Universitat Autònoma de Barcelona

2018/2019

Endocrinology

Code: 100809
ECTS Credits: 6

Degree	Type	Year	Semester
2500250 Biology	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, articlesand 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. Hypothalamic survival circuits: hunger, thirst, sex ... Programs of action (motivations, emotions) & feelings: ancestral mechanisms; vasopressin and oxytocin as examples.

2- Circadian rhythm and suprachiasmatic nucleus. Clock genes. Use of light as a synchronizing mechanism & other possible synchronizers. Living against our circadian rhythm has a cost. Seasonal rhythms & melatonin. Other rhythms

3- Stress and some of its consequences. Anticipatory and reactive pathways control the hypothalamo-pituitary-adrenal axis. MR and GR receptors. Stress & fear & anxiety & depression: an example of the importance of epigenetics. "Battle of the sexes" & genomic imprinting. Epigenetic transgenerational inheritance.

4- Obesity, the new epidemic?. Body weight control: much more than an aesthetic issue. Main factors and pathways involved. Homeostatic & hedonic systems. Body mass index, fat deposits & genome-wide association studies (GWAs) & its limitations. Diets and surgical procedures (and their failures & potential hazards). Obesity & inflammation. Obesity & microbiome.

5- Growth: Heritability and susceptibility. GWAs. Psychosocial dwarfism. Acceleration & deceleration. Growth & development. Main families of growth factors. 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 the species &longevity: strict or flexible law?. Caloric contribution: apparent relationship with morbidity & longevity. Oxidative stress, mitochondrial DNA, p53, telomeres, senescence & longevity. mTOR, rapamycin & other "anti-aging pills". What (probably) announces the experiments of parabiosis between old and young animals.

7- Genetic, gonadal and phenotypic sex. Dmrt1, SRY and other critical factors in sexual determination and differentiation. Somatic sexual identity in mammals?. Gonadal sex is not irreversible. Compensation of the gene dose of the sex chromosomes. XIC: X inactivation center. Internal and external genitalia: main hormones involved. Intersexual states: congenital adrenal hyperplasia & Prader classification; other endocrine problems.

8- Hypothalamus-pituitary-gonadal axis: integral control of vertebrate reproduction. Importance of the control of GnRH neurons: pulse generator versus preovulatory peak. Sex steroids, kisspeptin & other factors involved. Puberty: everything changes. Menarche & context & kisspeptin & limitations of the GWAs. Puberty & risk behaviors.

9- Sexual differentiation of behavior: Battle of the sexes?. Sexual dimorphism: what does it reveal? Sexual selection: the omission of Darwin. The Coolidge effect. Biological bases of sexual behavior in animal models. Organization and activation of the CNS by sex steroids. Default sex & masculinization & defeminization: beware of analgesics! Sex steroids & epigenetics.

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

11- Violence: an extraordinary problem. Lethal aggression intra-species: we are not the only ones. Infanticide and paternity dilution. Is there a link between sex and violence?. Sex steroids & neurosteroids & VMH. Monogamy vs polygamy in mammals. Social vs sexual monogamy. Oxytocin & vasopressin & dopamine: pair bonding and other social behaviors.

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