

Endocrinology

Code: 100860
ECTS Credits: 6

Degree	Type	Year	Semester
2500252 Biochemistry	OT	4	0

Contact

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Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

Most of the slides used in the classroom are in English

Prerequisites

To have passed the subject of Animal Physiology, as well as of Cell Biology and Biochemistry

Objectives and Contextualisation

The subject "Endocrinology" is an option of the last course in Biology and Biochemistry, so that the student already has a high level of basic knowledge of biology, which will allow to deepen in this matter.

The subject does not structure to the classic mode of "Hormone A, functions B and C", but will analyze several relevant biological aspects in which endocrine / neuroendocrine factors participate. The idea is to give an integrated vision of critical factors in the survival of the individual and of the species: rhythms, stress, growth and longevity, weight control, sexual and maternal behavior. As far as possible we will proceed to the analysis of animal models that help us to understand the human species.

In the classes, articles and scientific reviews of reference journals will be used as much as possible (Nature, Science, Cell, etc.) rather than textbooks. Documentation will be prepared that will be provided beforehand to the student with the fundamental information, indicating the original reference of the publication in case the student needs clarification and wishes to consult it (it will not be indispensable but it will also benefit the student from the point of view of the domain of the English). The idea is that the student has to complement that basic information with the work in class, acquiring an important method of work.

Content

After the basic concepts of the previous basic subject (Animal Physiology), Endocrinology will proceed to deepen the various endocrine axes, particularly at the neuroendocrine level, its relationship with behavior, and trying to maintain a vision integrated into the major themes:

1. Introduction. General organization of the nervous and endocrine system. Hypothalamic-pituitary relationship and biological bases of its development. Action programs (drive, emotion) & feelings. ("Selfish" hormone) and

oxytocin (the "altruistic" hormone), an example of dendritic secretion and cross-talk between neurosecretory and preautonomic networks and other neuronal populations.

2 - Circadian rhythm and suprachiasmatic nucleus: divisions, connections and main factors involved. Clock genes. Use of light and feeding as synchronizing mechanisms. Master and slave oscillators. Other rhythms.

3- Stress and its consequences. Impact on the neuroendocrine system. Hypothalamic-pituitary-adrenal axis: relevance, regulation and interactions. Interaction with the immune system. Stress & Fear & Anxiety & Depression. An example of the importance of epigenetics. Battle of sexes & genomic imprinting. Epigenetic transgenerational inheritance.

4- Obesity, the new epidemic. Body weight control: much more than an aesthetic question. Main factors involved. Diets (and their failures). Obesity & inflammation. Obesity & microbioma.

5- Growth: Inheritability & susceptibility. Psychosocial dwarfism. Limitations of the GWAs. Growth & Development. Main families of growth factors. Acceleration & deceleration. Saltatory growth. Catch-up. Hypothalamo-pituitary-somatic axis: endocrine and paracrine / autocrine actions of IGF-I.

6- Growth vs longevity: it was not so simple. Size of species & longevity: strict or flexible law? Caloric intake: apparent relationship with morbidity & longevity. Oxidative stress, mitochondrial DNA, p53, telomers, senescence & longevity. MTOR, rapamycin & other "anti-aging pills". What (probably) announces the experiments of parabiosis between old and young mice.

7- Genetic, gonadal and phenotypic sex. Dmrt1, SRY, and other critical factors in sex determination and differentiation. Compensation of the gene dose of the sex chromosomes. XIC: X inactivation center. Gonadal sex is not irreversible. Internal and external genitalia: main hormones involved. Intersex states: Prader classification.

8- Hypothalamic-pituitary-gonadal axis: integral control of reproduction. Importance of control of GnRH neurons: pulse generator versus preovulatory peak. Sexual steroids, kisspeptine & other factors involved. Puberty: everything changes. Limitations of the GWAs.

9- Sexual Differentiation of Behavior: Battle of Sexes?. Sexual dimorphism: what does it reveal? Sexual selection: the omission of Darwin. The Coolidge effect. Biological bases of sexual behavior. Organization and activation of the CNS by sexual steroids. Default sex & masculinization & defeminization: beware of analgesics! Sexual steroids & epigenetics. Direct effects of sex chromosomes in the brain?

10- Proceptivity & receptivity. Attractiveness (body & facial): what is it and what does it reveal? Main features and factors involved. Some considerations about pheromones & MHC in mammals.

11- Intra-species lethal aggression: we are not the only ones. Is there a link between sex and violence ?. Sexual Steroids & Neurosteroids & VMH. Monogamy vs polygamy. Social versus sexual monogamy. Infanticide. Oxytocin & vasopressin & dopamine: pair bonds and other social behaviors.

12- Gender identity and transsexuality. Behavior of gender, cognitive sexual differences & evolutionary roles. Gender orientation & homosexuality.

13- The pregnant brain. Maternal behavior & changes in stress and anxiety. Major changes and responsible hormones.

PRACTICES:

Study of the presence of cortisol in hair