Insulin family

Overview: The circulating peptide hormones insulin and the related insulin-like growth factors activate transmembrane tyrosine kinase receptors to evoke cellular responses, mediated through multiple intracellular adaptor proteins. Exceptionally amongst the catalytic receptors, the functional receptor in the insulin receptor family is derived from a single gene product, cleaved post-translationally into two peptides, which then cross-link via disulphide bridges to form a heterotetramer. Intriguingly, the endogenous peptide ligands are formed in a parallel fashion with post-translational processing producing a heterodimer linked by disulphide bridges. Signalling through the receptors is mediated through a rapid autophosphorylation event at intracellular tyrosine residues, followed by recruitment of multiple adaptor proteins, notably IRS1 (ENSG00000169047), IRS2 (ENSG00000185950), Shc1 (ENSG00000160691), Grb2 (ENSG00000177885) and Sos1 (ENSG00000115904).

Nomenclature	Insulin	Insulin-like growth factor I	INSRR
Other names	CD220 antigen	IGF-I receptor, CD221 antigen	Insulin receptor-related protein , IRR
Ensembl ID	ENSG00000171105	ENSG00000140443	ENSG00000027644
	Codes for both α and β chains	Codes for both α and β chains	Codes for both α and β chains
Endogenous ligands	Insulin (ENSG00000129965)	IGF1 (ENSG00000017427), IGF2 (ENSG00000167244)	–

There is evidence for low potency binding and activation of insulin receptors by IGF1. IGF2 also binds and activates the cation-independent mannose 6-phosphate receptor (CI-MPR, insulin-like growth factor II receptor, 300 kDa mannose 6-phosphate receptor, MPR 300, CD222 antigen ENSG00000197081), which lacks classical signalling capacity and appears to subserve a trafficking role (Macdonald *et al*., 1988). INSRR, which has a much more discrete localization, being predominant in the kidney (Kurachi *et al*., 1992), currently lacks a cognate ligand or evidence for functional impact.

Abbreviations: **IGF**, insulin-like growth factor

Further reading

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