

Oxytocin Hormone Control of Bone, Fat Mass and Metabolism

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Description

Oxytocin (OT) was discovered in 1906 when Sir Henry H. Dale found that an extract from the human posterior pituitary gland contracted the uterus of a pregnant cat. OT belongs to the family of pituitary hormones and is taken into account as an abundant neuropeptide displaying homologs right along evolution. The structure of OT decided and was the primary chemically synthesized peptide during a biologically active form. Like all neurohypophysial hormones, OT may be a nonapeptide with a disulfide bridge between Cys residues 1 and 6. OT displays a good spectrum of central and peripheral functions from the modulation of neuroendocrine reflexes arcs including hormone secretion, to the establishment of social and relationship behaviors. OT is additionally referred to as the "love hormone" thanks to its involvement in attachments, reproduction behaviors, offspring care, also as its ethnical connections

Among disorders commonly considered as being age-related, which represent a serious explanation for morbidity and mortality, are osteoarthritis, osteoporosis, obesity, atherosclerosis and neurodegenerative diseases. Osteoporosis is well established that tight links between osteoporosis and adiposity exist. An inverse relationship between osteogenesis and adipogenesis is well documented and thus controlling the fine balance between these two pathways is of clear therapeutic significance. During the last decade, the role of a hypothalamic nonapeptide, the oxytocin (OT), has been described in the control of bone remodeling and adiposity and thus represent an interesting strategy to treat bone and fat related disorders.

Osteoporosis and overweight/obesity constitute major worldwide public health burdens. Human anticipation has increased continuously in industrialized countries. Aging is said to immunosenescence, a decrease in hormonal secretion, lean mass, and bone mass, and an increase in fat accumulation. It has been reported that both obesity and osteoporosis are affected by genetic and environmental factors; bone remodeling and adiposity are both regulated through the hypothalamus and sympathetic nervous system. Furthermore, mesenchymal somatic cell represents a standard precursor for adipocytes and osteoblasts; fat and skeleton are known endocrine organs.

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Oxytocin (OT) belongs to the pituitary hormone family and regulates the function of peripheral target organs, including the mammary glands and smooth muscle of the uterus. Due to this property, it's commonly been utilized in other medical obstetrics without significant side effects. It also modulates a good range of behaviors, like social recognition, love, and fear. Of note, it has been established that OT pathway was involved within the physiology of bone remodeling by the analysis of OT and its cognate receptor knock-out mice. Furthermore, OTR-deficient mice exhibit disorders in several aspects of social behavior, bone defects, and develop late-onset obesity. Thus, OT emerges as a promising molecule within the treatment of osteoporosis and obesity also as associated metabolic disorders like type 2 diabetes.

The levels of OT decreased with age. The crosstalk between bone and energy metabolism has been clearly evidenced within the last years through the investigations on the role of leptin, osteocalcin, and other molecules. Several reports, published recently, show clearly that OT could play an important role within the control of bone and fat mass and their metabolism. In conclusion, there are growing evidences showing that administration of OT holds promise as a possible therapy for both osteoporosis and weight gain/obesity, and should represent the primary therapy targeting these two diseases linked to aging and their associated pathologies like diabetes and cardiovascular disorders.