

Table S14: Ranking of dimethylated (naturally unmodified) N-termini reduced in the TAILS experiment comparing wild-type and *Ctsl*^{-/-} skin.

Non Prime Site	Prime Site	Fold change (log ₂) of ASAPRatio (replicate 1)	Fold change (log ₂) of ASAPRatio (replicate 2)	Ranking (max. 5 points / min. -6 points)	Uniprot ID	Protein Name
QADCAVLIVA	AGVGEFEAGISKNGQTR	-1.89	-1.22	5	EF1A1_MOUSE	Elongation factor 1-alpha 1;
AAQYSDKGV	SGPGPMGLMGPR	-2.74	-1.84	5	CO1A2_MOUSE	Collagen alpha-2(I) chain;
HLAQGSETVQ	ATPESLEVPEVTEDVDR	-0.81	-2.74	5	AKA12_MOUSE	A-kinase anchor protein 12;
TKIFTASNVS	SVPLPAENVITAGQR	-4.32	-3.32	4	UBP2L_MOUSE	Ubiquitin-associated protein 2-like;
LESKSNKIVQ	SVIQTAVDQFAR	-1.18	-2.25	4	AKA12_MOUSE	A-kinase anchor protein 12;
SAANCDKSLH	TLFGDKLCAIPNLR	-3.18	-3.64	3	ALBU_MOUSE	Serum albumin;
TIEHLLPLFL	AQLKDECEPVR	-3.47	-1.84	3	2AAA_MOUSE	Serine/threonine-protein phosphatase 2A 65 kDa regulatory subunit A alpha isoform;
VEPDTYCRYD	SVSVFNGAVSDDSKR	-1.74	-4.06	3	PCOC1_MOUSE	Procollagen C-endopeptidase enhancer 1;
EGNASGVLL	EALDTLPPTRPTDKPLR	-4.32	-3.64	3	EF1A2_MOUSE	Elongation factor 1-alpha 2;
DGSASGTTLL	EALDCILPPTPTDKPLR	-1.79	-1.56	3	EF1A1_MOUSE	Elongation factor 1-alpha 1;
LWKFETSKYY	VTIIDAPGHR	-5.06	-4.32	3	EF1A1_MOUSE	Elongation factor 1-alpha 1;
AGDEESYEVF	ADLFDPIVILR	-2.56	-3.84	3	KCRS_MOUSE	Creatine kinase S-type, mitochondrial;
PTDKHKTDLN	HENLKGDDLDPNVYVSSR	-1.25	-1.74	3	KCRM_MOUSE	Creatine kinase M-type;
HPFMWNEHLG	YVLTCPNLGTGLR	-2.56	-2.74	3	KCRM_MOUSE	Creatine kinase M-type;
EGPVGLPGID	GRPGPIGPAGPR	-2.47	-2.47	3	CO1A2_MOUSE	Collagen alpha-2(I) chain;
MKVLQTRGFV	SDSSDSMDTGAGSIR	-1.74	-1.29	3	ATIF1_MOUSE	ATPase inhibitor, mitochondrial;
CDIDIRKDL	ANNVMSGTTMYPGIADR	-2.64	-4.32	3	ACTS_MOUSE	Actin, alpha skeletal muscle;
QKIGQPTLL	AVEEQYSCYVSGSR	-1.52	-1.15	3	E9PX16_MOUSE	
FVREPPIMVT	KQLEDMNAYCGER	-4.06	-5.06	3	D3YU50_MOUSE	
LPGFPATHY	STLSKPAPLTGTLEVR	-2.56	-1.94	2	PKN1_MOUSE	Serine/threonine-protein kinase N1;
KGSVAGGAVY	LVYDQELLGSPDKSEALR	-1.84	-1.40	2	QIL1_MOUSE	Protein QIL1;
LEEVTMKQIC	KEVYENYPAYDLTER	-1.52	-3.06	2	DEK_MOUSE	Protein DEK;
YKNSKFHRVI	KDFMIQGGDFTR	-3.47	-4.64	2	PPIB_MOUSE	Peptidyl-prolyl cis-trans isomerase B;
LNLKQKGYFF	VEGELYCETHAR	-1.74	-2.84	2	PDLI3_MOUSE	PDZ and LIM domain protein 3;
SVTREDSGQY	AAAYISNAVGAAYSSAR	-4.64	-3.84	2	OBSCN_MOUSE	Obscurin;
LQPQNLQPPS	QPHLSVSSAANGHLGR	-3.84	-3.84	2	NOTC1_MOUSE	Neurogenic locus notch homolog protein 1;
DIKSKTYQVM	RDYEQAGSAAVSVFSR	-1.64	-2.06	2	MSTN1_MOUSE	Musculoskeletal embryonic nuclear protein 1;
KKAGHPFMWN	EHLGYVLTCPNLGTGLR	-0.97	-2.47	2	KCRM_MOUSE	Creatine kinase M-type;
LGGNFASQMS	YGYDEKSAGVSVPGPMGSPGR	-3.32	-5.64	2	CO1A1_MOUSE	Collagen alpha-1(I) chain;
MRAAPRRAPA	AQPPAAAAPSAVGPAAAPR	-1.43	-1.84	2	CHCH2_MOUSE	Coiled-coil-helix-coiled-coil-helix domain-containing protein 2, mitochondrial;
VETQPGKTVI	RLPSGSGPASPTTGSVDIR	-1.79	-1.69	2	E9Q616_MOUSE	
KWKISFDPQD	TFESEFYLDEKR	-1.89	-1.36	1	SPA3K_MOUSE	Serine protease inhibitor A3K;
LSVPCILGQN	GISDVVKVTLTPEEAR	-0.84	-1.64	1	LDHA_MOUSE	L-lactate dehydrogenase A chain;
SQASDSEGHS	DFSEGQAVGAHR	-1.94	-2.25	1	FILA_MOUSE	Filaggrin;
TVKTTVFSCN	LGEKFDETTADGR	-6.64	-6.64	1	FABP5_MOUSE	Fatty acid-binding protein, epidermal;
LLALAGLLQA	RLLLPQAGFGGECDR	-2.64	-2.06	1	ENDD1_MOUSE	Endonuclease domain-containing 1 protein;
GNFAAQYSDK	GVSSGPGPMGLMGPR	-1.74	-2.32	1	CO1A2_MOUSE	Collagen alpha-2(I) chain;
GLTGNFAAQY	SDKGVSSGPGPMGLMGPR	-1.52	-2.32	1	CO1A2_MOUSE	Collagen alpha-2(I) chain;
GPVGPAGKNG	DRGETGPAGPAGIPAGAR	-2.64	-2.00	1	CO1A1_MOUSE	Collagen alpha-1(I) chain;
NDAYGPPSNF	LEIDVSNPQTVGVGR	-1.12	-2.00	0	SNX3_MOUSE	Sorting nexin-3;
VHKAVLDVAE	TGTEAAAATGVIGGIR	-3.64	-3.47	0	SPA3K_MOUSE	Serine protease inhibitor A3K;
SRDGKALEQF	LQEYFDGNLKR	-1.60	-1.12	0	PDIA3_MOUSE	Protein disulfide-isomerase A3;

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EGKGTIKKQF	LEELLTQCDR	-1.56	-3.06	0	MLRS_MOUSE	Myosin regulatory light chain 2, skeletal muscle isoform;
VFSMFDQTI	QEFKEAFTVIDQNR	-2.94	-3.64	0	MLRS_MOUSE	Myosin regulatory light chain 2, skeletal muscle isoform;
D	IQMTQTSSLSASLGDR	-1.79	-2.12	0	KV5AA_MOUSE	Ig kappa chain V-V region MOPC 173;
LVLILKGVQC	DVQLVESGGGLVQPGGSR	-3.18	-2.25	0	HVM16_MOUSE	Ig heavy chain V region MOPC 21;
DTEEYNLRDY	FEKYGIETIEVMEDR	-0.86	-1.84	0	ROA3_MOUSE	Heterogeneous nuclear ribonucleoprotein A3;
WPDARGIWHN	DNKSFLVWVNEEDHLR	-1.32	-3.84	0	KCRM_MOUSE	Creatine kinase M-type;
YSGLQGLPGL	AGLHGDQAGPVPVGPAGPR	-2.40	-2.25	0	CO1A2_MOUSE	Collagen alpha-2(I) chain;
PGLTGNFAAQ	YSDKGVSSGPGMGLMGPR	-2.40	-4.32	0	CO1A2_MOUSE	Collagen alpha-2(I) chain;
LLHPTLILAQ	QSNVDLGCSSLGQSYESR	-1.74	-3.64	0	CO3A1_MOUSE	Collagen alpha-1(III) chain;
PGLGGNFASQ	MSYGYDEKSAGVSPGPMGSPGPR	-3.18	-2.84	0	CO1A1_MOUSE	Collagen alpha-1(I) chain;
SQMSYGYDEK	SAGVSPGPMGSPGPR	-2.74	-3.32	0	CO1A1_MOUSE	Collagen alpha-1(I) chain;
YRIWRDTANW	LEINPETGAIFTR	-2.00	-2.56	0	CADH1_MOUSE	Cadherin-1;
R	IFQTTTTRPFQKLF	-2.12	-1.52	0	F7D9Q0_MOUSE	
SPLPVIPHQK	VVANSAPANADYQER	-1.89	-1.64	0	E9PYJ9_MOUSE	
CDLYEKLGEY	GFQNAILVR	-2.00	-1.18	-1	ALBU_MOUSE	Serum albumin;
EQFLPMMQAI	SNNKQGGYEDFVEGLR	-2.32	-2.40	-1	MYL1_MOUSE	Myosin light chain 1/3, skeletal muscle isoform;
LFVRNLANTV	TEEILEKFSQFGKLER	-2.18	-3.47	-1	HNRPO_MOUSE	Heterogeneous nuclear ribonucleoprotein Q;
KDLKDYFSKF	GEVVDCTLKLDPITGR	-1.64	-2.06	-1	HNRPD_MOUSE	Heterogeneous nuclear ribonucleoprotein D0;
KDLTEYLSRF	GEVVDCTIKTDPVTGR	-2.32	-3.32	-1	HNRDL_MOUSE	Heterogeneous nuclear ribonucleoprotein D-like;
ERRGFCFITY	TDEEPVKLLLES	-2.18	-2.25	-1	HNRDL_MOUSE	Heterogeneous nuclear ribonucleoprotein D-like;
YNLRDYFEKY	GKIETIEVMEDR	-1.36	-1.89	-1	ROA3_MOUSE	Heterogeneous nuclear ribonucleoprotein A3;
KDLKDYFTKF	GEVVDCTIKMDPNTGR	-1.94	-6.64	-1	ROAA_MOUSE	Heterogeneous nuclear ribonucleoprotein A/B;
TPGHACTQKF	SNEEIAMATVTALR	-1.32	-1.69	-1	ALDOA_MOUSE	Fructose-bisphosphate aldolase A;
FQLIGIQDGY	LSLLQDSGEVR	-2.84	-2.25	-1	IF5A1_MOUSE	Eukaryotic translation initiation factor 5A-1;
SPSEIGPGMP	ANQDTTFEGIGGPR	-3.47	-2.56	-1	CO5A1_MOUSE	Collagen alpha-1(V) chain;
GATALLTHGQ	EDIPEVSCIHNGLR	-0.94	-1.84	-1	CO1A1_MOUSE	Collagen alpha-1(I) chain;
PGPVGPAGKN	GDRGETGPAGPAGPIGPAGAR	-2.00	-2.84	-1	CO1A1_MOUSE	Collagen alpha-1(I) chain;
GGNFASQMSY	GYDEKSAGVSPGPMGSPGPR	-1.89	-2.64	-1	CO1A1_MOUSE	Collagen alpha-1(I) chain;
PVGPAGKNGD	RGETGPAGPAGPIGPAGAR	-2.64	-2.25	-1	CO1A1_MOUSE	Collagen alpha-1(I) chain;
HRSGETEDTF	IADLVVGLCTGQIKTGAPCR	-1.40	-2.40	-1	ENOB_MOUSE	Beta-enolase;
DKIREYKSKR	QASGGPVDIGPEYQQDLDR	-1.74	-2.40	-1	ATP5J_MOUSE	ATP synthase-coupling factor 6, mitochondrial;
DKAKELWDTL	YQLETKDFEFGEKLR	-2.94	-1.43	-2	TNNT3_MOUSE	Troponin T, fast skeletal muscle;
ARRQSRMEKY	VISSGHAELAR	-3.06	-4.06	-2	SYNPO_MOUSE	Synaptopodin;
DALKRGLREH	LCEQQAELDYLCGR	-3.32	-5.06	-2	FA65C_MOUSE	Protein FAM65C;
LQKRPKPDEK	YYSSSIWGPCTCDGLDR	-6.64	-6.64	-2	DCOR_MOUSE	Ornithine decarboxylase;
KQIQKLEXRV	RELEGEVENEQKR	-3.06	-1.69	-2	MYH1_MOUSE	Myosin-1;
MFDQTIQIEF	KEAFTVIDQNR	-1.43	-2.32	-2	MLRS_MOUSE	Myosin regulatory light chain 2, skeletal muscle isoform;
AGLPTSLTL	YLDNNKISNIPDEYFKR	-2.40	-3.64	-2	LUM_MOUSE	Lumican;
LLWVPGSTGD	IVLTQSPASLAVSLGQR	-1.64	-2.25	-2	KV3A1_MOUSE	Ig kappa chain V-III region PC 2880/PC 1229;
GTDIFTGKKY	EDICPSTHNMDVPNIKR	-1.47	-2.06	-2	IF5A1_MOUSE	Eukaryotic translation initiation factor 5A-1;
KEGNASGVSL	LEALDTLPPTRPDKPLR	-3.84	-2.56	-2	EF1A2_MOUSE	Elongation factor 1-alpha 2;
ASGTTLLEAL	DCILPPTRPDKPLR	-2.25	-2.12	-2	EF1A1_MOUSE	Elongation factor 1-alpha 1;
KDGASGTTL	LEALDCILPPTRPDKPLR	-2.74	-2.64	-2	EF1A1_MOUSE	Elongation factor 1-alpha 1;
SVGDGETVEF	DVVEGEKGAEANVTGPDGVPVEGSR	-3.06	-1.79	-2	DBPA_MOUSE	DNA-binding protein A;
KHKTDLNHEN	LKGGDDLDPNYVLSR	-1.12	-1.94	-2	KCRM_MOUSE	Creatine kinase M-type;
GIWHNDNKSF	LVWVNEEDHLR	-1.56	-1.89	-2	KCRM_MOUSE	Creatine kinase M-type;
NFASQMSYGY	DEKSAGVSPGPMGSPGPR	-3.06	-3.06	-2	CO1A1_MOUSE	Collagen alpha-1(I) chain;
APPWKDSKKF	KDAPDGPTVVLTVDGR	-6.64	-6.64	-2	FA12_MOUSE	Coagulation factor XII;

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Non Prime Site	Prime Site	Fold change (log ₂) of ASAPRatio (replicate 1)	Fold change (log ₂) of ASAPRatio (replicate 2)	Ranking (max. 5 points / min. -6 points)	Uniprot ID	Protein Name
LAKYNQLMRI	EEALGDKAVFAGR	-5.06	-2.84	-2	ENOB_MOUSE	Beta-enolase;
MPCKI	EEIKDFLLTAR	-5.64	-1.84	-2	RL38_MOUSE	60S ribosomal protein L38;
FLPMMQAISN	NKDQGGYEDFVEGLR	-1.12	-2.25	-2	E9PWG4_MOUSE	
KKILAERRKP	LNIDHLSDDKLR	-1.64	-3.18	-4	TNNT3_MOUSE	Troponin T, fast skeletal muscle;