**Circadian hormonal rhythms**

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Andrea Vesalius, born in Brussels, described the pineal gland it in the chap VII of his monumental book "*De humani corporis fabrica* (1555)". It was not until the 20th century that its physiologic role was discovered. In humans, the secretion of melatonin occurs at night, synthetized in the pineal gland and then discharged to the general circulation. However, there is a quantitatively most important melatonin production at the level of the digestive tract. Membrane melatonin MT1 and MT2 receptors use G proteins transduction. They are distributed mainly in the CNS at the level of the retina, hypothalamic nuclei and the pineal gland.

With the greater availability of radiology and brain scans, it was discovered with interest that the pineal gland is often calcified. We and others have described a familial presentation of pineal calcified lesions such as pineal secreting cysts (Alloch & al Ann Endocrinol 2002) and pinealoblastomas (trilateral retinoblastoma syndrome caused by mutations in the RB1 gene (13q14.2), Plowman & al Clin Oncol 2004).

A current research topic, that is developed in this presentation, is the study of disturbance of circadian hormonal cycles and the secretion of melatonin. Traumatic brain injury is associated to hypopituitarism in up to 10-35% of cases, depending on the dynamic tests used to diagnose hypopituitarism (Valdés-Socin & al 2009, Valdés-Socin & al 2015).Melatonin secretion and hormonal rhythms are severely disturbed in acute TBI patients (Seifman & al. Front Neurol 2014).

Light is the primary variable that entrains the main circadian clock in the central nervous system. The retinohypothalamic tract generates an overt 24-hour rhythm. These coordinated outputs are conveyed through to the rest of the body via neuroendocrine (ie melatonin and ACTH-cortisol secretion), autonomic (sympathetic and parasympathetic pathways) and behavioral pathways (feeding, locomotor activity, etc). At the cellular level, molecular oscillations of the SNC and the metabolism depend on several clock genes (CLOCK, BMAL, Per (1-3), etc).

Energy intake and expenditure fluctuate over a near 24 hs period associated with fasting/feeding, activity/rest and sleep/awake periods. Alterations in feeding pattern (nocturnal eating syndrome) can desynchronize the endocrine and metabolic rythms. Several signals such as leptin and ghrelin are internal time givers. Leptin is an adipokine hormone secreted by the white adipose tissue. It has an anorectic action, resulting in a reduced food intake. The peak of leptin secretion occurs at night, during the fasting/rest period. The anorectic leptin action is antagonized by ghrelin. Ghrelin is secreted by the parietal (oxyntic) cells of the stomach during fasting, in anticipation of food intake. Ghrelin, as leptin, is also elevated during sleep. Ghrelin can reset the master clock if injected in vivo. Circadian regulation of the pituitary -adrenal axis plays an important role in the regulation of energy metabolism, mainly through glucocorticoids secretion. Excess of cortisol leads to hyperglycemia, hypertension, obesity , sleep disturbances and psychiatric symptoms (Beckers & al 2002). Glucose and insulin secretion show clearly daily rhythms in order to fulfill time of the day energy requirements.

Finally, we will discuss some recent data connecting light pollution and nocturnal human activity with the metabolic syndrome (chronobesity).

**Références**

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