SUBJECT CARD

Faculty of Medicine and Health Sciences
Field of studies: Medicine
Form of studies: Full-time
Degree: long-cycle Master's program
Specializations: No specialization
Academic year: 2022/2023

THE ENDOCRINE SYSTEM AND SKIN	
SUBJECT	**The endocrine system and skin**
NUMBER OF ECTS POINTS	4
LANGUAGE OF INSTRUCTION	English
TEACHER(S)	Professor Filip Gołkowski, MD, PhD Professor Jadwiga Mirecka, MD, PhD Assoc. Professor Agata Bałdys-Waligórska, MD, PhD Assoc. Professor Piotr Kopiński, MD, PhD Anna Krzentowska-Korek, MD, PhD Maciej Krupiński, MD, PhD Bożena Wójcik, MSc
PERSON RESPONSIBLE	Professor Filip Gołkowski, MD, PhD
NUMBER OF HOURS	
LECTURES	30 h
CLASSES	8 h
SEMINARS	12 h
GENERAL OBJECTIVES	
OBJECTIVE 1	To familiarize students with endocrine system macroscopic and microscopic structure and physiology.
OBJECTIVE 2	To familiarize students with the histological structure and the importance of skin in human physiology.
LEARNING OUTCOMES	
MK1	**Knowledge:** The student characterizes the epidermis and dermis.
MK2	**Knowledge:** The student lists and describes additional skin creations (small sweat glands, sebaceous, aporocrine, hair roots, nails).
MK3	**Knowledge:** The student describes the microscopic structure of the endocrine glands.

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MK4	**Knowledge:** The student explains the relationship between the microstructure of the endocrine glands and their function.
MK5	**Knowledge:** The student knows the locations, vascularization and innervation of the hypothalamus, pituitary gland, thyroid gland with pituitary glands, pancreas and thymus.
MK6	**Knowledge:** The student explains the regulatory effect of the hypothalamus pituitary system on the secretion of hormones by the thyroid glands, gonads and adrenal glands.
MK7	**Knowledge:** The student is familiar with the regulatory mechanisms and biological effects of the renin-angiotensin-aldosterone system.
MK8	**Knowledge:** The student explains the physiological roles of prolactin, growth hormone, vasopressin, and oxytocin.
MK9	**Knowledge:** The student describes the factors regulating the calcium-phosphate balance.
MK10	**Knowledge:** The student is familiar with the biological effects of hormones of the gastrointestinal tract and secreted by the endocrine part of the pancreas.
MK11	**Knowledge:** The student explains the physiological importance of glucocoricosteroids and catechol amnes, taking into account their role during stress.
MK12	**Knowledge:** The student explains the physiological importance of glucocorticosteroids and catecholamines, taking into account their role during stress.
MK13	**Knowledge:** Student knows the roles of biological effects caused by thyroid hormones and the dependence of their production on iodine intake
MS1	**Skills:** The student recognizes the structure of the skin under a microscope.
MS2	**Skills:** The student identifies particular endocrine glands under a microscope.
MS3	**Skills:** The student can indicate the locations and elements of vascularization and innervation of endocrine system elements.
COURSE PROGRAM	**DETAILED DESCRIPTION OF THE TOPIC BLOCKS**
LECTURE 1	Histological structure of the skin: Epidermis, process of keratinisation, keratinocytes, and other cells. Skin proper. Skin glands: eccrine, sebaceous and apocrine. Hair follicles, nails. Characteristics of skin deriving from different regions of the body. (**Field A**)

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LECTURE 2	Histological structure of the pituitary gland. Glandular and nervous components, functional classification of cells from the pars anterior and hormones secreted. Portal circulation of the pituitary gland. Pars intermedia and pars tuberalis. Posterior lobe and its association with hypothalamus, its role in the release of hormones. Thyroid – the structure of thyroid follicles. Secretion and resorption of thyreoglobulin, production of thyroid hormones. The parafollicular cells (C cells). Adrenal gland: Cortex and its layers. Characteristics of steroid producing cells- Adrenal medulla – chromaffin cells and production of adrenaline. Functional significance of the blood flow between the cortex and medulla. (**Field A**)
LECTURE 3	Histological structure of the parathyroid gland -chief and oxyphil cells. Secretion of PTH. The microscopic structure of the pineal gland., characteristics of pinealocytes. Secretory products of the pineal gland and their significance. Corpora arenacea. Diffuse neuroendocrine system (DNES) Characteristics of APUD cells., their localization and functions. (**Field A**)
LECTURE 4	General overview of the anatomy of endocrine system. The anatomy of hypothalamus, pituitary, pancreas, thyroid with parathyroid glands, adrenal glands, pineal gland. (**Field A**)
LECTURE 5	Normal radiological anatomy of the endocrine glands. (**Field A**)
LECTURE 6	Organisation of the endocrine system being crucial for controlling homeostasis. (**Field B**)
LECTURE 7	Definition of hormone, scope and mechanisms of hormones function, methods of signal transducing in the cells, characteristics of the groups of hormones according to their receptor specifity. Hormones of the posterior pituitary lobe. (**Field B**)
LECTURE 8	Pancreatic hormones and a group of hormones regulating the activity of the digestive tract. Physiology of the hypothalamuspituitary-gonadal axis. (**Field B**)
LECTURE 9	Hypothalamic neurohormones. Hormones of the anterior lobe of pituitary. (**Field B**)
LECTURE 10	Physiology of normal skin. (**Field B**)
LECTURE 11	Physiology of the hypothalamus-pituitary-adrenal axis. (**Field B**)
LECTURE 12	Physiology of the hypothalamus-pituitary-thyroid axis. (**Field B**)
LECTURE 13	Calcium-phosphate balance. (**Field B**)
LECTURE 14	Renin-angiotensin-aldosterone system. Release and physiological role of catecholamines.(**Field B**)

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LECTURE 15	Physiological changes in the endocrine system in childhood and puberty. (**Field B**)
CLASS 1	Microscopic structure of the skin. Epidermis and skin proper. Ultrastructure of keratinocytes, melanocytes, cells of Langerhans and cells of Merkel. Identification of secretory and excretory segments of eccrine sweat glands. Hair follicles. Sebaceous and apocrine glands. (**Field A**)
CLASS 2	Microscopic structure of the pituitary gland. Microscopic and ultrastructural characteristics of various cells in the anterior lobe. Pars nervosa – Hering's bodies under electron microscope. Thyroid – morphological picture of follicular cells in various functional stages. Characteristics of perifollicular cells. Adrenal gland - layers of the adrenal cortex. Ultrastructure of cells in the cortex. Adrenal medulla, characteristics of cells. (**Field A**)
CLASS 3	Microscopic structure of parathyroid glands, pineal gland and pancreatic cislets. Enteroendocrine cells of the digestive tract under optical and electron microscope. Sensory cells of the olfactory mucosa. Ultrastructure of the taste buds. (**Field A**)
CLASS 4	The anatomical localisation, structure, blood supply and innervation of hypothalamus, pituitary, pancreas, thyroid with parathyroid glands, adrenal glands, pineal gland. (**Field A**)
CLASS 5	Normal radiological anatomy of the endocrine glands. (**Field A**)
SEMINAR 1	Physiological regulation of the secretion of the pituitary posterior lobe hormones, growth hormone and prolactin. (**Field B**)
SEMINAR 2	Circadian rhythms of hormone secretion. Regulation of the secretion of hormones of the adrenal glands. (**Field B**)
SEMINAR 3	Physiological regulation of gonadal axis function in both men and women. (**Field B**)
SEMINAR 4	Mechanisms regulating the secretion of hypothalamus-pituitary-thyroid axis hormones. (**Field B**)
SEMINAR 5	Hormonal regulation of calcium-phosphate balance. (**Field B**)
SEMINAR 6	Physiology of the endocrine system in pregnancy. (**Field B**)
DIDACTIC METHODS (APPLIED)	
	Lectures; Seminars; Practical classes; Discussion; Practical laboratories.

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STUDENTS WORKLOAD	
NUMBER OF HOURS UNDER SUPERVISION	50 hours
NUMBER OF PREPARATION HOURS	70 hours
TOTAL NUMBER OF HOURS FOR THE COURSE	120 hours
CONDITIONS FOR COURSE COMPLETION	
	Attendance in all lectures, classes and seminars is obligatory. Credit for the obligatory classes according to the criteria established by the teacher. Credit is necessary to be admitted to the exam.
METHODS OF ASSESMENT	
IN TERMS OF KNOWLEDGE	Written examination in form of test.
IN TERMS OF SKILLS	Practical recognition of histological preparations.
IN TERMS OF SOCIAL COMPETENCE	Not applicable.
FORMATIVE	Quizzes in exercise classes.
SUMMATIVE (I & II terms)	**I term (EXAM):** Writing exam (test). 80 questions: Field A – 40 Field B - 40 **II term (RETAKE EXAM):** Terms I and II: an oral examination, consisting of answers to 4 randomised questions: 2 concerning Field A and 2 concerning Field B. Assessment system in accordance with the faculty protocol of the oral examination. Each response is evaluated on a score scale of 0-3. The number of points is awarded according to the following rules: 0 – no response, or wrong answer; 1 – incomplete answer, requires additional questions, contains errors, lack of understanding; 2 – satisfactory response (no major errors), sufficient understanding; 3 – comprehensive answer, presented with full understanding.
GRADING SCALE	
3,0 (Satisfactory)	**Term I:** 55-63 % of the correct answers from the whole test with at least 50% of valid Field A responses and 50% of valid Field B responses are met at the same time. **Term II:** 6 pts.

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3,5 (Satisfactory plus)	**Term I:** 64-71 % of the correct answers from the whole test with at least 50% of valid Field A responses and 50% of valid Field B responses are met at the same time. **Term II**: 7 pts.
4,0 (Good)	**Term I:** 72-80 % of the correct answers from the whole test with at least 50% of valid Field A responses and 50% of valid Field B responses are met at the same time. **Term II**: 8-9 pts.
4,5 (Good plus)	**Term I:** 81-89 % of the correct answers from the whole test. **Term II**: 10 pts.
5,0 (Very Good)	**Term I:** 90-100 % of the correct answers from the whole test. **Term II**:11-12 pts.

BASIC LITERATURE

[1] Linda S. Costanzo, *Physiology*. Elsevier, 2017;
[2] Anthony L. Mescher, *Junqueira's Basic Histology*. McGraw-Hill, 2018;
[3] Kyung W. Chung, Harold M. Chung, *Gross Anatomy*. Lippincott Williams & Wilkins, 2011.