Supplementary Table 1: Candidate genes associated with at least one drug addiction*

Gene symbol	Gene name	Biological Function	Chromosomal location	Drug (phenotype#)	Evidence from knockout animal model
ADRA2A	Alpha-2a-adrenergic receptor	Signal transduction	10q24-q26	Nicotine (d); Alcohol (d)	
ANKK1	Ankyrin repeat and kinase domain containing 1	Protein amino acid phosphorylation	11q23.1	Alcohol (d); Nicotine (d)	
CD14	Monocyte differentiation antigen CD14	Immune response	5q31.1	Nicotine (d); Alcohol (d)	More resistant to endotoxin-induced shock in response to alcohol
CCK	Cholecystokinin	Signal transduction	11p15.4	Alcohol (d, c); Nicotine (d)	Increased sensitivity and intake to the sedative effect of alcohol
COMT	Catechol-O-methyltransferase	Catecholamine metabolic process	22q11.21	Alcohol (d, c); nicotine (i, d, c) heroin (d)	High alcohol intake in male mice; Cocaine induced hyperlocomotion in mice
CHRM2	Cholinergic receptor, muscarinic 2	Neuromuscular synaptic transmission	7q31-q35	Alcohol (i, d); Heroin (d); Cocaine (d) ; morphine (d)	
CHRNA3	Nicotinic acetylcholine receptor, α3	Synaptic transmission, cholinergic	15q24	Alcohol (i, d); Nicotine (i, d)	
CHRNA4	Nicotinic acetylcholine receptor, α4	Synaptic transmission, cholinergic	20q13.--q13.3	Alcohol (i, d); Nicotine (d)	Increased extracellular levels of dopamine.
CHRNA5	Nicotinic acetylcholine receptor, α5	Synaptic transmission, cholinergic	15q24	Alcohol (i, d); Nicotine (i, d)	Resistant to nicotine-induced seizures
CHRNA6	Cholinergic receptor, neuronal nicotinic, α6	Synaptic transmission, cholinergic	8p11.21	Alcohol (i, d); Nicotine (i, d)	
CHRNB1	Cholinergic receptor, neuronal nicotinic, β1	Synaptic transmission, cholinergic	17p13.1	Alcohol (d); Nicotine (d)	
CHRNB2	Cholinergic receptor, neuronal nicotinic, β2	Synaptic transmission, cholinergic	1q21.3	Nicotine (d, c); Alcohol (d)	Impaired exploratory and social behavior in response to chronic nicotine; Enhances nicotine reinforcing effects
CHRNB3	Cholinergic receptor, neuronal nicotinic, β3	Synaptic transmission, cholinergic	8p11.2	Nicotine (i, d); Alcohol (d)	
CHRNB4	Nicotinic acetylcholine receptor beta 4	Synaptic transmission, cholinergic	15q24	Alcohol (i, d); Nicotine (i, d)	Decreased signs of nicotine withdrawal in mice
CNR1	Cannabinoid receptor 1	Signal transduction	6q14-q15	Alcohol (d, c); Cocaine (d); Marijuana (d); Nicotine (d)	Absent alcohol withdrawal symptoms; Reduced alcohol-induced conditioned place preference and self-administration
CREB1	cAMP response element-binding protein 1	Signal transduction	2q34	Alcohol (d); Nicotine (d); morphine (d)	Increased alcohol-drinking behaviors; Increased expression of morphine withdrawal

CYP17A1	Cytochrome p450, family 17, subfamily a, polypeptide 1	Oxidation reduction	10q24.3	Alcohol (i, d); Nicotine (d)	
CYP2B6	Cytochrome p450, subfamily IIB, polypeptide 6	Oxidation reduction	19q13.2	Alcohol (d, c); Nicotine (d, c)	
CYP2D6	Cytochrome P450, family 2, subfamily D, polypeptide 6	Oxidation reduction	22q13.1	Alcohol (d); Heroin (d); Cocaine (d); Nicotine (d)	
CYP2E1	Cytochrome p450, subfamily iiE	Oxidation reduction	10q24.3-qter	Alcohol (i, d); Nicotine (d)	Contribute to alcohol-induced fatty liver in mice
DBH	Dopamine beta-hydroxylase	Synaptic transmission	9q34	Alcohol (d, c); Cocaine (d); Heroin (d); Nicotine (d, c)	Increased alcohol preference; Reduced alcohol preference; Hypersensitivity to cocaine
DDC	Dopa decarboxylase	Catecholamine biosynthetic process	7p11	Alcohol (d); Nicotine (d)	
DRD1	Dopamine receptor 1	Synaptic transmission, dopaminergic	5q35.1	Alcohol (d, c); Nicotine (d); Heroin (d);	Alterations in alcohol intake
DRD3	Dopamine receptor 3	Synaptic transmission, dopaminergic	3q13.3	Alcohol (d, c); Cocaine (d); Nicotine (d); Amphetamine (d) ; Heroin (d)	Reduced alcohol intake; Severe alcohol withdrawal signs; Enhanced behavioral sensitivity to cocaine and amphetamine
DRD4	Dopamine receptor D4	Synaptic transmission, dopaminergic	11p15.5	Alcohol; Cocaine (d); Nicotine (i, d, c); Methamphetamine (d); Heroin (d)	Reduced alcohol intake; Locomotor supersensitivity to alcohol, cocaine, and methamphetamine
DRD5	Dopamine D5 receptor	Synaptic transmission, dopaminergic	4p16.1	Alcohol (d); Nicotine (i); Cocaine (d)	Reduced Alcohol intake; Enhanced locomotor and discriminative-stimulus effects of cocaine
ESR1	Estrogen receptor 1	Signal transduction	6q25.1	Nicotine (d); Alcohol (d)	
FAAH	Fatty acid amynohydroxylase	Fatty acid catabolic process	1p35-p34	Alcohol (d, c); Nicotine (d)	Increased alcohol intake; Enhanced the expression of nicotine conditioned place preference
GABAB2	GABA receptor A β2	Gamma-aminobutyric acid signaling pathway	5q34	Alcohol (d); Nicotine (d)	Lower Alcohol intake
GABRA2	Gamma-aminobutyric acid A receptor 2	Gamma-aminobutyric acid signaling pathway	4p12	Alcohol (d, c); Nicotine (d); Cocaine (d)	Cocaine-induced hyperactivity; Reduced alcohol intake
GluR1	Glutamate receptor, ionotropic, AMPA1	Signal transduction	5q31.1	Alcohol (d); Cocaine (c); Amphetamine (d); Opiates (d)	Impairs extinction of cocaine-seeking behavior; Alcohol-induced depression of locomotor activity

GluR2	Glutamate receptor, ionotropic, AMPA2	Signal transduction	4q32-q33	Alcohol (d); Nicotine (d); Amphetamine (d); Opiates (d)	Impairs extinction of cocaine-seeking behavior
GRIK1	Glutamate receptor, ionotropic, kinate 1	Glutamate signaling pathway	21q22.11	Alcohol (d, c); Nicotine (d)	
GRIN1	Glutamate receptor, ionotropic, N-methyl D-aspertate 1	Glutamate signialing pathway	9q34.3	Alcohol (d, c); Nicotine (i, d, c); Cocaine (c); Opiates (d)	
HOMER1	homer homolog 1 (Drosophila)	Glutamate signaling pathway	5q14.2	Cocaine (d); Nicotine (d)	Altered behavioral and neurochemical responses to cocaine
HOMER2	homer homolog 2 (Drosophila)	Glutamate signaling pathway	15q24.3	Cocaine (d); Nicotine (d)	Altered behavioral and neurochemical responses to cocaine
HTR1A	Serotonin receptor 1A	Signal transduction	5q11.2-q13	Alcohol (d); Cocaine (d)	Altered behavioral responses to cocaine and alcohol
HTR1B	Serotonin receptor 1B	Serotonin receptor signaling pathway	6q13	Alcohol (d); Cocaine (d); Heroin (d)	Increased alcohol intake
HTR2A	Serotonin receptor 2A	Serotonin receptor signaling pathway	13q14-q21	Alcohol (d); Cocaine (d); Nicotine (d); Heroin (d)	
HTR3A	Serotonin receptor 3A	Serotonin receptor signaling pathway	11q23.1	Alcohol (d); Cocaine (d)	Reduction in alcohol self-administration
HTR6	5-hydroxytryptamine receptor 6	Serotonin receptor signaling pathway	1p36-p35	Alcohol (d); Nicotine (i)	Increased alcohol intake
MAOA	Monoamine oxidase A	Immune response	Xp11.3	Alcohol (d); Nicotine (d)	Impaired nicotine preference; Alcohol intake in KO mice same as wild-type
mGluR2	Metabotropic glutamate receptor 2 precursor	Neurotransmitter catabolic process	3p21.1	Alcohol (d); Cocaine (c); Amphetamine (d); Morphine (d); Nicotine (d)	Enhances cocaine conditioned place-preference
mGluR3	Metabotropic glutamate receptor 3 precursor	Neurotransmitter catabolic process	7q21.1-q21.2	Alcohol (d); Cocaine (c); Amphetamine (d); Morphine (d); Nicotine (d)	Enhances cocaine conditioned place-preference
mGluR5	Metabotropic glutamate receptor 5 precursor	Neurotransmitter catabolic process	11p11.12	Alcohol (d); Cocaine (c); Amphetamine (d)	Increased sensitivity to centrally mediated effects of alcohol
NPY	Neuropeptide Y	Signal transduction	7p15.1	Alcohol (d, c); Cocaine (d)	Increased intake of alcohol; Locomotor activation caused by low dose of alcohol
NR2a	Glutamate receptor, ionotropic, N-methyl D-aspartate 2a	Synaptic transmission	16p13.2	Alcohol (d, c) Amphetamine (d) Opiates (d)	Impairment in learned reward-related responses to alcohol

NR2b	Glutamate receptor, ionotropic, N-methyl D-aspartate 2b	Response to drug	12p12	Alcohol (d, c) Amphetamine (d) Opiates (d)	Mediates acute sedative effects of alcohol
NRXN3	Neurexin 3	Cell adhesion	14q31	Alcohol (d); Polysubstances (d); Opioid (d)	
NTRK2	Neurotrophic tyrosine receptor kinase 2	Cell adhesion	9q22.1	Alcohol (d); Nicotine (d)	
OPRD1	Opioid receptor, delta 1	Response to DNA damage stimulus	1p34.3-p36.1	Alcohol (d); Heroin/opiates (d); Cocaine (d) Nicotine (c, d)	Increased self-administration
OPRK1	Opioid receptor, kappa 1	Signal transduction	8q11.2	Alcohol (d); Heroin/opiates (d); Cocaine (d)	Reduced self-administration
OPRM1	Opioid receptor, mu 1	Synaptic transmission	6q24-q25	Alcohol (d); Heroin/opiates (d); Cocaine (d); Methamphetamine (d); Nicotine (i)	Reduced alcohol intake; Reduced cocaine conditioned place preference; Enhanced sensitization of cocaine-induced locomotion
PDYN	Preprodynorphin	Oxidation reduction	20pter-p12	Alcohol (d); Heroin/opiates (d); Cocaine (d)	
PENK	Preproenkephalin	Synaptic transmission	8q23-q24	Alcohol (d); Heroin/opiates (d); Cocaine (d)	Alcohol intake same as wild type
SLC18A2	Solute carrier family 18 (vesicular monoamine transporter), member 2	Neurotransmitter transport	10q25	Alcohol (d); Nicotine (d); Amphetamine (d); Cocaine (d)	Increased dose-dependent alcohol intake in male KO mice; Amphetamine-evoked dopamine release in SLC18A2+/- mice; SLC18A2 heterozygous mice did not develop further sensitization to repeated cocaine administration
SLC6A2	Norepinephrine transporter	Neurotransmitter transport	16q12.2	Alcohol (i, d, c); Heroin/opiates (d); Cocaine (d, c); Methamphetamine (d); Nicotine (d)	Enhanced cocaine reward
TAS2R38	Taste receptor, type 2, member 38	Synaptic transmission, dopaminergic	7q34	Alcohol (d); Nicotine (d)	
TH	Tyrosine hydroxylase	Serotonin metabolism	11p15.5	Alcohol (d, c); Nicotine (d)	
TPH1	Tryptophan hydroxylase 1	Serotonin metabolism	11p15.3-p14	Alcohol (d); Heroin (d); Nicotine (i, d)	
TPH2	Tryptophan hydroxylase 2	Signal transduction	12q21.1	Alcohol (d); Heroin (d); Nicotine (d)	
TTC12	Tetratricopeptide repeat domain 12	Neurotransmitter transport	11q23.1	Nicotine (d); Alcohol (d)	

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Notes: *: The genes reported here have one or more variants that have been reported to be associated with more than one addiction.
#: d – Abuse/Dependence; i - initiation; c - cessation/withdrawal. * Meta-analyses conducted for genetic associations for at least one of the drug addictions listed in the table. This table may only represent a partial list of genes that have been investigated for association with addictions.