

Article

Supplementary Materials: From Viral Infections to Autistic Neurodevelopmental Disorders via Cross-ReactivityDarja Kanduc ^{1,*}, Anna Polito ²¹ Department of Biosciences, Biotechnologies and Biopharmaceutics, University of Bari, Bari 70125, Italy² Complex Structure of Neuropsychiatry Childhood-Adolescence, United Hospitals of Foggia, Foggia 71122, Italy* Correspondence: Darja Kanduc, Email: dkanduc@gmail.com; Tel. +39-3356141668.**Table S1. List of 138 human proteins retrieved at random from UniProtKB Database (<http://www.uniprot.org/>) using “autism” and “autistic” as keywords.**

UniProt and Protein names
ADNP. Activity-dependent neuroprotector homeobox protein
ADR2. Adiponectin receptor protein 2 (Progesterin and adipoQ receptor family member II)
AGAP1. Arf-GAP with GTPase, ANK repeat and PH domain-containing protein 1 (AGAP-1) (Centaurin-gamma-2) (Cnt-g2) (GTP-binding and GTPase-activating protein 1) (GGAP1)
AGRA2. Adhesion G protein-coupled receptor A2 (G-protein coupled receptor 124) (Tumor endothelial marker 5)
AGRG2. Adhesion G-protein coupled receptor G2 (G-protein coupled receptor 64) (Human epididymis-specific protein 6) (He6)
AMER1. APC membrane recruitment protein 1 (Amer1) (Protein FAM123B) (Wilms tumor gene on the X chromosome protein)
ANK3. Ankyrin-3 (ANK-3) (Ankyrin-G)
ANR11. Ankyrin repeat domain-containing protein 11 (Ankyrin repeat-containing cofactor 1)
APCL. Adenomatous polyposis coli protein 2 (Adenomatous polyposis coli protein-like) (APC-like)
ARI1B. AT-rich interactive domain-containing protein 1B (ARID domain-containing protein 1B) (BRG1-associated factor 250b) (BAF250B) (BRG1-binding protein hELD/OSA1) (Osa homolog 2) (hOsa2) (p250R)
ARX. Homeobox protein ARX (Aristaless-related homeobox)
ASMT. Acetylserotonin O-methyltransferase (Hydroxyindole O-methyltransferase) (HIOMT)
AT10A. Probable phospholipid-transporting ATPase VA (ATPase class V type 10A) (Aminophospholipid translocase VA) (P4-ATPase flippase complex alpha subunit ATP10A)
AT1B1. Sodium/potassium-transporting ATPase subunit beta-1
AUTS2. Autism susceptibility gene 2 protein
BCKD. [3-methyl-2-oxobutanoate dehydrogenase [lipoamide]] kinase, mitochondrial (Branched-chain alpha-ketoacid dehydrogenase kinase) (BCKD-kinase) (BCKDHKIN)
BICC1. Protein bicaudal C homolog 1 (Bic-C)
CAC1C. Voltage-dependent L-type calcium channel subunit alpha-1C (Calcium channel, L type, alpha-1 polypeptide, isoform 1, cardiac muscle) (Voltage-gated calcium channel subunit alpha Cav1.2)
CAC1H. Voltage-dependent T-type calcium channel subunit alpha-1H (Low-voltage-activated calcium

channel alpha1 3.2 subunit) (Voltage-gated calcium channel subunit alpha Cav3.2)
CADM1. Cell adhesion molecule 1 (Immunoglobulin superfamily member 4) (IgSF4) (Nectin-like protein 2) (NECL-2) (Spermatogenic immunoglobulin superfamily) (SgIgSF) (Synaptic cell adhesion molecule) (SynCAM) (Tumor suppressor in lung cancer 1) (TSLC-1)
CBPA5. Carboxypeptidase A5
CCD22. Coiled-coil domain-containing protein 22
CDKL5. Cyclin-dependent kinase-like 5 (Serine/threonine-protein kinase 9)
CEP41. Centrosomal protein of 41 kDa (Cep41) (Testis-specific gene A14 protein)
CHD8. Chromodomain-helicase-DNA-binding protein 8 (CHD-8) (ATP-dependent helicase CHD8) (Helicase with SNF2 domain 1)
CNTP2. Contactin-associated protein-like 2 (Cell recognition molecule Caspr2)
CPLX1. Complexin-1 (CPX I) (Synaphin-2)
CRADD. Death domain-containing protein CRADD (Caspase and RIP adapter with death domain) (RIP-associated protein with a death domain)
CT47B. Cancer/testis antigen 47B (Cancer/testis antigen 47.13) (CT47.13)
CTNB1. Catenin beta-1 (Beta-catenin)
CTND2. Catenin delta-2 (Delta-catenin) (GT24) (Neural plakophilin-related ARM-repeat protein) (NPRAP) (Neurojungin)
CTTB2. Cortactin-binding protein 2 (CortBP2)
CUL3. Cullin-3 (CUL-3)
CYFP1. Cytoplasmic FMR1-interacting protein 1 (Specifically Rac1-associated protein 1) (Sra-1) (p140sra-1)
DCNL1. DCN1-like protein 1 (DCUN1 domain-containing protein 1) (Defective in cullin neddylation protein 1-like protein 1) (Squamous cell carcinoma-related oncogene)
DEAF1. Deformed epidermal autoregulatory factor 1 homolog (Nuclear DEAF-1-related transcriptional regulator) (NUDR) (Suppressin) (Zinc finger MYND domain-containing protein 5)
DEPD5. GATOR complex protein DEPDC5 (DEP domain-containing protein 5)
DGCR6. Protein DGCR6 (DiGeorge syndrome critical region 6)
DIA1. Deleted in autism protein 1 (Golgi Protein of 49 kDa) (GoPro49) (Hypoxia and AKT-induced stem cell factor) (HASF)
DIA1R. Deleted in autism-related protein 1
DLG4. Disks large homolog 4 (Postsynaptic density protein 95) (PSD-95) (Synapse-associated protein 90) (SAP-90) (SAP90)
DMPK. Myotonin-protein kinase (MT-PK) (DM-kinase) (DMK) (DM1 protein kinase) (DMPK) (Myotonic dystrophy protein kinase)
DYR1A. Dual specificity tyrosine-phosphorylation-regulated kinase 1A (Dual specificity YAK1-related kinase) (HP86) (Protein kinase minibrain homolog) (MNBH) (hMNB)
EF1A2. Elongation factor 1-alpha 2 (EF-1-alpha-2) (Eukaryotic elongation factor 1 A-2) (eEF1A-2) (Statin-S1)
EFR3A. Protein EFR3 homolog A (Protein EFR3-like)
ERBB2. Receptor tyrosine-protein kinase erbB-2 (Metastatic lymph node gene 19 protein) (MLN 19)

(Proto-oncogene Neu) (Proto-oncogene c-ErbB-2) (Tyrosine kinase-type cell surface receptor HER2) (p185erbB2) (CD antigen CD340)
FAN1. Fanconi-associated nuclease 1 (FANCD2/FANCI-associated nuclease 1) (hFAN1) (Myotubularin-related protein 15)
FHIT. Bis(5'-adenosyl)-triphosphatase (AP3A hydrolase) (AP3Aase) (Diadenosine 5',5'''-P1,P3-triphosphate hydrolase) (Dinucleosidetriphosphatase) (Fragile histidine triad protein)
FMR1. Synaptic functional regulator FMR1 (Fragile X mental retardation protein 1) (FMRP) (Protein FMR-1)
FOXP1. Forkhead box protein P1 (Mac-1-regulated forkhead) (MFH)
GBRB1. Gamma-aminobutyric acid receptor subunit beta-1 (GABA(A) receptor subunit beta-1)
GBRB3. Gamma-aminobutyric acid receptor subunit beta-3 (GABA(A) receptor subunit beta-3)
GLT13. Polypeptide N-acetylgalactosaminyltransferase 13 (Polypeptide GalNAc transferase 13) (GalNAc-T13) (pp-GaNTase 13) (Protein-UDP acetylgalactosaminyltransferase 13) (UDP-GalNAc:polypeptide N-acetylgalactosaminyltransferase 13)
GLYM. Serine hydroxymethyltransferase, mitochondrial (SHMT) (Glycine hydroxymethyltransferase) (Serine methylase)
GPHRA. Golgi pH regulator A (Protein GPR89A) (Putative MAPK-activating protein PM01) (Putative NF-kappa-B-activating protein 90)
GPR85. Probable G-protein coupled receptor 85 (Super conserved receptor expressed in brain 2)
HDAC4. Histone deacetylase 4 (HD4)
HECAM. Hepatocyte cell adhesion molecule (Protein hepaCAM)
HERC2. E3 ubiquitin-protein ligase HERC2 (HECT domain and RCC1-like domain-containing protein 2) (HECT-type E3 ubiquitin transferase HERC2)
HME2. Homeobox protein engrailed-2 (Homeobox protein en-2) (Hu-En-2)
HNRH2. Heterogeneous nuclear ribonucleoprotein H2 (hnRNP H2) (FTP-3) (Heterogeneous nuclear ribonucleoprotein H') (hnRNP H') [Cleaved into: Heterogeneous nuclear ribonucleoprotein H2, N-terminally processed]
HUWE1. E3 ubiquitin-protein ligase HUWE1 (ARF-binding protein 1) (ARF-BP1) (HECT, UBA and WWE domain-containing protein 1) (HECT-type E3 ubiquitin transferase HUWE1) (Homologous to E6AP carboxyl terminus homologous protein 9) (HectH9) (Large structure of UREB1) (LASU1) (Mcl-1 ubiquitin ligase E3) (Mule) (Upstream regulatory element-binding protein 1) (URE-B1) (URE-binding protein 1)
HXA1. Homeobox protein Hox-A1 (Homeobox protein Hox-1F)
HXB1. Homeobox protein Hox-B1 (Homeobox protein Hox-2I)
IF4E. Eukaryotic translation initiation factor 4E (eIF-4E) (eIF4E) (eIF-4F 25 kDa subunit) (mRNA cap-binding protein)
IGSF1. Immunoglobulin superfamily member 1 (IgSF1) (Immunoglobulin-like domain-containing protein 1) (Inhibin-binding protein) (InhBP) (Pituitary gland-specific factor 2) (p120)
IRPL1. Interleukin-1 receptor accessory protein-like 1 (IL-1-RAPL-1) (IL-1RAPL-1) (IL1RAPL-1) (Oligophrenin-4) (Three immunoglobulin domain-containing IL-1 receptor-related 2) (TIGIRR-2) (X-linked interleukin-1 receptor accessory protein-like 1)
K1210. Acrosomal protein KIAA1210

K2022. Protein KIAA2022
KCND2. Potassium voltage-gated channel subfamily D member 2 (Voltage-gated potassium channel subunit Kv4.2)
KIRR3. Kin of IRRE-like protein 3 (Kin of irregular chiasm-like protein 3) (Nephrin-like protein 2) [Cleaved into: Processed kin of IRRE-like protein 3]
MAGA4. Melanoma-associated antigen 4 (Cancer/testis antigen 1.4) (CT1.4) (MAGE-4 antigen) (MAGE-41 antigen) (MAGE-X2 antigen)
MAGE1. Melanoma-associated antigen E1 (Alpha-dystrobrevin-associated MAGE Protein) (DAMAGE) (Hepatocellular carcinoma-associated protein 1) (MAGE-E1 antigen)
MAGL2. MAGE-like protein 2 (Necdin-like protein 1) (Protein nM15)
MAP1B. Microtubule-associated protein 1B (MAP-1B) [Cleaved into: MAP1B heavy chain; MAP1 light chain LC1]
MARK1. Serine/threonine-protein kinase MARK1 (MAP/microtubule affinity-regulating kinase 1) (PAR1 homolog c) (Par-1c) (Par1c)
MECP2. Methyl-CpG-binding protein 2 (MeCp-2 protein) (MeCp2)
MEF2C. Myocyte-specific enhancer factor 2C
MET. Hepatocyte growth factor receptor (HGF receptor) (HGF/SF receptor) (Proto-oncogene c-Met) (Scatter factor receptor) (SF receptor) (Tyrosine-protein kinase Met)
MXRA5. Matrix-remodeling-associated protein 5 (Adhesion protein with leucine-rich repeats and immunoglobulin domains related to perlecan) (Adlican)
MYO16. Unconventional myosin-XVI (Neuronal tyrosine-phosphorylated phosphoinositide-3-kinase adapter 3) (Unconventional myosin-16)
MYT1L. Myelin transcription factor 1-like protein (MyT1-L) (MyT1L)
NAC2. Sodium/calcium exchanger 2 (Na(+)/Ca(2+)-exchange protein 2) (Solute carrier family 8 member 2)
NHS. Nance-Horan syndrome protein (Congenital cataracts and dental anomalies protein)
NLGN2. Neuroligin-2
NLGN3. Neuroligin-3 (Gliotactin homolog)
NLGNX. Neuroligin-4, X-linked (Neuroligin X) (HNLX)
NLGN4. Neuroligin-4, Y-linked (Neuroligin Y)
NMDE1. Glutamate receptor ionotropic, NMDA 2A (GluN2A) (Glutamate [NMDA] receptor subunit epsilon-1) (N-methyl D-aspartate receptor subtype 2A) (NMDAR2A) (NR2A) (hNR2A)
NMDE2. Glutamate receptor ionotropic, NMDA 2B (GluN2B) (Glutamate [NMDA] receptor subunit epsilon-2) (N-methyl D-aspartate receptor subtype 2B) (NMDAR2B) (NR2B) (N-methyl-D-aspartate receptor subunit 3) (NR3) (hNR3)
NPRL2. GATOR complex protein NPRL2 (Gene 21 protein) (G21 protein) (Nitrogen permease regulator 2-like protein) (NPR2-like protein) (Tumor suppressor candidate 4)
NPRL3. GATOR complex protein NPRL3 (-14 gene protein) (Alpha-globin regulatory element-containing gene protein) (Nitrogen permease regulator 3-like protein) (Protein CGTHBA)
NRX1A. Neurexin-1 (Neurexin I-alpha) (Neurexin-1-alpha)
NRX1B. Neurexin-1-beta (Neurexin I-beta)

NSE3. Non-structural maintenance of chromosomes element 3 homolog (Non-SMC element 3 homolog) (Hepatocellular carcinoma-associated protein 4) (MAGE-G1 antigen) (Melanoma-associated antigen G1) (Necdin-like protein 2)
PHF8. Histone lysine demethylase PHF8 (PHD finger protein 8)
POGZ. Pogo transposable element with ZNF domain (Suppressor of hairy wing homolog 5) (Zinc finger protein 280E) (Zinc finger protein 635)
PPR3F. Protein phosphatase 1 regulatory subunit 3F (R3F)
PQBP1. Polyglutamine-binding protein 1 (PQBP-1) (38 kDa nuclear protein containing a WW domain) (Npw38) (Polyglutamine tract-binding protein 1)
PTEN. Phosphatidylinositol 3,4,5-trisphosphate 3-phosphatase and dual-specificity protein phosphatase PTEN (Mutated in multiple advanced cancers 1) (Phosphatase and tensin homolog)
PTHD1. Patched domain-containing protein 1
RB39B. Ras-related protein Rab-39B
REEP3. Receptor expression-enhancing protein 3
RERE. Arginine-glutamic acid dipeptide repeats protein (Atrophin-1-like protein) (Atrophin-1-related protein)
RFWD2. E3 ubiquitin-protein ligase RFWD2 (Constitutive photomorphogenesis protein 1 homolog) (hCOP1) (RING finger and WD repeat domain protein 2) (RING finger protein 200) (RING-type E3 ubiquitin transferase RFWD2)
RIMS3. Regulating synaptic membrane exocytosis protein 3 (Nim3) (RIM3 gamma) (Rab-3-interacting molecule 3) (RIM 3)
RL10. 60S ribosomal protein L10 (Laminin receptor homolog) (Large ribosomal subunit protein uL16) (Protein QM) (Tumor suppressor QM)
S12A5. Solute carrier family 12 member 5 (Electroneutral potassium-chloride cotransporter 2) (K-Cl cotransporter 2) (hKCC2) (Neuronal K-Cl cotransporter)
S35A3. UDP-N-acetylglucosamine transporter (Golgi UDP-GlcNAc transporter) (Solute carrier family 35 member A3)
SC6A8. Sodium- and chloride-dependent creatine transporter 1 (CT1) (Creatine transporter 1) (Solute carrier family 6 member 8)
SCN1A. Sodium channel protein type 1 subunit alpha (Sodium channel protein brain I subunit alpha) (Sodium channel protein type I subunit alpha) (Voltage-gated sodium channel subunit alpha Nav1.1)
SCN2A. Sodium channel protein type 2 subunit alpha (HBSC II) (Sodium channel protein brain II subunit alpha) (Sodium channel protein type II subunit alpha) (Voltage-gated sodium channel subunit alpha Nav1.2)
SCN3A. Sodium channel protein type 3 subunit alpha (Sodium channel protein brain III subunit alpha) (Sodium channel protein type III subunit alpha) (Voltage-gated sodium channel subtype III) (Voltage-gated sodium channel subunit alpha Nav1.3)
SCN8A. Sodium channel protein type 8 subunit alpha (Voltage-gated sodium channel subunit alpha Nav1.6)
SEM5A. Semaphorin-5A (Semaphorin-F) (Sema F)
SETD2. Histone-lysine N-methyltransferase SETD2 (HIF-1) (Huntingtin yeast partner B) (Huntingtin-interacting protein 1) (HIP-1) (Huntingtin-interacting protein B) (Lysine

N-methyltransferase 3A) (SET domain-containing protein 2) (hSET2) (p231HBP)
SETD5. SET domain-containing protein 5
SHAN2. SH3 and multiple ankyrin repeat domains protein 2 (Shank2) (Cortactin-binding protein 1) (CortBP1) (Proline-rich synapse-associated protein 1)
SHAN3. SH3 and multiple ankyrin repeat domains protein 3 (Shank3) (Proline-rich synapse-associated protein 2) (ProSAP2)
SL9A9. Sodium/hydrogen exchanger 9 (Na ⁺)/H ⁺ exchanger 9) (NHE-9) (Solute carrier family 9 member 9)
SLIK2. SLIT and NTRK-like protein 2
STK39. STE20/SPS1-related proline-alanine-rich protein kinase (Ste-20-related kinase) (DCHT) (Serine/threonine-protein kinase 39)
SYGP1. Ras/Rap GTPase-activating protein SynGAP (Neuronal RasGAP) (Synaptic Ras GTPase-activating protein 1) (Synaptic Ras-GAP 1)
T4S20. Transmembrane 4 L6 family member 20
TBL1R. F-box-like/WD repeat-containing protein TBL1XR1 (Nuclear receptor corepressor/HDAC3 complex subunit TBLR1) (TBL1-related protein 1) (Transducin beta-like 1X-related protein 1)
TEN1. Teneurin-1 (Ten-1) (Protein Odd Oz/ten-m homolog 1) (Tenascin-M1) (Ten-m1) (Teneurin transmembrane protein 1) [Cleaved into: Ten-1 intracellular domain (IDten-1) (Ten-1 ICD); Teneurin C-terminal-associated peptide (TCPA-1) (Ten-1 extracellular domain) (Ten-1 ECD)]
TMLH. Trimethyllysine dioxygenase, mitochondrial (Epsilon-trimethyllysine 2-oxoglutarate dioxygenase) (Epsilon-trimethyllysine hydroxylase) (TML hydroxylase) (TML-alpha-ketoglutarate dioxygenase) (TML dioxygenase) (TMLD)
TNPO2. Transportin-2 (Karyopherin beta-2b)
TROP. Trophinin (MAGE-D3 antigen)
TRPC5. Short transient receptor potential channel 5 (TrpC5) (Transient receptor protein 5) (TRP-5) (hTRP-5) (hTRP5)
TSC2. Tuberin (Tuberous sclerosis 2 protein)
TSH3. Teashirt homolog 3 (Zinc finger protein 537)
UFC1. Ubiquitin-fold modifier-conjugating enzyme 1 (Ufm1-conjugating enzyme 1)
ULK4. Serine/threonine-protein kinase ULK4 (Unc-51-like kinase 4)
V1AR. Vasopressin V1a receptor (V1aR) (AVPR V1a) (Antidiuretic hormone receptor 1a) (Vascular/hepatic-type arginine vasopressin receptor)
WNT2. Protein Wnt-2 (Int-1-like protein 1) (Int-1-related protein) (IRP)
XPC. DNA repair protein complementing XP-C cells (Xeroderma pigmentosum group C-complementing protein) (p125)
ZN713. Zinc finger protein 713

Table S2. List of 44 human proteins expressed by Y-linked genes. Data retrieved from Skaletsky *et al.* [53] and UniProtKB Database (<http://www.uniprot.org/>).

UniProt and Protein Names
AMELY. Amelogenin, Y-linked.
CDY1. Testis-specific chromodomain protein Y 1
CDY2. Testis-specific chromodomain protein Y 2
DAZ1. Deleted in azoospermia protein 1
DAZ2. Deleted in azoospermia protein 2
DAZ3. Deleted in azoospermia protein 3
DAZ4. Deleted in azoospermia protein 4
DDX3Y. ATP-dependent RNA helicase DDX3Y
HSFY1. Heat shock transcription factor, Y-linked (Heat shock transcription factor 2-like protein) (HSF2-like)
IF1AY. Eukaryotic translation initiation factor 1A, X-chromosomal
KDM5D. Lysine demethylase 5D. SMCY.
NLGNY. Neurologin-4, Y-linked (Neurologin Y).
PC11Y. Protocadherin-11 Y-linked (Protocadherin-11) (Protocadherin on the Y chromosome) (PCDH-Y)
PRKY. Putative serine/threonine-protein kinase PRKY*
PRORY. Proline-rich protein, Y-linked
PRY. PTPN13-like protein, Y-linked (Testis-specific PTP-BL-related Y protein)
RBY1A. RNA binding motif protein, Y-linked, family 1, member A1
RBY1B. RNA binding motif protein, Y-linked, family 1, member B
RBY1C. RNA binding motif protein, Y-linked, family 1, member C
RBY1D. RNA binding motif protein, Y-linked, family 1, member D
RBY1E. RNA binding motif protein, Y-linked, family 1, member E
RBY1F. RNA binding motif protein, Y-linked, family 1, member J
RS4Y1. 40S ribosomal protein S4, Y isoform 1
RS4Y2. 40S ribosomal protein S4, Y isoform 2
SRY. Sex determining region Y
TBL1Y. F-box-like/WD repeat-containing protein TBL1Y (Transducin-beta-like protein 1, Y-linked)
TF2LY. Homeobox protein TGIF2LY (TGFB-induced factor 2-like protein, Y-linked) (TGIF-like on the Y)
TSPY1. Testis specific protein, Y-linked 1
TSPY2. Testis specific protein, Y-linked 2
TSPY3. Testis specific protein, Y-linked 3
TSPY4. Testis specific protein, Y-linked 4
TSPY8. Testis specific protein, Y-linked 8
TSPYA. Testis specific protein, Y-linked 10
TXNG2*. Putative gamma-taxilin 2*
TYB4Y. Thymosin beta 4, Y-linked
USP9Y. Probable ubiquitin carboxyl-terminal hydrolase FAF-Y . Ubiquitin-specific protease 9, Y chromosome.

UTY. Histone demethylase UTY. KDM6C. Ubiquitously transcribed tetratricopeptide repeat containing, Y-linked
VCY1. Testis-specific basic protein Y 1 (Basic charge, Y-linked 1) (Variably charged protein Y)
VCY2. Testis-specific basic protein Y 2
VCY2. Testis-specific basic protein Y 2 (Basic charge, Y-linked 2) (Variably charged protein Y 2)
XKRY. Testis-specific XK-related protein, Y-linked
XKRY2. Testis-specific XK-related protein, Y-linked 2
ZFY. Zinc finger Y-chromosomal protein

* uncertain protein.

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