

## Hypothalamic amenorrhea

*S Berga (US) [1]*

Functional hypothalamic amenorrhea (FHA), often termed stress-induced anovulation (SIA), is a type of chronic anovulation that presents clinically as amenorrhea. The proximate cause of anovulation in FHA is insufficient GnRH drive to sustain folliculogenesis. The term “functional” implies reversibility. FHA manifests as a constellation of neuroendocrine alterations including low LH and FSH with FSH>LH, nocturnal hypercortisolemia, and hypothyroxinemia with normal TSH. Behavioral concomitants are highly variable. Dieting and excessive exercise are often initiated to cope with subtle psychosocial challenges. While psychological stress reflects individual valences, metabolic stressors such as undernutrition and exercise are more readily identified. We found that combining multiple metabolic and psychogenic stressors synergistically suppressed ovarian function in monkeys. We also demonstrated that cognitive behavior therapy (CBT) restored ovulation and menstrual cycles in FHA and reversed the classical neuroendocrine concomitants. Specifically, CBT reduced hypercortisolism which led to recovery of ovarian and thyroidal function and increased leptin levels absent weight gain. In contrast to organic HA, functional HA reflects a reversible (often termed allostatic) adaptation to individual circumstance that can be reversed by behavioral changes that improve energy deficits and coping responses to relevant psychological stressors.

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[1] Wake Forest School of Medicine, Winston Salem