

Pathways Affected Male and Female Brain Region Signature Gene Lists and Chosen Modules from Separate Networks

Pathway Class / Pathway Name	Impact Factor ONTOGA*	Female Signature Lists							Impact Factor ONTOGA*	Male Signature Lists							Male and Female 6 Regions	Modules of Separate Networks													
		# Input Genes in PW								# Input Genes in PW								# Input Genes in Pathway													
		6 Brain Regions	Amy	Hipp	CngCTX	EnCTX	OlfB	POAH		6 Brain Regions	Amy	Hipp	CngCTX	EnCTX	OlfB	POAH		Fem-Amy-Turq	Fem-CngCTX_Yellow	Fem-OlfB-Yellow	Male-Amy-Blue	Male-Amy-Turq	Male-CngCTX-Turq	Male-EnCTX-Turq	Male-Hipp-Blue	Male-Hipp-Turq	Male-OlfB-Blue	Male-OlfB-Brown	Male-OlfB-Green	Male-OlfB-Yellow	Male-POAH-Turq
Total Number of Affected KEGG Pathways (at least with 1 gene)		175	15	22	105	125	120	40		195	51	60	163	116	150	11	202	5	26	6	12	51	163	112	3	63	51	10	4	2	12
Carbohydrate Metabolism																															
Propanoate metabolism		6		1	2	2	1			7			5		2		11						3								
Inositol phosphate metabolism		4			2	2		1		8		3	4	1	1		10						3	1		3					
Glycolysis / Gluconeogenesis		3				1	1			5		1	1		3		7						1			1					
Pyruvate metabolism		3				1	1			4			2		2		6						2								
Energy Metabolism																															
Oxidative phosphorylation		16			14		10			2			1	1			18						1	1							
Nitrogen metabolism		4		1	2	2		2		5	1		3	1	2		8		1			1	3	1			1				
Lipid Metabolism																															
Glycerophospholipid metabolism		8			5	2	3			9	1		3	2	3		16		1			1	3	2					1		
Fatty acid metabolism		5				3	1			7			4	1	3		11						4	1							
Ether lipid metabolism		2			2	1				8	1	1	4		3		10					1	4			1		2			
Arachidonic acid metabolism		6	1		2	1	3			4	1	1	1		1		10					1	1			1					
Sphingolipid metabolism		2			1	1				4			3		1		6						3								
Nucleotide Metabolism																															
Purine metabolism		10			3	2	4			10			7	1	2		19						7	1							
Pyrimidine metabolism		4				2	1			6			4	2	1		9						4	2							
Amino Acid Metabolism																															
Valine, leucine and isoleucine degradation		5			3	1				9			6	1	3		13						5	1							
Tryptophan metabolism		4				1	2			8			6	1	3		11			1			6	1							
Arginine and proline metabolism		3				2				7			4	1	2		9						4	1							
Glycine, serine and threonine metabolism		3				3				8	1		5		3		8					1	5				1				
Lysine degradation		2																													

Drug metabolism - cytochrome P450		2				1	1			5		1	4	1	1		7							4	1		1					
Metabolism of xenobiotics by cytochrome P450		2				1	1			4		2	2	1	1		6							2	1		2					
Transcription																																
Spliceosome		7				4	2	2			4	1		2	1		12	1	2				1	2	1							
Translation																																
Ribosome	1.0	52				26		46		0.9	3			1	1	1	54							1	1			1				
Folding, Sorting and Degradation																																
RNA transport		11	1			6	1	5			11			10	1		21	1						9	1							
Ubiquitin mediated proteolysis	0.9	4				3	1			1.5	9			8	2		13							8	2							
Protein processing in endoplasmic reticulum		4				3		2			9			6	2	2	12							6	2							
SNARE interactions in vesicular transport	5.2	6				3	2	2		2.7	4			1	2	1	8							2	1		1					
Proteasome	3.7	6				4		1		0.8	1			1			7						1									
RNA degradation		3				2	1				2			1	1		5		1				1	1		1					1	
Membrane Transport																																
ABC transporters	3.2	6				3	4	2		1.2	2	1		1			8						1	1								
Signal Transduction																																
MAPK signaling pathway	2.7	17				7	10	3	1	8.6	31	3	2	15	7	7	45						3	15	7		2	1				
Calcium signaling pathway	7.5	21				8	9	6	1	6.7	20	2	3	7	3	7	35		2				2	7	3		3	1	1			
Wnt signaling pathway	2.5	10				2	5	2	1	2.5	12	1	1	5	2	6	21					1		5	2		1	1				
ErbB signaling pathway	2.2	6				4	2			2.9	10			6	2	4	16		1					6	2							
Phosphatidylinositol signaling system	8.5	8				2	5	1	1	28	9		3	3	2	2	14							3	2		3					
TGF-beta signaling pathway	2.8	5		2		2	1	1	1	5.8	9		2	6	1		14		1				6	1		2						
VEGF signaling pathway	3.4	6				1	3	1	1	2.0	6	1		4		1	12					1	4									
Jak-STAT signaling pathway	1.7	7				2	5	1		2.9	8			4	2	3	12		1				3	2								
Notch signaling pathway	1.8	2				1	1			3.5	6			3		3	8						3							1		
Toll-like receptor signaling pathway	0.8	2	1			1				2.3	6		1	3	1	1	8						2	1		1						
Hedgehog signaling pathway	1.2	2		1		1				3.4	5		2	1	1	1	7						1	1		2	1					
Signaling Molecules and Interaction																																
Neuroactive ligand-receptor interaction	4.5	24				8	12	8		4.9	26	5	3	12	4	4	45		2				5	12	4		3	1	1			
Cell adhesion molecules (CAMs)	157	14	1	2	6	4	2	2		14	18	2	1	12	2	2	1	30		3		1	1	8	1		1					1
Cytokine-cytokine receptor interaction	1.7	10		1	4	4	2			2.3	16		2	8	3	5	23		1				8	3		2						
ECM-receptor interaction	2.6	6			3		3			2.4	7		3	3		1	12		1				3			3						
Transport and Catabolism																																
Endocytosis		13		2	2	6	3	1			25	2	3	15	2	5	37					1	1	11	1		3					
Phagosome		11		2	1	1	5	2			21	2	3	14	1	2	30					1	1	9		1	2					
Lysosome		5		1	1	2	3				14	1		5	3	5	19						1	5	2			1				
Peroxisome		3			1	2					7			4	3		9							4	3							
Cell Motility																																
Regulation of actin cytoskeleton	2.7	14				3	8	4		3.6	20	1	3	10	2	5	1	31					1	10	2		3	2	1			1
Cell Growth and Death																																
Cell cycle	1.4	5				1	2	3		2.1	9	1		6	1	2	13						1	6	1							
Oocyte meiosis		5				2	1	2			8			6	1	2	13							6	1			1				
p53 signaling pathway	1.2	4				1	1	2		2.7	6	1		2	2	3	9					1		2	2							
Apoptosis	1.4	3		1		2				1.8	4			3	1	2	7							3	1			1				
Cell Communication																																
Focal adhesion	2.6	12				4	5	3		4.1	18		5	10	1	6	30		1					10	1		5	1				
Gap junction	4.2	8				2	4	3	1	7.2	11	1	2	6		3	18						1	6			2	1				
Tight junction	5.0	5				1	5			2.5	10			7		2	1	15						7			2					1
Adherens junction	5.8	3				1	1			6.1	5		1	2	1	1	7							2	1		1	1				
Immune System																																
Chemokine signaling pathway		14				5	6	4	1		19	1	2	11		6	1	31						1	10			2	1			1
Antigen processing and presentation	27	8		2	1		2	3		10	13	2		9	1	2	21						1	1	5							

Leukocyte transendothelial migration	348	7			1	7			23	8		1	3		3	1	15						3		1		2				1
Fc gamma R-mediated phagocytosis		8			1	4	2			9		1	6	1	1		13						5	1		1		1			
T cell receptor signaling pathway	1.5	4			2	3			1.8	8			5	3			12						5	3							
Hematopoietic cell lineage	2.9	7			2	4	1	1	3.9	9		3	3	2	2		11		2				3	2		3					
Natural killer cell mediated cytotoxicity	3.2	4			1	2	2		1.8	7			7		3		10						7								
B cell receptor signaling pathway	1.3	3				2			4.1	8			7	1			10						6	1							
Complement and coagulation cascades	4.7	1	1						3.9	8		3	2	1	2	1	9						2	1		3	1			1	1
Fc epsilon RI signaling pathway	1.7	2				2			1.9	6	1		4		1		8					1	4								
Endocrine System																															
GnRH signaling pathway	4.4	8			3	4	1	1	2.7	9	1	1	4		3		16		1			1	4			1	1				
Melanogenesis	3.3	7			2	3	2	1	4.4	9		1	7	1	2		14						7	1		1	1				
Progesterone-mediated oocyte maturation		6			2	2	2			8	1		6	1	1		13						1	6	1			1			
PPAR signaling pathway	1.4	5			1	2	1	1	2.0	5	1		2		2		10						1	2							
Adipocytokine signaling pathway	1.6	5			1	3	1		2.9	3			1	1	2		8						1	1							
Insulin signaling pathway	1.0	1			1				1.1	6			3	1	3		7						3	1			1	1			
Circulatory System																															
Vascular smooth muscle contraction		9			2	6	2	2		14	1	2	6		5		20		1			1	6			2	2				
Cardiac muscle contraction	2.8	10			9		5		1.0	2			1	1			12						1	1							
Digestive System																															
Gastric acid secretion		11		1	5	5	1	1		11	1	1	4	1	4		20		1			1	4	1		1	2				
Salivary secretion		16			8	7	2	1		5		1	1		3		19		1				1			1	1				
Pancreatic secretion		12			5	5	2	1		8	1	1	3		3		18					1	3			1					
Protein digestion and absorption		8			7		2			3			2		2		10		1				2				1				
Excretory System																															
Vasopressin-regulated water reabsorption		3			2	1				3			2		1		6						2				1				
Proximal tubule bicarbonate reclamation		4			2	1	1			1			1				5						1								
Nervous System																															
Long-term depression	3.9	6			1	4	2	1	9.8	13	1	1	8	1	2		18					1	8	1		1					
Long-term potentiation	6.0	8			2	3	4	1	4.7	8		1	4	1	2		15						4	1		1	1				
Neurotrophin signaling pathway		2			1	1				9			7	2	2		11						7	2							
Sensory System																															
Olfactory transduction	1.4	12	2	2	2	2	6		1.2	31	1	1	16	13	3		40			1		1	14	12		1	1		1		
Taste transduction	2.4	3			2		1		2.1	2					2		5										1				
Development																															
Axon guidance	8.0	16	1		5	5	6		8.7	17	1		10	7	3		32	1	1			1	10	7							
Cancers																															
Pathways in cancer (overview)	2.2	18			7	7	4		4.3	28	1	2	16	7	6		43														
Renal cell carcinoma	2.7	6			3	2	2		3.0	7			6	1	1		13						6	1							
Small cell lung cancer	1.4	6			2	2	1		1.9	8		1	4	1	2		12						2	1		1					
Pancreatic cancer	3.0	6			1	3	3		2.3	5		1	3		1		11						2			1					
Chronic myeloid leukemia	1.3	3			2	2	2		2.7	8		1	6		2		11						6			1					
Colorectal cancer	1.6	2			2	1			3.5	7		1	3	2	2		9						3	2		1					
Glioma	1.5	3			1	1	1		1.7	5			4		2		8						4								
Melanoma	1.0	1					1		5.2	6			4	1	2		7						4	1							
Non-small cell lung cancer	2.5	2				1	1		2.5	5			3		2		7						2								
Bladder cancer	2.8	3			1	1	1		2.0	3			2		1		6						2								
Endometrial cancer									2.4	5			2	1	2		5						2	1			1				
Thyroid cancer	3.4	1					1		3.4	4			2		2		5						2								
Acute myeloid leukemia	1.9	1			1				2.4	5			3	1	1		5						3	1							
Immune System Diseases																															
Systemic lupus erythematosus	12	23	1		9	1	14	1	1.2	4		1	2		1		25						1			1					
Autoimmune thyroid disease	2.9	6	1	2			1	2	5.3	9	2		6	1	1		15				1	1	2								
Allograft rejection	3.1	6	1	2			1	2	6.0	9	2		6	1	1		15				1	1	2								
Graft-versus-host disease	3.8	6	1	2			1	2	6.4	9	2		6	1	1		15				1	1	2								
Neurodegenerative Diseases																															

Huntington's disease	3.1	19			12	3	11	1	1.0	9		2	4	3	2		27						4	3		2				1	
Alzheimer's disease	2.6	17			12	2	10	1	1.3	9	1	1	4	2	3		25					1	4	2		1			1		
Parkinson's disease	2.7	14			11		10		1.0	3			2	1	1		17						2	1							
Amyotrophic lateral sclerosis (ALS)	2.0	4				2	2		4.4	7			4	4	1		11						4	4							
Cardiovascular Diseases																															
Viral myocarditis		9	1	2	1	1	2	2		15	2	1	9	1	5		23				1	1	5			1					
Dilated cardiomyopathy		6			2	1	4			10		3	4	1	2		15						4	1		3	1				
Arrhythmogenic right ventricular cardiomyopathy (ARVC)		5		1	2		2			11		3	5	1	2		14						5	1		3	1				
Hypertrophic cardiomyopathy (HCM)		4			1	1	3			10		3	4	2	1	1	13														
Metabolic Diseases																															
Type I diabetes mellitus	3.4	7	1	2	1		1	2	5.2	9	2		6	1	1		16				1	1	2								
Infectious Diseases																															
Toxoplasmosis		4				3	1	1		14	1	1	10	2	3		18					1	9	2		1					
Chagas disease		3				3	1	1		15		2	9	4	3	1	17														
Hepatitis C		5			2	4	1			9		1	6	1	1	1	14						5	1		1					1
Amoebiasis		4				3	1	2		9		2	3	1	5		12						3	1		2	2				
Leishmaniasis		6			1	3	2	1		6			4	2	1		11						3	2							
Malaria		9				1	6			8	5	1	1		1		11					2	1			1					
Bacterial invasion of epithelial cells		3				2	1			6			5		5		9						5			2					
Staphylococcus aureus infection		3					1	1		5		1	3		1		6						2			1	1				

*- impact factor was calculated using online software Ontoga-tool which features only signaling pathways