

7TM RECEPTORS

Overview: The completion of the Human Genome Project allowed the identification of a large family of proteins with a common motif of seven groups of 20–24 hydrophobic amino acids arranged as α helices. Approximately 800 of these seven transmembrane (7TM) receptors have been identified of which over 300 are non-olfactory receptors (see Fredriksson *et al.*, 2003; Lagerstrom and Schioth, 2008). Subdivision on the basis of sequence homology allows the definition of rhodopsin, secretin, adhesion, glutamate and Frizzled receptor families. NC-IUPHAR recognizes Classes A, B, and C, which equate to the rhodopsin, secretin and glutamate receptor families.

The nomenclature of 7TM receptors is commonly used interchangeably with G protein-coupled receptors, although the former nomenclature allows for signalling of 7TM receptors through pathways not involving G proteins. For example, adiponectin and membrane progesterin receptors appear to signal independently of G proteins and appear to reside in membranes in an inverted fashion compared with conventional 7TM receptors. Additionally, the NPR3 natriuretic peptide receptor has a single transmembrane domain structure, but appears to couple to G proteins to generate cellular responses. The 300+ non-olfactory 7TM receptors are the targets for the majority of drugs in clinical usage (Overington *et al.*, 2006), although only a minority of these receptors are exploited therapeutically.

Further Reading

- Foord SM, Bonner TI, Neubig RR, Rosser EM, Pin JP, Davenport AP *et al.* (2005). International Union of Pharmacology. XLVI. G protein-coupled receptor list. *Pharmacol Rev* 57: 279–288.
- Fredriksson R, Lagerstrom MC, Lundin LG, Schioth HB (2003). The G-protein-coupled receptors in the human genome form five main families. Phylogenetic analysis, paralogon groups, and fingerprints. *Mol Pharmacol* 63: 1256–1272.
- Lagerstrom MC, Schioth HB (2008). Structural diversity of G protein-coupled receptors and significance for drug discovery. *Nat Rev Drug Discov* 7: 339–357.
- Overington JP, Al-Lazikani B, Hopkins AL (2006). How many drug targets are there? *Nat Rev Drug Discov* 5: 993–996.
- <http://www.iuphar-db.org/>