100 YEARS PATHOPHYSIOLOGY IN THE MEDICAL EDUCATION IN BULGARIA

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ABSTRACT

Pathophysiology is a medical discipline whose subject is the violation of the main regulatory mechanisms leading to pathological processes and diseases. The first lectures were conducted in 1790 at the University of Erfurt, Germany, by Professor August Hecker.

This review follows the founding and development of pathophysiology in medical universities in Bulgaria. With the establishment in 1917 of the Faculty of Medicine at Sofia University on April 10, 1918, the teaching in the new disciplines was organized. Under number nine in the amendments to the National Education Act, published in the State Gazette, is the subject "pathological physiology and experimental medicine". Professor Vasil Mollov in 1936-1937 delivered a lecture series on clinical pathophysiology at the Medical Faculty in Sofia. The founder of Bulgarian pathophysiology is Assoc. Prof. Minko Dobrev, who prepared a full course of 32 lectures. In 1947, the Faculty of Medicine in Plovdiv established the first Department of Pathological Physiology in Bulgaria, headed by Prof. Lyuben Telcharov, and in 1950 the Department at the Faculty of Medicine in Sofia headed by Prof. Stefan Pisarev was founded. With the establishment of new medical faculties, departments of pathophysiology were established in Varna, Pleven and Stara Zagora.

Key words: pathophysiology, history, medical education, Bulgaria

INTRODUCTION

Pathophysiology is one of the fundamental sciences in medicine. The name itself shows that it has a close connection with physiology on the one hand and pathology on the other. It is the link between medical preclinical disciplines and the clinical practice. The subject of pathophysiology is the disturbance of the main regulatory mechanisms linked to the emergence, development and outcome of pathological processes and diseases. Pathophysiology seeks to form students' functional thinking, medical logic and skills. With its in-depth knowledge of the causes and mechanisms of disease, it enables medical specialists to make rational decisions about their therapy.

The first lectures on pathophysiology were conducted in 1790 at the University of Erfurt, Germany, by Professor August Hecker (1763-1811). In 1791 he published the first textbook in the subject - "Grundriss der Physiologia

pathologica, oder die Lehre von dem Bau, von der Mischung, und von den Verrichtungen des menschlichen Körpers und seiner Theile im widernatürlichen Zustande" (1).

Training in pathophysiology as an independent discipline was introduced by the Russian pathologist academician Victor Pashutin (1845-1901) at the University of Kazan, Russia, in 1874. He called this subject "pathological physiology and experimental medicine". His students, Acad. Nikolay Anichkov (1885-1964) and Prof. Semyon Kalatov (1884-1951), had a significant role in distinguishing the new discipline from pathology (2).

Pathophysiology in Bulgaria had a difficult start. The methodology of teaching was based on Russian and Soviet methods, while the majority of the medical community was trained in the German style of thought. At the same time, the newly formed pathophysiology departments had to measure to academic disciplines with decades of experience, who had significant scientific body of work and had already established their professors.

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PATHOPHYSIOLOGY IN THE MEDICAL EDUCATION IN SOFIA

With the establishment in 1917 of the Faculty of Medicine at the Sofia University on April 10, 1918, the training in the new disciplines and the foundation of the respective departments was organized. This was done by decree of Prince Ferdinand, and on 29 November 1917 amendments were published to the National Education Act (State Gazette

XXXIX, Issue 226), which for the first time introduced new university disciplines and departments. Under number nine in the document was the discipline "Pathological Physiology and Experimental Medicine". Because of several organizational problems, no separate training course on pathophysiology was introduced at the time.

Picture 1. State Gazette from 29.11.1917.

The beginning of the training in pathophysiology at the Medical Faculty in Sofia was made by Prof. Vassil Mollov (22.11.1875 - 22.12.1938), who in 1936-1937 presented a cycle of lectures on clinical pathophysiology in the Internal Medicine Clinic. The lecture course was expanded by Assoc. Prof. Minko Dobrev (5.06.1898-

14.03.1939), who prepared a full course of 32 lectures. This gives grounds for accepting Prof. Minko Dobrev as the founder of Bulgarian pathophysiology. The death of Prof. Mollov, and, not long after, the tragic and premature death of Assoc. Prof. Minko Dobrev, caused the course to last only three years (1936-1939) (2, 3).

The department of pathophysiology was included in the structure of the Faculty of Medicine in Sofia in 1946, but it did not function until 1950. Prof. Stefan Pisarev (then assistant professor) was appointed as head of the department and the first assistants were Dr. Vasil Serafimov, Dr. Raina Sabeva, Dr. Dobri Kiprof and Dr. Zdravka Kemileva (4). At first the conditions for teaching and scientific work were lacking: the department was based in two rooms of the Department of Anatomy, it was short on auxiliary personnel and equipment, the practical classes with students were held in the basement of the Anatomical Building. Later, the Department of Pathophysiology was accommodated in the old ophthalmology clinic together with the Department of Pharmacology. After the construction of the Preclinical Building on Zdrave St and the relocation of the Department of Pharmacology, the whole building was provided to the Department of Pathophysiology. Unfortunately, struck by lightning, the building of the department burned down and it is currently housed in the pre-clinical training center.

The first scientific developments in the department were aimed at elucidating the pathogenesis and the role of nerve receptor disorders in the course of experimental myocarditis and arthritis.

The Medical Faculty was separated from the Sofia University on January 28, 1950, when the Medical Academy was formed by Decree No 246 of the Presidium of the National Assembly. It also included the Faculty of Dental Medicine and the Faculty of Pharmacy. In July 1950 an Institute for Specialization and Improvement of Physicians (ISIP) was established. In 1954 the Medical Academy was transformed into a Higher Medical Institute (5).

By Decree No 921 of the State Council of 30 April 1972, the Higher Medical Institute – Sofia was incorporated into the Medical Academy, which united all medical schools in Bulgaria: in Sofia, Plovdiv, Varna and later the newly-formed schools in Pleven and Stara Zagora.

In 1972, with the establishment of the Medical Academy, the Department of Pathophysiology of the Higher Medical Institute – Sofia and the Department of Pathophysiology of ISIP (established in 1970) were merged. First head of the unified department was Prof. Zdravka Kemileva (5). Associates from the Group for Hypertension Studies at the Bulgarian

Academy of Sciences - Prof. D. Kiprof, Assoc. Prof. Traycho Dimitrov and others also joined the Department. In 1973 Assoc. Prof. Nikola Nikolov (later professor) took over as head of the department. The scientific areas of interest in the department in the following period were: the participation of the thymus in the reactivity, pathophysiology of arterial hypertension, corticosteroidal pathology, shock and stress. Under the leadership of Prof. N. Nikolov (1984-1990) the Department continued its active research in cooperation with Russian, American and Japanese scientists.

The HMI – Sofia was reestablished as an independent higher education institution under a Council of Ministers Decree (October 29, 1990) and received autonomy according to global university practice. By decision of the 37th National Assembly (May 21, 1995), the Higher Medical Institute – Sofia was renamed Medical University – Sofia.

The period after 1990 was characterized by frequent changes of the heads of the Department of Pathophysiology. In 1990, Assoc. Prof. Emil Yanev (later professor) was head of the Department, followed by Assoc. Prof. Ivanka Sirakova (1996), Prof. E. Yanev again (2000), Assoc. Prof. I. Sirakova (2001), Assoc. Prof. Zdravko Velkov (2002), Assoc. Prof. Angel Logofetov (2002), Assoc. Prof. I. Sirakova (2004), Assoc. Prof. M. Todorova (2008) and Prof. A. Stoynev (2012). The main directions and achievements in the scientific research of the Department of Pathophysiology at MU – Sofia were: experimental model of streptococcal myocarditis and arthritis and its complex biochemical, morphological and functional characteristics; model of experimental infectious-allergic encephalitis with EEG and immunological characteristics; studies on morphological and biochemical characterization of the inflammatory process, study on the regression of myocardial hypertrophy by beta-blockers and captopril; influence of beta-blockade on alkaline-acid equilibrium in experimental hypertension; neurophysiological analysis of the influence of certain pressor factors on experimentally induced hypertonic reactions; the role of ligand-receptor interactions in the pathogenesis of arterial hypertension and endotoxic shock; studies on adrenocortical activity in endotoxin shock, stress and hypertension; studies on the pathogenic action of the duodenal content in some diseases of the hepatopancreato-duodenal system; investigation of haemodynamic disorders and pumping function of the heart in

various pathological processes; studies on the pulmonary surfactant system in endotoxin respiratory distress syndrome, acute diffuse peritonitis, pesticidal resorptive distress syndrome; chronobiology (regulation of biological rhythms); pathophysiology of pain, etc. (6).

In 2006 a project was started for the reestablishment of the Medical Faculty as part of Sofia University "St. Kliment Ohridski". Assoc. Prof. Nikolov is currently the Head of Section Physiology and Pathophysiology at the Department of Chemistry and Biochemistry, Physiology and Pathophysiology at the Medical Faculty, Sofia University. The scientific studies in the section include: neuroendocrine and behavioral aspects of female reproductive health; endocrine, psychophysiological and metabolic aspects of pain; neuropeptides, stress and pain; neuromediator and neuromodulatory interactions in the central and peripheral nervous system; adaptation of muscles to physical loads.

PATHOPHYSIOLOGY IN THE MEDICAL EDUCATION IN PLOVDIV

In 1944, prominent citizens of Plovdiv joined together in the "Urban Committee for Cultural Uprising of Plovdiv" with clear and ambitious goals: the city must have its own higher education institution, a music school, a symphony orchestra. By Decree 180 of 4 August 1945 the creation of the first Plovdiv higher education institution was announced. Its first rector became the otorhinolaryngologist Prof. Georgi Yankov, graduate of the Viennese Medical School. In 1947 the first Department of Pathological Physiology in Bulgaria was established in the newly opened Medical Faculty in Plovdiv. Its founder and first supervisor was Prof. Lyuben Telcharov (7). He was a student of Professors Mollov and Klisurov and the first professor of pathophysiology in Bulgaria, Assoc. Prof. Minko Dobrev. Prof. Telcharov heads the department from 1947 to 1963. He also wrote the first "General Pathophysiology" textbook in Bulgaria, published in 1954. By Decree No 247 of May 28, 1950, the Faculty of Medicine became Plovdiv Medical Academy, and on October 25, 1950 by Decree No 566 of the Presidium of the National Assembly, the Academy was named after the famous Russian scientist and Nobel laureate Ivan Petrovich Pavlov. In 1972, a new wave of centralization took place and the higher medical institutes in the capital, Plovdiv and Varna became faculties of the Medical Academy. Five years later, they returned to their autonomy as

institutes, and the Plovdiv Higher Medical Institute then comprised of two faculties - Medical and Dental. By a Decision of parliament of 13 February 2002, the Higher Medical Institute acquired its current name - "Medical University - Plovdiv".

After Prof. Lyuben Telcharov, heads of the Department of Pathological Physiology for 60 years were: Prof. N. Boshev (1963-1965), Prof. Ivan Kirin (1965-1989), Prof. Dimitar Mitkov (1989-2001), Prof. Dimitar Iluchev (2001-2004) and Prof. Stefan Kostyanov (2004 till now). In 1978-1991 in Pazardjik existed a branch of the Department of Pathophysiology, headed by Prof. D. Iluchev.

Picture 2. Prof. Dimitar Mitkov, Head of the Department of Pathological Physiology, Medical University – Plovdiv (1989-2001).

Picture 3. Prof. Dimitar Iluchev, Head of the Department of Pathological Physiology, Medical University – Plovdiv (2001-2004).

The first lectures on pathophysiology were read in the Plovdiv cinema hall and in a classroom of the Economic High School. The main scientific areas for the first 20 years were: changes in leukocyte number in pulmonary and interceptive irritations (Prof. Ivan Kirin), influence of cortisone and ACTH on higher nervous activity (Prof. Nikola

Nikolov), investigation of some liver functions in disturbed higher nervous activity (Prof. B. Kutjuqchiev). In the 1960s and 1970s, the main scientific work of the Department concerned: evaluation of the evolution of chronic respiratory failure (stages, grades and classification) in patients with chronic non-specific pulmonary diseases (Prof. Ivan Kirin), studies on the pathogenesis and treatment of liver fat dystrophy in experimental alcohol intoxication (Prof. D. Mitkov). In the 1980s, the two main fields of study developed in the Department were pathogenesis of hepatic encephalopathy (under the direction of Prof. D. Mitkov) and functional study of respiration and acid-alkaline status in physiological and pathological conditions (D. Iluchev, I. Yanev, St. Kostyaney, M. Gerginova, M. Ovansian, A. Karova, D. Genova, A. Hristova). Since its inception, the Department of Pathological Physiology has been developing intensive functional-diagnostic activity: puncture biopsy of the liver and capillary; functional pulmonary, blood-gas and acid-alkaline diagnostics; diagnostic activity in the field of functional lung diagnosis.

The current laboratory complex of the Department includes: Functional Breathing Test Laboratory, equipped with state-of-the-art body plethysmograph and diffusion test, Blood Gas Laboratory, Physical Load Laboratory, Sleep Apnea Laboratory, a laboratory for the diagnosis of pulmonary pathology vibration response imaging (VRI). The laboratories allow functional diagnosis of a wide range of diseases and conditions as well as comprehensive assessment of disability, functional capacity, bronchial hyperreactivity, dyspnea and preoperative risk. After Prof. Dimitar Mitkov and Prof. Dimitar Iluchev, the Department is now headed by Prof. Stefan Kostyaney, who is also the current Rector of the Medical University - Plovdiv. His dissertations are "Functional-Diagnostic Airway Obstruction Surveys in the Respiratory Tract" (PhD thesis, 1987) and "External Breathing, Dyspnoea and Functional Capacity - Integrative Assessment" (Doctoral thesis, 2005). In 2017, the Department of Pathological Physiology at the Medical University - Plovdiv celebrated its 75th anniversary with colleagues pathophysiologists from the country.

Picture 4. Pathophysiologists from the Medical faculties in Bulgaria at the celebration of the 75th anniversary of Medical University – Plovdiv (2017).

PATHOPHYSIOLOGY IN THE MEDICAL EDUCATION IN VARNA

After the establishment of departments of pathophysiology in Plovdiv and Sofia, in 1961, a Department of Pathophysiology was founded headed by Prof. Zdravka Kemileva at the Higher Medical Institute in Varna. She was the head of the department from 1961-1971 and rector of the Higher Medical Institute – Varna from 1963 to 1966. She was also head of the Department of Pathophysiology at the Institute for Specialization and Improvement of

Physicians in Sofia from 1970-1981 and of the Unified Department of Pathophysiology at ISUP and HMI – Sofia from 1981-1984. Her main scientific interests were in the pathophysiology of thrombosis, metabolism and cell type inflammatory reactions. Her PhD thesis was "The Role of the Neuroses on the Course of Experimental Arthritis" (8).

In the early years of Higher Medical Institute – Varna, in addition to Prof. Kemileva, Prof. Popdimitrov left his mark on the educational

process, scientific and experimental activities in the Department of Pathophysiology (1971-1988). He was Vice Dean at the Higher Medical Institute – Varna (1973-1977). Prior to his arrival in Varna he was Head of the Department of Pathophysiology and Experimental Medicine at the Bulgarian Academy of Sciences, 1958-1971. His PhD thesis topic was "The role of the central nervous system in the pathogenesis of tuberculosis".

Prof. Anelia Uzunova (born 15.05.1933) was the first scientist who successfully defended dissertation at the Higher Medical Institute – Varna in 1964 titled "Experimental myocarditis and arthritis against a background of changed immunological reactivity". She was later appointed Head of the Department of Pathological Physiology at the Higher Medical Institute – Pleven (1982-1999). Her main scientific interests were: participation of the thymus in immune processes, pathogenesis of thrombosis and the influence of eicosanoids on arterial thrombosis.

Head of the department of pathophysiology at HMI – Varna from 1988 to 2000 was Assoc. Prof. Ivan Kozarev. He was also the founder and first head of the Department of Pathophysiology at the branch of the Higher Medical Institute – Varna in Dobrich, 1978-1988. His doctorate was titled "Influence of the thymus on the immune-allergic reactivity of the organism", successfully defended in 1973. His main scientific interests were in the field of thermal injuries and immune-allergic processes.

Assoc. Prof. Kalinka Mircheva-Demireva was head of the experimental laboratory for radioisotopes at the Department of Pathophysiology at Medical University - Varna and from 1999 until her retirement - head of the Department of Pathophysiology at the Medical Faculty, Trakia University – Stara Zagora. Her doctorate, "Pathogenesis and Prophylaxis of Experimental Atherosclerosis", was defended in 1977. Her scientific work was on atherosclerosis, transplanted tumor strains, gerontology and geriatrics, innovations in medical education.

Assoc. Prof. Tsvetan Tsekov was head of the Central Experimental Electrophysiology Laboratory at the Department of Pathophysiology and of the Central Research Laboratory at the Higher Medical Institute – Varna. His main scientific interests were regulation of action potentials in motor activity and electrophysiological organ activity.

The Department of Physiology and the Department of Pathophysiology, which existed separately until 2001 in Medical University – Varna, were united in a new department. The first head of the Department of Physiology and Pathophysiology was Assoc. Prof. Dr. Negrin Negrev.

Prof. Ganka Bekyarova was head of Sector Pathophysiology in the years 2000-2017. In 1990 she defended the doctoral dissertation "Changes in functional properties of erythrocytes in the acute period after thermal trauma related to free radical oxidation". Her research is in the field of oxidative stress and application of melatonin and antioxidants; hepatic dysfunction and metabolic syndrome. The topic of her successfully defended dissertation for Doctor of Science in 2014 was "A study of some possible mechanisms of liver damage associated with oxidative stress in experimental thermal trauma and the role of melatonin in hepatoprotection".

PATHOPHYSIOLOGY IN THE MEDICAL EDUCATION IN PLEVEN

The Department of Pathological Physiology at the Higher Medical Institute - Pleven was founded in the autumn of 1975 and the training started during the summer semester of the academic year 1975/76. The first head of the department is Prof. Mladen Argirov with Assistant Professors P. Topalski, D. Strashimirov and H. Popov. After the retirement of Prof. Argirov in 1982, Prof. Anelia Uzunova was elected head of the department, followed by Assoc. Prof. Denko Strashimirov. By decision of the Academic Council from 24.01.2000 departments "General Biology" and "Pathophysiology" were reformed, creating a new Department "General Biology and Pathophysiology" with sections "General Biology" and "Pathophysiology". During the academic years 1983 and 1984, Dr. Emilia Lakova and Dr. Anelia Dimitrova were appointed as Assistants. Since May 2005 the head of the department has been Assoc. Prof. Georgi Nikolov.

In 2009 the Department of Physiology and the Section of Pathological Physiology were united in the Department of Physiology and Pathological Physiology. In 2011 two new assistants were appointed - Dr. Krasimir Kostov and Dr. Armine Grigoriyan. Since 2011 the head of the Department of Physiology and Pathological Physiology is Assoc. Prof. Aneliya Dimitrova (her PhD thesis was "Vascular Protective Effects of Zinc

Supplementation - Experimental Studies" from 2007).

At the Department of Pathophysiology in 2002 was established a Research and Diagnostic Laboratory for determination of microelements in biological and organic samples, currently led by Assoc. Prof. K. Mutafchiev. The main topics for scientific research of the Section are: the role of thymus as organ of immune reactivity in the development of various pathological processes; pathogenesis of arterial thrombosis; atherosclerosis and arterial hypertension; trace elements; oxidative stress and hypertension; pathophysiological aspects of aging, etc.

During the period 1975-2005 aiding the department's teaching were several prominent guest speakers: Prof. Z. Kemileva, Prof. I. Kirin, Prof. D. Mitkov, Prof. R. Lolov, Prof. N. Nikolov, Prof. E. Yanev, and Prof. D. Illichev. From 2001 to 2005, the lecture course on pathophysiology in English was led by Prof. D. Illichev. The teaching of the discipline at the medical colleges in Pleven, Ruse and Veliko Tarnovo is carried out by lecturers from the Department of Pathophysiology at MU – Pleven.

The department has had a long tradition of conducting "Pathophysiology Evenings", while the students from Higher Medical Institute – Pleven have won awards in national competitions on pathophysiology. Students from the pathophysiology workshop have successfully presented their works at international scientific meetings in Pleven's twin towns, Rostock and Rostov-on-Don.

PATHOPHYSIOLOGY IN THE MEDICAL EDUCATION IN STARA ZAGORA

The Department of Pathophysiology in Stara Zagora was founded in 1984 as an integral part of the Higher Medical Institute – Stara Zagora, which opened in 1982. In 1995 the Faculty of Medicine entered the structure of Trakia University (TU).

The founder and first head of the department was Assoc. Prof. Yakim Yakimov, a graduate of the Higher Medical Institute - Sofia. At the beginning, the department was housed in the Morphological Building. The first assistant was Dr. Rossitsa Sandeva, who was appointed in July 1984. Other assistants assigned to the department were Dr. Ruska Katsarova, Dr. Georgi Sarov and Dr. Georgi Lisichkov. During the mandate of Assoc. Prof. Yakim Yakimov (03.10.1984 - 01.10.1991)

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predominantly organizational work was done on equipping the newly opened department and preparing the curricula for medical students, who study pathophysiology during the 4th and 5th semesters. Visual projection methods were implemented in the teaching process. A pathophysiology workshop was founded, where main mechanisms of chronic diseases were discussed and various pathological processes and diseases were modeled on experimental animals. Each year a pathophysiology quiz took place with students competing in teams, answering interesting questions in the field of medicine. The winners went on to take part in a national competition against the other medical faculties in the country.

After the retirement of Assoc. Prof. Yakimov, lecturers from the medical universities in Plovdiv and Sofia were recruited for the lecture course and the semester examinations: Prof. Dimitar Ilchev, Prof. Dimitar Mitkov, Assoc. Prof. Velkov and others. In 2000 Dr. Svetlana Dimova was appointed as a new assistant. During this period, under the leadership of Prof. Dimitar Ilchev a joint study on dyspnea and pulmonary functions of patients with COPD from the Raduntsi State Pulmonary Hospital was performed together with colleagues from Medical University – Plovdiv.

In 1999 Assoc. Prof. Kalinka Mircheva-Demireva (17.05.1999 - 18.05.2002) from the Medical University – Varna was elected head of the Department of Pathophysiology. In the following years examination tests were introduced, as well as some teaching innovations such as problem-based and integrated training in pathophysiology. The main scientific studies in the Department included: pathogenesis of risk behavior, disorders of the carbohydrate metabolism and metabolic syndrome, immune status in schizophrenia, neuropeptides and contractility of smooth muscle organs, etc. After reforms in some departments, the Department of Physiology, Pathophysiology and Pharmacology was established and the Department of Pathophysiology became a section of the Department. Prof. Traycho Dimitrov from Medical University – Sofia was elected head of the Department during the period 01.07.2003 - 31.03.2013. The Department's efforts were aimed at maintaining quality of teaching, despite the shortcomings such as lack of experimental animals and obsolete equipment. Dr. Stanislava Mihaylova became an assistant at the Department in 2009 and worked there until

2017. Scientific activity during the period was in the following areas: H1-antagonists; isolated kidney and study of the influence of biologically active substances and pharmacological effects on renal function; ghrelin and contractibility of isolated organs; streptozotocin-induced diabetes; risk behavior and metabolic syndrome. Since 26.05.2014 the lecture course on pathophysiology for

Bulgarian and English speaking medical students has been lead by Assoc. Prof. Aneliya Dimitrova from Medical University – Pleven. The practical classes are led by Dr. Rossitsa Sandeva and Dr. Stanislava Mihaylova, who developed the curriculum and tests for the English-language training, in line with the modern teaching aids in pathophysiology.

Picture 5. Photo of English speaking students and lecturers of pathophysiology in Medical Faculty, Trakia University, Stara Zagora (2017).

Picture 6. Photo of Bulgarian students and lecturers of pathophysiology in Medical Faculty, Trakia University, Stara Zagora (2018).

Assoc. Prof. Aneliya Dimitrova has high interest and scientific expertise regarding the influence of micronutrients, metalloproteinases and endothelins, as well as the use of nanomaterials in experimental model of osteoporosis. Major post-2014 scientific studies concern changes in metabolic status and some neuropeptides and adipokins in experimental burden with sweeteners (fructose, sucrose, aspartame); metabolic disorders and leptin changes in rat ovariectomy; risk behavior, etc. In addition to training in pathophysiology of master and bachelor students, members of the faculty have also taught the subject in medical colleges in Stara Zagora, Haskovo, Sliven and Bourgas. They have also participated in a number of scientific projects at Medical Faculty – Trakia University, and at national and international level.

REFERENCES

1. Hecker, A.F., Grundriss der Physiologia pathologica, oder die Lehre von dem Bau, von der Mischung, und von den Verrichtungen des menschlichen Körpers und seiner Theile im widernatürlichen Zustande. Lehmann, Erfurt, 1791.
2. Iluchev, D., Stoynev, A., Fundamentals of Pathophysiology. Raikov Medical Publishing House, Plovdiv, 2010.

3. Stoynev, A., Pathophysiology - Textbook for Students of Dental Medicine at Medical University. Simel Press Publishing House, Sofia, 2015.
4. Pisarev, S. Short Information about the Establishment and Development of the Department of Pathological Physiology at Higher Medical Institute - Sofia (1950-1958). In: Panev, A. (editor), *40 Years of Medical Faculty (1918-1958). Jubilee Collection*. Meditsina i Fizkultura, Sofia, pp 197-201, 1958.
5. Kemileva, H., Kirin, I., Pathological Physiology. Meditsina i Fizkultura, Sofia, 1973.
6. Mitov, I., Georgiev, M., Todorova, P., Avramova, A., *Almanac "100 Years of Medical Faculty – Sofia"*. Publishing House "St. Georgi Pobedonosets" Ltd., Sofia, 2017.
7. Iluchev, D., Kostyanov, S., *Department of Pathophysiology - Medical University - Plovdiv. 60 Years of History and Development*. Vasil Petrov - VAP, Plovdiv, 2007.
8. Klisarova, A., Madjov, R., *50 Years of Medical University "Prof. Dr Paraskev Stoyanov" – Varna. Almanac 1961-2011*. Medical University - Varna, 2011.