Orphan 7TM receptors

Preliminary pairings

While the remainder of this section focuses on those 7TM receptors for which there is substantial pharmacological information, or interest, listed below are a number of putative 7TM receptors identified by IUPHAR (Foord *et al*., 2005), for which only preliminary evidence for an endogenous ligand has been published, or for which there exists a potential link to a disease, or disorder.

Gene Symbol	Ensembl ID	Other names	Putative endogenous ligand	Comment
GPR1	ENSG00000183671		–	Appears to act as a co-receptor for HIV (Shimizu *et al.*, 1999)
GPR3	ENSG00000181773	ACCA	Fails to respond to a variety of lipid-derived agents (Yin *et al.*, 2009)	Has been reported to activate adenylyl cyclase constitutively through G_s (Eggerickx *et al.*, 1995). Gene disruption results in premature ovarian aging (Ledent *et al.*, 2005) and reduced β-amyloid deposition (Thathiah *et al.*, 2009) in mice
GPR4	ENSG00000177464		Protons (Ludwig *et al.*, 2003; Tobo *et al.*, 2007)	An initial report suggesting activation by lysophosphatidylcholine, sphingosylphosphorylcholine (Zhu *et al.*, 2001) has been retracted (Zhu *et al.*, 2005). Gene disruption is associated with increased perinatal mortality and impaired vascular proliferation (Yang *et al.*, 2007)
GPR6	ENSG00000146360		Fails to respond to a variety of lipid-derived agents (Yin *et al.*, 2009)	Has been reported to activate adenylyl cyclase constitutively through G_s and to be located intracellularly (Padmanabhan *et al.*, 2009)
GPR12	ENSG00000132975	GPCR21	Fails to respond to a variety of lipid-derived agents (Yin *et al.*, 2009)	Gene disruption results in dyslipidemia and obesity (Bjursell *et al.*, 2006)
GPR15	ENSG00000154165	BOB	–	Appears to act as a co-receptor for HIV (Edinger *et al.*, 1997)
GPR17	ENSG00000144230	R12	Dual leukotriene and UDP receptor (Ciana *et al.*, 2006)	Has been reported to antagonize CysLT1 receptor signalling *in vivo* and *in vitro* (Maekawa *et al.*, 2009)
GPR18	ENSG00000125245		*N*-Arachidonoylglycine (Kohno *et al.*, 2006), but fails to respond to a variety of lipid-derived agents (Yin *et al.*, 2009)	–
GPR20	ENSG00000204882		–	Has been reported to inhibit adenylyl cyclase constitutively through $G_{i/o}$ (Hase *et al.*, 2008)
GPR22	ENSG00000172209		–	Has been reported to inhibit adenylyl cyclase constitutively through $G_{i/o}$; gene disruption results in increased severity of functional decompensation following aortic banding (Adams *et al.*, 2008)
GPR26	ENSG00000154478		–	Has been reported to activate adenylyl cyclase constitutively through G_s (Jones *et al.*, 2007)
GPR34	ENSG00000171659		Lysophosphatidylserine (Sugo *et al.*, 2006), but fails to respond to a variety of lipid-derived agents (Yin *et al.*, 2009)	–
GPR35	ENSG00000178623		Kynurenic acid (Wang *et al.*, 2006)	Has also been reported to respond to the phosphodiesterase inhibitor zaprinast (Taniguchi *et al.*, 2006) and the chloride channel blocker 5-nitro-2-(3-phenylpropylamino) benzoic acid (Taniguchi *et al.*, 2008)
GPR37	ENSG00000170775	PAELR, EDNRLB	Head activator peptide (Rezgaoui *et al.*, 2006)	Reported to associate and regulate the dopamine transporter (Marazziti *et al.*, 2007) and to be a substrate for parkin (Marazziti *et al.*, 2009)

GPR39	ENSG00000183840		Obestatin (Zhang *et al.*, 2005), or Zn^{2+} (Holst *et al.*, 2007)	Has been reported to be down-regulated in adipose tissue in obesity-related diabetes (Catalan *et al.*, 2007)
GPR48	ENSG00000205213	Leucine-rich repeat-containing G protein-coupled receptor 4, LGR4	–	Gene disruption leads to multiple developmental disorders (Jin *et al.*, 2008; Song *et al.*, 2008; Weng *et al.*, 2008; Luo *et al.*, 2009)
GPR50	ENSG00000102195	H9	–	A potential orthologue of an avian melatonin receptor (Dufourny *et al.*, 2008)
GPR55	ENSG00000135898		Lysophosphatidylinositol (see Ross, 2009)	
GPR56	ENSG00000205336	TM7LN4, TM7XN1	–	Binds tissue transglutaminase 2 (Xu *et al.*, 2006)
GPR63	ENSG00000112218	PSP24B	Fails to respond to a variety of lipid-derived agents (Yin *et al.*, 2009)	
GPR65	ENSG00000140030	TDAG8	Protons (Wang *et al.*, 2004)	Reported to activate adenylyl cyclase; gene disruption leads to reduced eosinophlia in models of allergic airway disease (Kottyan *et al.*, 2009)
GPR68	ENSG00000119714	OGR1	Protons (Ludwig *et al.*, 2003)	–
GPR77	ENSG00000134830	C5L2	–	Binds C5a complement factor, but appears to lack G protein signalling and has been termed a decoy receptor (Scola *et al.*, 2009)
GPR84	ENSG00000139572	EX33	Medium chain fatty acids (Wang *et al.*, 2006)	
GPR87	ENSG00000138271	GPR95	Lysophosphatidic acid (Tabata *et al.*, 2007)	
GPR98	ENSG00000164199	VLGR1	–	Loss-of-function mutations are associated with Usher syndrome, a sensory deficit disorder (Jacobson *et al.*, 2008)
GPR120	ENSG00000186188		Free fatty acids (Katsuma *et al.*, 2005; Hirasawa *et al.*, 2005)	–
GPR132	ENSG00000183484	G2A	Protons (Murakami *et al.*, 2004)	–
GPR143	ENSG00000101850	OA1	L-DOPA (Lopez *et al.*, 2008)	Loss-of-function mutations underlie ocular albinism type 1 (Bassi *et al.*, 1995)
GPR161	ENSG00000143147	RE2	–	Gene disruption is associated with a failure of asymmetric embryonic development in zebrafish (Leung *et al.*, 2008)
MRGPRD	ENSG00000172938	TGR7	β-Alanine (Shinohara *et al.*, 2004)	Potentially exists as a heteromer with MRGPRE (GPR167, ENSG00000184350, Milasta *et al.*, 2006)
MRGPRX1	ENSG00000170255	SNSR4	BAM8-22 (Chen and Ikeda, 2004)	
MRGPRX2	ENSG00000183695		PAMP (Kamohara *et al.*, 2005), cortistatin (Robas *et al.*, 2003)	
OXGR1	ENSG00000165621	GPR80, GPR99, P2Y15	α-Ketoglutarate (He *et al.*, 2004)	
SUCNR1	ENSG00000198829	GPR91	Succinate (He *et al.*, 2004)	
BAI1	ENSG00000181790	Brain-specific angiogenesis inhibitor 1	Phosphatidylserine (Park *et al.*, 2007)	

Further Reading

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Additional 'orphan' 7-transmembrane receptors

In the second set of tables below, putative 7-transmembrane receptors with as-yet unidentified endogenous ligands are listed.

Gene symbol	Ensembl ID	Other names	Gene symbol	Ensembl ID	Other names
GPR19	ENSG00000183150		GPR149	ENSG00000174948	PGR10, IEDA
GPR21	ENSG00000188394		GPR150	ENSG00000178015	PGR11
GPR25	ENSG00000170128		GPR151	ENSG00000173250	PGR7, GALR4, GPCR-2037
GPR27	ENSG00000170837	SREB1, super-conserved receptor expressed in brain 1	GPR152	ENSG00000175514	PGR5
GPR31	ENSG00000120436		GPR153	ENSG00000158292	PGR1
GPR32	ENSG00000142511		GPR155	ENSG00000163328	DEPDC3, DEP.7, FLJ31819, PGR22
GPR33	ENSMUSG00000035148	Pseudogene in man	GPR156	ENSG00000175697	PGR28, GABABL
GPR45	ENSG00000135973	PSP24	GPR157	ENSG00000180758	FLJ12132
GPR49	ENSG00000139292	LGR5, GPR67, FEX, HG38, MGC117008	GPR158	ENSG00000151025	KIAA1136
GPR52	ENSG00000203737		GPR160	ENSG00000173890	GPCR150, GPCR1
GPR61	ENSG00000156097	BALGR	GPR162	ENSG00000110811	A-2, GRCA
GPR62	ENSG00000180929		GPR164	ENSG00000180785	Olfactory receptor 51E1, prostate overexpressed G protein-coupled receptor
GPR64	ENSG00000173698	HE6	GPR165	ENSMUSG00000031210	
GPR70	ENSG00000173662	TAS1R1	GPR169	ENSG00000182170	MRGPRG
GPR71	ENSG00000179002	TAS1R2	GPR171	ENSG00000174946	H963
GPR72	ENSG00000123901	GPR83	GPR172A	ENSG00000185803	PAR1, Porcine endogenous retrovirus A receptor 1
GPR75	ENSG00000119737	WI31133	GPR173	ENSG00000184194	Super conserved receptor expressed in brain 3
GPR78	ENSG00000155269		GPR174	ENSG00000147138	FKSG79
GPR82	ENSG00000171657		GPR175	ENSG00000163870	TPRA40
GPR85	ENSG00000164604	SREB2	GPR176	ENSG00000166073	Gm1012, HB954
GPR88	ENSG00000181656	STRG	GPR177	ENSG00000116729	Protein wntless homologue, putative NFκB-activating protein 373

Gene symbol	Ensembl ID	Other names	Gene symbol	Ensembl ID	Other names
GPR90	ENSMUSG00000059408	MRGPRH	GPR178	ENSG00000146433	KIAA1423, TMEM181
GPR97	ENSG00000182885	Pb99, PGR26	GPR179	ENSG00000188888	GPR158L1
GPR101	ENSG00000165370		GPR180	ENSG00000152749	Intimal thickness-related receptor
GPR107	ENSG00000148358	KIAA1624, RP11-88G17, FLJ20998, LUSTR1	GPR183	ENSG00000169508	EBI2, Epstein-Barr virus-induced gene 2, lymphocyte-specific G protein-coupled receptor
GPR110	ENSG00000153292	hGPCR36, PGR19	MAS1	ENSG00000130368	
GPR111	ENSG00000164393	hGPCR35, PGR20	MAS1L	ENSG00000204687	
GPR112	ENSG00000156920	RP1-299I16, PGR17	MGRPRX3	ENSG00000179826	Sensory neuron-specific G protein-coupled receptor 1/2
GPR113	ENSG00000173567	hGPCR37, PGR23	MGRPRX4	ENSG00000179817	Sensory neuron-specific G protein-coupled receptor 5/6
GPR114	ENSG00000159618	PGR27	P2RY10	ENSG00000078589	
GPR115	ENSG00000153294	FLJ38076, PGR18	P2YR8	ENSG00000182162	
GPR116	ENSG00000069122	DKFZp564O1923, KIAA0758	BAI2	ENSG00000121753	Brain-specific angiogenesis inhibitor 2
GPR123	ENSG00000197177	KIAA1828	BAI3	ENSG00000135298	Brain-specific angiogenesis inhibitor 3
GPR124	ENSG00000020181	Tumour endothelial marker 5	CD97	ENSG00000123146	Leukocyte antigen CD97
GPR125	ENSG00000152990	PGR21	CELR1	ENSG00000075275	Cadherin EGF LAG seven-pass G-type receptor 1, flamingo homologue 2, hFmi2
GPR126	ENSG00000112414	FLJ14937	CELR2	ENSG00000143126	Cadherin EGF LAG seven-pass G-type receptor 2, epidermal growth factor-like 2, multiple epidermal growth factor-like domains 3, flamingo 1
GPR127	ENSG00000186629	PGR16, EMR4	CELR3	ENSG00000008300	Cadherin EGF LAG seven-pass G-type receptor 3, flamingo 1, hFmi1, multiple epidermal growth factor-like domains 2, epidermal growth factor-like 1
GPR128	ENSG00000144820	FLJ14454	ELTD1	ENSG00000162618	EGF, latrophilin and seven transmembrane domain-containing protein 1, EGF-TM7-latrophilin-related protein, ETL protein
GPR132	ENSG00000183484	G2A	EMR1	ENSG00000174837	EGF-like module-containing mucin-like hormone receptor-like 1, cell surface glycoprotein EMR1, EMR1 hormone receptor
GPR133	ENSG00000111452	PGR25	EMR2	ENSG00000127507	EGF-like module-containing mucin-like hormone receptor-like 2, EGF-like module EMR2, CD312 antigen
GPR136	ENSG00000124818	OPN5, neuropsin, PGR14	EMR3	ENSG00000131355	EGF-like module-containing mucin-like hormone receptor-like 3, EGF-like module-containing mucin-like receptor EMR3

Gene symbol	Ensembl ID	Other names	Gene symbol	Ensembl ID	Other names
GPR137	ENSG00000173264	GPR137A, TM7SF1L1	LPHN1	ENSG00000072071	Latrophilin-1, calcium-independent α-latrotoxin receptor 1, lectomedin-2
GPR139	ENSG00000180269	PGR3	LPHN2	ENSG00000117114	Latrophilin-2, calcium-independent α-latrotoxin receptor 2, latrophilin homologue 1, lectomedin-1
GPR140	ENSG00000172935	MRGPRF, GPR168, RTA	LPHN3	ENSG00000150471	Latrophilin-3, calcium-independent α-latrotoxin receptor 3, lectomedin-3
GPR141	ENSG00000187037	PGR13	GPRC5A	ENSG00000013588	Retinoic acid-induced protein 3, G protein-coupled receptor family C group 5 member A, retinoic acid-induced gene 1 protein, RAIG-1, orphan G protein-coupling receptor PEIG-1
GPR142	ENSG00000196169	PGR2, KIF19	GPRC5B	ENSG00000167191	G protein-coupled receptor family C group 5 member B, retinoic acid-induced gene 2 protein, RAIG-2, A-69G12.1
GPR144	ENSG00000180264	PGR24	GPRC5C	ENSG00000170412	G protein-coupled receptor family C group 5 member C, retinoic acid-induced gene 3 protein, RAIG-3)
GPR146	ENSG00000164849	PGR8	GPRC5D	ENSG00000111291	G protein-coupled receptor family C group 5 member D
GPR148	ENSG00000173302	PGR6, brain and testis restricted GPCR			