Supplemental Table 1. *Slc* genes not detected in brain ($\hat{E}$=0)

Gene Symbol	Protein Name	Substrates	Gene Symbol	Protein Name	Substrates
Slc1a7	EAAT5	L-Glu, D/L-Asp	*Slco6c1*	Oatp6c1	Taurocholate, T3, T4, DHEAS
Slc2a2	GLUT2	Glucose,galactose, mannose, glucosamine, fructose	*Slc22a12*	hURAT1	Urate
Slc5a4a	SGLT3a	Na+ (H+)	*Slc22a13*	OCTL1	unknown
Slc5a4b	SGLT3b	Na+ (H+)	*Slc22a14*	OCTL2	unknown
Slc5a8	SMCT1	short-chain fatty acids/lactate/nicotinate, iodide	*Slc22a15*	FLIPT1	unknown
Slc5a12	SMCT2	short-chain fatty acids/lactate/nicotinate	*Slc22a16*	hCT2	Carnitine
Slc6a14	ATB(O+)	neutral, cationic amino acids	*Slc23a3*	SVCT3	L-Ascorbic acid
Slc6a18	Xtrp2	unknown	*Slc25a24*	APC1	ATP, ADP, AMP, and Pi
Slc7a7	y+LAT1	cationic and large neutral L-amino acids	*Slc25a31*		unknown
Slc7a12	xCT	small neutral L-amino acids	*Slc25a32*	MFTC	folate
Slc7a13	AGT-1	L-Asp, L-Glu	*Slc25a34*		unknown
Slc9a10		monovalent cation/H+	*Slc26a3*	PAT3	SO42-, Cl-, HCO3-, OH-, oxalate
Slc10a1	NTCP	Bile acids	*Slc26a5*		unknown
Slc10a5	P5	unknown	*Slc27a2*	FATP2	Long-chain fatty acids
Slc10a6	P6	estrone-3-sulfate, dehydroepiandroster-one sulfate	*Slc27a6*	FATP6	Long-chain fatty acids
Slc11a1	NRAMP1	divalent metal cations	*Slc28a1*	CNT1	Pyrimidine nucleosides, adenosine
Slc13a1	NaS1	Sulfate, selenate, thiosulfate	*Slc30a4*	ZNT4	zinc
Slc15a1	PEPT1	Di- and tri-peptides/H+	*Slc30a6*	ZNT6	zinc
Slc16a3	MCT4	Lactate, pyruvate, ketones	*Slc30a10*	ZNT10	unknown
Slc16a5	MCT6	unknown	*Slc34a3*	NaPi-llc	inorganic phosphate
Slc16a8	MCT3	Lactate	*Slc35d2*		unknown
Slc17a2	NPT1	unknown	*Slc35e4*		unknown
Slc17a3	NPT3	unknown	*Slc36a3*	PAT3	unknown
Slc18a1	VMAT1	Serotonin, dopamine, noradrenaline, adrenaline, histamine	*Slc44a3*	CTL3	unknown
Slc19a3	ThTr2	Thiamine	*Slc44a4*	CTL34	unknown
Slco1a1	Oatp1a1	Bile salts, organic anions, organic cations	*Slc45a2*		unknown
Slco4c1	Oatp4c1	T3, cAMP	*Slc47a2*		organic cations
Slco6b1	Oatp6b1	Taurocholate, T3, T4, DHEAS			

Legends to Supplemental Figures

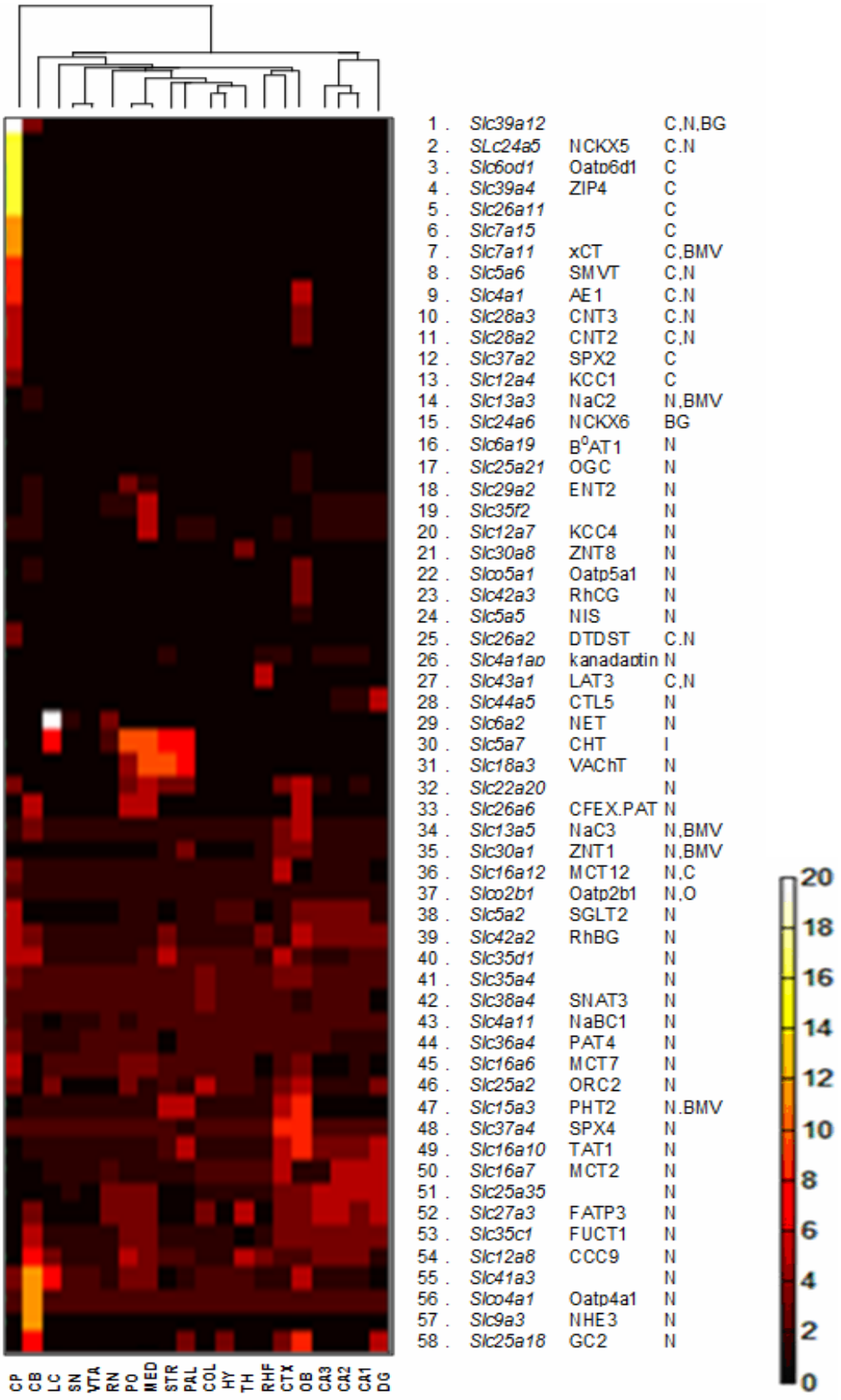
Supplemental Figure 1. Expression pattern, gene and protein name, and cell type annotation of *Slc* genes in cluster IA. Abbreviations for brain regions are: "OB" olfactory bulb; "CTX" cerebral cortex; "PAL" pallidum; "STR" striatum; "DG" dentate gyrus; "CA3" CA3 hippocampal field; "CA2" CA2 hippocampal field; "CA1" CA1 hippocampal field; "RHF" retrohippocampal formation; "CP" choroid plexus; "T" thalamus; "HY" hypothalamus; "COL" colliculi; "SN" substantia nigra; "VTA" ventral tegmental area; "LC" locus coeruleus; "R" raphe; "P" pons; "MED" medulla; "CB" cerebellum. Abbreviations for cells types are: A, astrocytes; G, glial cells; N, neuron; O, oligodendrocytes; I, interneurons; C, choroiod plexus; BMV, brain microvessels; BG, Bergmann glial cells.

Supplemental Figure 2. Expression pattern, gene and protein name, and cell type annotation of *Slc* genes in cluster IB. Abbreviations for brain regions are: "OB" olfactory bulb; "CTX" cerebral cortex; "PAL" pallidum; "STR" striatum; "DG" dentate gyrus; "CA3" CA3 hippocampal field; "CA2" CA2 hippocampal field; "CA1" CA1 hippocampal field; "RHF" retrohippocampal formation; "CP" choroid plexus; "T" thalamus; "HY" hypothalamus; "COL" colliculi; "SN" substantia nigra; "VTA" ventral tegmental area; "LC" locus coeruleus; "R" raphe; "P" pons; "MED" medulla; "CB" cerebellum. Abbreviations for cells types are: A, astrocytes; G, glial cells; N, neuron; O, oligodendrocytes; I, interneurons; C, choroiod plexus; BMV, brain microvessels; BG, Bergmann glial cells.

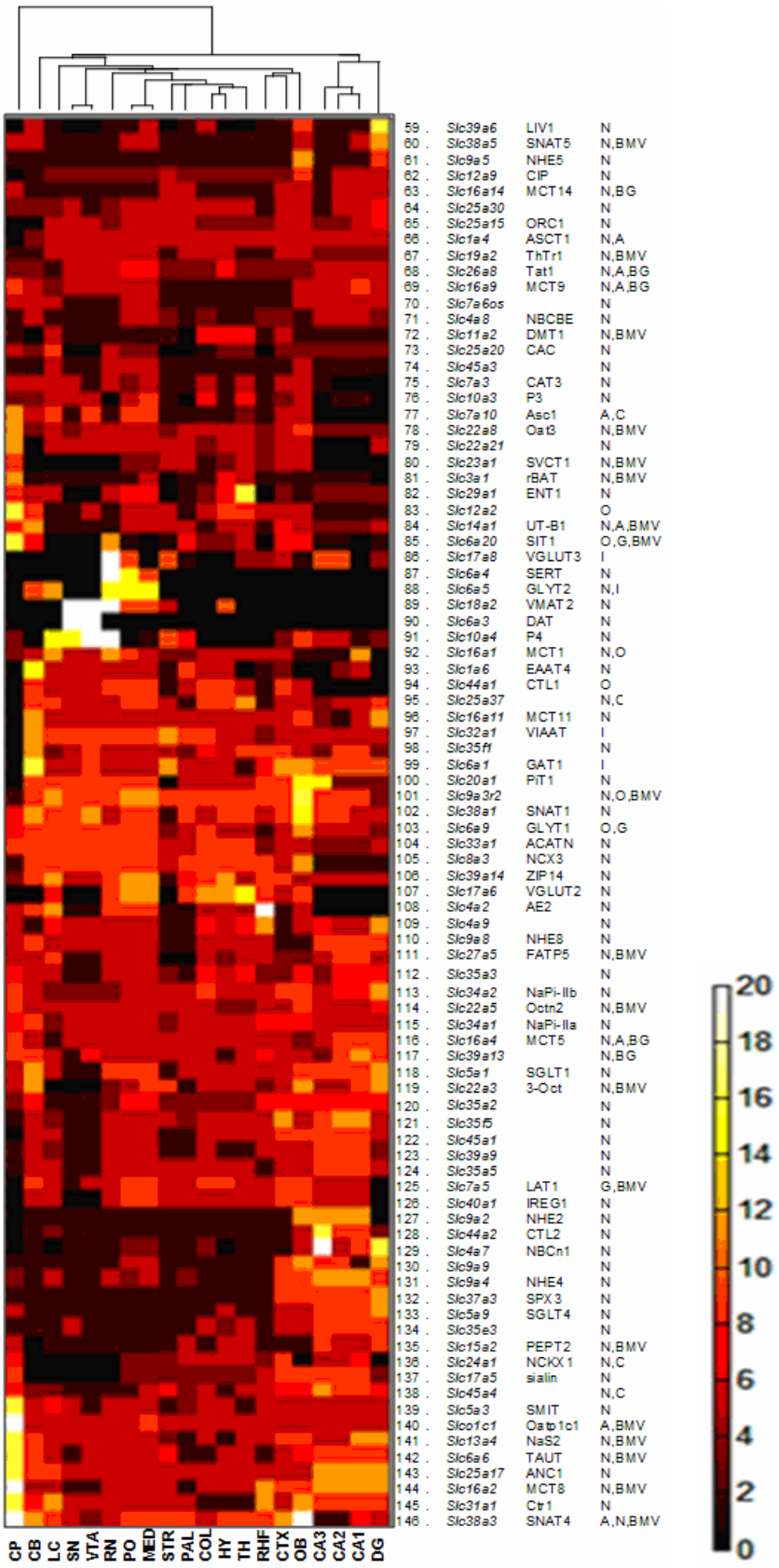
Supplemental Figure 3. Expression pattern, gene and protein name, and cell type annotation of *Slc* genes in cluster IIA and IIB. Abbreviations for brain regions are: "OB" olfactory bulb; "CTX" cerebral cortex; "PAL" pallidum; "STR" striatum; "DG" dentate gyrus; "CA3" CA3 hippocampal field; "CA2" CA2 hippocampal field; "CA1" CA1 hippocampal field; "RHF" retrohippocampal formation; "CP" choroid plexus; "T" thalamus; "HY" hypothalamus; "COL" colliculi; "SN" substantia nigra; "VTA" ventral tegmental area; "LC" locus coeruleus; "R" raphe; "P" pons; "MED" medulla; "CB" cerebellum. Abbreviations for cells types are: A, astrocytes; G, glial cells; N, neuron; O, oligodendrocytes; I, interneurons; C, choroiod plexus; BMV, brain microvessels; BG, Bergmann glial cells.

Supplemental Figure 4. Expression pattern, gene and protein name, and cell type annotation of *Slc* genes in cluster IIC. Abbreviations for brain regions are: "OB" olfactory bulb; "CTX" cerebral cortex; "PAL" pallidum; "STR" striatum; "DG" dentate gyrus; "CA3" CA3 hippocampal field; "CA2" CA2 hippocampal field; "CA1" CA1 hippocampal field; "RHF" retrohippocampal formation; "CP" choroid plexus; "T" thalamus; "HY" hypothalamus; "COL" colliculi; "SN" substantia nigra; "VTA" ventral tegmental area; "LC" locus coeruleus; "R" raphe; "P" pons; "MED" medulla; "CB" cerebellum. Abbreviations for cells types are: A, astrocytes; G, glial cells; N, neuron; O, oligodendrocytes; I, interneurons; C, choroiod plexus; BMV, brain microvessels; BG, Bergmann glial cells; U, all cell types.

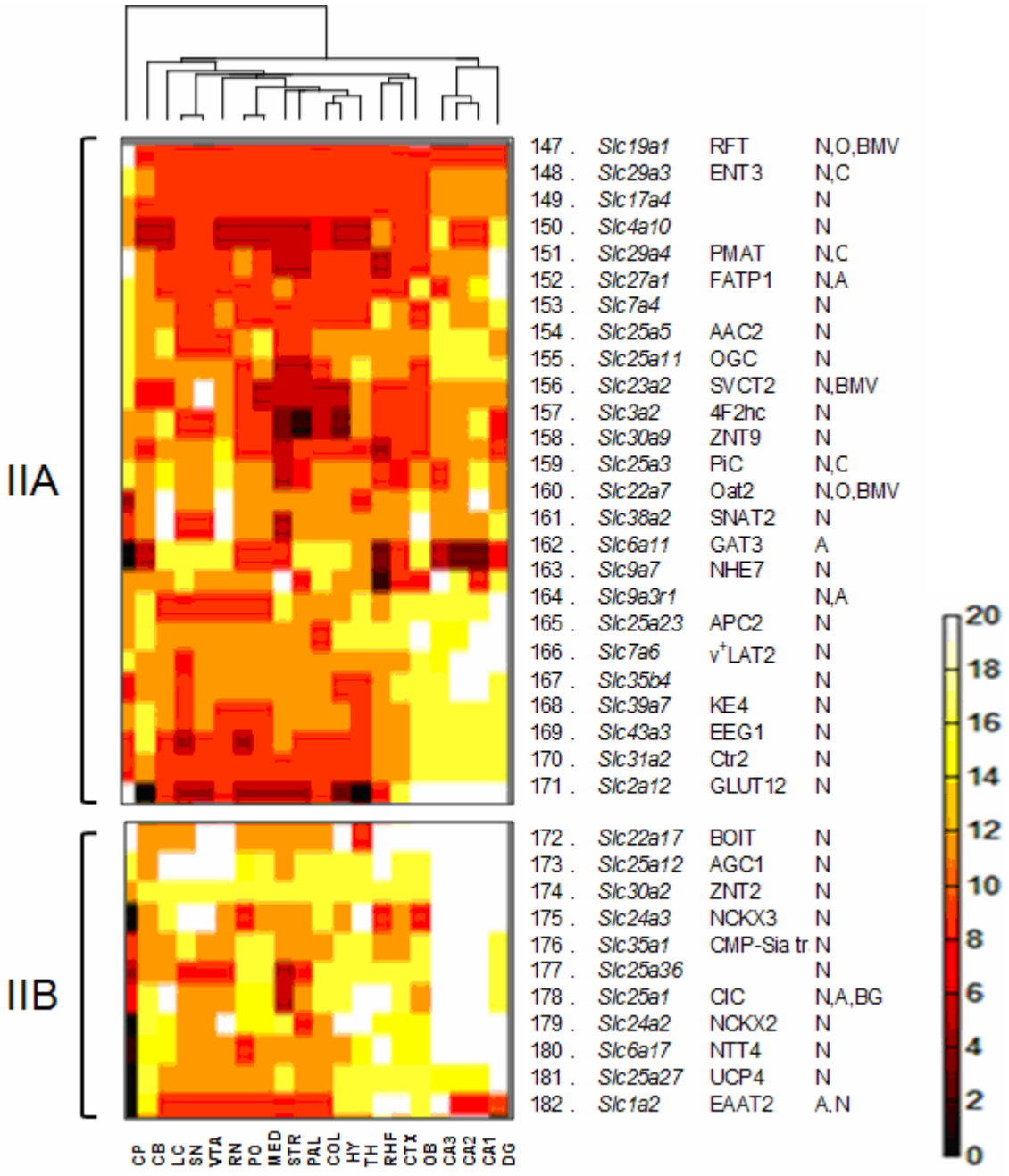
Supplemental Fig. 1



Supplemental Fig. 2



Supplemental Fig. 3



Supplemental Fig. 4