

Glycoprotein hormone

Overview: Glycoprotein hormone receptors (provisional nomenclature) are activated by a heterodimeric glycoprotein made up of a common α chain (116 amino-acid ENSG00000135346), with a unique β chain that confers the biological specificity to FSH (follicle-stimulating hormone, follitropin, 129 amino-acid, ENSG00000131808), LH (luteinizing hormone, lutropin, 141 amino-acid ENSG00000104826), CG (choriogonadotropin, chorionic gonadotropin, 165 amino-acid, ENSG00000104818/ENSG00000104827) or TSH (thyrotropin, thyroid-stimulating hormone, 138 amino-acid ENSG00000134200). There is binding cross-reactivity across the endogenous agonists for each of the glycoprotein hormone receptors. The deglycosylated hormones appear to exhibit reduced efficacy at these receptors (Sairam, 1989).

Nomenclature	FSH	LH	TSH
Ensembl ID	ENSG00000170820	ENSG00000168546	ENSG00000146013
Principal transduction	G _s	G _s , G _{q/11} and G _i	All four families of G proteins can be activated by this receptor
Selective agonists	FSH	LH, CG	TSH
Probes	[¹²⁵ I]-FSH	[¹²⁵ I]-LH, [¹²⁵ I]-CG	[¹²⁵ I]-TSH

Animal follitropins are less potent than the human hormone as agonists at the human FSH receptor. Autoimmune antibodies that act as agonists of the TSH receptor are found in patients with Grave's disease (e.g. Rapoport *et al.*, 1998). Gain- and loss-of-function mutations of the FSH receptor are associated with human reproductive disorders (Aittomaki *et al.*, 1995; Gromoll *et al.*, 1996; Beau *et al.*, 1998; Touraine *et al.*, 1999). Loss-of-function mutations of the LH receptor are associated with Leydig cell hypoplasia, and gain-of-function mutations are associated with male-limited gonadotropin-independent precocious puberty (e.g. Latronico and Segaloff, 1999; Shenker, 2002) and Leydig cell tumours (Liu *et al.*, 1999). Mutations of the TSH receptor exhibiting constitutive activity underlie hyperfunctioning thyroid adenomas (Parma *et al.*, 1993) and congenital hyperthyroidism (Kopp *et al.*, 1995). TSH receptor loss-of-function mutations are associated with thyrotropin resistance (Sunthornthepvarakul *et al.*, 1995). The rat FSH receptor also stimulates phosphoinositide turnover through an unidentified G protein (Quintana *et al.*, 1994).

Further Reading

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