

Neural mechanisms involved in the physical stress-induced inhibition of ovarian function

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Stress is known to change the secretion of ovarian steroid hormones via the hypothalamic-pituitary-ovarian (HPO) axis. Noxious physical stress can cause reflex responses in visceral function via autonomic nerves. In this symposium, I will talk about our recent animal studies on neural mechanisms involved in ovarian estradiol secretion induced by noxious physical stress stimulation. In anesthetized rats, noxious physical stress decreased ovarian estradiol secretion. Electrical stimulation of the ovarian sympathetic nerves (superior ovarian nerves: SON) decreased ovarian estradiol secretion. Sympathectomy or spinal transection was effective for disrupting the physical stress-induced estradiol decrease responses, while decerebration was ineffective. Thus, the inhibition of ovarian estradiol secretion during physical stress was mainly integrated in the brainstem, and this inhibitory response was due to reflex activation of the ovarian sympathetic nerves. The sympathetic inhibitory regulation of ovarian estradiol secretion was pronounced when the HPO axis was inhibited by chronic estradiol treatment in rats. Considering the female life cycle, extensive physical stress may inhibit ovarian function, especially before puberty and during old ages when the HPO axis is inactive.