293 cells occurs.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 19535604 Robertson HR, Gibson ES, Benke TA, Dell'Acqua ML. Regulation of postsynaptic structure and function by an A-kinase anchoring protein-membrane-associated guanylate kinase scaffolding complex. J Neurosci. 2009 Jun 17;29(24):7929-43.

Source: Ingenuity Expert Findings

• Binding of human AKAP5 protein and rat Dlg4 protein occurs.

Experiment Type: affinity chromatography

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: BIOGRID

• Binding of rat Akap150 [Akap5] protein and rat PSD-95 [Dlg4] protein occurs in Triton X-100 soluble fractions from forebrain of 21-28 day-old rat.

Experiment Type: immunoprecipitation immunoblot

PMID: 15930126 Gorski JA, Gomez LL, Scott JD, Dell'Acqua ML. Association of an A-kinase-anchoring protein signaling scaffold with cadherin adhesion molecules in neurons and epithelial cells. Mol Biol Cell. 2005 Aug;16(8):3574-90. Epub 2005 Jun 1.

Source: Ingenuity Expert Findings

• Binding of human AKAP5 protein and rat Dlg4 protein occurs.

Experiment Type: pulldown assay
PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.
Source: BIOGRID
• Binding of human AKAP79 [AKAP5] protein and rat Psd-95 [Dlg4] protein occurs in Cos-7 cells.
Experiment Type: co-immunoprecipitation
PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.
Source: Ingenuity Expert Findings

Relation 12:
Ingenuity Relationships
<u>protein-protein interactions [1]</u>
• Binding of mouse Camk2b protein and mouse PSD-95 [Dlg4] protein in mouse forebrain occurs.
Experiment Type: tandem affinity purification
PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.
Source: Ingenuity Expert Findings

Relation 13:
Ingenuity Relationships
<u>activation [1]</u>
• In Xenopus oocytes, rat Psd-95 [Dlg4] protein decreases channel protein activity of a protein-protein complex consisting of mouse Nmdar [Grin1] and of mouse Nmda Receptor epsilon2 [Grin2b] that is increased by PKC protein(s).
PMID: 10037761 Yamada Y, Chochi Y, Takamiya K, Sobue K, Inui M. Modulation of the channel activity of the epsilon2/zeta1-subtype N-methyl D-aspartate receptor by PSD-95. J Biol Chem. 1999 Mar 5;274(10):6647-52.
Source: Ingenuity Expert Findings

<u>phosphorylation [2]</u>
• Interaction of PSD-95 [DLG4] protein and mutant HTT protein (insertion with its polyglutamine repeat inserted) increases tyrosine phosphorylation of NR2B [GRIN2B] protein.
PMID: 16101555 Rego AC, de Almeida LP. Molecular targets and therapeutic strategies in Huntington's disease. Curr Drug Targets CNS Neurol Disord. 2005 Aug;4(4):361-81.
Source: Ingenuity Expert Findings
• PSD-95 [DLG4] protein increases tyrosine phosphorylation of NR2B [GRIN2B] protein in 293t cells that is increased by mutant HTT protein (insertion with its polyglutamine repeat (48 repeats) inserted).
Experiment Type: immunoblot
PMID: 12810713 Song C, Zhang Y, Parsons CG, Liu YF. Expression of polyglutamine-expanded huntingtin induces tyrosine phosphorylation of N-methyl-D-aspartate receptors. J Biol Chem. 2003 Aug 29;278(35):33364-9. Epub 2003 Jun 16.
Source: Ingenuity Expert Findings

<u>protein-protein interactions [214]</u>
• Binding of rat Dlg4 protein and rat Grin2b protein occurs.
Experiment Type: two-hybrid assay
PMID: 7569905 Kornau HC, Schenker LT, Kennedy MB, Seeburg PH. Domain interaction between NMDA receptor subunits and the postsynaptic density protein PSD-95. Science. 1995 Sep 22;269(5231):1737-40.
Source: INTACT
• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.V11F) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S6D) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J

Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Mutant HTT protein (unspecified protein mutation) increases disassociation of a protein-protein complex consisting of PSD-95 [DLG4] and of NR2B [GRIN2B].
PMID: 17303312 Popoli P, Blum D, Martire A, Ledent C, Ceruti S, Abbracchio MP. Functions, dysfunctions and possible therapeutic relevance of adenosine A2A receptors in Huntington's disease. Prog Neurobiol. 2007 Apr;81(5-6):331-48. Epub 2007 Jan 9.
Source: Ingenuity Expert Findings
• Binding of rat PSD-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in Preoptic region from proestrus stage female rat.
Experiment Type: co-immunoprecipitation
PMID: 17553983 d'Anglemont de Tassigny X, Campagne C, Dehouck B, Leroy D, Holstein GR, Beauvillain JC, Buée-Scherrer V, Prevot V. Coupling of neuronal nitric oxide synthase to NMDA receptors via postsynaptic density-95 depends on estrogen and contributes to the central control of adult female reproduction. J Neurosci. 2007 Jun 6;27(23):6103-14.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7D) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
•In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S9A) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In neurons, a protein chimera composed of a protein fragment (KLSSIESDV) containing a C-terminal domain from NR2B [GRIN2B] protein and of a protein fragment (YGRKKRRQRRR) from HIV viral Tat protein a decreases binding of rat Psd-95 [Dlg4] protein and rat Nr2b [Grin2b] protein.
PMID: 12399596 Aarts M, Liu Y, Liu L, Besshoh S, Arundine M, Gurd JW, Wang YT, Salter MW, Tymianski M. Treatment of ischemic brain damage by perturbing NMDA receptor- PSD-95 protein interactions. Science. 2002 Oct 25;298(5594):846-50.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.V11L) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.V11I) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg4 protein and rat Grin2b protein occurs.
Experiment Type: two-hybrid assay
PMID: 9647694 Kurschner C, Mermelstein PG, Holden WT, Surmeier DJ. CIPP, a novel multivalent PDZ domain protein, selectively interacts with Kir4.0 family members, NMDA receptor subunits, neurexins, and neuroligins. Mol Cell Neurosci. 1998 Jun;11(3):161-72.
Source: MINT
• Binding of human DLG4 protein and human GRIN2B protein occurs.
Experiment Type: affinity chromatography
PMID: 7569905 Kornau HC, Schenker LT, Kennedy MB, Seeburg PH. Domain interaction between NMDA receptor subunits and the postsynaptic density protein PSD-95. Science. 1995 Sep 22;269(5231):1737-40.
Source: BIOGRID
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat Psd95/sap90 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in rat hippocampus.

Experiment Type: co-immunoprecipitation

PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.Y1D) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S6D) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Grin2b protein in cortex from mouse brain occurs.

Experiment Type: co-immunoprecipitation

PMID: 22933778 Wang YB, Wang JJ, Wang SH, Liu SS, Cao JY, Li XM, Qiu S, Luo JH. Adaptor protein APPL1 couples synaptic NMDA receptor with neuronal prosurvival phosphatidylinositol 3-kinase/Akt pathway. J Neurosci. 2012 Aug 29;32(35):11919-29.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Nmdar2b [Grin2b] protein in postsynaptic density from mouse cerebral cortex occurs.

Experiment Type: affinity precipitation, immunoblot

PMID: 20554866 Delint-Ramirez I, Fernández E, Bayés A, Kicsi E, Komiyama NH, Grant SG. In vivo composition of NMDA receptor signaling complexes differs between membrane subdomains and is modulated by PSD-95 and PSD-93. J Neurosci. 2010 Jun 16;30(24):8162-70.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: affinity chromatography

PMID: 16554481 Son GH, Geum D, Chung S, Kim EJ, Jo JH, Kim CM, Lee KH, Kim H, Choi S, Kim HT, Lee CJ, Kim K. Maternal stress produces learning deficits associated with impairment of NMDA receptor-mediated synaptic plasticity. J Neurosci. 2006 Mar 22;26(12):3309-18.

Source: BIOGRID

• Binding of mouse Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: two-hybrid assay

PMID: 9647694 Kurschner C, Mermelstein PG, Holden WT, Surmeier DJ. CIPP, a novel multivalent PDZ domain protein, selectively interacts with Kir4.0 family members, NMDA receptor subunits, neurexins, and neuroligins. Mol Cell Neurosci. 1998 Jun;11(3):161-72.

Source: INTACT

• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein occurs in mouse hippocampus.

Experiment Type: immunoprecipitation immunoblot

PMID: 17673549 Norris EH, Strickland S. Modulation of NR2B-regulated contextual fear in the hippocampus by the tissue plasminogen activator system. Proc Natl Acad Sci U S A. 2007 Aug 14;104(33):13473-8. Epub 2007 Aug 2.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S6D) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10S) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Grin2b protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S9A) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of Psd95 [DLG4] protein and Nr2b [GRIN2B] protein and Mals2 [LIN7B] protein occurs in lysate from Cos-7 cells.

Experiment Type: pulldown assay

PMID: 10341223 Jo K, Derin R, Li M, Bredt DS. Characterization of MALS/Velis-1, -2, and -3: a family of mammalian LIN-7 homologs enriched at brain synapses in association with the postsynaptic density-95/NMDA receptor postsynaptic complex. J Neurosci. 1999 Jun 1;19(11):4189-99.

Source: Ingenuity Expert Findings

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 7569905 Kornau HC, Schenker LT, Kennedy MB, Seeburg PH. Domain interaction between NMDA receptor subunits and the postsynaptic density protein PSD-95. Science. 1995 Sep 22;269(5231):1737-40.

Source: INTACT

• Binding of human DLG4 protein and human GRIN2B protein occurs.

Experiment Type: pulldown assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: BIOGRID

• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10K) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of PSD95 [DLG4] protein and NR2 [GRIN2B] protein occurs.

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (KLSSIESDV) containing a PDZ binding motif from NMDAR2B [GRIN2B] protein and a protein fragment containing a pdz domain 1-3 from mouse PSD-95 [Dlg4] protein in yeast occurs.

Experiment Type: yeast two-hybrid assay

PMID: 20219992 Yamagata M, Sanes JR. Synaptic localization and function of Sidekick recognition molecules require MAGI scaffolding proteins. J Neurosci. 2010 Mar 10;30(10):3579-88.
Source: Ingenuity Expert Findings
• Binding of rat Dlg4 protein and rat Grin2b protein occurs.
Experiment Type: two-hybrid assay
PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.
Source: MINT
• Binding of human DLG4 protein and human GRIN2B protein occurs.
Experiment Type: two-hybrid assay
PMID: 9278515 Irie M, Hata Y, Takeuchi M, Ichtchenko K, Toyoda A, Hirao K, Takai Y, Rosahl TW, Südhof TC. Binding of neuroligins to PSD-95. Science. 1997 Sep 5;277(5331):1511-5.
Source: BIOGRID
• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein in YAC72 mice striatum occurs.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 19726651 Fan J, Cowan CM, Zhang LY, Hayden MR, Raymond LA. Interaction of postsynaptic density protein-95 with NMDA receptors influences excitotoxicity in the yeast artificial chromosome mouse model of Huntington's disease. J Neurosci. 2009 Sep 2;29(35):10928-38.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8T) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein in mouse striatum occurs.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 19726651 Fan J, Cowan CM, Zhang LY, Hayden MR, Raymond LA. Interaction of postsynaptic density protein-95 with NMDA receptors influences excitotoxicity in the yeast artificial chromosome mouse model of Huntington's disease. J Neurosci. 2009 Sep 2;29(35):10928-38.
Source: Ingenuity Expert Findings
• Binding of a protein fragment (149-253) containing a pdz domain 2 from PSD-95 [DLG4] protein and a protein fragment (SIESDV) from NMDAR2B [GRIN2B] protein occurs in a system of purified components.
Experiment Type: competition binding assay
PMID: 11352727 Harris BZ, Hillier BJ, Lim WA. Energetic determinants of internal motif recognition by PDZ domains. Biochemistry. 2001 May 22;40(20):5921-30.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8A) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is the same as binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.
Experiment Type: solid phase binding assay
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Disassociation of a protein-protein complex consisting of PSD-95 [DLG4] and of NR2B [GRIN2B] increases activation of NMDA Receptor complex(es).
PMID: 17303312 Popoli P, Blum D, Martire A, Ledent C, Ceruti S, Abbracchio MP. Functions, dysfunctions and possible therapeutic relevance of adenosine A2A receptors in Huntington's disease. Prog Neurobiol. 2007 Apr;81(5-6):331-48. Epub 2007 Jan 9.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: two-hybrid assay
PMID: 9647694 Kurschner C, Mermelstein PG, Holden WT, Surmeier DJ. CIPP, a novel multivalent PDZ domain protein, selectively interacts with Kir4.0 family members, NMDA receptor subunits, neurexins, and neuroligins. Mol Cell Neurosci. 1998 Jun;11(3):161-72.
Source: BIOGRID
• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10K) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of human DLG4 protein and human GRIN2B protein occurs.
Experiment Type: pulldown assay
PMID: 9581762 Niethammer M, Valtschanoff JG, Kapoor TM, Allison DW, Weinberg RJ, Craig AM, Sheng M. CRIPT, a novel postsynaptic protein that binds to the third PDZ domain of PSD-95/SAP90. Neuron. 1998 Apr;20(4):693-707.
Source: BIOGRID
• Binding of mouse PSD-95 [Dlg4] protein and mouse Nmdar2b [Grin2b] protein in synaptosomal fractions from frontal cortex of 26 month-old mouse occurs.
Experiment Type: co-immunoprecipitation
PMID: 23884936 Zamzow DR, Elias V, Shumaker M, Larson C, Magnusson KR. An increase in the association of GluN2B containing NMDA receptors with membrane scaffolding proteins was related to memory declines during aging. J Neurosci. 2013 Jul 24;33(30):12300-5.
Source: Ingenuity Expert Findings
• Binding of PSD-95 [DLG4] protein and NR2 [GRIN2B] protein increases tyrosine phosphorylation of NMDA Receptor complex(es).
PMID: 15336977 Bezprozvanny I, Hayden MR. Deranged neuronal calcium signaling and Huntington disease. Biochem Biophys Res Commun. 2004 Oct 1;322(4):1310-7.
Source: Ingenuity Expert Findings
• Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.I7K) from NR2B [GRIN2B] protein occurs in a system of purified components.
Experiment Type: fluorescence anisotropy
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of rat Dlg4 protein and rat Grin2b protein occurs.
Experiment Type: pulldown assay
PMID: 7569905 Kornau HC, Schenker LT, Kennedy MB, Seeburg PH. Domain interaction between NMDA receptor subunits and the postsynaptic density protein PSD-95. Science. 1995 Sep 22;269(5231):1737-40.
Source: INTACT
• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8D) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Interaction of PSD-95 [DLG4] and NR2B [GRIN2B] occurs.

PMID: 20831617 Fan J, Vasuta OC, Zhang LY, Wang L, George A, Raymond LA. N-methyl-D-aspartate receptor subunit- and neuronal-type dependence of excitotoxic signaling through post-synaptic density 95. J Neurochem. 2010 Nov;115(4):1045-56. Epub 2010 Sep 28.

Source: Ingenuity ExpertAssist Findings

• Original Sentence: In contrast, NMDAR signaling to cell death in cultured striatal neurons occurred independently of the NR2B/PSD-95 interaction or neuronal nitric oxide synthase activation.

Binding of a protein fragment (839-1482) containing a C-terminal domain and a PDZ motif (aa sequence TDI) and a SH3 Class I binding motif (aa sequence RRRPRSP) from mutant Nr2b [GRIN2B] protein (p.Ser1480Ala with its PSD 95 binding domain mutated) and mutant PSD95 alpha [product of DLG4] protein (p.Trp470Leu with its SH3 mutated) containing a GK domain and a PDZ motif 1-3 in yeast occurs.

Experiment Type: yeast two-hybrid assay

PMID: 22375001 Cousins SL, Stephenson FA. Identification of N-methyl-D-aspartic acid (NMDA) receptor subtype-specific binding sites that mediate direct interactions with scaffold protein PSD-95. J Biol Chem. 2012 Apr 13;287(16):13465-76. Epub 2012 Feb 28.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7K) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat PSD-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in membrane from ca1/ca2 region of hippocampus of 42 day-old rat.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 17670980 Al-Hallaq RA, Conrads TP, Veenstra TD, Wenthold RJ. NMDA di-heteromeric receptor populations and associated proteins in rat hippocampus. J Neurosci. 2007 Aug 1;27(31):8334-43.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 16710293 Nakazawa T, Komai S, Watabe AM, Kiyama Y, Fukaya M, Arima-Yoshida F, Horai R, Sudo K, Ebine K, Delawary M, Goto J, Umemori H, Tezuka T, Iwakura Y, Watanabe M, Yamamoto T, Manabe T. NR2B tyrosine phosphorylation modulates fear learning as well as amygdaloid synaptic plasticity. EMBO J. 2006 Jun 21;25(12):2867-77. Epub 2006 May 18.

Source: INTACT

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: filter binding assay

PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.

Source: INTACT

• Binding of mouse Psd-95 [Dlg4] protein and mouse Nr2b [Grin2b] protein occurs in mouse spinal cord.

Experiment Type: co-immunoprecipitation

PMID: 12593798 Garry EM, Moss A, Delaney A, O'Neill F, Blakemore J, Bowen J, Husi H, Mitchell R, Grant SG, Fleetwood-Walker SM. Neuropathic sensitization of behavioral reflexes and spinal NMDA receptor/CaM kinase II interactions are disrupted in PSD-95 mutant mice. Curr Biol. 2003 Feb 18;13(4):321-8.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8Q) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10G) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of PSD-95 [DLG4] protein and NR2 [GRIN2B] protein occurs.

PMID: 15336977 Bezprozvanny I, Hayden MR. Deranged neuronal calcium signaling and Huntington disease. Biochem Biophys Res Commun. 2004 Oct 1;322(4):1310-7.

Source: Ingenuity Expert Findings

• Binding of rat PSD-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in Preoptic region from proestrus stage female rat.

Experiment Type: co-immunoprecipitation

PMID: 17553983 d'Anglemont de Tassigny X, Campagne C, Dehouck B, Leroy D, Holstein GR, Beauvillain JC, Buée-Scherrer V, Prevot V. Coupling of neuronal nitric oxide synthase to NMDA receptors via postsynaptic density-95 depends on estrogen and contributes to the central control of adult female reproduction. J Neurosci. 2007 Jun 6;27(23):6103-14.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8D) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of human AKAP79 [AKAP5] protein and rat Psd-95 [Dlg4] protein and NR2B [GRIN2B] protein occurs in Cos-7 cells.

Experiment Type: co-immunoprecipitation

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and human GRIN2B protein occurs.

Experiment Type: two-hybrid assay

PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.

Source: BIOGRID

• Binding of rat Psd95/sap90 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in rat hippocampus.

Experiment Type: co-immunoprecipitation

PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.

Source: Ingenuity Expert Findings

• Binding of PSD95 [DLG4] protein and NR2B [GRIN2B] protein occurs.

PMID: 10845110 Sheng M, Pak DT. Ligand-gated ion channel interactions with cytoskeletal and signaling proteins. Annu Rev Physiol. 2000;62:755-78.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8K) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

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PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8S) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

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Source: Ingenuity Expert Findings

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Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is the same as the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

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PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat Psd95/sap90 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in rat hippocampus.

Experiment Type: co-immunoprecipitation

PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7L) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In mouse hippocampus, mouse Plat protein is necessary for binding of mouse PSD-95 [Dlg4] protein and mouse NR2B

[Grin2b] protein.
Experiment Type: immunoprecipitation immunoblot
17673549 Norris EH, Strickland S. Modulation of NR2B-regulated contextual fear in the hippocampus by the tissue plasminogen activator system. Proc Natl Acad Sci U S A. 2007 Aug 14;104(33):13473-8. Epub 2007 Aug 2.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is the same as binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

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PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.
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PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

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Source: Ingenuity Expert Findings

• Binding of PSD-95 [DLG4] protein and NR2B [GRIN2B] protein occurs.
PMID: 17303312 Popoli P, Blum D, Martire A, Ledent C, Ceruti S, Abbracchio MP. Functions, dysfunctions and possible therapeutic relevance of adenosine A2A receptors in Huntington's disease. Prog Neurobiol. 2007 Apr;81(5-6):331-48. Epub 2007 Jan 9.

Source: Ingenuity Expert Findings

• Binding of rat PSD-95 [Dlg4] protein in Preoptic region from proestrus stage female rat and rat Nr2b [Grin2b] protein in Preoptic region from proestrus stage female rat is the same as binding of rat PSD-95 [Dlg4] protein in Preoptic region from diestrus stage female rat and rat Nr2b [Grin2b] protein in Preoptic region from diestrus stage female rat.
PMID: 17553983 d'Anglemont de Tassigny X, Campagne C, Dehouck B, Leroy D, Holstein GR, Beauvillain JC, Buée-Scherrer V, Prevot V. Coupling of neuronal nitric oxide synthase to NMDA receptors via postsynaptic density-95 depends on estrogen and contributes to the central control of adult female reproduction. J Neurosci. 2007 Jun 6;27(23):6103-14.

Source: Ingenuity Expert Findings

• Binding of mouse Dapk1 protein and mouse Dlg4 protein and mouse Grin1 protein and mouse Grin2b protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 20141836 Tu W, Xu X, Peng L, Zhong X, Zhang W, Soundarapandian MM, Balel C, Wang M, Jia N, Zhang W, Lew F, Chan SL, Chen Y, Lu Y. DAPK1 interaction with NMDA receptor NR2B subunits mediates brain damage in stroke. Cell. 2010 Jan 22;140(2):222-34.

Source: INTACT

• In dendrites, opening of eye in rat decreases binding of rat Psd95/sap90 [Dlg4] protein and rat Nr2b [Grin2b] protein.
PMID: 12552131 Yoshii A, Sheng MH, Constantine-Paton M. Eye opening induces a rapid dendritic localization of PSD-95 in central visual neurons. Proc Natl Acad Sci U S A. 2003 Feb 4;100(3):1334-9. Epub 2003 Jan 27.

Source: Ingenuity Expert Findings

• Binding of C-terminal domain from Nr2b [GRIN2B] protein and a protein fragment (84-398) containing a pdz domain 1-2 from human PSD95 [DLG4] protein occurs in a cell free system.
Experiment Type: protein overlay assay
PMID: 15347662 Fitzgerald ML, Okuhira K, Short GF, Manning JJ, Bell SA, Freeman MW. ATP-binding cassette transporter A1 contains a novel C-terminal VFVNFA motif that is required for its cholesterol efflux and ApoA-I binding activities. J Biol Chem. 2004 Nov 12;279(46):48477-85. Epub 2004 Sep 3.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Grin2b protein in cortex from 1 week-old mouse occurs.
Experiment Type: co-immunoprecipitation
PMID: 22578505 Martel MA, Ryan TJ, Bell KF, Fowler JH, McMahon A, Al-Mubarak B, Komiyama NH, Horsburgh K, Kind PC, Grant SG, Wyllie DJ,

Hardingham GE. The subtype of GluN2 C-terminal domain determines the response to excitotoxic insults. Neuron. 2012 May 10;74(3):543-56.
Source: Ingenuity Expert Findings
• Binding of PSD-95 [DLG4] protein and mutant NR2 [GRIN2B] protein (N-terminal truncation with its C-terminal tail retained) occurs.
PMID: 17188796 Fan MM, Raymond LA. N-methyl-D-aspartate (NMDA) receptor function and excitotoxicity in Huntington's disease. Prog Neurobiol. 2007 Apr;81(5-6):272-93. Epub 2006 Dec 22.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.V11I) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of rat PSD-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in Preoptic region from diestrus stage female rat.
Experiment Type: co-immunoprecipitation
PMID: 17553983 d'Anglemont de Tassigny X, Campagne C, Dehouck B, Leroy D, Holstein GR, Beauvillain JC, Buée-Scherrer V, Prevot V. Coupling of neuronal nitric oxide synthase to NMDA receptors via postsynaptic density-95 depends on estrogen and contributes to the central control of adult female reproduction. J Neurosci. 2007 Jun 6;27(23):6103-14.
Source: Ingenuity Expert Findings
• In a system of purified components, the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of a protein fragment (1001-1484) from NR2B [GRIN2B] protein and a protein fragment (150-253) containing a pdz domain 2 from rat Psd95 [Dlg4] protein occurs in a cell-free system.
Experiment Type: immunoblot, pulldown assay
PMID: 17329427 Metzler M, Gan L, Wong TP, Liu L, Helm J, Liu L, Georgiou J, Wang Y, Bissada N, Cheng K, Roder JC, Wang YT, Hayden MR. NMDA receptor function and NMDA receptor-dependent phosphorylation of huntingtin is altered by the endocytic protein HIP1. J Neurosci. 2007 Feb 28;27(9):2298-308.
Source: Ingenuity Expert Findings
• In a system of purified components, the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8S) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.I7G) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein occurs in a system of purified components.
Experiment Type: fluorescence anisotropy
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: affinity chromatography

PMID: 15663482 Amparan D, Avram D, Thomas CG, Lindahl MG, Yang J, Bajaj G, Ishmael JE. Direct interaction of myosin regulatory light chain with the NMDA receptor. J Neurochem. 2005 Jan;92(2):349-61.

Source: BIOGRID

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.

Source: MINT

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: pulldown assay

PMID: 17950729 Christenn M, Kindler S, Schulz S, Buck F, Richter D, Kreienkamp HJ. Interaction of brain somatostatin receptors with the PDZ domains of PSD-95. FEBS Lett. 2007 Nov 13;581(27):5173-7. Epub 2007 Oct 12.

Source: INTACT

• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg4 protein and mouse Grin1 protein and mouse Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 20141836 Tu W, Xu X, Peng L, Zhong X, Zhang W, Soundarapandian MM, Balel C, Wang M, Jia N, Zhang W, Lew F, Chan SL, Chen Y, Lu Y. DAPK1 interaction with NMDA receptor NR2B subunits mediates brain damage in stroke. Cell. 2010 Jan 22;140(2):222-34.

Source: INTACT

• Binding of rat PSD-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in membrane from ca1/ca2 region of hippocampus of 42 day-old rat.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 17670980 Al-Hallaq RA, Conrads TP, Veenstra TD, Wenthold RJ. NMDA di-heteromeric receptor populations and associated proteins in rat hippocampus. J Neurosci. 2007 Aug 1;27(31):8334-43.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8D) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8D) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7K) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and human GRIN2B protein occurs.

Experiment Type: protein overlay assay

PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.

Source: BIOGRID

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8K) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8F) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8A) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is the same as binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Association of rat Dlg4 protein and rat Grin1 protein and rat Grin2b protein and rat Prickle2 protein and mouse Vangl2 protein occurs.

Experiment Type: pulldown assay

PMID: 23567299 Yoshioka T, Hagiwara A, Hida Y, Ohtsuka T. Vangl2, the planar cell polarity protein, is complexed with postsynaptic density protein PSD-95 [corrected]. FEBS Lett. 2013 May 21;587(10):1453-9. Epub 2013 Apr 6.

Source: INTACT

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.V11F) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Novel taste learning by adult male rat increases binding of 95 kd rat Psd95 [Dlg4] protein and phosphorylated (Y) rat Nr2b [Grin2b] protein in insular cortex from brain of adult male rat.

Experiment Type: anti-phosphoresidue immunoprecipitation

PMID: 19625512 Barki-Harrington L, Elkobi A, Tzabary T, Rosenblum K. Tyrosine phosphorylation of the 2B subunit of the NMDA receptor is necessary for taste memory formation. J Neurosci. 2009 Jul 22;29(29):9219-26.

Source: Ingenuity Expert Findings

• Binding of human PSD95 [DLG4] protein and GluN2B [GRIN2B] protein and mouse Srr protein in lysate from SH-SY5Y cells occurs.

Experiment Type: co-immunoprecipitation

PMID: 25164819 Ma TM, Paul BD, Fu C, Hu S, Zhu H, Blackshaw S, Wolosker H, Snyder SH. Serine racemase regulated by binding to stargazin and PSD-95: potential N-methyl-D-aspartate-α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (NMDA-AMPA) glutamate neurotransmission cross-talk. J Biol Chem. 2014 Oct 24;289(43):29631-41. Epub 2014 Aug 27.

Source: Ingenuity Expert Findings

• Binding of carboxy terminal domain from rat Nr2b [Grin2b] protein and rat Psd-95 [Dlg4] protein occurs in synaptosomal fractions from rat brain.

Experiment Type: pulldown assay

PMID: 11679592 Fallon L, Moreau F, Croft BG, Labib N, Gu WJ, Fon EA. Parkin and CASK/LIN-2 associate via a PDZ-mediated interaction and are co-

localized in lipid rafts and postsynaptic densities in brain. J Biol Chem. 2002 Jan 4;277(1):486-91. Epub 2001 Oct 25.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID
• Binding of rat Dlgh4 [Dlg4] protein and rat Grin2b protein occurs.
PMID: 7569905 Kornau HC, Schenker LT, Kennedy MB, Seeburg PH. Domain interaction between NMDA receptor subunits and the postsynaptic density protein PSD-95. Science. 1995 Sep 22;269(5231):1737-40.
Source: BIND
• Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein occurs in a system of purified components.
Experiment Type: fluorescence anisotropy
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: pulldown assay
PMID: 17950729 Christenn M, Kindler S, Schulz S, Buck F, Richter D, Kreienkamp HJ. Interaction of brain somatostatin receptors with the PDZ domains of PSD-95. FEBS Lett. 2007 Nov 13;581(27):5173-7. Epub 2007 Oct 12.
Source: MINT
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7M) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.I7G) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of mouse PSD-95 [Dlg4] protein and mouse Grin2b protein in cortex from mouse brain occurs.
Experiment Type: co-immunoprecipitation
PMID: 22933778 Wang YB, Wang JJ, Wang SH, Liu SS, Cao JY, Li XM, Qiu S, Luo JH. Adaptor protein APPL1 couples synaptic NMDA receptor with neuronal prosurvival phosphatidylinositol 3-kinase/Akt pathway. J Neurosci. 2012 Aug 29;32(35):11919-29.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S9A) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of human DLG4 protein and human GRIN2B protein occurs.
Experiment Type: pulldown assay
PMID: 7569905 Kornau HC, Schenker LT, Kennedy MB, Seeburg PH. Domain interaction between NMDA receptor subunits and the postsynaptic density protein PSD-95. Science. 1995 Sep 22;269(5231):1737-40.
Source: BIOGRID
• Binding of mouse PSD-95 [Dlg4] protein and mouse Nmdar2b [Grin2b] protein in postsynaptic density from mouse cerebral cortex occurs.
Experiment Type: affinity precipitation, immunoblot
PMID: 20554866 Delint-Ramirez I, Fernández E, Bayés A, Kicsi E, Komiyama NH, Grant SG. In vivo composition of NMDA receptor signaling complexes differs between membrane subdomains and is modulated by PSD-95 and PSD-93. J Neurosci. 2010 Jun 16;30(24):8162-70.
Source: Ingenuity Expert Findings
• Binding of rat Nr2a [Grin2a] protein and rat Nr2b [Grin2b] protein and a protein fragment (54-256) from PSD-95 [DLG4] protein occurs in a system of purified components.

Experiment Type: pulldown assay

PMID: 11222640 Gardoni F, Schrama LH, Kamal A, Gispen WH, Cattabeni F, Di Luca M. Hippocampal synaptic plasticity involves competition between Ca2+/calmodulin-dependent protein kinase II and postsynaptic density 95 for binding to the NR2A subunit of the NMDA receptor. J Neurosci. 2001 Mar 1;21(5):1501-9.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7L) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is the same as the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat Dlgh4 [Dlg4] protein and rat Grin2b protein occurs.

Experiment Type: co-immunoprecipitation

PMID: 15531608 Pagel P, Kovac S, Oesterheld M, Brauner B, Dunger-Kaltenbach I, Frishman G, Montrone C, Mark P, Stümpflen V, Mewes HW, Ruepp A, Frishman D. The MIPS mammalian protein-protein interaction database. Bioinformatics. 2005 Mar;21(6):832-4. Epub 2004 Nov 5.

Source: MIPS

• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein occurs in mouse hippocampus.

Experiment Type: immunoprecipitation immunoblot

PMID: 17673549 Norris EH, Strickland S. Modulation of NR2B-regulated contextual fear in the hippocampus by the tissue plasminogen activator system. Proc Natl Acad Sci U S A. 2007 Aug 14;104(33):13473-8. Epub 2007 Aug 2.

Source: Ingenuity Expert Findings

• Binding of rat Psd95/sap90 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in rat hippocampus.

Experiment Type: co-immunoprecipitation

PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.

Source: Ingenuity Expert Findings

• Binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat Dlgh4 [Dlg4] protein and rat Grin2b protein occurs.

PMID: 10627592 Nehring RB, Wischmeyer E, Döring F, Veh RW, Sheng M, Karschin A. Neuronal inwardly rectifying K(+) channels differentially couple to PDZ proteins of the PSD-95/SAP90 family. J Neurosci. 2000 Jan 1;20(1):156-62.

Source: BIND

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: two-hybrid assay

PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.

Source: INTACT

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.I7A) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S9A) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Grin2b protein in cortex from 1 week-old mouse occurs.

Experiment Type: co-immunoprecipitation

PMID: 22578505 Martel MA, Ryan TJ, Bell KF, Fowler JH, McMahon A, Al-Mubarak B, Komiyama NH, Horsburgh K, Kind PC, Grant SG, Wyllie DJ, Hardingham GE. The subtype of GluN2 C-terminal domain determines the response to excitotoxic insults. Neuron. 2012 May 10;74(3):543-56.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (1-428) from Psd-95 [DLG4] protein and a protein fragment (1289-1482) from rat Nr2b [Grin2b] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 9647694 Kurschner C, Mermelstein PG, Holden WT, Surmeier DJ. CIPP, a novel multivalent PDZ domain protein, selectively interacts with Kir4.0 family members, NMDA receptor subunits, neurexins, and neuroligins. Mol Cell Neurosci. 1998 Jun;11(3):161-72.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S6D) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of PSD-95 [DLG4] protein and NR2 [GRIN2B] protein increases recruitment of SRC protein.

PMID: 15336977 Bezprozvanny I, Hayden MR. Deranged neuronal calcium signaling and Huntington disease. Biochem Biophys Res Commun. 2004 Oct 1;322(4):1310-7.

Source: Ingenuity Expert Findings

• Binding of mouse Psd-95 [Dlg4] protein and mouse Nr2a [Grin2a] protein and mouse Nr2b [Grin2b] protein occurs in a cell fraction from mouse thalamus.

Experiment Type: immunoblot

PMID: 9870943 Furuyashiki T, Fujisawa K, Fujita A, Madaule P, Uchino S, Mishina M, Bito H, Narumiya S. Citron, a Rho-target, interacts with PSD-95/SAP-90 at glutamatergic synapses in the thalamus. J Neurosci. 1999 Jan 1;19(1):109-18.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

PMID: 9647694 Kurschner C, Mermelstein PG, Holden WT, Surmeier DJ. CIPP, a novel multivalent PDZ domain protein, selectively interacts with Kir4.0 family members, NMDA receptor subunits, neurexins, and neuroligins. Mol Cell Neurosci. 1998 Jun;11(3):161-72.

Source: BIND

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8K) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8L) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of mutant Nr2b [GRIN2B] protein (p.Thr1152_Ile1154delinsAlaAspAla with its C-terminal domain PDZ motif mutated; p.X1158* with its PSD 95 binding domain deleted) containing a C-terminal domain SH3 Class I binding motif (aa sequence RRRPRSP) and NR1A [product of GRIN1] protein and PSD95 alpha [product of DLG4] protein containing a GK domain and a PDZ motif 1-3 and a SH3 in HEK293 cells occurs.

Experiment Type: co-immunoprecipitation

PMID: 22375001 Cousins SL, Stephenson FA. Identification of N-methyl-D-aspartic acid (NMDA) receptor subtype-specific binding sites that mediate direct interactions with scaffold protein PSD-95. J Biol Chem. 2012 Apr 13;287(16):13465-76. Epub 2012 Feb 28.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8L) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8K) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.
Experiment Type: solid phase binding assay
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 22234183 Halt AR, Dallapiazza RF, Zhou Y, Stein IS, Qian H, Juntti S, Wojcik S, Brose N, Silva AJ, Hell JW. CaMKII binding to GluN2B is critical during memory consolidation. EMBO J. 2012 Mar 7;31(5):1203-16. Epub 2012 Jan 10.
Source: INTACT

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.
Experiment Type: solid phase binding assay
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than the affinity of binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10G) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• Binding of rat Psd-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in a membrane extract from rat forebrain.
Experiment Type: co-immunoprecipitation
PMID: 12399596 Aarts M, Liu Y, Liu L, Besshoh S, Arundine M, Gurd JW, Wang YT, Salter MW, Tymianski M. Treatment of ischemic brain damage by perturbing NMDA receptor- PSD-95 protein interactions. Science. 2002 Oct 25;298(5594):846-50.
Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein occurs in a system of purified components.
Experiment Type: solid phase binding assay
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is the same as binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• Binding of rat Psd-95 [Dlg4] protein and rat Nr2a [Grin2a] protein and rat Nr2b [Grin2b] protein occurs in hippocampus from rat brain.
Experiment Type: co-immunoprecipitation
PMID: 11222640 Gardoni F, Schrama LH, Kamal A, Gispen WH, Cattabeni F, Di Luca M. Hippocampal synaptic plasticity involves competition between Ca2+/calmodulin-dependent protein kinase II and postsynaptic density 95 for binding to the NR2A subunit of the NMDA receptor. J Neurosci. 2001 Mar

1;21(5):1501-9.
Source: Ingenuity Expert Findings
• Association of rat Dlg4 protein and rat Grin2b protein and rat Prickle2 protein and mouse Vangl2 protein occurs.
Experiment Type: pulldown assay
PMID: 23567299 Yoshioka T, Hagiwara A, Hida Y, Ohtsuka T. Vangl2, the planar cell polarity protein, is complexed with postsynaptic density protein PSD-95 [corrected]. FEBS Lett. 2013 May 21;587(10):1453-9. Epub 2013 Apr 6.
Source: INTACT
• Binding of human DLG4 protein and human GRIN2B protein occurs.
Experiment Type: pulldown assay
PMID: 11723117 Imamura F, Maeda S, Doi T, Fujiyoshi Y. Ligand binding of the second PDZ domain regulates clustering of PSD-95 with the Kv1.4 potassium channel. J Biol Chem. 2002 Feb 1;277(5):3640-6. Epub 2001 Nov 26.
Source: BIOGRID
• In a system of purified components, the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is the same as the affinity of binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Association of mouse Camk2a protein and mouse Dapk1 protein and mouse Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 20141836 Tu W, Xu X, Peng L, Zhong X, Zhang W, Soundarapandian MM, Balel C, Wang M, Jia N, Zhang W, Lew F, Chan SL, Chen Y, Lu Y. DAPK1 interaction with NMDA receptor NR2B subunits mediates brain damage in stroke. Cell. 2010 Jan 22;140(2):222-34.
Source: INTACT
• Binding of rat Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 20467438 Arbuckle MI, Komiyama NH, Delaney A, Coba M, Garry EM, Rosie R, Allchorne AJ, Forsyth LH, Bence M, Carlisle HJ, O'Dell TJ, Mitchell R, Fleetwood-Walker SM, Grant SG. The SH3 domain of postsynaptic density 95 mediates inflammatory pain through phosphatidylinositol-3-kinase recruitment. EMBO Rep. 2010 Jun;11(6):473-8. Epub 2010 May 14.
Source: INTACT
• Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein occurs in a system of purified components.
Experiment Type: fluorescence anisotropy
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8T) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.S9T) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.
Experiment Type: solid phase binding assay
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
•Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein occurs in a system of purified components.
Experiment Type: fluorescence anisotropy
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein occurs in mouse hippocampus.
Experiment Type: immunoprecipitation immunoblot
PMID: 17673549 Norris EH, Strickland S. Modulation of NR2B-regulated contextual fear in the hippocampus by the tissue plasminogen activator system. Proc Natl Acad Sci U S A. 2007 Aug 14;104(33):13473-8. Epub 2007 Aug 2.
Source: Ingenuity Expert Findings
• Binding of PSD-95 [DLG4] protein in cytoplasm and GRIN2B protein in plasma membrane occurs.

PMID: 12399596 Aarts M, Liu Y, Liu L, Besshoh S, Arundine M, Gurd JW, Wang YT, Salter MW, Tymianski M. Treatment of ischemic brain damage by perturbing NMDA receptor- PSD-95 protein interactions. Science. 2002 Oct 25;298(5594):846-50.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is the same as binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10Q) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In mouse hippocampus, mouse Plat protein is necessary for binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein.

Experiment Type: immunoprecipitation immunoblot

PMID: 17673549 Norris EH, Strickland S. Modulation of NR2B-regulated contextual fear in the hippocampus by the tissue plasminogen activator system. Proc Natl Acad Sci U S A. 2007 Aug 14;104(33):13473-8. Epub 2007 Aug 2.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 16710293 Nakazawa T, Komai S, Watabe AM, Kiyama Y, Fukaya M, Arima-Yoshida F, Horai R, Sudo K, Ebine K, Delawary M, Goto J, Umemori H, Tezuka T, Iwakura Y, Watanabe M, Yamamoto T, Manabe T. NR2B tyrosine phosphorylation modulates fear learning as well as amygdaloid synaptic plasticity. EMBO J. 2006 Jun 21;25(12):2867-77. Epub 2006 May 18.

Source: MINT

• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: INTACT

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: filter binding assay

PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.

Source: MINT

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 10341223 Jo K, Derin R, Li M, Bredt DS. Characterization of MALS/Velis-1, -2, and -3: a family of mammalian LIN-7 homologs enriched at brain synapses in association with the postsynaptic density-95/NMDA receptor postsynaptic complex. J Neurosci. 1999 Jun 1;19(11):4189-99.

Source: MINT

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: two-hybrid assay

PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.

Source: BIOGRID

• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is the same as the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10E) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.E8Q) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and rat Grin2b protein occurs.

Experiment Type: two-hybrid assay

PMID: 9581762 Niethammer M, Valtschanoff JG, Kapoor TM, Allison DW, Weinberg RJ, Craig AM, Sheng M. CRIPT, a novel postsynaptic protein that binds to the third PDZ domain of PSD-95/SAP90. Neuron. 1998 Apr;20(4):693-707.

Source: BIOGRID

• Binding of postsynaptic protein PSD-95 [DLG4] and NR2B [GRIN2B] occurs.

PMID: 10617118 Takagi N, Logan R, Teves L, Wallace MC, Gurd JW. Altered interaction between PSD-95 and the NMDA receptor following transient global ischemia. J Neurochem. 2000 Jan;74(1):169-78.

Source: Ingenuity ExpertAssist Findings

Original Sentence: The postsynaptic protein PSD-95 binds to NMDA receptor subunits NR2A and NR2B and to signaling molecules such as neuronal nitric oxide synthase and p135synGAP.

•Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.

Experiment Type: affinity chromatography

PMID: 20467438 Arbuckle MI, Komiyama NH, Delaney A, Coba M, Garry EM, Rosie R, Allchorne AJ, Forsyth LH, Bence M, Carlisle HJ, O'Dell TJ, Mitchell R, Fleetwood-Walker SM, Grant SG. The SH3 domain of postsynaptic density 95 mediates inflammatory pain through phosphatidylinositol-3-kinase recruitment. EMBO Rep. 2010 Jun;11(6):473-8. Epub 2010 May 14.

Source: BIOGRID

• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein in YAC72 mice striatum occurs.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 19726651 Fan J, Cowan CM, Zhang LY, Hayden MR, Raymond LA. Interaction of postsynaptic density protein-95 with NMDA receptors influences excitotoxicity in the yeast artificial chromosome mouse model of Huntington's disease. J Neurosci. 2009 Sep 2;29(35):10928-38.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein in mouse striatum occurs.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 19726651 Fan J, Cowan CM, Zhang LY, Hayden MR, Raymond LA. Interaction of postsynaptic density protein-95 with NMDA receptors influences excitotoxicity in the yeast artificial chromosome mouse model of Huntington's disease. J Neurosci. 2009 Sep 2;29(35):10928-38.

Source: Ingenuity Expert Findings

• Binding of rat Psd-95 [Dlg4] protein and NR2B [GRIN2B] protein occurs in Cos-7 cells.

Experiment Type: co-immunoprecipitation

PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse NR2B [Grin2b] protein in YAC128 mice striatum occurs.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 19726651 Fan J, Cowan CM, Zhang LY, Hayden MR, Raymond LA. Interaction of postsynaptic density protein-95 with NMDA receptors influences excitotoxicity in the yeast artificial chromosome mouse model of Huntington's disease. J Neurosci. 2009 Sep 2;29(35):10928-38.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein is greater than binding of a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein and a mutant protein fragment (YEKLSSIESDV) (p.I7D) from NR2B [GRIN2B] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat PSD-95 [Dlg4] protein and rat Nr2b [Grin2b] protein occurs in Preoptic region from diestrus stage female rat.

Experiment Type: co-immunoprecipitation

PMID: 17553983 d'Anglemont de Tassigny X, Campagne C, Dehouck B, Leroy D, Holstein GR, Beauvillain JC, Buée-Scherrer V, Prevot V. Coupling of neuronal nitric oxide synthase to NMDA receptors via postsynaptic density-95 depends on estrogen and contributes to the central control of adult female reproduction. J Neurosci. 2007 Jun 6;27(23):6103-14.

Source: Ingenuity Expert Findings

• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10N) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.

Experiment Type: solid phase binding assay

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of PSD-95 [DLG4] protein in cytoplasm and GRIN2B protein in plasma membrane occurs.

PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a dansylated (S) protein fragment (SIESDV) from NMDAR2B [GRIN2B] protein and a protein fragment (149-253) containing a pdz domain 2 from PSD-95 [DLG4] protein is greater than the affinity of binding of a protein fragment (149-253) containing a pdz domain 2 from PSD-95 [DLG4] protein and a protein fragment (SIESDV) from NMDAR2B [GRIN2B] protein.
PMID: 11352727 Harris BZ, Hillier BJ, Lim WA. Energetic determinants of internal motif recognition by PDZ domains. Biochemistry. 2001 May 22;40(20):5921-30.
Source: Ingenuity Expert Findings
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.E8F) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of rat Dlg4 protein and rat Grin2b protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.
Source: INTACT
• Disassociation of a protein-protein complex consisting of PSD-95 [DLG4] and of NR2B [GRIN2B] increases activation of NMDA Receptor complex(es).
PMID: 17303312 Popoli P, Blum D, Martire A, Ledent C, Ceruti S, Abbracchio MP. Functions, dysfunctions and possible therapeutic relevance of adenosine A2A receptors in Huntington's disease. Prog Neurobiol. 2007 Apr;81(5-6):331-48. Epub 2007 Jan 9.
Source: Ingenuity Expert Findings
• Binding of human DLG4 protein and human GRIN2B protein occurs.
Experiment Type: affinity chromatography
PMID: 11997254 Inanobe A, Fujita A, Ito M, Tomoike H, Inageda K, Kurachi Y. Inward rectifier K+ channel Kir2.3 is localized at the postsynaptic membrane of excitatory synapses. Am J Physiol Cell Physiol. 2002 Jun;282(6):C1396-403.
Source: BIOGRID
• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7M) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10S) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein occurs in a system of purified components.
Experiment Type: solid phase binding assay
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings
• Association of mouse Dlg1 protein and mouse Dlg2 protein and mouse Dlg3 protein and mouse Dlg4 protein and mouse Grin1 protein and mouse Grin2a protein and mouse Grin2b protein occurs.
Experiment Type: anti tag coimmunoprecipitation
PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.
Source: INTACT
• Binding of mouse Dlg4 protein and mouse Grin2b protein occurs.
Experiment Type: anti tag coimmunoprecipitation
PMID: 16332682 Hoe HS, Pocivavsek A, Chakraborty G, Fu Z, Vicini S, Ehlers MD, Rebeck GW. Apolipoprotein E receptor 2 interactions with the N-methyl-D-aspartate receptor. J Biol Chem. 2006 Feb 10;281(6):3425-31. Epub 2005 Dec 6.
Source: INTACT
• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10K) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.
PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.
Source: Ingenuity Expert Findings

• Binding of a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein and a mutant protein fragment (YEKLSSIESDV) (p.I7K) from NR2B [GRIN2B] protein occurs in a system of purified components.

Experiment Type: fluorescence anisotropy

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of rat Dlg4 protein and rat Grin2b protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 10341223 Jo K, Derin R, Li M, Bredt DS. Characterization of MALS/Velis-1, -2, and -3: a family of mammalian LIN-7 homologs enriched at brain synapses in association with the postsynaptic density-95/NMDA receptor postsynaptic complex. J Neurosci. 1999 Jun 1;19(11):4189-99.

Source: INTACT

• Association of rat Dlg4 protein and rat Grin1 protein and rat Grin2b protein and rat Vangl2 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 23567299 Yoshioka T, Hagiwara A, Hida Y, Ohtsuka T. Vangl2, the planar cell polarity protein, is complexed with postsynaptic density protein PSD-95 [corrected]. FEBS Lett. 2013 May 21;587(10):1453-9. Epub 2013 Apr 6.

Source: INTACT

• In a system of purified components, binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein is greater than binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.I7D) from NR2B [GRIN2B] protein and a protein fragment (82-202) containing a pdz domain 1 from human PSD95 [DLG4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• In a system of purified components, the affinity of binding of a immobilized protein fragment (YEKLSSIESDV) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein is greater than the affinity of binding of a immobilized mutant protein fragment (YEKLSSIESDV) (p.D10A) from NR2B [GRIN2B] protein and a protein fragment (154-248) containing a pdz domain 2 from rat Psd-95 [Dlg4] protein.

PMID: 11937501 Lim IA, Hall DD, Hell JW. Selectivity and promiscuity of the first and second PDZ domains of PSD-95 and synapse-associated protein 102. J Biol Chem. 2002 Jun 14;277(24):21697-711. Epub 2002 Apr 5.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (839-1482) containing a C-terminal domain and a PDZ motif (aa sequence TDI) and a PSD 95 binding domain (aa sequence ESDV) and a SH3 Class I binding motif (aa sequence RRRPRSP) from Nr2b [GRIN2B] protein and mutant PSD95 alpha [product of DLG4] protein (p.Trp470Leu with its SH3 mutated) containing a GK domain and a PDZ motif 1-3 in yeast occurs.

Experiment Type: yeast two-hybrid assay

PMID: 22375001 Cousins SL, Stephenson FA. Identification of N-methyl-D-aspartic acid (NMDA) receptor subtype-specific binding sites that mediate direct interactions with scaffold protein PSD-95. J Biol Chem. 2012 Apr 13;287(16):13465-76. Epub 2012 Feb 28.

Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and human GRIN2B protein occurs.

Experiment Type: affinity chromatography

PMID: 12738960 Sans N, Prybylowski K, Petralia RS, Chang K, Wang YX, Racca C, Vicini S, Wenthold RJ. NMDA receptor trafficking through an interaction between PDZ proteins and the exocyst complex. Nat Cell Biol. 2003 Jun;5(6):520-30.

Source: BIOGRID

<u>regulation of binding [1]</u>

• A protein fragment (ESDV) from cytoplasmic tail NR2B [GRIN2B] protein mediates binding of NR2A [GRIN2A] protein and a protein fragment containing a pdz domain 1;2 from SAP90 [DLG4] protein.

PMID: 10845110 Sheng M, Pak DT. Ligand-gated ion channel interactions with cytoskeletal and signaling proteins. Annu Rev Physiol. 2000;62:755-78.

Source: Ingenuity Expert Findings

Relation 14:

Ingenuity Relationships

<u>protein-protein interactions [24]</u>

• Association of mouse Dlg1 protein and mouse Dlg2 protein and mouse Dlg3 protein and mouse Dlg4 protein and mouse Grin1 protein and mouse Grin2a protein and mouse Grin2b protein occurs.

Experiment Type: anti tag coimmunoprecipitation

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: INTACT

• Association of rat Dgkz protein and rat Dlg1 protein and rat Dlg2 protein and rat Dlg3 protein and rat Dlg4 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 19229292 Kim K, Yang J, Zhong XP, Kim MH, Kim YS, Lee HW, Han S, Choi J, Han K, Seo J, Prescott SM, Topham MK, Bae YC, Koretzky G, Choi SY, Kim E. Synaptic removal of diacylglycerol by DGKzeta and PSD-95 regulates dendritic spine maintenance. EMBO J. 2009 Apr 22;28(8):1170-9. Epub 2009 Feb 19.

Source: MINT

• Binding of mouse PSD93 [Dlg2] protein and mouse PSD-95 [Dlg4] protein in postsynaptic density from mouse cerebral cortex occurs.

Experiment Type: affinity precipitation, immunoblot

PMID: 20554866 Delint-Ramirez I, Fernández E, Bayés A, Kicsi E, Komiyama NH, Grant SG. In vivo composition of NMDA receptor signaling complexes differs between membrane subdomains and is modulated by PSD-95 and PSD-93. J Neurosci. 2010 Jun 16;30(24):8162-70.

Source: Ingenuity Expert Findings

• Binding of rat Dlg2 protein and rat Dlg4 protein occurs.

Experiment Type: imaging techniques

PMID: 10433268 Naisbitt S, Kim E, Tu JC, Xiao B, Sala C, Valtschanoff J, Weinberg RJ, Worley PF, Sheng M. Shank, a novel family of postsynaptic density proteins that binds to the NMDA receptor/PSD-95/GKAP complex and cortactin. Neuron. 1999 Jul;23(3):569-82.

Source: MINT

• Binding of a protein fragment (431-500) containing a SH3 domain from PSD-95 [DLG4] protein in yeast and a protein fragment (630-852) containing a guanylate kinase domain from rat Psd-93 [Dlg2] protein in a cell-free system occurs.

Experiment Type: protein overlay assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (508-724) containing a guanylate kinase domain from PSD-95 [DLG4] protein and a protein fragment (539-608) containing a SH3 domain from chapsyn-110 [DLG2] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Binding of guanylate kinase domain from chapsyn-110 [DLG2] protein and a protein fragment (431-711) containing a guanylate kinase domain and a SH3 domain from PSD-95 [DLG4] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Association of rat Cask protein and rat Dlg1 protein and rat Dlg2 protein and rat Dlg3 protein and rat Dlg4 protein and rat Kcnj12 protein and rat Lin7a protein and rat Lin7c protein occurs.

Experiment Type: pulldown assay

PMID: 15024025 Leonoudakis D, Conti LR, Anderson S, Radeke CM, McGuire LM, Adams ME, Froehner SC, Yates JR, Vandenberg CA. Protein trafficking and anchoring complexes revealed by proteomic analysis of inward rectifier potassium channel (Kir2.x)-associated proteins. J Biol Chem. 2004 May 21;279(21):22331-46. Epub 2004 Mar 15.

Source: INTACT

• Association of rat Dlg2 protein and rat Dlg4 protein and rat Dlgap1 protein and rat Grin1 protein and rat Shank1 protein occurs.

Experiment Type: pulldown assay

PMID: 10433268 Naisbitt S, Kim E, Tu JC, Xiao B, Sala C, Valtschanoff J, Weinberg RJ, Worley PF, Sheng M. Shank, a novel family of postsynaptic density proteins that binds to the NMDA receptor/PSD-95/GKAP complex and cortactin. Neuron. 1999 Jul;23(3):569-82.

Source: INTACT

• Association of rat Dgki protein and rat Dlg1 protein and rat Dlg2 protein and rat Dlg3 protein and rat Dlg4 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 21119615 Yang J, Seo J, Nair R, Han S, Jang S, Kim K, Han K, Paik SK, Choi J, Lee S, Bae YC, Topham MK, Prescott SM, Rhee JS, Choi SY, Kim E. DGKι regulates presynaptic release during mGluR-dependent LTD. EMBO J. 2011 Jan 5;30(1):165-80. Epub 2010 Nov 30.

Source: MINT

• Association of rat Dlg2 protein and rat Dlg4 protein and rat Dlgap1 protein and rat Shank1 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 10433268 Naisbitt S, Kim E, Tu JC, Xiao B, Sala C, Valtschanoff J, Weinberg RJ, Worley PF, Sheng M. Shank, a novel family of postsynaptic density proteins that binds to the NMDA receptor/PSD-95/GKAP complex and cortactin. Neuron. 1999 Jul;23(3):569-82.

Source: INTACT

• Binding of mouse PSD93 [Dlg2] protein and mouse PSD-95 [Dlg4] protein in lipid rafts from mouse cerebral cortex occurs.

Experiment Type: affinity precipitation, immunoblot

PMID: 20554866 Delint-Ramirez I, Fernández E, Bayés A, Kicsi E, Komiyama NH, Grant SG. In vivo composition of NMDA receptor signaling complexes differs between membrane subdomains and is modulated by PSD-95 and PSD-93. J Neurosci. 2010 Jun 16;30(24):8162-70.

Source: Ingenuity Expert Findings

• Binding of a protein fragment (431-500) containing a SH3 domain from PSD-95 [DLG4] protein and a protein fragment (522-852) containing a guanylate kinase domain from chapsyn-110 [DLG2] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Binding of human DLG2 protein and human DLG4 protein occurs.

Experiment Type: affinity chromatography

PMID: 9182804 Hsueh YP, Kim E, Sheng M. Disulfide-linked head-to-head multimerization in the mechanism of ion channel clustering by PSD-95. Neuron. 1997 May;18(5):803-14.

Source: BIOGRID

• Binding of a protein fragment (431-500) containing a SH3 domain from PSD-95 [DLG4] protein and a protein fragment (630-852) containing a guanylate kinase domain from rat Psd-93 [Dlg2] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg2 protein and mouse Dlg4 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: INTACT

• Binding of a protein fragment (431-500) containing a SH3 domain from PSD-95 [DLG4] protein and a protein fragment (642-852) containing a guanylate kinase domain from rat Psd-93 [Dlg2] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Binding of mouse PSD93 [Dlg2] protein and mouse PSD-95 [Dlg4] protein in lipid rafts from mouse cerebral cortex occurs.

Experiment Type: affinity precipitation, immunoblot

PMID: 20554866 Delint-Ramirez I, Fernández E, Bayés A, Kicsi E, Komiyama NH, Grant SG. In vivo composition of NMDA receptor signaling complexes differs between membrane subdomains and is modulated by PSD-95 and PSD-93. J Neurosci. 2010 Jun 16;30(24):8162-70.

Source: Ingenuity Expert Findings

• Binding of rat Psd-93 [Dlg2] protein and rat Psd95/sap90 [Dlg4] protein in detergent-soluble membrane from rat brain occurs.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 20089912 Ogawa Y, Oses-Prieto J, Kim MY, Horresh I, Peles E, Burlingame AL, Trimmer JS, Meijer D, Rasband MN. ADAM22, a Kv1 channel-interacting protein, recruits membrane-associated guanylate kinases to juxtaparanodes of myelinated axons. J Neurosci. 2010 Jan 20;30(3):1038-48.

Source: Ingenuity Expert Findings

• Association of rat Apba1 protein and rat Cask protein and rat Dlg1 protein and rat Dlg2 protein and rat Dlg3 protein and rat Dlg4 protein and rat Kcnj12 protein and rat Lin7a protein and rat Lin7c protein occurs.

Experiment Type: pulldown assay

PMID: 15024025 Leonoudakis D, Conti LR, Anderson S, Radeke CM, McGuire LM, Adams ME, Froehner SC, Yates JR, Vandenberg CA. Protein trafficking and anchoring complexes revealed by proteomic analysis of inward rectifier potassium channel (Kir2.x)-associated proteins. J Biol Chem. 2004 May 21;279(21):22331-46. Epub 2004 Mar 15.

Source: INTACT

• Association of rat Dgkz protein and rat Dlg1 protein and rat Dlg2 protein and rat Dlg3 protein and rat Dlg4 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 19229292 Kim K, Yang J, Zhong XP, Kim MH, Kim YS, Lee HW, Han S, Choi J, Han K, Seo J, Prescott SM, Topham MK, Bae YC, Koretzky G, Choi SY, Kim E. Synaptic removal of diacylglycerol by DGKzeta and PSD-95 regulates dendritic spine maintenance. EMBO J. 2009 Apr 22;28(8):1170-9. Epub 2009 Feb 19.

Source: INTACT

• Binding of a protein fragment (431-500) containing a SH3 domain from PSD-95 [DLG4] protein in yeast and a protein fragment (630-852) containing a guanylate kinase domain from rat Psd-93 [Dlg2] protein in a cell-free system occurs.

Experiment Type: protein overlay assay

PMID: 10804199 Shin H, Hsueh YP, Yang FC, Kim E, Sheng M. An intramolecular interaction between Src homology 3 domain and guanylate kinase-like domain required for channel clustering by postsynaptic density-95/SAP90. J Neurosci. 2000 May 15;20(10):3580-7.

Source: Ingenuity Expert Findings

• Binding of mouse Dlg2 protein and mouse PSD-95 [Dlg4] protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

• Association of rat Dgki protein and rat Dlg1 protein and rat Dlg2 protein and rat Dlg3 protein and rat Dlg4 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 21119615 Yang J, Seo J, Nair R, Han S, Jang S, Kim K, Han K, Paik SK, Choi J, Lee S, Bae YC, Topham MK, Prescott SM, Rhee JS, Choi SY, Kim E. DGKι regulates presynaptic release during mGluR-dependent LTD. EMBO J. 2011 Jan 5;30(1):165-80. Epub 2010 Nov 30.

Source: INTACT

Relation 15:

Ingenuity Relationships

<u>protein-protein interactions [8]</u>

• Binding of human DLG4 protein and rat Kcna2 protein occurs.

Experiment Type: protein overlay assay

PMID: 7477295 Kim E, Niethammer M, Rothschild A, Jan YN, Sheng M. Clustering of Shaker-type K+ channels by interaction with a family of membrane-associated guanylate kinases. Nature. 1995 Nov 2;378(6552):85-8.

Source: INTACT

• Binding of rat Psd-95 [Dlg4] protein and rat Kv1.2 [Kcna2] protein occurs in a membrane fraction from rat brain.

Experiment Type: co-immunoprecipitation

PMID: 12438413 Rasband MN, Park EW, Zhen D, Arbuckle MI, Poliak S, Peles E, Grant SG, Trimmer JS. Clustering of neuronal potassium channels is independent of their interaction with PSD-95. J Cell Biol. 2002 Nov 25;159(4):663-72. Epub 2002 Nov 18.

Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and human KCNA2 protein occurs.

Experiment Type: two-hybrid assay

PMID: 12435606 Eldstrom J, Doerksen KW, Steele DF, Fedida D. N-terminal PDZ-binding domain in Kv1 potassium channels. FEBS Lett. 2002 Nov 20;531(3):529-37.

Source: BIOGRID

• Binding of rat Psd-95 [Dlg4] protein and rat Kv1.2 [Kcna2] protein occurs in a membrane fraction from rat spinal cord.

Experiment Type: co-immunoprecipitation

PMID: 12438413 Rasband MN, Park EW, Zhen D, Arbuckle MI, Poliak S, Peles E, Grant SG, Trimmer JS. Clustering of neuronal potassium channels is independent of their interaction with PSD-95. J Cell Biol. 2002 Nov 25;159(4):663-72. Epub 2002 Nov 18.

Source: Ingenuity Expert Findings

• Binding of human DLG4 protein and rat Kcna2 protein occurs.

Experiment Type: two-hybrid assay

PMID: 7477295 Kim E, Niethammer M, Rothschild A, Jan YN, Sheng M. Clustering of Shaker-type K+ channels by interaction with a family of membrane-associated guanylate kinases. Nature. 1995 Nov 2;378(6552):85-8.

Source: INTACT

• Binding of human DLG4 protein and human KCNA2 protein occurs.

Experiment Type: pulldown assay

PMID: 12435606 Eldstrom J, Doerksen KW, Steele DF, Fedida D. N-terminal PDZ-binding domain in Kv1 potassium channels. FEBS Lett. 2002 Nov 20;531(3):529-37.

Source: BIOGRID

• Binding of rat Psd95/sap90 [Dlg4] protein and rat Kv1.2 [Kcna2] protein in detergent-soluble membrane from rat brain occurs.

Experiment Type: co-immunoprecipitation, immunoblot

PMID: 20089912 Ogawa Y, Oses-Prieto J, Kim MY, Horresh I, Peles E, Burlingame AL, Trimmer JS, Meijer D, Rasband MN. ADAM22, a Kv1 channel-interacting protein, recruits membrane-associated guanylate kinases to juxtaparanodes of myelinated axons. J Neurosci. 2010 Jan 20;30(3):1038-48.

Source: Ingenuity Expert Findings

• Binding of mouse PSD-95 [Dlg4] protein and mouse Kcna2 protein in mouse forebrain occurs.

Experiment Type: tandem affinity purification

PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.

Source: Ingenuity Expert Findings

Relation 16:

Ingenuity Relationships

<u>protein-protein interactions [1]</u>

• Interaction of PSD-95 [DLG4] and LRRTM2 occurs.

PMID: 20064388 de Wit J, Sylwestrak E, O'Sullivan ML, Otto S, Tiglio K, Savas JN, Yates JR, Comoletti D, Taylor P, Ghosh A. LRRTM2 interacts with

Neurexin1 and regulates excitatory synapse formation. Neuron. 2009 Dec 24;64(6):799-806.
Source: Ingenuity ExpertAssist Findings
Original Sentence: LRRTM2 interacts with PSD-95 and regulates surface expression of AMPA receptors, and lentivirus-mediated knockdown of LRRTM2 in vivo decreases the strength of evoked excitatory synaptic currents.

Relation 17:
Ingenuity Relationships
protein-protein interactions [1]
• Binding of rat Actin protein(s) and rat Phactr [Phactr1] protein occurs in rat brain.
Experiment Type: co-immunoprecipitation
PMID: 15107502 Allen PB, Greenfield AT, Svenningsson P, Haspeslagh DC, Greengard P. Phactrs 1-4: A family of protein phosphatase 1 and actin regulatory proteins. Proc Natl Acad Sci U S A. 2004 May 4;101(18):7187-92. Epub 2004 Apr 23.
Source: Ingenuity Expert Findings

Relation 18:
Ingenuity Relationships
protein-protein interactions [1]
Association of rat Cacng8 protein and rat Gria1 protein and rat Gria2 protein and rat Ppp3ca protein and rat Ppp3r1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 24418105 Itakura M, Watanabe I, Sugaya T, Takahashi M. Direct association of the unique C-terminal tail of transmembrane AMPA receptor regulatory protein γ-8 with calcineurin. FEBS J. 2014 Mar;281(5):1366-78. Epub 2014 Jan 27.
Source: INTACT

Relation 19:
Ingenuity Relationships
protein-protein interactions [2]
• Binding of rat GluR2 [Gria2] protein and rat Klc2 protein in lysate from rat hippocampus occurs.
Experiment Type: co-immunoprecipitation
PMID: 20534517 Du J, Wei Y, Liu L, Wang Y, Khairova R, Blumenthal R, Tragon T, Hunsberger JG, Machado-Vieira R, Drevets W, Wang YT, Manji HK. A kinesin signaling complex mediates the ability of GSK-3beta to affect mood-associated behaviors. Proc Natl Acad Sci U S A. 2010 Jun 22;107(25):11573-8. Epub 2010 Jun 7.
Source: Ingenuity Expert Findings
• Binding of rat GluR2 [Gria2] protein and rat Klc2 protein in lysate from cultured hippocampal neurons of rat occurs.
Experiment Type: co-immunoprecipitation
PMID: 20534517 Du J, Wei Y, Liu L, Wang Y, Khairova R, Blumenthal R, Tragon T, Hunsberger JG, Machado-Vieira R, Drevets W, Wang YT, Manji HK. A kinesin signaling complex mediates the ability of GSK-3beta to affect mood-associated behaviors. Proc Natl Acad Sci U S A. 2010 Jun 22;107(25):11573-8. Epub 2010 Jun 7.
Source: Ingenuity Expert Findings

Relation 20:
Ingenuity Relationships
protein-protein interactions [1]
• Binding of human GRIA2 protein and human MYO5A protein occurs.
Experiment Type: affinity chromatography
PMID: 18311135 Correia SS, Bassani S, Brown TC, Lisé MF, Backos DS, El-Husseini A, Passafaro M, Esteban JA. Motor protein-dependent transport of AMPA receptors into spines during long-term potentiation. Nat Neurosci. 2008 Apr;11(4):457-66. Epub 2008 Mar 2.
Source: BIOGRID

Relation 21:
Ingenuity Relationships
protein-protein interactions [1]
• Bovine CREATINE KINASE [CKMT2] protein increases binding of rat Actin protein(s) and rat Myosin VI [Myo6] protein in a cell-free system that is decreased by Mg-ADP.
Experiment Type: microscopy
PMID: 8548904 Sata M, Sugiura S, Yamashita H, Momomura S, Serizawa T. Coupling between myosin ATPase cycle and creatinine kinase cycle facilitates cardiac actomyosin sliding in vitro. A clue to mechanical dysfunction during myocardial ischemia. Circulation. 1996 Jan 15;93(2):310-7.
Source: Ingenuity Expert Findings

Relation 22:

Custom Relationships

protein-protein interactions [2]

• Actin binds to MYO5A.

PMID: 8402892 Cheney RE, O´shea MK, Heuser JE, Coelho MV, Wolenski JS, Espreafico EM, Forscher P, Larson RE, Mooseker MS. Brain myosin-V is a two-headed unconventional myosin with motor activity. Cell. 1993 Oct 8;75(1):13-23.

Source:

Original Sentence:

Myosin-V binds to and decorates F-actin, has actin-activated magnesium-ATPase activity, and is a barbed-end-directed motor capable of moving actin filaments at rates of up to 400 nm/s.

• MYO5A binds to Actin

PMID:10448864 Mehta AD, Rock RS, Rief M, Spudich JA, Mooseker MS, Cheney RE. Myosin-V is a processive actin-based motor. Nature. 1999 Aug 5;400(6744):590-3.

Source: Ensemble (ENSMUSP00000116028, Mus musculus)

Original Sentence (Ensemble):

Processive actin-based motor that can move in large steps approximating the 36-nm pseudo-repeat of the actin filament. Involved in melanosome transport. Also mediates the transport of vesicles to the plasma membrane.

Relation 23:

Custom Relationship

protein-protein interactions [1]

• MYH11 binds to Actin.

PMID: 22939629 Havugimana PC, Hart GT, Nepusz T, Yang H, Turinsky AL, Li Z, Wang PI, Boutz DR, Fong V, Phanse S, Babu M, Craig SA, Hu P, Wan C, Vlasblom J, Dar VU, Bezginov A, Clark GW, Wu GC, Wodak SJ, Tillier ER, Paccanaro A, Marcotte EM, Emili A. A census of human soluble protein complexes. Cell. 2012 Aug 31;150(5):1068-81.

Source: STRING

Original Sentence:

The third tab contains the approximate subunit stoichiometries for the set of 5,257 interacting protein pairs, estimated from the average corrected ratios of their mass spectral counts in fractions in which both proteins coeluted. (Suppl Table S2 in PMID 22939629 (line 5254))

Relation 24:

Custom Relationship

protein-protein interactions [1]

• Actin binds to ABLIM2.

PMID: 17194709 Barrientos T, Frank D, Kuwahara K, Bezprozvannaya S, Pipes GC, Bassel-Duby R, Richardson JA, Katus HA, Olson EN, Frey N. Two novel members of the ABLIM protein family, ABLIM-2 and -3, associate with STARS and directly bind F-actin. J. Biol. Chem. Mar. 16, 2007; 282(11);8393-403

Source: BIOGRID

Original Sentence:

ABLIM proteins strongly bind F-actin, are localized to actin stress fibers.

Relation 25:

Ingenuity Relationships

localization [1]

•Regulation of Actin protein(s) is necessary for localization of Alpha catenin protein(s) to periphery.

PMID: 11992112 Sahai E, Marshall CJ. ROCK and Dia have opposing effects on adherens junctions downstream of Rho. Nat Cell Biol. 2002 Jun;4(6):408-15.

Source: Ingenuity Expert Findings

protein-protein interactions [8]

• In the intracellular space, binding of Actin protein(s) in the intracellular space and Alpha actinin protein(s) in the intracellular space and a protein-protein complex consisting of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1] in the intracellular space increases binding of actin cytoskeleton and a protein-protein complex consisting of Actin and of Alpha actinin and of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1].

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• Binding of dimeric Cadherin protein(s) bound to Ca2+ and a protein-protein complex consisting of polymerized Actin and of dimeric Alpha actinin and of Alpha catenin and of BETA CATENIN [CTNNB1] occurs in plasma membrane.

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• Interaction of actin and alpha-catenin occurs.

PMID: 11069925 Pradhan D, Lombardo CR, Roe S, Rimm DL, Morrow JS. alpha -Catenin binds directly to spectrin and facilitates spectrin-membrane assembly in vivo. J Biol Chem. 2001 Feb 9;276(6):4175-81. Epub 2000 Nov 7.

Source: Ingenuity ExpertAssist Findings

Original Sentence: We propose that ankyrin-independent interactions of modest affinity between alpha-catenin and the amino-terminal domain of beta-spectrin augment the interaction between alpha-catenin and actin, and together they provide a polyvalent linkage directing the topographic assembly of a nascent spectrin-actin skeleton to membrane regions enriched in E-cadherin.

• Binding of actin and alpha-catenin occurs.

PMID: 9614196 Herren B, Levkau B, Raines EW, Ross R. Cleavage of beta-catenin and plakoglobin and shedding of VE-cadherin during endothelial apoptosis: evidence for a role for caspases and metalloproteinases. Mol Biol Cell. 1998 Jun;9(6):1589-601.

Source: Ingenuity ExpertAssist Findings

Original Sentence: beta-Catenin and plakoglobin, which form intracellular links between vascular endothelial cadherin (VE-cadherin) and actin-binding alpha-catenin in adherens junctions, are cleaved in apoptotic cells.

• Binding of actin and alpha-catenin occurs.

PMID: 10963665 Lecuit M, Hurme R, Pizarro-Cerda J, Ohayon H, Geiger B, Cossart P. A role for alpha-and beta-catenins in bacterial uptake. Proc Natl Acad Sci U S A. 2000 Aug 29;97(18):10008-13.

Source: Ingenuity ExpertAssist Findings

Original Sentence: Because beta-catenin is known to interact with alpha-catenin, which binds to actin, we generated a fusion molecule consisting of the ectodomain of E-cadherin and the actin binding site of alpha-catenin.

• In the intracellular space, binding of Alpha catenin protein(s) in the intracellular space and a protein-protein complex consisting of Cadherin and of BETA CATENIN [CTNNB1] in the intracellular space increases binding of Actin protein(s) and Alpha actinin protein(s) and a protein-protein complex consisting of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1].

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• In the intracellular space, binding of Actin protein(s) in the intracellular space and Alpha actinin protein(s) in the intracellular space and a protein-protein complex consisting of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1] in the intracellular space increases binding of actin cytoskeleton and a protein-protein complex consisting of Actin and of Alpha actinin and of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1].

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• Binding of Actin protein(s) and Alpha catenin protein(s) and BETA CATENIN [CTNNB1] protein occurs.

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

<u>regulation of binding [2]</u>

• In the intracellular space, binding of Actin protein(s) in the intracellular space and Alpha actinin protein(s) in the intracellular space and a protein-protein complex consisting of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1] in the intracellular space increases binding of actin cytoskeleton and a protein-protein complex consisting of Actin and of Alpha actinin and of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1].

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• In the intracellular space, binding of Alpha catenin protein(s) in the intracellular space and a protein-protein complex consisting of Cadherin and of BETA CATENIN [CTNNB1] in the intracellular space increases binding of Actin protein(s) and Alpha actinin protein(s) and a protein-protein complex consisting of Alpha catenin and of Cadherin and of BETA CATENIN [CTNNB1].

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

Relation 26:

Ingenuity Relationships

<u>protein-protein interactions [1]</u>

• Binding of Actin protein(s) and Arp2/3 [Arp2-3] complex occurs in cytoplasm.

PMID: 9600938 Mullins RD, Heuser JA, Pollard TD. The interaction of Arp2/3 complex with actin: nucleation, high affinity pointed end capping, and formation of branching networks of filaments. Proc Natl Acad Sci U S A. 1998 May 26;95(11):6181-6.

Source: Ingenuity Expert Findings

Relation 27:
Ingenuity Relationships
protein-protein interactions [3]
• Binding of rat Actin protein(s) and a protein fragment (480-559) from human WAVE [WASF1] protein occurs in a cell fraction from rat brain.
Experiment Type: immunoblot
PMID: 10970852 Westphal RS, Soderling SH, Alto NM, Langeberg LK, Scott JD. Scar/WAVE-1, a Wiskott-Aldrich syndrome protein, assembles an actin-associated multi-kinase scaffold. EMBO J. 2000 Sep 1;19(17):4589-600.
Source: Ingenuity Expert Findings
• Binding of monomeric Actin protein(s) and a protein fragment containing a WH2 domain from Scar [WASF1] protein occurs.
PMID: 11395419 Higgs HN, Pollard TD. Regulation of actin filament network formation through ARP2/3 complex: activation by a diverse array of proteins. Annu Rev Biochem. 2001;70:649-76.
Source: Ingenuity Expert Findings
• Binding of actin and Scar1 [WASF1] occurs.
PMID: 11747816 Zalevsky J, Lempert L, Kranitz H, Mullins RD. Different WASP family proteins stimulate different Arp2/3 complex-dependent actin-nucleating activities. Curr Biol. 2001 Dec 11;11(24):1903-13.
Source: Ingenuity ExpertAssist Findings
Original Sentence: Using chemical crosslinking assays, we determined that both N-WASP and Scar1 induce a conformational change in the Arp2/3 complex but crosslink with different efficiencies to the small molecular weight subunits p18 and p14.Conclusion: The WA domains of N-WASP, WASP, and Scar1 bind actin and Arp2/3 with nearly identical affinities but stimulate rates of actin nucleation that vary by almost 100-fold.

regulation of binding [1]
Rat Actin protein(s) decreases binding of rat Pka rII [Prkar2a] protein and a protein fragment (480-559) from human WAVE [WASF1] protein.
PMID: 10970852 Westphal RS, Soderling SH, Alto NM, Langeberg LK, Scott JD. Scar/WAVE-1, a Wiskott-Aldrich syndrome protein, assembles an actin-associated multi-kinase scaffold. EMBO J. 2000 Sep 1;19(17):4589-600.
Source: Ingenuity Expert Findings

Relation 28:
Custom Relationships
protein-protein interactions [2]
• CTTN encodes the actin-binding protein cortactin.
PMID: 14695912 Kai M, Irie M, Okutsu T, Inoue K, Ogonuki N, Miki H, Yokoyama M, Migishima R, Muguruma K, Fujimura H, Kohda T, Ogura A, Kaneko-Ishino T, Ishino F. The novel dominant mutation Dspd leads to a severe spermiogenesis defect in mice. Biol Reprod. 2004 Apr;70(4):1213-21. Epub 2003 Dec 26.
Source: iHOP

• binding of CTTN to actin occurs.
PMID: 21669400 Tegtmeyer N, Wittelsberger R, Hartig R, Wessler S, Martinez-Quiles N, Backert S. Serine phosphorylation of cortactin controls focal adhesion kinase activity and cell scattering induced by Helicobacter pylori. Cell Host Microbe. 2011 Jun 16;9(6):520-31.
Original Sentence: --
Cell migration and invasion require the coordinated regulation of cytoskeletal architectural changes by signaling factors, including the actin-binding protein cortactin.

Relation 29:
Ingenuity Relationships
protein-protein interactions [1]
• Binding of rat Actin protein(s) and rat C-src [Src] protein occurs in seminiferous tubules from testis of 90 day-old rat.
Experiment Type: immunoprecipitation immunoblot
PMID: 15870075 Siu MK, Wong CH, Lee WM, Cheng CY. Sertoli-germ cell anchoring junction dynamics in the testis are regulated by an interplay of lipid and protein kinases. J Biol Chem. 2005 Jul 1;280(26):25029-47. Epub 2005 May 3.
Source: Ingenuity Expert Findings

Relation 30:
Ingenuity Relationships
protein-protein interactions [1]
• Binding of rat Actin protein(s) and rat Camk2b protein and rat IP3kinA [Itpka] protein occurs in rat forebrain.

Experiment Type: immunoprecipitation immunoblot

PMID: 11468283 Schell MJ, Erneux C, Irvine RF. Inositol 1,4,5-trisphosphate 3-kinase A associates with F-actin and dendritic spines via its N terminus. J Biol Chem. 2001 Oct 5;276(40):37537-46. Epub 2001 Jul 23.

Source: Ingenuity Expert Findings

Relation 31:

Ingenuity Relationships

protein-protein interactions [8]

• Tyrosine phosphorylation of human PROTEIN 4.1 [EPB41] protein decreases assembly of a protein-protein complex consisting of Actin and of phosphorylated (Y) human PROTEIN 4.1 [EPB41] and of Spectrin that is increased by phosphorylated (Y) human PROTEIN 4.1 [EPB41] protein.

PMID: 1647028 Subrahmanyam G, Bertics PJ, Anderson RA. Phosphorylation of protein 4.1 on tyrosine-418 modulates its function in vitro. Proc Natl Acad Sci U S A. 1991 Jun 15;88(12):5222-6.

Source: Ingenuity Expert Findings

• Interaction of actin protein(s) and spectrin protein(s) occurs.

PMID: 7896872 Hu RJ, Moorthy S, Bennett V. Expression of functional domains of beta G-spectrin disrupts epithelial morphology in cultured cells. J Cell Biol. 1995 Mar;128(6):1069-80.

Source: Ingenuity ExpertAssist Findings

Original Sentence: These polypeptides, in principle, could interfere with the interaction of spectrin with actin or ankyrin, as well as block normal assembly of alpha- and beta-spectrin subunits.

• Binding of human actin protein(s) and a protein fragment containing a spectrin-actin binding domain from human 4.1B [EPB41L3] protein and human Spectrin protein(s) occurs in a cell-free system.

Experiment Type: falling ball viscometry

PMID: 10652311 Parra M, Gascard P, Walensky LD, Gimm JA, Blackshaw S, Chan N, Takakuwa Y, Berger T, Lee G, Chasis JA, Snyder SH, Mohandas N, Conboy JG. Molecular and functional characterization of protein 4.1B, a novel member of the protein 4.1 family with high level, focal expression in brain. J Biol Chem. 2000 Feb 4;275(5):3247-55.

Source: Ingenuity Expert Findings

• Binding of human actin protein(s) and a protein fragment containing a spectrin-actin binding domain from human 4.1R [EPB41] protein and human Spectrin protein(s) occurs in a cell-free system.

Experiment Type: falling ball viscometry

PMID: 10652311 Parra M, Gascard P, Walensky LD, Gimm JA, Blackshaw S, Chan N, Takakuwa Y, Berger T, Lee G, Chasis JA, Snyder SH, Mohandas N, Conboy JG. Molecular and functional characterization of protein 4.1B, a novel member of the protein 4.1 family with high level, focal expression in brain. J Biol Chem. 2000 Feb 4;275(5):3247-55.

Source: Ingenuity Expert Findings

• Binding of NCAM [NCAM1] protein and a protein-protein complex consisting of polymerized Actin and of Ankyrin and of dimeric Spectrin occurs in plasma membrane.

PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.

Source: Ingenuity Expert Findings

• Interaction of actin and spectrin occurs.

PMID: 23747363 Baines AJ, Lu HC, Bennett PM. The Protein 4.1 family: hub proteins in animals for organizing membrane proteins. Biochim Biophys Acta. 2014 Feb;1838(2):605-19. Epub 2013 Jun 4.

Source: Ingenuity ExpertAssist Findings

Original Sentence: Protein 4.1R was the first to be discovered: it is a major mammalian erythrocyte cytoskeletal protein, essential to the mechanochemical properties of red cell membranes because it promotes the interaction between spectrin and actin in the membrane cytoskeleton. 4.1R also binds certain phospholipids and is required for the stable cell surface accumulation of a number of erythrocyte transmembrane proteins that span multiple functional classes; these include cell adhesion molecules, transporters and a chemokine receptor.

• Binding of actin and spectrin occurs.

PMID: 24210427 Fowler VM. The human erythrocyte plasma membrane: a Rosetta Stone for decoding membrane-cytoskeleton structure. Curr Top Membr. 2013;72:39-88.

Source: Ingenuity ExpertAssist Findings

Original Sentence: Accessory proteins, 4.1R and dematin, also promote spectrin binding to actin and, with -adducin, link to membrane proteins, targeting actin nodes to the membrane.

Association of actin and spectrin occurs.

PMID: 20655268 Franco T, Low PS. Erythrocyte adducin: a structural regulator of the red blood cell membrane. Transfus Clin Biol. 2010 Sep;17(3):87-94. Epub 2010 Jul 23.

Source: Ingenuity ExpertAssist Findings

Original Sentence: Third, adducin stabilizes the association between actin and spectrin, assuring that the junctional complex remains intact during the mechanical distortions experienced by the circulating cell.

Relation 32:
Custom Relationship
protein-protein interactions [2]
• ABLIM1 interacts with actin.
PMID: 9245787 Roof DJ, Hayes A, Adamian M, Chishti AH, Li T. Molecular characterization of abLIM, a novel actin-binding and double zinc finger protein. J Cell Biol. 1997 Aug 11;138(3):575-88.
Original Sentence:
We have characterized a novel protein, the actin-binding LIM (abLIM) protein, which could mediate such interactions between actin filaments and cytoplasmic targets.
• ABLIM1 interacts with actin.
Source: Ensemble (ENSG00000099204, homo sapiens)
Original Sentence (Ensemble):
This gene encodes a cytoskeletal LIM protein that binds to actin filaments via a domain that is homologous to erythrocyte dematin

Relation 33:
Ingenuity Relationships
protein-protein interactions [1]
• Binding of rat Actin protein(s) and rat Phactr [Phactr1] protein occurs in rat brain.
Experiment Type: co-immunoprecipitation
PMID: 15107502 Allen PB, Greenfield AT, Svenningsson P, Haspeslagh DC, Greengard P. Phactrs 1-4: A family of protein phosphatase 1 and actin regulatory proteins. Proc Natl Acad Sci U S A. 2004 May 4;101(18):7187-92. Epub 2004 Apr 23.
Source: Ingenuity Expert Findings

Relation 34:
Ingenuity Relationships
protein-protein interactions [1]
• Association of human AKT1S1 protein and human KLC2 protein and human KLC3 protein and human MARK2 protein and human PARD3 protein and human TSC2 protein and human YWHAH protein and human YWHAH protein and human YWHAZ protein occurs.
Experiment Type: tandem affinity purification
PMID: 17979178 Gloeckner CJ, Boldt K, Schumacher A, Roepman R, Ueffing M. A novel tandem affinity purification strategy for the efficient isolation and characterisation of native protein complexes. Proteomics. 2007 Dec;7(23):4228-34.
Source: INTACT

Relation 35:
Ingenuity Relationships
protein-protein interactions [2]
• Interaction of alpha-catenin and spectrin occurs.
PMID: 11069925 Pradhan D, Lombardo CR, Roe S, Rimm DL, Morrow JS. alpha -Catenin binds directly to spectrin and facilitates spectrin-membrane assembly in vivo. J Biol Chem. 2001 Feb 9;276(6):4175-81. Epub 2000 Nov 7.
Source: Ingenuity ExpertAssist Findings
Original Sentence: An in vivo role for the interaction of spectrin with alpha-catenin is suggested by the impaired membrane assembly of spectrin and its enhanced detergent solubility in Clone A cells that harbor a defective alpha-catenin.
• Binding of alpha-catenin and spectrin occurs.
PMID: 11069925 Pradhan D, Lombardo CR, Roe S, Rimm DL, Morrow JS. alpha -Catenin binds directly to spectrin and facilitates spectrin-membrane assembly in vivo. J Biol Chem. 2001 Feb 9;276(6):4175-81. Epub 2000 Nov 7.
Source: Ingenuity ExpertAssist Findings
Original Sentence: By surface plasmon resonance and in vitro binding assays, we find that alpha-catenin binds alphaIIbetaII spectrin with an apparent K(d) of approximately 20-100 nm.

Relation 36:
Ingenuity Relationships
activation [1]
• V-SRC [SRC] protein increases tyrosine phosphorylation of Alpha catenin protein(s).
PMID: 9442882 Thomas SM, Brugge JS. Cellular functions regulated by Src family kinases. Annu Rev Cell Dev Biol. 1997;13:513-609.
Source: Ingenuity Expert Findings

phosphorylation [1]

• V-SRC [SRC] protein increases tyrosine phosphorylation of Alpha catenin protein(s).
PMID: 9442882 Thomas SM, Brugge JS. Cellular functions regulated by Src family kinases. Annu Rev Cell Dev Biol. 1997;13:513-609.
Source: Ingenuity Expert Findings

<u>regulation of binding [1]</u>
• SRC protein decreases binding of human Alpha catenin protein(s) and human Plakoglobin [JUP] protein.
PMID: 14517306 Miravet S, Piedra J, Castaño J, Raurell I, Francí C, Duñach M, García de Herreros A. Tyrosine phosphorylation of plakoglobin causes contrary effects on its association with desmosomes and adherens junction components and modulates beta-catenin-mediated transcription. Mol Cell Biol. 2003 Oct;23(20):7391-402.
Source: Ingenuity Expert Findings

Relation 37:
Ingenuity Relationships
<u>protein-protein interactions [1]</u>
• Binding of CTNN α [Alpha catenin] protein(s) and ARP 2/3 [Arp2-3] complex occurs in cytoskeleton from epithelial cells.
PMID: 16325573 Gates J, Peifer M. Can 1000 reviews be wrong? Actin, alpha-Catenin, and adherens junctions. Cell. 2005 Dec 2;123(5):769-72.
Source: Ingenuity Expert Findings

Relation 38:
Ingenuity Relationships
<u>protein-protein interactions [3]</u>
• In HEK293 cells, binding of human Arp2/3 complex and human CORO1B protein is greater than binding of human Arp2/3 complex and mutant human CORO1B protein (p.S2D).
PMID: 16027158 Cai L, Holoweckyj N, Schaller MD, Bear JE. Phosphorylation of coronin 1B by protein kinase C regulates interaction with Arp2/3 and cell motility. J Biol Chem. 2005 Sep 9;280(36):31913-23. Epub 2005 Jul 18.
Source: Ingenuity Expert Findings
• In HEK293 cells, binding of human Arp2/3 complex and mutant human CORO1B protein (p.S2A) is greater than binding of human Arp2/3 complex and human CORO1B protein.
PMID: 16027158 Cai L, Holoweckyj N, Schaller MD, Bear JE. Phosphorylation of coronin 1B by protein kinase C regulates interaction with Arp2/3 and cell motility. J Biol Chem. 2005 Sep 9;280(36):31913-23. Epub 2005 Jul 18.
Source: Ingenuity Expert Findings
• In Rat2 cells, phosphorylation of rat Coro1b protein to phosphorylated (S2) rat Coro1b protein is involved in binding of rat ARP2/3 [ARP2-3 (Actin-related protein complex)] complex and rat Coro1b protein.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 16027158 Cai L, Holoweckyj N, Schaller MD, Bear JE. Phosphorylation of coronin 1B by protein kinase C regulates interaction with Arp2/3 and cell motility. J Biol Chem. 2005 Sep 9;280(36):31913-23. Epub 2005 Jul 18.
Source: Ingenuity Expert Findings

<u>regulation of binding [1]</u>
• In Rat2 cells, phosphorylation of rat Coro1b protein to phosphorylated (S2) rat Coro1b protein is involved in binding of rat ARP2/3 [ARP2-3 (Actin-related protein complex)] complex and rat Coro1b protein.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 16027158 Cai L, Holoweckyj N, Schaller MD, Bear JE. Phosphorylation of coronin 1B by protein kinase C regulates interaction with Arp2/3 and cell motility. J Biol Chem. 2005 Sep 9;280(36):31913-23. Epub 2005 Jul 18.
Source: Ingenuity Expert Findings

Relation 39:
Ingenuity Relationships
<u>activation [15]</u>
• In cytoplasm, WASF1 protein increases activation of Arp2-3 complex.
PMID: 16949823 Ridley AJ. Rho GTPases and actin dynamics in membrane protrusions and vesicle trafficking. Trends Cell Biol. 2006 Oct;16(10):522-9. Epub 2006 Sep 1.
Source: Ingenuity Expert Findings
• In MDCKII cells, WA domain from SCAR1 [WASF1] protein decreases function of mouse Arp2/3 complex.
Experiment Type: fluorescence microscopy
PMID: 16601114 Guerriero CJ, Weixel KM, Bruns JR, Weisz OA. Phosphatidylinositol 5-kinase stimulates apical biosynthetic delivery via an Arp2/3-dependent mechanism. J Biol Chem. 2006 Jun 2;281(22):15376-84. Epub 2006 Apr 6.
Source: Ingenuity Expert Findings
• In cytoplasm, WAVE [WASF1] protein increases activation of ARP2/3 [Arp2-3] complex.
PMID: 18003739 Richardson BE, Beckett K, Nowak SJ, Baylies MK. SCAR/WAVE and Arp2/3 are crucial for cytoskeletal remodeling at the site of myoblast

fusion. Development. 2007 Dec;134(24):4357-67. Epub 2007 Nov 14.
Source: Ingenuity Expert Findings

• In cytoplasm, WAVE [WASF1] protein increases activation of ARP2/3 [Arp2-3] complex.
PMID: 11683406 Ridley AJ. Rho GTPases and cell migration. J Cell Sci. 2001 Aug;114(Pt 15):2713-22.
Source: Ingenuity Expert Findings

• In cytoplasm, WAVE [WASF1] protein increases activation of Arp2/3 [Arp2-3] complex.
PMID: 11130076 Miki H, Yamaguchi H, Suetsugu S, Takenawa T. IRSp53 is an essential intermediate between Rac and WAVE in the regulation of membrane ruffling. Nature. 2000 Dec 7;408(6813):732-5.
Source: Ingenuity Expert Findings

• In cytoplasm, WASF1 protein increases activation of Arp2-3 complex.
PMID: 15509861 Schwartz M. Rho signalling at a glance. J Cell Sci. 2004 Nov 1;117(Pt 23):5457-8.
Source: Ingenuity Expert Findings

• WAVE [WASF1] protein increases activation of Arp2-3 complex.
PMID: 15630019 Govek EE, Newey SE, Van Aelst L. The role of the Rho GTPases in neuronal development. Genes Dev. 2005 Jan 1;19(1):1-49.
Source: Ingenuity Expert Findings

• In cytoplasm, WASF1 protein increases activation of Arp2-3 complex.
PMID: 18000759 Ellenbroek SI, Collard JG. Rho GTPases: functions and association with cancer. Clin Exp Metastasis. 2007;24(8):657-72. Epub 2007 Nov 14.
Source: Ingenuity Expert Findings

• WA domain from Scar [WASF1] protein is sufficient for activation of Arp2-3 complex.
PMID: 11395419 Higgs HN, Pollard TD. Regulation of actin filament network formation through ARP2/3 complex: activation by a diverse array of proteins. Annu Rev Biochem. 2001;70:649-76.
Source: Ingenuity Expert Findings

• In cytoplasm, WAVE [WASF1] protein increases activation of ARP2/3 [Arp2-3] complex.
PMID: 16599904 Ten Klooster JP, Evers EE, Janssen L, Machesky LM, Michiels F, Hordijk P, Collard JG. Interaction between Tiam1 and the Arp2/3 complex links activation of Rac to actin polymerization. Biochem J. 2006 Jul 1;397(1):39-45.
Source: Ingenuity Expert Findings

• In cytoplasm from epithelial cells, WAVE [WASF1] protein increases activation of Arp2/3 [Arp2-3] complex.
PMID: 18198193 Abou-Kheir W, Isaac B, Yamaguchi H, Cox D. Membrane targeting of WAVE2 is not sufficient for WAVE2-dependent actin polymerization: a role for IRSp53 in mediating the interaction between Rac and WAVE2. J Cell Sci. 2008 Feb 1;121(Pt 3):379-90. Epub 2008 Jan 15.
Source: Ingenuity Expert Findings

• In cytoplasm, WAVE [WASF1] protein increases activation of ARP2/3 [Arp2-3] complex.
PMID: 15899863 Connolly BA, Rice J, Feig LA, Buchsbaum RJ. Tiam1-IRSp53 complex formation directs specificity of rac-mediated actin cytoskeleton regulation. Mol Cell Biol. 2005 Jun;25(11):4602-14.
Source: Ingenuity Expert Findings

• In cytoplasm, WAVE [WASF1] protein increases activation of ARP2/3 [Arp2-3] complex.
11329366 Takenawa T, Miki H. WASP and WAVE family proteins: key molecules for rapid rearrangement of cortical actin filaments and cell movement. J Cell Sci. 2001 May;114(Pt 10):1801-9.
Source: Ingenuity Expert Findings

• Activation of WASP [WAS] protein and WAVE [WASF1] protein increases activation of Arp2-3 complex.
PMID: 11807174 Juliano RL. Signal transduction by cell adhesion receptors and the cytoskeleton: functions of integrins, cadherins, selectins, and immunoglobulin-superfamily members. Annu Rev Pharmacol Toxicol. 2002;42:283-323.
Source: Ingenuity Expert Findings

• In cytoplasm, WAVE [WASF1] protein increases activation of ARP2/3 [Arp2-3] complex.
PMID: 16597702 Steffen A, Faix J, Resch GP, Linkner J, Wehland J, Small JV, Rottner K, Stradal TE. Filopodia formation in the absence of functional WAVE- and Arp2/3-complexes. Mol Biol Cell. 2006 Jun;17(6):2581-91. Epub 2006 Apr 5.
Source: Ingenuity Expert Findings

<u>inhibition [1]</u>

• In MDCKII cells, WA domain from SCAR1 [WASF1] protein increases inhibition of active mouse Arp2/3 complex.
Experiment Type: fluorescence microscopy
PMID: 16601114 Guerriero CJ, Weixel KM, Bruns JR, Weisz OA. Phosphatidylinositol 5-kinase stimulates apical biosynthetic delivery via an Arp2/3-dependent mechanism. J Biol Chem. 2006 Jun 2;281(22):15376-84. Epub 2006 Apr 6.
Source: Ingenuity Expert Findings

<u>protein-protein interactions [2]</u>

• Binding of Arp2-3 complex and WAVE [WASF1] protein occurs.
PMID: 15630019 Govek EE, Newey SE, Van Aelst L. The role of the Rho GTPases in neuronal development. Genes Dev. 2005 Jan 1;19(1):1-49.
Source: Ingenuity Expert Findings

• Binding of Arp2-3 complex and a protein fragment containing a acidic domain and a C-terminal domain from Scar [WASF1] protein occurs.
PMID: 11395419 Higgs HN, Pollard TD. Regulation of actin filament network formation through ARP2/3 complex: activation by a diverse array of proteins. Annu Rev Biochem. 2001;70:649-76.

Source: Ingenuity Expert Findings

Relation 40:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of human CYFIP2 protein and human WASF1 protein occurs.

Experiment Type: co-immunoprecipitation

PMID: 12181570 Eden S, Rohatgi R, Podtelejnikov AV, Mann M, Kirschner MW. Mechanism of regulation of WAVE1-induced actin nucleation by Rac1 and Nck. Nature. 2002 Aug 15;418(6899):790-3.

Source: MINT

Relation 41:

Ingenuity Relationships

expression [6]

• In fibroblasts from embryonic mouse, human ABI1 protein increases expression of mouse Wave1 [Wasf1] protein that is decreased by heterozygous mutant mouse Abi1 gene (knockout) and homozygous mutant mouse Abi2 gene (knockout).

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• In fibroblasts from embryonic mouse, mutant human ABI1 protein (deletion 65-79) causes little or no change in expression of mouse Wave1 [Wasf1] protein that is decreased by heterozygous mutant mouse Abi1 gene (knockout) and homozygous mutant mouse Abi2 gene (knockout).

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• In fibroblasts from embryonic mouse, human ABI1 protein increases expression of mouse Wave1 [Wasf1] protein that is decreased by heterozygous mutant mouse Abi1 gene (knockout) and homozygous mutant mouse Abi2 gene (knockout).

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• In fibroblasts from embryonic mouse, mutant human ABI1 protein (deletion 56-65) causes little or no change in expression of mouse Wave1 [Wasf1] protein that is decreased by heterozygous mutant mouse Abi1 gene (knockout) and homozygous mutant mouse Abi2 gene (knockout).

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• In fibroblasts from embryonic mouse, mutant human ABI1 protein (deletion 44-111 with its SNARE domain deleted) causes little or no change in expression of mouse Wave1 [Wasf1] protein that is decreased by heterozygous mutant mouse Abi1 gene (knockout) and homozygous mutant mouse Abi2 gene (knockout).

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• In fibroblasts from embryonic mouse, heterozygous mutant mouse Abi1 gene (knockout) and homozygous mutant mouse Abi2 gene (knockout) decrease expression of mouse Wave1 [Wasf1] protein.

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

protein-protein interactions [21]

• Binding of mutant human ABI1 protein (p.X112* or 112-End) and mouse Wave1 [Wasf1] protein occurs in 293t cells.

Experiment Type: co-immunoprecipitation

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and mutant mouse Wave1 [Wasf1] protein (deletion 498-513 with its V domain deleted) occurs in 293t cells.

Experiment Type: co-immunoprecipitation

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and mouse Wave1 [Wasf1] protein occurs in 293t cells.
Experiment Type: co-immunoprecipitation
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and mutant mouse Wave1 [Wasf1] protein (deletion 275-435 with its proline rich domain deleted) occurs in 293t cells.
Experiment Type: co-immunoprecipitation
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and mutant mouse Wave1 [Wasf1] protein (p.X97* or 97-End) occurs in 293t cells.
Experiment Type: co-immunoprecipitation
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and human WAVE [WASF1] protein occurs in Hela cells.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 16155590 Innocenti M, Gerboth S, Rottner K, Lai FP, Hertzog M, Stradal TE, Frittoli E, Didry D, Polo S, Disanza A, Benesch S, Di Fiore PP, Carlier MF, Scita G. Abi1 regulates the activity of N-WASP and WAVE in distinct actin-based processes. Nat Cell Biol. 2005 Oct;7(10):969-76. Epub 2005 Sep 11.
Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and Scar/WAVE homology domain from human SCAR1 [WASF1] protein occurs in lysate from Cos-7 cells.
Experiment Type: pulldown assay
PMID: 15752430 Stovold CF, Millard TH, Machesky LM. Inclusion of Scar/WAVE3 in a similar complex to Scar/WAVE1 and 2. BMC Cell Biol. 2005;6(1):11. Epub 2005 Mar 7.
Source: Ingenuity Expert Findings

• Binding of mutant human ABI1 protein (p.X146* or 146-End) and mouse Wave1 [Wasf1] protein occurs in 293t cells.
Experiment Type: co-immunoprecipitation
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of mutant human ABI1 protein (deletion 100-163) and mouse Wave1 [Wasf1] protein occurs in 293t cells.
Experiment Type: co-immunoprecipitation
15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of rat Abi1 protein and rat Wave-1 [Wasf1] protein occurs in crude extract from rat brain.
Experiment Type: tandem mass spectrometry
PMID: 12447388 Soderling SH, Binns KL, Wayman GA, Davee SM, Ong SH, Pawson T, Scott JD. The WRP component of the WAVE-1 complex attenuates Rac-mediated signalling. Nat Cell Biol. 2002 Dec;4(12):970-5.
Source: Ingenuity Expert Findings

• Binding of mouse Abi1 protein and mouse Wave1 [Wasf1] protein occurs in mouse brain.
Experiment Type: co-immunoprecipitation
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of mutant human ABI1 protein (deletion 2-17) and mouse Wave1 [Wasf1] protein occurs in 293t cells.
Experiment Type: co-immunoprecipitation
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.
Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and Scar/WAVE homology domain from human SCAR1 [WASF1] protein occurs in Cos-7 cells.
Experiment Type: co-immunoprecipitation
PMID: 15752430 Stovold CF, Millard TH, Machesky LM. Inclusion of Scar/WAVE3 in a similar complex to Scar/WAVE1 and 2. BMC Cell Biol. 2005;6(1):11. Epub 2005 Mar 7.
Source: Ingenuity Expert Findings

• In 293t cells, binding of human ABI1 protein and mouse Wave1 [Wasf1] protein is greater than binding of mutant human ABI1 protein (deletion 1-55) and mouse Wave1 [Wasf1] protein.
PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and mutant mouse Wave1 [Wasf1] protein (p.X278* or 278-End) occurs in a cell-free system.

Experiment Type: pulldown assay

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of human ABI1 protein and mutant mouse Wave1 [Wasf1] protein (deletion 278-559) occurs in 293t cells.

Experiment Type: co-immunoprecipitation

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of rat Abi1 protein and rat Wasf1 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 17304222 Proepper C, Johannsen S, Liebau S, Dahl J, Vaida B, Bockmann J, Kreutz MR, Gundelfinger ED, Boeckers TM. Abelson interacting protein 1 (Abi-1) is essential for dendrite morphogenesis and synapse formation. EMBO J. 2007 Mar 7;26(5):1397-409. Epub 2007 Feb 15.

Source: INTACT

• In 293t cells, binding of human ABI1 protein and mouse Wave1 [Wasf1] protein is greater than binding of mutant human ABI1 protein (deletion 3-32) and mouse Wave1 [Wasf1] protein.

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of mutant human ABI1 protein (p.X380* or 380-End with its SH3 domain deleted) and mouse Wave1 [Wasf1] protein occurs in 293t cells.

Experiment Type: co-immunoprecipitation

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• In 293t cells, binding of human ABI1 protein and mouse Wave1 [Wasf1] protein is greater than binding of mutant human ABI1 protein (deletion 18-32) and mouse Wave1 [Wasf1] protein.

PMID: 15143189 Echarri A, Lai MJ, Robinson MR, Pendergast AM. Abl interactor 1 (Abi-1) wave-binding and SNARE domains regulate its nucleocytoplasmic shuttling, lamellipodium localization, and wave-1 levels. Mol Cell Biol. 2004 Jun;24(11):4979-93.

Source: Ingenuity Expert Findings

• Binding of rat Abi1 protein and rat Wasf1 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 17304222 Proepper C, Johannsen S, Liebau S, Dahl J, Vaida B, Bockmann J, Kreutz MR, Gundelfinger ED, Boeckers TM. Abelson interacting protein 1 (Abi-1) is essential for dendrite morphogenesis and synapse formation. EMBO J. 2007 Mar 7;26(5):1397-409. Epub 2007 Feb 15.

Source: MINT

Relation 42:

Ingenuity Relationships

activation [1]

• ArgBP2 [SORBS2] increases tyrosine phosphorylation of WAVE1 [WASF1].

PMID: 19631450 Roignot J, Taïeb D, Suliman M, Dusetti NJ, Iovanna JL, Soubeyran P. CIP4 is a new ArgBP2 interacting protein that modulates the ArgBP2 mediated control of WAVE1 phosphorylation and cancer cell migration. Cancer Lett. 2010 Feb 1;288(1):116-23. Epub 2009 Jul 23.

Source: Ingenuity ExpertAssist Findings

Original Sentence: ArgBP2 and CIP4 acted synergistically to increase WAVE1 tyrosine phosphorylation.

phosphorylation [1]

• ArgBP2 [SORBS2] increases tyrosine phosphorylation of WAVE1 [WASF1].

PMID: 19631450 Roignot J, Taïeb D, Suliman M, Dusetti NJ, Iovanna JL, Soubeyran P. CIP4 is a new ArgBP2 interacting protein that modulates the ArgBP2 mediated control of WAVE1 phosphorylation and cancer cell migration. Cancer Lett. 2010 Feb 1;288(1):116-23. Epub 2009 Jul 23.

Source: Ingenuity ExpertAssist Findings

Original Sentence: ArgBP2 and CIP4 acted synergistically to increase WAVE1 tyrosine phosphorylation.

protein-protein interactions [4]

• Binding of human SORBS2 protein and human WASF1 protein occurs.

Experiment Type: two-hybrid assay

PMID: 11130076 Miki H, Yamaguchi H, Suetsugu S, Takenawa T. IRSp53 is an essential intermediate between Rac and WAVE in the regulation of membrane ruffling. Nature. 2000 Dec 7;408(6813):732-5.

Source: INTACT

• Binding of human SORBS2 protein and human WASF1 protein occurs.

Experiment Type: affinity chromatography

18559503 Taieb D, Roignot J, André F, Garcia S, Masson B, Pierres A, Iovanna JL, Soubeyran P. ArgBP2-dependent signaling regulates pancreatic cell migration, adhesion, and tumorigenicity. Cancer Res. 2008 Jun 15;68(12):4588-96.

Source: BIOGRID

• Binding of SH3 domain 2 from rat nArgBP2 [product of Sorbs2] protein and rat Wave-1 [Wasf1] protein occurs in a cell extract from rat brain.

Experiment Type: Coomassie blue staining, mass spectrometry, pulldown assay

PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.

Source: Ingenuity Expert Findings

• Binding of human SORBS2 protein and human WASF1 protein occurs.

Experiment Type: pulldown assay

PMID: 18559503 Taieb D, Roignot J, André F, Garcia S, Masson B, Pierres A, Iovanna JL, Soubeyran P. ArgBP2-dependent signaling regulates pancreatic cell migration, adhesion, and tumorigenicity. Cancer Res. 2008 Jun 15;68(12):4588-96.

Source: BIOGRID

Relation 43:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of rat Snip [Srcin1] protein and rat Wave-1 [Wasf1] protein occurs in crude extract from rat brain.

Experiment Type: tandem mass spectrometry

PMID: 12447388 Soderling SH, Binns KL, Wayman GA, Davee SM, Ong SH, Pawson T, Scott JD. The WRP component of the WAVE-1 complex attenuates Rac-mediated signalling. Nat Cell Biol. 2002 Dec;4(12):970-5.

Source: Ingenuity Expert Findings

Relation 44:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of human ARHGEF2 protein and human WASF1 protein occurs.

Experiment Type: affinity chromatography

PMID: 9843499 Miki H, Suetsugu S, Takenawa T. WAVE, a novel WASP-family protein involved in actin reorganization induced by Rac. EMBO J. 1998 Dec 1;17(23):6932-41.

Source: BIOGRID

Relation 45:

Ingenuity Relationships

inhibition [1]

• PAR1b [MARK2] increases inactivation of active GEF-H1 [ARHGEF2].

PMID: 23076215 Yamahashi Y, Hatakeyama M. PAR1b takes the stage in the morphogenetic and motogenetic activity of Helicobacter pylori CagA oncoprotein. Cell Adh Migr. 2013 Jan-Feb;7(1):11-8. Epub 2012 Oct 17.

Source: Ingenuity ExpertAssist Findings

Original Sentence: We also found that PAR1b inactivates a RhoA-specific GEF, GEF-H1, via phosphorylation and thereby inhibits cortical actin and stress fiber formation.

phosphorylation [1]

• Par1b [MARK2] increases phosphorylation of GEF-H1 [ARHGEF2].

PMID: 21513698 Yoshimura Y, Miki H. Dynamic regulation of GEF-H1 localization at microtubules by Par1b/MARK2. Biochem Biophys Res Commun. 2011 May 6;408(2):322-8. Epub 2011 Apr 12.

Source: Ingenuity ExpertAssist Findings

Original Sentence: We find that Par1b phosphorylates GEF-H1 at three serine residues conserved in vertebrates and releases GEF-H1 from microtubules, which abrogates stabilization and acetylation of microtubules induced by GEF-H1 overexpression.

protein-protein interactions [3]

• Binding of human ARHGEF2 protein and human MARK2 protein occurs.

Experiment Type: enzyme activity assay

PMID: 21513698 Yoshimura Y, Miki H. Dynamic regulation of GEF-H1 localization at microtubules by Par1b/MARK2. Biochem Biophys Res Commun. 2011 May 6;408(2):322-8. Epub 2011 Apr 12.

Source: BIOGRID

• Binding of human ARHGEF2 protein and human MARK2 protein occurs.

Experiment Type: affinity chromatography

PMID: 22072711 Yamahashi Y, Saito Y, Murata-Kamiya N, Hatakeyama M. Polarity-regulating kinase partitioning-defective 1b (PAR1b) phosphorylates guanine nucleotide exchange factor H1 (GEF-H1) to regulate RhoA-dependent actin cytoskeletal reorganization. J Biol Chem. 2011 Dec 30;286(52):44576-84. Epub 2011 Nov 9.

Source: BIOGRID

• Binding of human ARHGEF2 protein and human MARK2 protein occurs.

Experiment Type: affinity chromatography

PMID: 19615732 Sowa ME, Bennett EJ, Gygi SP, Harper JW. Defining the human deubiquitinating enzyme interaction landscape. Cell. 2009 Jul 23;138(2):389-403. Epub 2009 Jul 16.

Source: BIOGRID

Relation 46:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of human CLASP2 protein and human MARK2 protein occurs.

Experiment Type: affinity chromatography

19615732 Sowa ME, Bennett EJ, Gygi SP, Harper JW. Defining the human deubiquitinating enzyme interaction landscape. Cell. 2009 Jul 23;138(2):389-403. Epub 2009 Jul 16.

Source: BIOGRID

Relation 47:

Ingenuity Relationships

protein-protein interactions [1]

• Association of human CYFIP1 protein and human CYFIP2 protein and human DCAF7 protein and human DOCK7 protein and human KIF23 protein and human MARK1 protein and human MARK2 protein and human MARK3 protein and human PARD3 protein and human PARD6G protein and human PNMA1 protein and human PNMA2 protein and human TUBG1 protein and human YWHAZ protein occurs.

Experiment Type: anti tag coimmunoprecipitation

PMID: 14676191 Brajenovic M, Joberty G, Küster B, Bouwmeester T, Drewes G. Comprehensive proteomic analysis of human Par protein complexes reveals an interconnected protein network. J Biol Chem. 2004 Mar 26;279(13):12804-11. Epub 2003 Dec 15.

Source: INTACT

Relation 48:

Ingenuity Relationships

protein-protein interactions [1]

• Association of mouse Atp6v1c1 protein and mouse Cyfip2 protein and mouse Dmxl2 protein and mouse Dync1h1 protein and mouse Idh3g protein and mouse Matr3 protein and mouse Nckap1 protein and mouse Pfkl protein and mouse Pfkp protein and mouse Prkcg protein and mouse Wdr7 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 22707207 Li KW, Chen N, Klemmer P, Koopmans F, Karupothula R, Smit AB. Identifying true protein complex constituents in interaction proteomics: the example of the DMXL2 protein complex. Proteomics. 2012 Aug;12(15-16):2428-32. Epub 2012 Jul 23.

Source: INTACT

Relation 49:

Ingenuity Relationships

protein-protein interactions [1]

• Association of mouse Atp6v1c1 protein and mouse Cyfip2 protein and mouse Dmxl2 protein and mouse Dync1h1 protein and mouse Idh3g protein and mouse Matr3 protein and mouse Nckap1 protein and mouse Pfkl protein and mouse Pfkp protein and mouse Prkcg protein and mouse Wdr7 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 22707207 Li KW, Chen N, Klemmer P, Koopmans F, Karupothula R, Smit AB. Identifying true protein complex constituents in interaction proteomics: the example of the DMXL2 protein complex. Proteomics. 2012 Aug;12(15-16):2428-32. Epub 2012 Jul 23.

Source: INTACT

Relation 50:

Ingenuity Relationships

protein-protein interactions [1]

• Association of mouse Atp6v1c1 protein and mouse Cyfip2 protein and mouse Dmxl2 protein and mouse Dync1h1 protein and mouse Idh3g protein and mouse Matr3 protein and mouse Nckap1 protein and mouse Pfkl protein and mouse Pfkp protein and

mouse Prkcg protein and mouse Wdr7 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 22707207 Li KW, Chen N, Klemmer P, Koopmans F, Karupothula R, Smit AB. Identifying true protein complex constituents in interaction proteomics: the example of the DMXL2 protein complex. Proteomics. 2012 Aug;12(15-16):2428-32. Epub 2012 Jul 23.
Source: INTACT

Relation 51:
Ingenuity Relationships
protein-protein interactions [7]
• In a system of purified components, IRSP53 [BAIAP2] protein increases activation of a protein-protein complex consisting of ABI1 and of PIR121 [CYFIP2] and of NAP1 [NCKAP1] and of WAVE2 [WASF2] that is dependent on phosphatidylinositol-3,4,5-trisphosphate [phosphatidylinositol-3,4,5-triphosphate] and Rac [RAC1] protein.
Experiment Type: bioactivity assay
PMID: 16702231 Suetsugu S, Kurisu S, Oikawa T, Yamazaki D, Oda A, Takenawa T. Optimization of WAVE2 complex-induced actin polymerization by membrane-bound IRSp53, PIP(3), and Rac. J Cell Biol. 2006 May 22;173(4):571-85. Epub 2006 May 15.
Source: Ingenuity Expert Findings
• In a in vitro system, human IRSP53 [BAIAP2] protein is necessary for activation of Arp2-3 complex that is increased by a protein-protein complex consisting of human ABI1 and of human HSPC300 [BRK1] and of human PIR121 [CYFIP2] and of human NAP1 [NCKAP1] and of human WAVE2 [WASF2] from A-431 cells Triton X-100 soluble fractions.
Experiment Type: bioactivity assay
PMID: 16702231 Suetsugu S, Kurisu S, Oikawa T, Yamazaki D, Oda A, Takenawa T. Optimization of WAVE2 complex-induced actin polymerization by membrane-bound IRSp53, PIP(3), and Rac. J Cell Biol. 2006 May 22;173(4):571-85. Epub 2006 May 15.
Source: Ingenuity Expert Findings
• In A-431 cells, interference of human IRSP53 [BAIAP2] mRNA by siRNA (5' GGAGCTGCAGTACATCGAC 3') causes little or no change in expression of a protein-protein complex consisting of human ABI1 and of human HSPC300 [BRK1] and of human PIR121 [CYFIP2] and of human NAP1 [NCKAP1] and of WAVE2 [WASF2].
Experiment Type: discontinuous sucrose gradient, immunoprecipitation
PMID: 16702231 Suetsugu S, Kurisu S, Oikawa T, Yamazaki D, Oda A, Takenawa T. Optimization of WAVE2 complex-induced actin polymerization by membrane-bound IRSp53, PIP(3), and Rac. J Cell Biol. 2006 May 22;173(4):571-85. Epub 2006 May 15.
Source: Ingenuity Expert Findings
• Binding of human ABI1 protein and human CYFIP2 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 15048123 Innocenti M, Zucconi A, Disanza A, Frittoli E, Areces LB, Steffen A, Stradal TE, Di Fiore PP, Carlier MF, Scita G. Abi1 is essential for the formation and activation of a WAVE2 signalling complex. Nat Cell Biol. 2004 Apr;6(4):319-27. Epub 2004 Mar 28.
Source: MINT
• Expression of a protein-protein complex consisting of human ABI1 and of human PIR121 [CYFIP2] and of human NAP1 [NCKAP1] and of human WAVE2 [WASF2] occurs in A-431 cells.
Experiment Type: Western blotting, discontinuous sucrose gradient
PMID: 16702231 Suetsugu S, Kurisu S, Oikawa T, Yamazaki D, Oda A, Takenawa T. Optimization of WAVE2 complex-induced actin polymerization by membrane-bound IRSp53, PIP(3), and Rac. J Cell Biol. 2006 May 22;173(4):571-85. Epub 2006 May 15.
Source: Ingenuity Expert Findings
• Binding of human ABI1 protein and human CYFIP2 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 15048123 Innocenti M, Zucconi A, Disanza A, Frittoli E, Areces LB, Steffen A, Stradal TE, Di Fiore PP, Carlier MF, Scita G. Abi1 is essential for the formation and activation of a WAVE2 signalling complex. Nat Cell Biol. 2004 Apr;6(4):319-27. Epub 2004 Mar 28.
Source: INTACT
• Binding of mouse Abi1 protein and mouse Cyfip2 protein occurs.
Experiment Type: affinity chromatography
PMID: 20697350 Titz B, Low T, Komisopoulou E, Chen SS, Rubbi L, Graeber TG. The proximal signaling network of the BCR-ABL1 oncogene shows a modular organization. Oncogene. 2010 Nov 4;29(44):5895-910. Epub 2010 Aug 9.
Source: BIOGRID

regulation of binding [1]
• In 293 cells, ABI-1 protein increases binding of c-ABL [ABL1] protein and PIR121 [CYFIP2] protein.
Experiment Type: immunoprecipitation immunoblot
PMID: 16899465 Stuart JR, Gonzalez FH, Kawai H, Yuan ZM. c-Abl interacts with the WAVE2 signaling complex to induce membrane ruffling and cell spreading. J Biol Chem. 2006 Oct 20;281(42):31290-7. Epub 2006 Aug 9.
Source: Ingenuity Expert Findings

Relation 52:

Ingenuity Relationships
protein-protein interactions [1]
• Binding of mouse Abi1 protein and mouse Mink1 protein occurs.
Experiment Type: two-hybrid assay
PMID: 15102471 Papin J, Subramaniam S. Bioinformatics and cellular signaling. Curr Opin Biotechnol. 2004 Feb;15(1):78-81.
Source: INTACT

Relation 53:
Ingenuity Relationships
protein-protein interactions [4]
• Binding of rat Abi1 protein and rat Shank3 protein occurs.
Experiment Type: pulldown assay
PMID: 17304222 Proepper C, Johannsen S, Liebau S, Dahl J, Vaida B, Bockmann J, Kreutz MR, Gundelfinger ED, Boeckers TM. Abelson interacting protein 1 (Abi-1) is essential for dendrite morphogenesis and synapse formation. EMBO J. 2007 Mar 7;26(5):1397-409. Epub 2007 Feb 15.
Source: INTACT
• Binding of rat Abi1 protein and rat Shank3 protein occurs.
Experiment Type: pulldown assay
PMID: 17304222 Proepper C, Johannsen S, Liebau S, Dahl J, Vaida B, Bockmann J, Kreutz MR, Gundelfinger ED, Boeckers TM. Abelson interacting protein 1 (Abi-1) is essential for dendrite morphogenesis and synapse formation. EMBO J. 2007 Mar 7;26(5):1397-409. Epub 2007 Feb 15.
Source: MINT
• Binding of rat Abi1 protein and rat Shank3 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 17304222 Proepper C, Johannsen S, Liebau S, Dahl J, Vaida B, Bockmann J, Kreutz MR, Gundelfinger ED, Boeckers TM. Abelson interacting protein 1 (Abi-1) is essential for dendrite morphogenesis and synapse formation. EMBO J. 2007 Mar 7;26(5):1397-409. Epub 2007 Feb 15.
Source: INTACT
• Binding of rat Abi1 protein and rat Shank3 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
17304222 Proepper C, Johannsen S, Liebau S, Dahl J, Vaida B, Bockmann J, Kreutz MR, Gundelfinger ED, Boeckers TM. Abelson interacting protein 1 (Abi-1) is essential for dendrite morphogenesis and synapse formation. EMBO J. 2007 Mar 7;26(5):1397-409. Epub 2007 Feb 15.
Source: MINT

Relation 54:
Ingenuity Relationships
protein-protein interactions [2]
• Binding of mouse Abi1 protein and rat Synj1 protein occurs.
Experiment Type: two-hybrid assay
PMID: 10764144 So CW, So CK, Cheung N, Chew SL, Sham MH, Chan LC. The interaction between EEN and Abi-1, two MLL fusion partners, and synaptojanin and dynamin: implications for leukaemogenesis. Leukemia. 2000 Apr;14(4):594-601.
Source: INTACT
• Binding of mouse Abi1 protein and rat Synj1 protein occurs.
Experiment Type: two-hybrid assay
PMID: 10764144 So CW, So CK, Cheung N, Chew SL, Sham MH, Chan LC. The interaction between EEN and Abi-1, two MLL fusion partners, and synaptojanin and dynamin: implications for leukaemogenesis. Leukemia. 2000 Apr;14(4):594-601.
Source: MINT

Relation 55:
Ingenuity Relationships
protein-protein interactions [1]
Binding of mouse Abi1 protein and mouse Dlgap4 protein occurs.
Experiment Type: two-hybrid assay
PMID: 15102471 Papin J, Subramaniam S. Bioinformatics and cellular signaling. Curr Opin Biotechnol. 2004 Feb;15(1):78-81.
Source: INTACT

Relation 56:
Ingenuity Relationships
protein-protein interactions [1]
• Binding of mouse Abi1 protein and mouse Dlgap4 protein occurs.
Experiment Type: two-hybrid assay
PMID: 15102471 Papin J, Subramaniam S. Bioinformatics and cellular signaling. Curr Opin Biotechnol. 2004 Feb;15(1):78-81.
Source: INTACT

Relation 57:
Ingenuity Relationships
protein-protein interactions [2]
• Binding of human ABI1 protein and human SRC protein occurs.
Experiment Type: array analysis
PMID: 20598684 Dubielecka PM, Machida K, Xiong X, Hossain S, Ogiue-Ikeda M, Carrera AC, Mayer BJ, Kotula L. Abi1/Hssh3bp1 pY213 links Abl kinase signaling to p85 regulatory subunit of PI-3 kinase in regulation of macropinocytosis in LNCaP cells. FEBS Lett. 2010 Aug 4;584(15):3279-86. Epub 2010 Jun 23.
Source: INTACT
• Binding of human ABI1 protein and human SRC protein occurs.
Experiment Type: array analysis
PMID: 20598684 Dubielecka PM, Machida K, Xiong X, Hossain S, Ogiue-Ikeda M, Carrera AC, Mayer BJ, Kotula L. Abi1/Hssh3bp1 pY213 links Abl kinase signaling to p85 regulatory subunit of PI-3 kinase in regulation of macropinocytosis in LNCaP cells. FEBS Lett. 2010 Aug 4;584(15):3279-86. Epub 2010 Jun 23.
Source: MINT

Relation 58:
Ingenuity Relationships
protein-protein interactions [12]
• Binding of SH3 domain 2 from rat nArgBP2 [product of Sorbs2] protein and rat Synaptojanin 1 [Synj1] protein occurs in a cell extract from rat brain.
Experiment Type: Coomassie blue staining, mass spectrometry, pulldown assay
PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.
Source: Ingenuity Expert Findings
• Binding of rat Sorbs2 protein and rat Synj1 protein occurs.
Experiment Type: pulldown assay
PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.
Source: MINT
• Binding of rat Sorbs2 protein and rat Synj1 protein occurs.
Experiment Type: pulldown assay
PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.
Source: INTACT
•Binding of SH3 domain 1 from rat nArgBP2 [product of Sorbs2] protein and human SYNJ1 protein occurs in a cell-free system.
Experiment Type: Coomassie blue staining, pulldown assay
PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.
Source: Ingenuity Expert Findings
• Binding of human SORBS2 protein and human SYNJ1 protein occurs.
Experiment Type: pulldown assay
PMID: 11292345 Zucconi A, Dente L, Santonico E, Castagnoli L, Cesareni G. Selection of ligands by panning of domain libraries displayed on phage lambda reveals new potential partners of synaptojanin 1. J Mol Biol. 2001 Apr 13;307(5):1329-39.
Source: INTACT
• Binding of SH3 domain 3 from rat nArgBP2 [product of Sorbs2] protein and human SYNJ1 protein occurs in a cell-free system.
Experiment Type: Coomassie blue staining, pulldown assay
PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.
Source: Ingenuity Expert Findings
• Binding of human SORBS2 protein and human SYNJ1 protein occurs.
Experiment Type: phage display
PMID: 11292345 Zucconi A, Dente L, Santonico E, Castagnoli L, Cesareni G. Selection of ligands by panning of domain libraries displayed on phage lambda reveals new potential partners of synaptojanin 1. J Mol Biol. 2001 Apr 13;307(5):1329-39.
Source: MINT
• Binding of human SORBS2 protein and human SYNJ1 protein occurs.
Experiment Type: pulldown assay
PMID: 11292345 Zucconi A, Dente L, Santonico E, Castagnoli L, Cesareni G. Selection of ligands by panning of domain libraries displayed on phage lambda reveals new potential partners of synaptojanin 1. J Mol Biol. 2001 Apr 13;307(5):1329-39.
Source: MINT
• Binding of SH3 domain 2 from rat nArgBP2 [product of Sorbs2] protein and human SYNJ1 protein occurs in a cell-free system.
Experiment Type: Coomassie blue staining, pulldown assay

PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.

Source: Ingenuity Expert Findings

• Binding of rat Sorbs2 protein and rat Synj1 protein occurs.

Experiment Type: pulldown assay

PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.

Source: BIOGRID

• Binding of human SORBS2 protein and human SYNJ1 protein occurs.

Experiment Type: phage display

PMID: 11292345 Zucconi A, Dente L, Santonico E, Castagnoli L, Cesareni G. Selection of ligands by panning of domain libraries displayed on phage lambda reveals new potential partners of synaptojanin 1. J Mol Biol. 2001 Apr 13;307(5):1329-39.

Source: INTACT

• Binding of SH3 domain 2 from rat nArgBP2 [product of Sorbs2] protein and rat Synaptojanin 1 [Synj1] protein occurs in a cell extract from rat brain.

Experiment Type: immunoblot, pulldown assay

PMID: 15659545 Cestra G, Toomre D, Chang S, De Camilli P. The Abl/Arg substrate ArgBP2/nArgBP2 coordinates the function of multiple regulatory mechanisms converging on the actin cytoskeleton. Proc Natl Acad Sci U S A. 2005 Feb 1;102(5):1731-6. Epub 2005 Jan 19.

Source: Ingenuity Expert Findings

Relation 59:

Ingenuity Relationships

protein-protein interactions [3]

• In a cell-free system, binding of rat SAPAP4 [Dlgap4] protein and a protein fragment (1032-1196) containing a SH3 domain 2;3 from rat nArgBP2 [product of Sorbs2] protein is greater than binding of rat SAPAP4 [Dlgap4] protein and a protein fragment (1123-1196) containing a SH3 domain 3 from rat nArgBP2 [product of Sorbs2] protein.

PMID: 10521485 Kawabe H, Hata Y, Takeuchi M, Ide N, Mizoguchi A, Takai Y. nArgBP2, a novel neural member of ponsin/ArgBP2/vinexin family that interacts with synapse-associated protein 90/postsynaptic density-95-associated protein (SAPAP). J Biol Chem. 1999 Oct 22;274(43):30914-8.

Source: Ingenuity Expert Findings

• Binding of human DLGAP4 protein and human SORBS2 protein occurs.

Experiment Type: pulldown assay

PMID: 10521485 Kawabe H, Hata Y, Takeuchi M, Ide N, Mizoguchi A, Takai Y. nArgBP2, a novel neural member of ponsin/ArgBP2/vinexin family that interacts with synapse-associated protein 90/postsynaptic density-95-associated protein (SAPAP). J Biol Chem. 1999 Oct 22;274(43):30914-8.

Source: BIOGRID

• Binding of rat Dlgap4 protein and rat Argbp2 [Sorbs2] protein occurs.

PMID: 10521485 Kawabe H, Hata Y, Takeuchi M, Ide N, Mizoguchi A, Takai Y. nArgBP2, a novel neural member of ponsin/ArgBP2/vinexin family that interacts with synapse-associated protein 90/postsynaptic density-95-associated protein (SAPAP). J Biol Chem. 1999 Oct 22;274(43):30914-8.

Source: BIND

Relation 60:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of rat Dlgap3 protein and rat Argbp2 [Sorbs2] protein occurs.

PMID: 10521485 Kawabe H, Hata Y, Takeuchi M, Ide N, Mizoguchi A, Takai Y. nArgBP2, a novel neural member of ponsin/ArgBP2/vinexin family that interacts with synapse-associated protein 90/postsynaptic density-95-associated protein (SAPAP). J Biol Chem. 1999 Oct 22;274(43):30914-8.

Source: BIND

Realtion 61:

Ingenuity Relationships

protein-protein interactions [1]

• Association of human CD2AP protein and human CRK protein and human CTTN protein and human SHANK3 protein and mouse Srcin1 protein occurs.

Experiment Type: pulldown assay

PMID: 19146815 Jaworski J, Kapitein LC, Gouveia SM, Dortland BR, Wulf PS, Grigoriev I, Camera P, Spangler SA, Di Stefano P, Demmers J, Krugers H, Defilippi P, Akhmanova A, Hoogenraad CC. Dynamic microtubules regulate dendritic spine morphology and synaptic plasticity. Neuron. 2009 Jan 15;61(1):85-100.

Source: INTACT

Relation 62:

Ingenuity Relationships

protein-protein interactions [11]

• Binding of human SRC protein and mouse RP23-157O10.7 [Srcin1] protein occurs.
Experiment Type: pulldown assay
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: MINT

• Binding of human SRC protein and human SRCIN1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: INTACT

• Binding of human SRC protein and human SRCIN1 protein occurs.
Experiment Type: pulldown assay
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: BIOGRID

• Association of human MAPRE3 protein and mouse Src protein and mouse Srcin1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 19146815 Jaworski J, Kapitein LC, Gouveia SM, Dortland BR, Wulf PS, Grigoriev I, Camera P, Spangler SA, Di Stefano P, Demmers J, Krugers H, Defilippi P, Akhmanova A, Hoogenraad CC. Dynamic microtubules regulate dendritic spine morphology and synaptic plasticity. Neuron. 2009 Jan 15;61(1):85-100.
Source: INTACT

• Binding of human CSK protein and human SRC protein and human SRCIN1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: INTACT

• Binding of human SRC protein and human SRCIN1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: MINT

• Binding of human SRC protein and human SRCIN1 protein occurs.
Experiment Type: pulldown assay
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: MINT

• Binding of mouse Src protein and mouse p140Cap [Srcin1] protein in synaptosomal fractions from mouse brain occurs.
Experiment Type: immunoprecipitation immunoblot
PMID: 24453341 Repetto D, Camera P, Melani R, Morello N, Russo I, Calcagno E, Tomasoni R, Bianchi F, Berto G, Giustetto M, Berardi N, Pizzorusso T, Matteoli M, Di Stefano P, Missler M, Turco E, Di Cunto F, Defilippi P. p140Cap regulates memory and synaptic plasticity through Src-mediated and citron-N-mediated actin reorganization. J Neurosci. 2014 Jan 22;34(4):1542-53.
Source: Ingenuity Expert Findings

• Association of human CSK protein and human SRC protein and human SRCIN1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: MINT

• Binding of human SRC protein and human SRCIN1 protein occurs.
Experiment Type: affinity chromatography
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: BIOGRID

• Binding of human SRC protein and mouse Srcin1 protein occurs.
Experiment Type: anti bait coimmunoprecipitation
PMID: 17525734 Di Stefano P, Damiano L, Cabodi S, Aramu S, Tordella L, Praduroux A, Piva R, Cavallo F, Forni G, Silengo L, Tarone G, Turco E, Defilippi P. p140Cap protein suppresses tumour cell properties, regulating Csk and Src kinase activity. EMBO J. 2007 Jun 20;26(12):2843-55. Epub 2007 May 24.
Source: INTACT

Relation 63:
Ingenuity Relationships

protein-protein interactions [1]

• Association of mouse Clasp2 protein and mouse Clip2 protein and human MAPRE3 protein and mouse Srcin1 protein occurs.

Experiment Type: pulldown assay

PMID: 19146815 Jaworski J, Kapitein LC, Gouveia SM, Dortland BR, Wulf PS, Grigoriev I, Camera P, Spangler SA, Di Stefano P, Demmers J, Krugers H, Defilippi P, Akhmanova A, Hoogenraad CC. Dynamic microtubules regulate dendritic spine morphology and synaptic plasticity. Neuron. 2009 Jan 15;61(1):85-100.

Source: INTACT

Relation 64:

Ingenuity Relationships

protein-protein interactions [1]

• Rostafuroxin decreases binding of mutant human ADD1 protein (p.Gly460Trp) and Src homology 2 (SH2) domain from SRC protein in a system of purified components.

Experiment Type: pulldown assay

PMID: 21106940 Ferrandi M, Molinari I, Torielli L, Padoani G, Salardi S, Rastaldi MP, Ferrari P, Bianchi G. Adducin- and ouabain-related gene variants predict the antihypertensive activity of rostafuroxin, part 1: experimental studies. Sci Transl Med. 2010 Nov 24;2(59):59ra86.

Source: Ingenuity Expert Findings

Relation 65:

Ingenuity Relationships

protein-protein interactions [1]

• Rostafuroxin decreases binding of mutant human ADD1 protein (p.Gly460Trp) and Src homology 2 (SH2) domain from SRC protein in a system of purified components.

Experiment Type: pulldown assay

PMID: 21106940 Ferrandi M, Molinari I, Torielli L, Padoani G, Salardi S, Rastaldi MP, Ferrari P, Bianchi G. Adducin- and ouabain-related gene variants predict the antihypertensive activity of rostafuroxin, part 1: experimental studies. Sci Transl Med. 2010 Nov 24;2(59):59ra86.

Source: Ingenuity Expert Findings

Relation 66:

Ingenuity Relationships

activation [1]

• Mutant HTT protein (insertion with its polyglutamine repeat inserted) increases tyrosine phosphorylation of active NR2B [GRIN2B] protein that is mediated by activation of SRC protein.

PMID: 16101555 Rego AC, de Almeida LP. Molecular targets and therapeutic strategies in Huntington's disease. Curr Drug Targets CNS Neurol Disord. 2005 Aug;4(4):361-81.

Source: Ingenuity Expert Findings

localization [1]

• Binding of PSD-95 [DLG4] protein and NR2 [GRIN2B] protein increases recruitment of SRC protein.

PMID: 15336977 Bezprozvanny I, Hayden MR. Deranged neuronal calcium signaling and Huntington disease. Biochem Biophys Res Commun. 2004 Oct 1;322(4):1310-7.

Source: Ingenuity Expert Findings

phosphorylation [1]

• Mutant HTT protein (insertion with its polyglutamine repeat inserted) increases tyrosine phosphorylation of active NR2B [GRIN2B] protein that is mediated by activation of SRC protein.

PMID: 16101555 Rego AC, de Almeida LP. Molecular targets and therapeutic strategies in Huntington's disease. Curr Drug Targets CNS Neurol Disord. 2005 Aug;4(4):361-81.

Source: Ingenuity Expert Findings

protein-protein interactions [3]

• Binding of mouse Grin2b protein and mouse Src protein occurs.

Experiment Type: affinity chromatography

PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.

Source: BIOGRID

• Binding of rat Grin2b protein and mouse Src protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.

Source: INTACT

• Binding of rat Grin2b protein and mouse Src protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 16990796 Kalia LV, Pitcher GM, Pelkey KA, Salter MW. PSD-95 is a negative regulator of the tyrosine kinase Src in the NMDA receptor complex. EMBO J. 2006 Oct 18;25(20):4971-82. Epub 2006 Sep 21.

Source: MINT

Relation 67:

Ingenuity Relationships

protein-protein interactions [1]

Binding of human DLGAP4 protein and human SRC protein occurs.

Experiment Type: peptide array analysis

17474147 Wu C, Ma MH, Brown KR, Geisler M, Li L, Tzeng E, Jia CY, Jurisica I, Li SS. Systematic identification of SH3 domain-mediated human protein-protein interactions by peptide array target screening. Proteomics. 2007 Jun;7(11):1775-85.

Source: INTACT

Relation 68:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of human SHANK3 protein and human SRC protein occurs.

Experiment Type: peptide array analysis

PMID: 17474147 Wu C, Ma MH, Brown KR, Geisler M, Li L, Tzeng E, Jia CY, Jurisica I, Li SS. Systematic identification of SH3 domain-mediated human protein-protein interactions by peptide array target screening. Proteomics. 2007 Jun;7(11):1775-85.

Source: INTACT

Relation 69:

Custom Relationships

gene regulation [1]:

• ADD1 expression is regulated by ADD1

PMID: 10485892 Gilligan DM, Lozovatsky L, Gwynn B, Brugnara C, Mohandas N, Peters LL. Targeted disruption of the beta adducin gene (Add2) causes red blood cell spherocytosis in mice. Proc Natl Acad Sci U S A. 1999 Sep 14;96(19):10717-22.

Source: Ingenuity target explorer

Original Sentence:

The lack of beta-adducin in RBCs leads to decreased membrane incorporation of alpha-adducin (30% of normal) and unexpectedly promotes a 5-fold increase in gamma-adducin incorporation into the RBC membrane skeleton.

protein-protein interaction [1]:

• ADD1 And ADD2 form heterodimers

Source: Ingenuity target explorer

Original Sentence:

Adducins are a family of cytoskeleton proteins encoded by three genes (alpha, beta, gamma). Adducin is a heterodimeric protein that consists of related subunits, which are produced from distinct genes but share a similar structure.

Relation 70:

Custom Relationships

gene regulation [1]:

• Interference of human ß-spectrin mRNA by shRNA decreases localization of human ADD1protein to lateral membrane from human bronchial epithelial cells.

PMID: 18003973 Abdi KM, Bennett V. Adducin promotes micrometer-scale organization of beta2-spectrin in lateral membranes of bronchial epithelial cells. Mol Biol Cell. 2008 Feb;19(2):536-45. Epub 2007 Nov 14.

Source: Ingenuity target explorer

Original Sentence:

Depletion of alpha-adducin resulted in increased detergent solubility of spectrin after normal membrane biogenesis during mitosis.

Relation 71:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of human ADD2 protein and human RPH3A protein occurs.

Experiment Type: pulldown assay

PMID: 7707875 Miyazaki M, Kaibuchi K, Shirataki H, Kohno H, Ueyama T, Nishikawa J, Takai Y. Rabphilin-3A binds to a M(r) 115,000 polypeptide in a phosphatidylserine- and Ca(2+)-dependent manner. Brain Res Mol Brain Res. 1995 Jan;28(1):29-36.

Source: BIOGRID

Relation 72:

Custom Relationships

• CTTN is Tyrosine phosphorylated by SRC

Experiment Type: *in vitro* phosphorylation in endothelial cells

PMID: 9748248 Huang C1, Liu J, Haudenschild CC, Zhan X. The role of tyrosine phosphorylation of cortactin in the locomotion of endothelial cells. J Biol Chem. 1998 Oct 2;273(40):25770-6.

Source: STRING

Relation 73:

Ingenuity Relationships

<u>protein-protein interactions [3]</u>

• Binding of rat Dlgap4 protein and rat Shank3 protein occurs.

Experiment Type: yeast two-hybrid assay

PMID: 15531608 Pagel P, Kovac S, Oesterheld M, Brauner B, Dunger-Kaltenbach I, Frishman G, Montrone C, Mark P, Stümpflen V, Mewes HW, Ruepp A, Frishman D. The MIPS mammalian protein-protein interaction database. Bioinformatics. 2005 Mar;21(6):832-4. Epub 2004 Nov 5.

Source: MIPS

• Binding of human DLGAP4 protein and human SHANK3 protein occurs.

Experiment Type: two-hybrid assay

PMID: 10527873 Boeckers TM, Winter C, Smalla KH, Kreutz MR, Bockmann J, Seidenbecher C, Garner CC, Gundelfinger ED. Proline-rich synapse-associated proteins ProSAP1 and ProSAP2 interact with synaptic proteins of the SAPAP/GKAP family. Biochem Biophys Res Commun. 1999 Oct 14;264(1):247-52.

Source: BIOGRID

• Binding of rat Dlgap4 protein and rat Shank3 protein occurs.

PMID: 10527873 Boeckers TM, Winter C, Smalla KH, Kreutz MR, Bockmann J, Seidenbecher C, Garner CC, Gundelfinger ED. Proline-rich synapse-associated proteins ProSAP1 and ProSAP2 interact with synaptic proteins of the SAPAP/GKAP family. Biochem Biophys Res Commun. 1999 Oct 14;264(1):247-52.

Source: BIND

Relation 74:

Ingenuity Relationships

<u>protein-protein interactions [7]</u>

• Binding of rat Dlgap3 protein and rat Shank3 protein occurs.

Experiment Type: yeast two-hybrid assay

PMID: 15531608 Pagel P, Kovac S, Oesterheld M, Brauner B, Dunger-Kaltenbach I, Frishman G, Montrone C, Mark P, Stümpflen V, Mewes HW, Ruepp A, Frishman D. The MIPS mammalian protein-protein interaction database. Bioinformatics. 2005 Mar;21(6):832-4. Epub 2004 Nov 5.

Source: MIPS

• Binding of mutant rat Gkap3 [Dlgap3] protein (N-terminal truncation) and a protein fragment (559-673) containing a pdz domain from rat Shank3 protein occurs in lysate from 293 cells.

Experiment Type: pulldown assay

PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.

Source: Ingenuity Expert Findings

• Binding of rat Dlgap3 protein and rat Shank3 protein occurs.

10527873 Boeckers TM, Winter C, Smalla KH, Kreutz MR, Bockmann J, Seidenbecher C, Garner CC, Gundelfinger ED. Proline-rich synapse-associated proteins ProSAP1 and ProSAP2 interact with synaptic proteins of the SAPAP/GKAP family. Biochem Biophys Res Commun. 1999 Oct 14;264(1):247-52.

Source: BIND

• Binding of rat Dlgap3 protein and rat Shank3 protein occurs.

Experiment Type: pulldown assay

PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.

Source: BIOGRID

• Binding of a protein fragment (559-673) containing a pdz domain 2 from rat Shank3 protein and a protein fragment containing a carboxy terminal domain from rat Gkap3 [Dlgap3] protein occurs in yeast.

Experiment Type: yeast two-hybrid assay

PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.

Source: Ingenuity Expert Findings

• Binding of human DLGAP3 protein and human SHANK3 protein occurs.
Experiment Type: two-hybrid assay
PMID: 10527873 Boeckers TM, Winter C, Smalla KH, Kreutz MR, Bockmann J, Seidenbecher C, Garner CC, Gundelfinger ED. Proline-rich synapse-associated proteins ProSAP1 and ProSAP2 interact with synaptic proteins of the SAPAP/GKAP family. Biochem Biophys Res Commun. 1999 Oct 14;264(1):247-52.
Source: BIOGRID
• Binding of rat Dlgap3 protein and rat Shank3 protein occurs.
Experiment Type: two-hybrid assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: BIOGRID

Relation 75:
Ingenuity Relationships
expression [2]
• Rat Prosap2 [Shank3] protein increases expression of rat Homer1 protein in primary culture hippocampal neurons from 18 day-old embryonic rat.
Experiment Type: immunofluorescence
PMID: 23100419 Arons MH, Thynne CJ, Grabrucker AM, Li D, Schoen M, Cheyne JE, Boeckers TM, Montgomery JM, Garner CC. Autism-associated mutations in ProSAP2/Shank3 impair synaptic transmission and neurexin-neuroligin-mediated transsynaptic signaling. J Neurosci. 2012 Oct 24;32(43):14966-78.
Source: Ingenuity Expert Findings
• Rat Prosap2 [Shank3] protein increases expression of rat Homer1 protein in primary culture hippocampal neurons from 18 day-old embryonic rat.
Experiment Type: immunofluorescence
PMID: 23100419 Arons MH, Thynne CJ, Grabrucker AM, Li D, Schoen M, Cheyne JE, Boeckers TM, Montgomery JM, Garner CC. Autism-associated mutations in ProSAP2/Shank3 impair synaptic transmission and neurexin-neuroligin-mediated transsynaptic signaling. J Neurosci. 2012 Oct 24;32(43):14966-78.
Source: Ingenuity Expert Findings

protein-protein interactions [13]
• Binding of rat Homer1b protein and rat Shank3 protein occurs in rat cerebellum.
Experiment Type: co-immunoprecipitation
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings
• Binding of rat Homer1 protein and rat Shank3 protein occurs.
Experiment Type: two-hybrid assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: BIOGRID
• In lysate from 293 cells, binding of HOMER-1C protein and rat Shank3 protein is greater than binding of HOMER-1C protein and mutant rat Shank3 protein (p.F1314C with its proline rich domain 2 mutated).
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings
• Binding of rat Homer1b protein and rat Shank3 protein occurs in rat cerebral cortex.
Experiment Type: co-immunoprecipitation
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings
• Binding of HOMER1B protein and a protein fragment (1143-1408) containing a proline rich domain 2 (aa sequence LVPPPEEFAN) from rat Shank3 protein occurs in lysate from 293 cells.
Experiment Type: pulldown assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings
• Binding of rat Homer1b protein and rat Shank3 protein occurs in rat cerebral cortex.
Experiment Type: co-immunoprecipitation
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

• Binding of rat Homer1 protein and rat Shank3 protein occurs.
Experiment Type: pulldown assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: BIOGRID

• Binding of HOMER-1A protein and a protein fragment (1063-1740) containing a proline rich domain 2;3 from rat Shank3 protein occurs in lysate from 293 cells.
Experiment Type: pulldown assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

• Binding of HOMER-1A protein and a protein fragment (544-1378) containing a proline rich domain 1;2 from rat Shank3 protein occurs in lysate from 293 cells.
Experiment Type: pulldown assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

• Binding of rat Homer1b protein and rat Shank3 protein occurs in rat cerebellum.
Experiment Type: co-immunoprecipitation
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

• Binding of HOMER-1A protein and a protein fragment (1063-1740) containing a proline rich domain 2;3 from rat Shank3 protein occurs in yeast.
Experiment Type: yeast two-hybrid assay
• 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

• Binding of HOMER-1A protein and a protein fragment (544-1376) containing a proline rich domain 1;2 from rat Shank3 protein occurs in yeast.
Experiment Type: yeast two-hybrid assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

• In lysate from 293 cells, binding of HOMER-1C protein and rat Shank3 protein is greater than binding of HOMER-1C protein and mutant rat Shank3 protein (p.P1331L with its proline rich domain 2 mutated).
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

Relation 76:
Ingenuity Relationships
<u>protein-protein interactions [1]</u>

• Binding of HOMER3 protein and a protein fragment (1143-1408) containing a proline rich domain 2 (aa sequence LVPPPEEFAN) from rat Shank3 protein occurs in lysate from 293 cells.
Experiment Type: pulldown assay
PMID: 10433269 Tu JC, Xiao B, Naisbitt S, Yuan JP, Petralia RS, Brakeman P, Doan A, Aakalu VK, Lanahan AA, Sheng M, Worley PF. Coupling of mGluR/Homer and PSD-95 complexes by the Shank family of postsynaptic density proteins. Neuron. 1999 Jul;23(3):583-92.
Source: Ingenuity Expert Findings

Relation 77:
Custom Relationships
<u>protein-protein interactions [1]</u>

• binding of SHANK3 and CTTN occurs
Experiment Type: pulldown assays, co-immunoprecipitations
PMID: 10433268 Naisbitt S, Kim E, Tu JC, Xiao B, Sala C, Valtschanoff J, Weinberg RJ, Worley PF, Sheng M. Shank, a novel family of postsynaptic density proteins that binds to the NMDA receptor/PSD-95/GKAP complex and cortactin. Neuron. 1999 Jul;23(3):569-82.
Original Sentence:
Two constructs of Shank3 that contained the -KPPVPPKP- motif were able to bind cortactin expressed in HEK293 cells
Source: Neuron publication

Relation 78:

Custom Relationships

protein-protein interactions [1]

• binding of CTNND2 and CTTN occurs.

PMID: 12835311 Martinez MC, Ochiishi T, Majewski M, Kosik KS. Dual regulation of neuronal morphogenesis by a delta-catenin-cortactin complex and Rho. J Cell Biol. 2003 Jul 7;162(1):99-111. Epub 2003 Jun 30.

Original Sentence: --

We report that delta-catenin interacts with cortactin in a tyrosine phosphorylation-dependent manner.

Source: JCB publication

Relation 79:

Custom Relationships

protein-protein interactions [1]

• binding of CTNND2 and CTTN occurs.

PMID: 9813110 Ohoka Y, Takai Y. Isolation and characterization of cortactin isoforms and a novel cortactin-binding protein, CBP90. Genes Cells. 1998 Sep;3(9):603-12.

Original Sentence: --

We identified a cortactin-A-binding protein with an Mr of approximately 90 kDa in rat brain and named it CBP90.

Source: Genes Cells publication

Relation 80:

Ingenuity Relationships

inhibition [2]

• Human PPP3CA protein increases dephosphorylation of phosphorylated rat Synj1 protein.

PMID: 14704270 Lee SY, Wenk MR, Kim Y, Nairn AC, De Camilli P. Regulation of synaptojanin 1 by cyclin-dependent kinase 5 at synapses. Proc Natl Acad Sci U S A. 2004 Jan 13;101(2):546-51. Epub 2004 Jan 2.

Source: MINT

• Human PPP3CA protein increases dephosphorylation of phosphorylated rat Synj1 protein.

PMID: 14704270 Lee SY, Wenk MR, Kim Y, Nairn AC, De Camilli P. Regulation of synaptojanin 1 by cyclin-dependent kinase 5 at synapses. Proc Natl Acad Sci U S A. 2004 Jan 13;101(2):546-51. Epub 2004 Jan 2.

Source: INTACT

phosphorylation [2]

• Human PPP3CA protein increases dephosphorylation of phosphorylated rat Synj1 protein.

PMID: 14704270 Lee SY, Wenk MR, Kim Y, Nairn AC, De Camilli P. Regulation of synaptojanin 1 by cyclin-dependent kinase 5 at synapses. Proc Natl Acad Sci U S A. 2004 Jan 13;101(2):546-51. Epub 2004 Jan 2.

Source: INTACT

• Human PPP3CA protein increases dephosphorylation of phosphorylated rat Synj1 protein.

PMID: 14704270 Lee SY, Wenk MR, Kim Y, Nairn AC, De Camilli P. Regulation of synaptojanin 1 by cyclin-dependent kinase 5 at synapses. Proc Natl Acad Sci U S A. 2004 Jan 13;101(2):546-51. Epub 2004 Jan 2.

Source: MINT

protein-protein interactions [1]

• Binding of rat Ppp3ca protein and rat Synj1 protein occurs.

Experiment Type: enzyme activity assay

PMID: 14704270 Lee SY, Wenk MR, Kim Y, Nairn AC, De Camilli P. Regulation of synaptojanin 1 by cyclin-dependent kinase 5 at synapses. Proc Natl Acad Sci U S A. 2004 Jan 13;101(2):546-51. Epub 2004 Jan 2.

Source: BIOGRID

Relation 81:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of mouse Calm1 protein and mouse Ppp3ca protein occurs.

PMID: 15543153 Frey N, Barrientos T, Shelton JM, Frank D, Rütten H, Gehring D, Kuhn C, Lutz M, Rothermel B, Bassel-Duby R, Richardson JA, Katus HA, Hill JA, Olson EN. Mice lacking calsarcin-1 are sensitized to calcineurin signaling and show accelerated cardiomyopathy in response to pathological biomechanical stress. Nat Med. 2004 Dec;10(12):1336-43. Epub 2004 Nov 14.

Source: BIND

Relation 82:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of mouse Grin2b protein and mouse Ppp3ca protein occurs.

Experiment Type: affinity chromatography

PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.

Source: BIOGRID

Relation 83:

Ingenuity Relationships

protein-protein interactions [3]

• Binding of human AKAP5 protein and human PPP3CA protein occurs.

Experiment Type: affinity chromatography

PMID: 9765270 Kashishian A, Howard M, Loh C, Gallatin WM, Hoekstra MF, Lai Y. AKAP79 inhibits calcineurin through a site distinct from the immunophilin-binding region. J Biol Chem. 1998 Oct 16;273(42):27412-9.

Source: BIOGRID

• Binding of human AKAP5 protein and human PPP3CA protein occurs.

Experiment Type: two-hybrid assay

PMID: 9765270 Kashishian A, Howard M, Loh C, Gallatin WM, Hoekstra MF, Lai Y. AKAP79 inhibits calcineurin through a site distinct from the immunophilin-binding region. J Biol Chem. 1998 Oct 16;273(42):27412-9.

Source: BIOGRID

• Binding of human AKAP79 [AKAP5] protein and mouse Calcineurin A Alpha [Ppp3ca] protein occurs in lateral membrane from living MDCKII cells.

Experiment Type: fluorescence resonance energy transfer

PMID: 15930126 Gorski JA, Gomez LL, Scott JD, Dell'Acqua ML. Association of an A-kinase-anchoring protein signaling scaffold with cadherin adhesion molecules in neurons and epithelial cells. Mol Biol Cell. 2005 Aug;16(8):3574-90. Epub 2005 Jun 1.

Source: Ingenuity Expert Findings

Relation 84:

Ingenuity Relationships

protein-protein interactions [1]

• Binding of mouse Camk2b protein and mouse Cpeb3 protein and mouse Epn2 protein and mouse Hk1 protein and mouse Hsp90ab1 protein and mouse Neurl1a protein and mouse Ppp3ca protein and mouse Uqcrc1 protein occurs.

Experiment Type: anti bait coimmunoprecipitation

PMID: 22153079 Pavlopoulos E, Trifilieff P, Chevaleyre V, Fioriti L, Zairis S, Pagano A, Malleret G, Kandel ER. Neuralized1 activates CPEB3: a function for nonproteolytic ubiquitin in synaptic plasticity and memory storage. Cell. 2011 Dec 9;147(6):1369-83.

Source: INTACT

Relation 85:

Ingenuity Relationships

protein-protein interactions [6]

• Binding of rat Akap150 [Akap5] protein and rat Pka rII beta [Prkar2b] protein occurs in cultured hippocampal neurons from 0-1 day-old newborn rat.

Experiment Type: co-immunoprecipitation

PMID: 12177200 Gomez LL, Alam S, Smith KE, Horne E, Dell'Acqua ML. Regulation of A-kinase anchoring protein 79/150-cAMP-dependent protein kinase postsynaptic targeting by NMDA receptor activation of calcineurin and remodeling of dendritic actin. J Neurosci. 2002 Aug 15;22(16):7027-44.

Source: Ingenuity Expert Findings

• Binding of AKAP75 [AKAP5] and RII beta [PRKAR2B] occurs.

PMID: 8509414 Glantz SB, Li Y, Rubin CS. Characterization of distinct tethering and intracellular targeting domains in AKAP75, a protein that links cAMP-dependent protein kinase II beta to the cytoskeleton. J Biol Chem. 1993 Jun 15;268(17):12796-804.

Source: Ingenuity ExpertAssist Findings

Original Sentence: Certain conservative mutations that should not alter significantly the overall hydrophobicity or helicity of the tethering region (e.g. replacement of Leu with Ala) diminish the RII beta binding activity of AKAP75.

• Binding of rat Akap150 [Akap5] protein and rat Pka rII beta [Prkar2b] protein occurs in cultured hippocampal neurons from 0-1 day-old newborn rat.

Experiment Type: co-immunoprecipitation

PMID: 12177200 Gomez LL, Alam S, Smith KE, Horne E, Dell'Acqua ML. Regulation of A-kinase anchoring protein 79/150-cAMP-dependent protein kinase postsynaptic targeting by NMDA receptor activation of calcineurin and remodeling of dendritic actin. J Neurosci. 2002 Aug 15;22(16):7027-44.

Source: Ingenuity Expert Findings

• Binding of rat Akap150 [Akap5] protein and rat Pka rII beta [Prkar2b] protein occurs in cultured hippocampal neurons from 0-

1 day-old newborn rat.
Experiment Type: co-immunoprecipitation
PMID: 12177200 Gomez LL, Alam S, Smith KE, Horne E, Dell'Acqua ML. Regulation of A-kinase anchoring protein 79/150-cAMP-dependent protein kinase postsynaptic targeting by NMDA receptor activation of calcineurin and remodeling of dendritic actin. J Neurosci. 2002 Aug 15;22(16):7027-44.
Source: Ingenuity Expert Findings
• Activation of rat Nr2c [Grin2c] protein is involved in binding of a protein-protein complex consisting of rat Akap150 [Akap5] and of rat Prkar2b and rat Psd Maguk protein(s).
PMID: 12177200 Gomez LL, Alam S, Smith KE, Horne E, Dell'Acqua ML. Regulation of A-kinase anchoring protein 79/150-cAMP-dependent protein kinase postsynaptic targeting by NMDA receptor activation of calcineurin and remodeling of dendritic actin. J Neurosci. 2002 Aug 15;22(16):7027-44.
Source: Ingenuity Expert Findings
• Binding of human AKAP5 protein and human PRKAR2B protein occurs.
Experiment Type: pulldown assay
PMID: 8509414 Glantz SB, Li Y, Rubin CS. Characterization of distinct tethering and intracellular targeting domains in AKAP75, a protein that links cAMP-dependent protein kinase II beta to the cytoskeleton. J Biol Chem. 1993 Jun 15;268(17):12796-804.
Source: BIOGRID

<u>translocation [1]</u>
• AKAP75 [AKAP5] protein increases translocation of Pkarb2 [PRKAR2B] protein from cytosolic fraction from A126 cells to a membrane fraction from A126 cells.
PMID: 10551810 Cassano S, Di Lieto A, Cerillo R, Avvedimento EV. Membrane-bound cAMP-dependent protein kinase controls cAMP-induced differentiation in PC12 cells. J Biol Chem. 1999 Nov 12;274(46):32574-9.
Source: Ingenuity Expert Findings

Relation 86:
Ingenuity Relationships
<u>protein-protein interactions [1]</u>
• Binding of mouse Grin2b protein and mouse Prkar2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID

Relation 87:
Ingenuity Relationships
<u>protein-protein interactions [1]</u>
• Binding of mouse Calm1 protein and mouse Grin2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID

Relation 88:
Ingenuity Relationships
<u>protein-protein interactions [1]</u>
• Binding of mouse Grin2b protein and mouse Homer1 protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID

Relation 89:
Ingenuity Relationships
<u>protein-protein interactions [12]</u>
• Binding of rat Psd-93 [Dlg2] protein and rat Nr2b [Grin2b] protein occurs in membrane from ca1/ca2 region of hippocampus of 42 day-old rat.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 17670980 Al-Hallaq RA, Conrads TP, Veenstra TD, Wenthold RJ. NMDA di-heteromeric receptor populations and associated proteins in rat hippocampus. J Neurosci. 2007 Aug 1;27(31):8334-43.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg2 protein and mouse Grin2b protein occurs.

PMID: 12890763 Tao YX, Rumbaugh G, Wang GD, Petralia RS, Zhao C, Kauer FW, Tao F, Zhuo M, Wenthold RJ, Raja SN, Huganir RL, Bredt DS, Johns RA. Impaired NMDA receptor-mediated postsynaptic function and blunted NMDA receptor-dependent persistent pain in mice lacking postsynaptic density-93 protein. J Neurosci. 2003 Jul 30;23(17):6703-12.
Source: BIND
• Binding of rat Psd-93 [Dlg2] protein and rat Nr2b [Grin2b] protein occurs in rat hippocampus.
Experiment Type: co-immunoprecipitation
PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.
Source: Ingenuity Expert Findings
• Binding of mouse Dlg2 protein and mouse Grin2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID
• Binding of rat Psd-93 [Dlg2] protein and rat Nr2b [Grin2b] protein occurs in membrane from ca1/ca2 region of hippocampus of 42 day-old rat.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 17670980 Al-Hallaq RA, Conrads TP, Veenstra TD, Wenthold RJ. NMDA di-heteromeric receptor populations and associated proteins in rat hippocampus. J Neurosci. 2007 Aug 1;27(31):8334-43.
Source: Ingenuity Expert Findings
• Binding of human DLG2 protein and human GRIN2B protein occurs.
Experiment Type: affinity chromatography
11997254 Inanobe A, Fujita A, Ito M, Tomoike H, Inageda K, Kurachi Y. Inward rectifier K+ channel Kir2.3 is localized at the postsynaptic membrane of excitatory synapses. Am J Physiol Cell Physiol. 2002 Jun;282(6):C1396-403.
Source: BIOGRID
• Association of mouse Dlg1 protein and mouse Dlg2 protein and mouse Dlg3 protein and mouse Dlg4 protein and mouse Grin1 protein and mouse Grin2a protein and mouse Grin2b protein occurs.
Experiment Type: anti tag coimmunoprecipitation
PMID: 19455133 Fernández E, Collins MO, Uren RT, Kopanitsa MV, Komiyama NH, Croning MD, Zografos L, Armstrong JD, Choudhary JS, Grant SG. Targeted tandem affinity purification of PSD-95 recovers core postsynaptic complexes and schizophrenia susceptibility proteins. Mol Syst Biol. 2009;5:269. Epub 2009 May 19.
Source: INTACT
• Binding of rat Dlg2 protein and rat Grin2b protein occurs.
Experiment Type: two-hybrid assay
PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.
Source: MINT
• Binding of rat Psd-93 [Dlg2] protein and rat Nr2b [Grin2b] protein occurs in rat hippocampus.
Experiment Type: co-immunoprecipitation
PMID: 10648730 Sans N, Petralia RS, Wang YX, Blahos J, Hell JW, Wenthold RJ. A developmental change in NMDA receptor-associated proteins at hippocampal synapses. J Neurosci. 2000 Feb 1;20(3):1260-71.
Source: Ingenuity Expert Findings
• Binding of rat Psd-93 [Dlg2] protein and rat Nr2b [Grin2b] protein occurs in membrane from ca1/ca2 region of hippocampus of 42 day-old rat.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 17670980 Al-Hallaq RA, Conrads TP, Veenstra TD, Wenthold RJ. NMDA di-heteromeric receptor populations and associated proteins in rat hippocampus. J Neurosci. 2007 Aug 1;27(31):8334-43.
Source: Ingenuity Expert Findings
• Binding of human DLG2 protein and human GRIN2B protein occurs.
Experiment Type: two-hybrid assay
PMID: 9278515 Irie M, Hata Y, Takeuchi M, Ichtchenko K, Toyoda A, Hirao K, Takai Y, Rosahl TW, Südhof TC. Binding of neuroligins to PSD-95. Science. 1997 Sep 5;277(5331):1511-5.
Source: BIOGRID
• Binding of rat Dlg2 protein and rat Grin2b protein occurs.
Experiment Type: two-hybrid assay
PMID: 8601796 Niethammer M, Kim E, Sheng M. Interaction between the C terminus of NMDA receptor subunits and multiple members of the PSD-95 family of membrane-associated guanylate kinases. J Neurosci. 1996 Apr 1;16(7):2157-63.
Source: INTACT

Relation 90:
Ingenuity Relationships

protein-protein interactions [4]

• Binding of a protein fragment (1086-1481) containing a cytoplasmic domain from NR2B [GRIN2B] protein and rat Spectrin protein(s) occurs in cytosolic fraction from rat brain.
Experiment Type: pulldown assay
PMID: 9670010 Wechsler A, Teichberg VI. Brain spectrin binding to the NMDA receptor is regulated by phosphorylation, calcium and calmodulin. EMBO J. 1998 Jul 15;17(14):3931-9.
Source: Ingenuity Expert Findings

• Binding of rat Nr2b [Grin2b] protein and rat Spectrin protein(s) occurs in soluble fraction from rat forebrain synaptosomes.
Experiment Type: fractionation immunoblot
PMID: 9670010 Wechsler A, Teichberg VI. Brain spectrin binding to the NMDA receptor is regulated by phosphorylation, calcium and calmodulin. EMBO J. 1998 Jul 15;17(14):3931-9.
Source: Ingenuity Expert Findings

• Binding of cytoplasmic tail domain from NR2B [GRIN2B] protein and Spectrin protein(s) occurs.
PMID: 10845110 Sheng M, Pak DT. Ligand-gated ion channel interactions with cytoskeletal and signaling proteins. Annu Rev Physiol. 2000;62:755-78.
Source: Ingenuity Expert Findings

• Calcium [Ca2+] and tyrosine phosphorylation of protein are involved in binding of NR2B [GRIN2B] protein and Spectrin protein(s).
PMID: 10845110 Sheng M, Pak DT. Ligand-gated ion channel interactions with cytoskeletal and signaling proteins. Annu Rev Physiol. 2000;62:755-78.
Source: Ingenuity Expert Findings

Relation 91:
Ingenuity Relationships
protein-protein interactions [1]

• Binding of mouse Camk2b protein and mouse Grin2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID

Relation 92:
Ingenuity Relationships
protein-protein interactions [3]

• Binding of human AKAP5 protein and rat Grin2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.
Source: BIOGRID

• Binding of mouse Akap5 protein and mouse Grin2b protein occurs.
Experiment Type: affinity chromatography
PMID: 10862698 Husi H, Ward MA, Choudhary JS, Blackstock WP, Grant SG. Proteomic analysis of NMDA receptor-adhesion protein signaling complexes. Nat Neurosci. 2000 Jul;3(7):661-9.
Source: BIOGRID

• Binding of human AKAP79 [AKAP5] protein and rat Psd-95 [Dlg4] protein and NR2B [GRIN2B] protein occurs in Cos-7 cells.
Experiment Type: co-immunoprecipitation
PMID: 10939335 Colledge M, Dean RA, Scott GK, Langeberg LK, Huganir RL, Scott JD. Targeting of PKA to glutamate receptors through a MAGUK-AKAP complex. Neuron. 2000 Jul;27(1):107-19.
Source: Ingenuity Expert Findings

Relation 93:
Ingenuity Relationships
protein-protein interactions [1]

• Binding of rat Psd-93 [Dlg2] protein and rat Kv1.2 [Kcna2] protein in detergent-soluble membrane from rat brain occurs.
Experiment Type: co-immunoprecipitation, immunoblot
PMID: 20089912 Ogawa Y, Oses-Prieto J, Kim MY, Horresh I, Peles E, Burlingame AL, Trimmer JS, Meijer D, Rasband MN. ADAM22, a Kv1 channel-interacting protein, recruits membrane-associated guanylate kinases to juxtaparanodes of myelinated axons. J Neurosci. 2010 Jan 20;30(3):1038-48.
Source: Ingenuity Expert Findings

Relation 94:
Ingenuity Relationships
protein-protein interactions [3]

• Binding of rat Homer1c protein and human HOMER-3 protein occurs in a cell fraction.

Experiment Type: co-immunoprecipitation

PMID: 9808458 Xiao B, Tu JC, Petralia RS, Yuan JP, Doan A, Breder CD, Ruggiero A, Lanahan AA, Wenthold RJ, Worley PF. Homer regulates the association of group 1 metabotropic glutamate receptors with multivalent complexes of homer-related, synaptic proteins. Neuron. 1998 Oct;21(4):707-16.

Source: Ingenuity Expert Findings

• Binding of rat Homer1 protein and human HOMER3 protein occurs.

Experiment Type: affinity chromatography

PMID: 9808458 Xiao B, Tu JC, Petralia RS, Yuan JP, Doan A, Breder CD, Ruggiero A, Lanahan AA, Wenthold RJ, Worley PF. Homer regulates the association of group 1 metabotropic glutamate receptors with multivalent complexes of homer-related, synaptic proteins. Neuron. 1998 Oct;21(4):707-16.

Source: BIOGRID

• Binding of rat Homer1 protein and rat Homer3 protein occurs.

PMID: 9808458 Xiao B, Tu JC, Petralia RS, Yuan JP, Doan A, Breder CD, Ruggiero A, Lanahan AA, Wenthold RJ, Worley PF. Homer regulates the association of group 1 metabotropic glutamate receptors with multivalent complexes of homer-related, synaptic proteins. Neuron. 1998 Oct;21(4):707-16.

Source: BIND

<u>regulation of binding [1]</u>

• HOMER-1A protein decreases binding of mouse Mglur1a [Grm1] protein and mouse Homer3 protein.

PMID: 9808458 Xiao B, Tu JC, Petralia RS, Yuan JP, Doan A, Breder CD, Ruggiero A, Lanahan AA, Wenthold RJ, Worley PF. Homer regulates the association of group 1 metabotropic glutamate receptors with multivalent complexes of homer-related, synaptic proteins. Neuron. 1998 Oct;21(4):707-16.

Source: Ingenuity Expert Findings