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Glycoprotein Hormones (LH/CG, FSH and TSH) and their Receptors: Interaction and Receptor Activation

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Abstract:

The glycoprotein hormone family is comprised of LH, CG, FSH and TSH. They are the largest known hormones and each consists of two noncovalently associated protein subunits, ~15 kD α and ~20 kD β . For each mammalian species, the α subunits are encoded by a single gene and have identical amino acid sequences. In contrast, the β subunits differ for each glycoprotein hormone because they are encoded by distinct genes that are interspersed with conserved and diverse sequences.

Only the $\alpha\beta$ dimer is capable of binding to receptors to induce biological responses and the dissociated subunits lose high affinity binding activity. Despite the overall structural similarities among glycoprotein hormones, receptor binding is highly specific for each with Kd values around pM concentrations. There is no cross-activity between the glycoprotein hormones, with the exception of LH and hCG. These two hormones have similar structures, bind to the same (LH/CG) receptor, and elicit the same biological responses. Structurally, the LH/CG receptor, the FSH receptor and the TSH receptor share similarities: they belong to the family of seven transmembrane receptors.

We will discuss similarities and differences in the interactions of these hormones and their receptors and in the subsequent receptor activation.