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| |  | | --- | | ***Alcohol*** | | **Brain** | | 10 sodium channel genes6 | | 21 potassium channel genes7 | | 21 serotonin-related genes7 | | 27 potassium ion channel genes6 | | 4 glycine receptor genes6 | | 5 calcium ion channel genes6 | | 5 serotonin receptor genes6 | | 6 acetylcholine receptor genes6 | | ABCA19 | | Agtr1a1 | | Axonal guidance pathways7 | | cAMP-mediated pathways4 | | Ces11 | | Cholesterol synthesis pathway6 | | Corticotropin-releasing  hormone system7 | | CYP46A16 | | Downstream CREB signaling  targets7 | | Drd28 | | Fam111a1 | | FDFT19 | | FDPS9 | | Gabra41 | | Gene clusters related to Fos,  Nfkbia, and Srebf111 | | Genes for 10 GABA-A receptors7 | | Glucocorticoid response  pathways11 | | Glutamate system genes6 | | Gng71 | | Growth factor genes7 | | Hdac1,2,55 | | HMGCoA9 | | Hmgcr6 | | Inflammatory response pathways1 | | Inflammatory response pathways7 | | Itpr11 | | LTP/LTD1 | | Mx21 | | Myelin producing genes6 | | Neuropeptide y system7 | | NMDA receptor genes6 | | Npy1r6 | | Oprk16 | | Oprm16 | | POMC3 | | Protein degradation pathways11 | | Protein kinase A signaling  pathways4 | | Renin-angiotensin signaling  pathway1 | | Slc5a71 | | SREBF29 | | Steroid hormone response  pathways11 | | Tac41 | |  | | **Liver** | | Cholesterol synthesis pathway2,9 | | Cytoskeleton component  regulatory genes2 | | Egr-110 | | Hdac2,4,55 | | HMG-CoA reductase2 | | Phosphorylation of  ERK1,2 and RSK10 | | Lipid and ketone synthesis  pathways2 | | PAI-110 | |  | | **Peripheral Blood** | | Hdac1-105 | |  | | **Heart** | | Hdac1,7,85 | | |  | | --- | | ***Cannabis*** | | **Brain** | | Tyrosine hydroxylase activity16 | | Dopamine signaling pathways12 | | Drd214 | | H3K14ac18 | | H3K9me218 | | H3K9me318 | | D1 and D2 dopaminergic receptors16 | | Mitochondrial function pathways19 | | Oxidative stress pathways19 | | Phosphorylation of Akt Thr 308, β-Catenin, GSK-3α/β, mTOR, p70S6 Kinase17 | | Slc6a312 | | Synaptic function and transmission pathways12 | |  | | **Sperm** | | CB115 | | c-MYC15 | | GLUT215 | | Hippo signaling pathways13 | | Pancreatic | | PKB15 | | UCP215 | | |  | | --- | | ***Cocaine*** | | **Brain** | | 5-HT2cR26 | | arc22 | | ATF324 | | ATF624 | | AVP25 | | bdnf22 | | BIP24 | | c-fos22 | | CHOP24 | | DA D2R26 | | DNMT3a28 | | GADD3424 | | Genes of axon guidance molecules27 | | Genes of synaptic proteins27 | | HDAC228 | | Oprk21 | | Oprm21 | | Pdyn21 | | Penk21 | | rBmal123 | | rClock23 | | rCry23 | | rPer123 | | rPer223 | | rPer323 | | Wnt signaling pathway27 | | XBP124 | | zif26820,22,26 | | |  | | --- | | ***Heroine*** | | **Brain** | | bdnf30 | | calb130 | | dusp5,630 | | egr130 | | Fcrls29 | | npy30 | | rgs230 | | Slc18a129 | | |  | | --- | | ***Methamphetamine*** | | **Brain** | | Alas136 | | Aldolase A37 | | AP134 | | Baiap237 | | Basigin37 | | Bhlhe2236 | | CaM237 | | Cell damage pathways37 | | Cellular metabolism pathways37 | | c-fos33,34 | | Cox-233 | | CREB34 | | Egr331,34 | | Erg134 | | Erg233,34 | | Fabp337 | | fosb31,34 | | fra1,231,34 | | GABAA receptor subunits α3, β135 | | GABAB1 receptor35 | | GAT1,335 | | Glycine receptor, subunit α237 | | Importin 1337 | | Intercellular signaling pathways37 | | Intracellular signaling pathways37 | | junB31,33,34 | | Lipocalin 237 | | Msx136 | | Neurod136 | | Nr4a1(Nur77)34 | | Nr4a2/nurr131,34,36 | | Nr4a3(Nor-1)33,34 | | Olfactomedin-related ER localized37 | | Per232 | | Preprotachykinin34 | | Rheb37 | | S100a8,936 | | Sdfr137 | | Sgk1 | | Syt1033 | | TRHR37 | | |  | | --- | | ***Nicotine*** | | **Brain** | | BDNF43 | | Canonical pathways38 | | Chrna4,5,741 | | Chrnb241 | | Cym42 | | Drd1,241 | | egr231 | | fosb31 | | fra1,231 | | Nervous system development pathways38 | | nr4a1/nurr7731 | | nr4a2/nurr131 | | Perp42 | |  | | **Liver** | | GSK3β40 | | PEPCK genes40 | |  | | **Connective Tissue** | | Bone morphogenic protein-239 | | Bone sialoprotein39 | | Core-binding factor α-139 | | Osteopontin39 | | Type II collagen39 | |

**Supplemental Table 5. Gene Expression Levels and Pathway Functions Altered by Substance Use Disorders in Rats.** Annotations of genes in the table correlate to the following citations: 1) Stankiewicz et al., 2015; 2) Klein et al., 2014; 3) Niikura et al., 2013; 4) McBride et al., 2014; 5) López‐Moreno et al., 2015; 6) McClintick et al., 2016; 7) McClintick et al., 2015; 8) Feltmann et al., 2018; 9) Alsebaaly et al., 2018; 10) Aroor et al., 2011; 11) McBride et al., 2013; 12) Brutman et al., 2019; 13) Murphy et al., 2018; 14) Di Nieri et al., 2011; 15) Levendal et al., 2012; 16) Fonseca et al., 1991; 17) Renard et al., 2017; 18) Prini et al., 2017; 19) Quinn et al., 2008; 20) Hollis et a., 2012; 21) Valenza et al., 2016; 22) Hearing et al., 2008; 23) Wang et al., 2019; 24) Pavlovsky et al., 2013; 25) Rodríguez-Borrero et al., 2010; 26) Besson et al., 2013; 27) Sillivan et al., 2011; 28) Zhou et al., 2014; 29) Imperio et al., 2016; 30) Kuntz-Melcavage et al., 2009; 31) Saint-Preux et al., 2013; 32) Natsubori et al., 2014; 33) Cadet et al., 2010; 34) McCoy et al., 2011; 35) Wearne et al., 2016; 36) dela Peña et al., 2013; 37) Ouchi et al., 2005; 38) Doura et al., 2010; 39) Yamano et al., 2010; 40) El.Golli et al., 2016; 41) Gozen et al., 2016; 42) Chen et al., 2014; 43) Castino et al., 2018.