

# Prolactin – A Pleiotrophic Hormone



**Hypothalamus**  
Dopamine (DA), synthesized by several groups of neuroendocrine dopamine (NEDA) neurons in the hypothalamus, is released into the hypophyseal portal circulation supplying the pituitary gland. Central (neurotransmitters, neuropeptides) and peripheral (suckling) signals influence DA secretion.

↓ DA

**Anterior pituitary**  
Synthesis and release of prolactin (PRL) by the lactotrophs is constitutively elevated in the absence of inhibitory control exerted by the hypothalamic release inhibiting factor, DA. The physiological significance of other hypothalamic factors that have PRL releasing (thyrotrophin releasing hormone, vasopressin) or release-inhibiting activities remains unclear. Basal PRL secretion is regulated by a “short-loop” negative feedback control system whereby PRL stimulates DA synthesis and release from NEDA neurons.

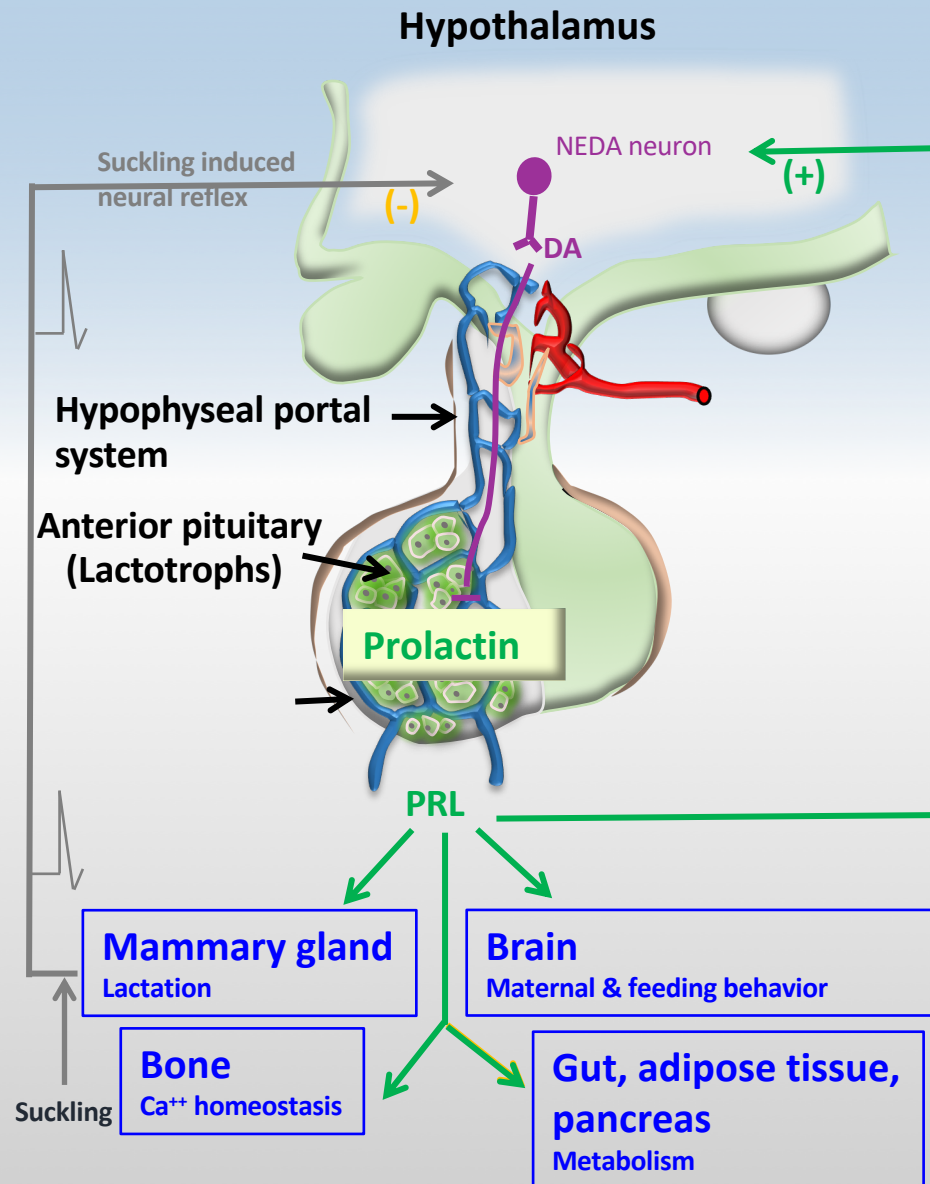
↓ PRL

**Target tissues**  
PRL is critical for mammary gland development at puberty and during pregnancy, and for lactation. The role of PRL in the male is less well studied but hyperprolactinemia in the male, as in the female, may result in infertility. The PRL receptor is a transmembrane protein with widespread tissue expression, the latter accounting for PRL’s role in a plethora of species specific and in many cases non-essential processes.



Ascending (spinal cord) neural activity

DA: Dopamine  
PRL: Prolactin



Prolactin (PRL) is essential for mammary gland development and milk production, and plays roles in a multitude of metabolic and stress adaptations to pregnancy and lactation. In some species, PRL is also luteotrophic and required for initiation of pregnancy. PRL may also serve as a stimulator of maternal care.

Dr. Grattan, an associate of QS<sup>3</sup>, is an internationally recognized authority on the hypothalamic control of PRL secretion and on the multiple reproductive functions of this pituitary hormone.

Dr. Hovey, an associate of QS<sup>3</sup>, is an expert on the role of PRL in mammary gland development. He is also an authority on the pleiotrophic effects of PRL and the implication of hyperprolactinemia for breast cancer.

Dr. Cooper, with colleagues at the EPA, have characterized the effect of chemicals on PRL release and milk letdown. They have described the long term consequences of elevating PRL secretion on prostate gland development.

Dr. Handa, an expert on the HPA axis, understands the relationship between PRL and stress, which includes an anxiolytic action of the hormone.

Let QS<sup>3</sup> scientists assist you in interpreting the toxicological implications of the effect of your chemical on prolactin.