Reproduction and Energy Homeostasis

Rosaria Meccariello

The availability of energy resources is the main checkpoint for successful reproduction. In fact, conditions of altered energy homeostasis (from cachexia to obesity) are frequently linked to variable degrees of infertility, sub-fertility and poor quality of gametes. In this respect, the hypothalamic Gonadotropin Releasing Hormone (GnRH) triggers the release of gonadotropins [Follicular Stimulating Hormone (FSH) and Luteinizing Hormone (LH)] from adenohypophysis. Via the main circulation, FSH and LH reach the gonads which in turn synthesize sex steroids (mainly estradiol/progesterone in females and testosterone in males) and other non-steroidal substances (i.e. activin, inhibin, follistatin.). Hence, gametogenesis occurs in both sexes under the strict control of endocrine, paracrine and autocrine factors [1,3]. Long, short and ultra-short feedback mechanisms deeply modulate reproduction. However, the complete knowledge of the process as a whole is far away to be fully understood.

The functional interplay between energy homeostasis and reproductive functions may be affected by many environmental factors including endocrine disrupting chemicals (EDCs) – natural and synthetic compounds with estrogenic, androgenic or anti-androgenic activity which includes phytoestrogens, pesticides, plasticizers, phthalates, polychlorinated biphenyls, dioxins, dioxin-like compounds etc. [11]. In particular, estrogen-like EDCs like bisphenol A can have obesogenic effects by interfering in the physiological activity of endogenous estrogens on food consumption and energy expenditure [12]. Environmental factors also induce epigenetic changes with outcomes on the reproductive and metabolic phenotype of exposed organisms and of their offsprings with possible consequences on pregnancy, embryo development and health [11,13,14]. Thus, further studies are required to investigate the master systems involved in the modulation of reproductive activity and energy homeostasis in order to provide future targets/drugs in the treatment of infertility, obesity and overweight.

REFERENCES


Department of Movement Sciences and Wellbeing, Universityof Naples “Parthenope”, Via Medina 40, 80133 Naples, Italy.

*Correspondence: Meccariello R, Department of Movement Sciences and Wellbeing, Universityof Naples “Parthenope”, Via Medina 40, 80133 Naples, Italy. Telephone: +39 081 5474668; Fax: +39 081 5474678; E-mail: rosaria.meccariello@uniparthenope.it

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