**FACULTY OF MEDICINE**

**CURRICULUM 09.12.1 MEDICINE**

**CHAIR OF PATHOPHYSIOLOGY AND CLINICAL PATHOPHYSIOLOGY**

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|  APPROVEDat the meeting of the Commission for Quality Assurance and Curriculum Evaluation of the Curriculum in Medicine FacultyMinutes No.\_\_\_of\_\_\_\_\_\_\_\_\_\_\_\_\_\_Chairman, PhD, Associate prof.Suman Serghei \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | APPROVEDat the Council meeting of the Faculty Medicine Minutes No.\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_Dean of Faculty, PhD, Associate prof.Placinta Gheoghe \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |
| APPROVEDat the meeting of the chair Physiopathology and Clinical Physiopathology Minutes No.1. of 09.09.2021Head of chair, PhD, prof.Cobet Valeriu \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**SYLLABUS**

**Pathophysiology of the fibrotic diseases**

**Integrated studies**

Type of course: **Optional**

 Curriculum developed by the team of authors:

Valeriu Cobet, PhD, dr. of med., professor

Vasilie Lutan, PhD, dr. of med., professor

Corneliu Hangan, PhD, dr. of med., associate professor

Chisinau, 2021

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| 1. **INTRODUCTION**
* **General presentation of the discipline: place and role of the discipline in the formation**

**of the specific competences of the professional / specialty training program** a) forming the concept of fibrotic disease;b) acquisition of nosological entities that can be completed by fibrosis;c) knowledge of the general laws of the origin, appearance, evolution and end of fibrosis;d) studying the morpho-functional and biochemical changes imminent to the fibrosis  of the vital organs;e) knowledge of the pathogenetic principles of correction and treatment of fibrotic diseases. |
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* **Mission of the curriculum (aim) in professional training**

Studying the morpho-functional and biochemical changes at the molecular, cellular, tissue, organ, system and whole organism level in fibrotic diseases to strengthen a feasible pathogenetic diagnosis and treatment algorithm.

**Languages of disciplines: Romanian, Russian, English**

● **Beneficiaries:** students of the third year, Faculty of Medicine

1. **ADMINISTRATION OF THE DISCIPLINE**

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| Discipline code | **S.06.A.057** |
| Name of the discipline | Pathophysiology of the fibrotic diseases  |
| Discipline Manager(s). | **Valeriu Cobeț, Corneliu Hangan**  |
| Year III |  | Semester | **VI** |
| Total number of hours, including: | **30** |
| Course | **10** |  |  |
| Seminars | **10** | Individual work | **10** |
| Clinical internship (total hours) |  |
| Evaluation form | **C** | Nr. of credits | **1** |

1. **TRAINING AIMS WITHIN THE DISCIPLINE**

# *At the end of the discipline study the student will be able to:*

 *●* **at the level of knowledge and understanding:**

**ν** To know the regularities of the origin, appearance, evolution and end of the pathological processes that lead to the development of fibrotic complications in the vital organs;

**ν** To know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop in fibrotic diseases;

**ν** To know the principles of pathogenetic therapy of fibrotic diseases.

**● at the application level:**

**ν** To be able to interpret the pathophysiological parameters of nervous, cardiac, external breathing, digestive system, liver and kidney activity in fibrotic diseases.

 **● at the integration level:**

**ν** To be able to clinically analyze and interpret complex situational problems, which include pathological processes and syndromes located in the body systems in fibrotic diseases;

**ν** To be able to formulate the principles of etiotropic and pathogenetic therapy of different pathological processes that develop in fibrotic diseases.

1. **PROVISIONAL TERMS AND CONDITIONS**

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|  In the third year the student requires the following: |
| * knowledge of the teaching language;
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| * confirmed competences in sciences at high school level (biology, chemistry, physics);
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| confirmed competences in sciences at the level of the second university year (anatomy, biology, |
| molecular, histology, physiology, biochemistry); |
| * digital skills (using the Internet, processing documents, tables
 |
| * electronics and presentations, use of graphics programs);
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1. **THEMES AND ESTIMATE ALLOCATION OF HOURS**

***Lectures, practical hours/ laboratory hours/seminars and self-training***

| Nr.d/o | THEME | Nr. of hours |
| --- | --- | --- |
| Lectures Practical works Individual work | Practical works  |  Individual work |
|  | Pathophysiology of myocardial fibrosis  | 2 | 2 | 1 |
|  | Pathophysiology of lung fibrosis (pneumo-sclerosis)  | 2 | 2 | 1 |
|  | Pathophysiology of hepatic cirrhosis  | 2 | 2 | 1 |
|  | Pathophysiology of nephrosclerosis  | 2 | 2 | 1 |
|  | Pathophysiology of pancreatic fibrosis | 2 | 2 | 1 |
| **Total**  | **10** | **10** | **10** |

**VI. PRACTICAL TOOLS PURCHASED AT THE END OF THE COURSE**

● Determination of indices of circulatory dyshomeostasis;

• Determination of biochemical indices of liver failure;

• Determination of biochemical indices of renal insufficiency;

• Determination of biochemical indices of pancreatic insufficiency.

1. **OBJECTIVES AND CONTENT UNITS**

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| **Topic (chapter) 1.** **Pathophysiology of myocardial fibrosis**  |
| **Objectives** | **Content units** |
| • to define the notion of myocardial fibrosis, remodeling of the extracellular matrix, congestive heart failure.• to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop in myocardial fibrosis.• demonstrate skills in interpreting clinical and paraclinical data in a patient with myocardial fibrosis.• to apply theoretical knowledge for the clinical interpretation of data and solving complex clinical cases in patients with myocardial fibrosis.• to integrate theoretical pathophysiological knowledge with clinical disciplines. | Etiological factors involved in the development of myocardial fibrosis.Pathogenetic mechanisms involved in the development of myocardial fibrosis. The role of inflammatory mediators, growth factors. The balance between the expression of extracellular matrix metalloproteases and the activity of fibroblasts and myofibroblasts.Changes in cardiac functional parameters at the connotation of systole and diastole in myocardial fibrosis.Pathogenetic principles of circulatory dyshomeostasis correction and pathogenetic treatment in myocardial fibrosis.Interpretation of functional parameters of cardiac activity and peripheral hemodynamics in myocardial fibrosis. |
| **Topic (chapter) 2.** **Pathophysiology of lung fibrosis (pneumo-sclerosis)**  |
| **Objectives** | **Content units** |
| • to define the notion of lung fibrosis, pulmonary restriction and compliance, respiratory insufficiency.• to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop in pneumo-sclerosis.• demonstrate skills in interpreting clinical and paraclinical data in a patient with pneumo-sclerosis.• to apply theoretical knowledge for the clinical interpretation of data and solving clinical cases on the subject.• to integrate theoretical pathophysiological l knowledge with clinical disciplines. | Etiological factors involved in the development of cardiogenic shock.The pathogenetic mechanisms involved in the development of pneumo-sclerosis. The role of interstitial fibroblasts.Changes in functional parameters (respiratory volume, vital capacity, volume of forced inspiration and expiration, volume of anatomical and functional dead space) in pneumo-sclerosis.Pathogenetic principles of correction of deregulated functions and pathogenetic treatment in pneumo-sclerosis.Interpretation of the pathophysiological parameters of the lung activity in contiguity but the indices of circulatory homeostasis in pneumo-sclerosis. Highlighting the signs of endangering blood oxygenation. |
| **Topic (chapter) 3.** **Pathophysiology of hepatic cirrhosis**  |
| **Objectives** | **Content units** |
| • to define the notion of acute and chronic liver failure, liver cirrhosis.• to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop liver cirrhosis.• demonstrate skills in interpreting clinical and paraclinical data in a patient with liver cirrhosis• to apply theoretical knowledge for the clinical interpretation of data and solving clinical cases on the subject.• to integrate theoretical pathophysiological knowledge with clinical disciplines. | Hepatic and extrahepatic etiological factors leading to the development of liver cirrhosis. The role of alcohol, fatty infiltration of the parenchyma and inflammatory diseases (hepatitis).The pathogenetic mechanisms involved in the development of liver cirrhosis and liver failure. Intake of stellate cells, mediators of inflammation, oxidative stress and fibroblast activators. Changes in biochemical blood parameters and liver function in a patient with liver cirrhosis.Pathogenetic principles of correction of deregulated functions and pathogenetic treatment in liver cirrhosis. |
| **Topic (chapter) 4.** **Pathophysiology of nephrosclerosis**  |
| **Objectives** | **Content units** |
| • to define the notion of nephrosclerosis, renal failure.• to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop in nephrosclerosis.• demonstrate skills in interpreting clinical and paraclinical data in a patient with nephrosclerosis.• to apply theoretical knowledge for the clinical interpretation of data and solving clinical cases on the subject.• to integrate theoretical pathophysiological knowledge with clinical disciplines. | Etiological factors involved in the development of nephrosclerosis.The pathogenetic mechanisms involved in the development of nephrosclerosis. The role of inflammatory blood cells and pro-inflammatory cytokines in the development of fibrosis of the renal parenchyma.Changes in blood and urine biochemical parameters in a patient with nephrosclerosis. Algorithm of functional examinations of renal failure caused by nephrosclerosis.Pathogenetic principles of correction of deregulated functions and pathogenetic treatment in a patient with nephrosclerosis.  |
| **Topic (chapter) 5.** **Pathophysiology of pancreas fibrosis**  |
| **Objectives** | **Content units** |
| • to define the notion of pancreatic fibrosis, exocrine pancreatic insufficiency, pancreatic shock.• to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop in pancreatic fibrosis.• demonstrate skills in interpreting clinical and paraclinical data in a patient with pancreatic fibrosis.• to apply theoretical knowledge for the clinical interpretation of data and solving clinical cases on the subject• to integrate theoretical pathophysiological knowledge with clinical disciplines. | Etiological factors involved in the development of pancreatic fibrosis. Acute and chronic pancreatitis, sabotage of pancreatic enzymes and their autoactivation.Pathogenetic mechanisms involved in the development of pancreatic fibrosis. Contribution of sterile inflammation, oxidative stress, fibroblast activation.Changes in the biochemical parameters of blood and urine in a patient with pancreatic fibrosis. Impending changes in intestinal digestion and absorption in pancreatic fibrosis.Pathogenetic principles of correction of deregulated functions and pathogenetic treatment in a patient with pancreatic fibrosis. |

1. **PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY FINalities**

 **Ꝩ Professional (specific) (SC) competences**

* SC1. The responsible execution of professional tasks with the application of the values and norms of professional ethics, as well as the provisions of the legislation in force.
* SC2. Adequate knowledge of the sciences about the structure of the body, the physiological functions and the behavior of the human body in various physiological and pathological states, as well as the existing relationships between the state of health, the physical and the social environment.
* SC5. Interdisciplinary integration of the doctor's work in the team with the efficient use of all resources.
* SC6. Conducting scientific research in the field of health and other branches of science.
* **Transversal competences (TC)**

 ● TC1. Autonomy and responsibility in activity linked to capacity of student to use and to implement the obtained theoretical knowledges in the various maneuvers of practical applications.

**Note. The aims of the discipline** (they are deduced from the professional competences and formative values of the informational content of the discipline).

1. **THE STUDENT'S INDIVIDUAL WORK**

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| Nr. | Expected product  |  Realization strategies  | Evaluation criteria  | Realization deadline |
| 1. | Working with textbooks | Studying the material from the recommended textbooksSummarizing the material in the form of postulatesRendering the material in the form of improvised schemesMarking questions that require special consultation | The ability to reproduce the main concepts and content of the material; the ability to render the essential.The ability to express the material in logical schemes;Ability to explain the material.Ability to answer control questions. | During the optional course |
| 2. | Working with the materials of the theoretical course | Studying the material of the theoretical course Studying the representations of the theoretical course Summarizing the material in the form of postulates | The ability to supplement the material from the textbook with information from the theoretical course.The ability to reproduce verbatim and interpret the presentations of the theoretical course. | During the optional course |
| 3. | Working with online materials | Studying the online materials on the department's WEBSITE.Working with encyclopedic materials, dictionaries, scientific news | Supplementing information with materials and literature. | During the optional course |

1. **METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT**
* **Teaching and learning methods used**

The teaching of the optional course will be done by classical methods with modern instructive elements by discussing clinical cases.

The theoretical course consists of the exposition of the main themes in the form of theses with the elucidation of the etiology, pathogenesis, manifestations, consequences, biological significance and principles of pathogenetic correction of the pathological processes that underlie the development of critical states. The exposition is supplemented by illustrations demonstrated through multimedia. The course material (theses and illustrative material) is offered to students in electronic form.

* **Applied** *(specific to the discipline)* ***teaching strategies / technologies***

In the process of teaching the subject, the following are used:

(1) The real and virtual pathophysiological experiment;

(2) Logical cascading resolving of situational problems and clinical paradigms of fibrosis.

* **Methods *of assessment*** *(including the method of final mark calculation)*

In the optional course, the following forms of knowledge assessment will be practiced:

Current: the current interpretation of the situational problems in the topic.

The final evaluation with grade formed (0.5+0.5) from the grade for theoretical knowledge and the

grade for solving critical problems and critical situations.

Absences from the course are recovered.

**Method of mark rounding at different assessment stages**

| **Intermediate marks scale (annual average, marks from the examination stages)**  | **National Assessment System** | **ECTS Equivalent** |
| --- | --- | --- |
| **1,00-3,00** | **2** | **F** |
| **3,01-4,99** | **4** | **FX** |
| **5,00** | **5** | **E** |
| **5,01-5,50** | **5,5** |
| **5,51-6,0** | **6** |
| **6,01-6,50** | **6,5** | **D** |
| **6,51-7,00** | **7** |
| **7,01-7,50** | **7,5** | **C** |
| **7,51-8,00** | **8** |
| **8,01-8,50** | **8,5** | **B** |
| **8,51-9,00** | **9** |
| **9,01-9,50** | **9,5** | **A** |
| **9,51-10,0** | **10** |

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student’s record-book.

*Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations in the failed exam.*

1. **RECOMMENDED LITERATURE:**

*A. Compulsory*

1. Porth C.M., Matfin G. Pathophysiology. Concepts of Altered Health States; 2009.
2. Robbins and Cotran. Pathologic Basis of Diseases. 2015.

*B. Additional*

1. Harrison’s. Principles of Internal Medicine; 2012.