

A – Practical work						
B – Work with literature						
No.	Type	Topic	Annotation	Mentor		N. of stud.
1	B	Short bowel disease.	Pathophysiological mechanisms. Clinical signs and their basis, current classification, principles of nutritional support	MUDr. Eva Krauzová eva.krauzova@fnkv.cz	2	5
2	B	Insulin resistance.	Pathophysiological mechanisms of insulin resistance in pertinent organs (the ominous octet)	MUDr. Eva Krauzová eva.krauzova@fnkv.cz	2	5
3	B	Endothelial dysfunction syndrome, causes and consequences.	The students elaborate the topic as a chapter into a textbook. The text will be based on review articles (not textbooks). The work must have at least three review and 5 primary citations. Custom images and diagrams are welcome.	MUDr. Klára Bernášková, CSc kbernas@lf3.cuni.cz	1	3
4	B	Mechanisms of carcinogenesis.	The students elaborate the topic as a chapter into a textbook. The text will be based on review articles (not textbooks). The work must have at least three review and 5 primary citations. Custom images and diagrams are welcome.	MUDr. Klára Bernášková, CSc kbernas@lf3.cuni.cz	1	3
5	B	Chronic mild inflammation, causes and consequences.	The students elaborate the topic as a chapter into a textbook. The text will be based on review articles (not textbooks). The work must have at least three review and 5 primary citations. Custom images and diagrams are welcome.	MUDr. Klára Bernášková, CSc kbernas@lf3.cuni.cz	1	3
6	B	Catabolic states, causes and consequences.	The students elaborate the topic as a chapter into a textbook. The text will be based on review articles (not textbooks). The work must have at least three review and 5 primary citations. Custom images and diagrams are welcome.	MUDr. Klára Bernášková, CSc kbernas@lf3.cuni.cz	1	3
7	B	Consequences of chronic stress (developmental mechanisms).	The students elaborate the topic as a chapter into a textbook. The text will be based on review articles (not textbooks). The work must have at least three review and 5 primary citations. Custom images and diagrams are welcome.	MUDr. Klára Bernášková, CSc kbernas@lf3.cuni.cz	1	3
8	B	Cell to cell communication in pathophysiology.	The students elaborate the topic as a chapter into a textbook. The text will be based on review articles (not textbooks). The work must have at least three review and 5 primary citations. Custom images and diagrams are welcome.	MUDr. Klára Bernášková, CSc kbernas@lf3.cuni.cz	1	3

9	B	Pathophysiological aspects of diabetic ketoacidosis.	History – life, therapy and death of Type 1 diabetic patient in era before the discovery of insulin. Epidemiology of diabetic ketoacidosis (current prevalence, mortality). Metabolic effects of insulin and glucagon in key tissues. Principle of ketogenesis. Development of diabetic ketoacidosis in Type 1 diabetes (ketoacidosis does not occur in type 2 diabetes - why?) The principle of the treatment of diabetic ketoacidosis. Ketogenic diet and Type 1 diabetes (advantages and disadvantages).	MUDr. Kateřina Westlake, PhD katerina.westlake@gmail.com	1	5
10	B	Pathophysiological mechanisms of diabetic microvascular complications development.	Current knowledge and opinions on the development of diabetic microvascular complications (protein glycation, reactive oxygen species, polyol pathway, mitochondrial dysfunction, etc). Mechanisms to prevent and eliminate microvascular complications - preventive measures, possibilities for targeted therapy and basic principles. In-vitro and animal models in microvascular complications research.	MUDr. Kateřina Westlake, PhD katerina.westlake@gmail.com	1	5
11	B	Causes and mechanisms of increased mortality in obstructive sleep apnoe syndrome. Critical evaluation of 2 seminal studies with contradictory results from the pathophysiological point of view.	Pathophysiological mechanisms linking obstructive sleep apnea syndrome (OSA) with increased cardiovascular mortality. Pathophysiological basis of OSA therapy and its impact on mortality - comparison of 2 studies with contradictory results (Martinez-Garcia x SAVE study provided below). Design of both studies, inclusion criteria, results, discussion - what are basic differences between both studies. Why studies found opposite results? MARTÍNEZ-GARCÍA et al., 2012. Cardiovascular mortality in obstructive sleep apnea in the elderly: role of long-term continuous positive airway pressure treatment: a prospective observational study. Am J Respir Crit Care Med. 186(9), 909–16. ISSN 1535-4970. https://www.atsjournals.org/doi/10.1164/rccm.201203-0448OC MCEVOY et al., 2016. CPAP for prevention of cardiovascular events in obstructive sleep apnea. New England Journal of Medicine. ISSN 1533-4406. https://www.nejm.org/doi/10.1056/NEJMoa1606599	MUDr. Kateřina Westlake, PhD katerina.westlake@gmail.com	1	5
12	B	Pathophysiological aspects of ventilation and its regulation during sleep in pregnancy.	Regulation of ventilation during sleep, ventilation mechanics, critical pressure for upper airway collapse (Pcrit) and changes of these parameters during pregnancy (increased abdominal volume, high diaphragm position, fluid retention). Partial oxygen pressure in tissues of the fetus. Disordered breathing during pregnancy and its impact on the fetus.	MUDr. Zuzana Vimmerová- Lattová, Ph.D. zuzana.vimmerova- lattova@lf3.cuni.cz	1	5

13	B	Nobel prizes associated with insulin.	Summary and explanation of key experiments leading to Nobel prizes in Medicine and physiology associated with insulin (Banting/Macleod 1921, Sanger 1958, Yalow 1977) from the pathophysiological perspective.	Doc. MUDr. Jan Polák, PhD jan.polak@lf3.cuni.cz	1	5
14	B	Nobel Prizes in Medicine and Physiology in last 20 years (selection of 5)	Summary and explanation of key experiments leading to Nobel prizes in Medicine and physiology in last 20 years from the pathophysiological perspective. Students should select 5 Nobelists from the given period.	Doc. MUDr. Jan Polák, PhD jan.polak@lf3.cuni.cz	2	5
15	A	The impact of acute sleep deprivation (a night shift) on cognitive functions	Experimental/research work Hypothesis: Acute sleep deprivation significantly worsens cognitive functions. Methods: 1 day of acute sleep deprivation (simulation of a night shift, total absence of sleep for 30 hours) versus a control experimental setting after 3 days of adequate sleep. Practical implementation and interpretation of computer-based PVT test (psychomotor vigilance test), memory test and ev. actigraphy monitoring. Statistical analysis, results, discussion. N= 6.	MUDr. Zuzana Vimmerová-Lattová, Ph.D. zuzana.vimmerova-lattova@lf3.cuni.cz	2	5
16	A	The impact of acute sleep deprivation (a night shift) on cognitive functions.	Experimental/research work Hypothesis: Acute sleep deprivation significantly worsens cognitive functions. Methods: 1 day of acute sleep deprivation (simulation of a night shift, total absence of sleep for 30 hours) versus a control experimental setting after 3 days of adequate sleep. Practical execution and interpretation of computer-based PVT test (psychomotor vigilance test), memory test. Statistical analysis, results, discussion. N= 6.	MUDr. Zuzana Vimmerová-Lattová, Ph.D. zuzana.vimmerova-lattova@lf3.cuni.cz	2	5
17	A	Heart rate variability in subjects with type 2 diabetes with/without obstructive sleep apnea syndrome	Experimental/research work. Hypothesis: The diagnosis of obstructive sleep apnea (OSA) has impact on heart rate variability. Methods: Analysis of heart rate variability from 5-min ECG recordings using appropriate software in patients with DM 2T and AHI (apnea-hypopnea index) >30 versus AHI < 10. The work will include all steps from identification of suitable ECG periods from polysomnographic recordings, software processing of ECG signal, processing of raw data. At least one member of the team should have interest in biosignals and their processing (including basics of spectral analysis / Fast Fourier Transform). Basic statistical analysis, results, discussion. N = 10 (5 OSA + 5 without OSA)	MUDr. Trinh Minh Duc trinh.minh.duc@seznam.cz	1	5

18	A	Heart rate variability in subjects with obstructive sleep apnea syndrome before versus after a train of apneic episodes.	Experimental/research work. Hypothesis: The presence of apneic episodes with hemoglobin desaturations in obstructive sleep apnea (OSA) has impact on heart rate variability. Methods: Analysis of heart rate variability form 5-min ECG recordings using appropriate software in patients severe OSA before and after train of hypoxic episodes. The work will include all steps from identification of suitable ECG periods form polysomnographic recordings, software processing of ECG signal, processing of raw data. At least one member of the team should have interest in biosignals and their processing (including basics of spectral analysis / Fast Fourier Transform). Basic statistical analysis, results, discussion. N = 5 (5 subjects before and after train of hypoxic episodes)	MUDr. Trinh Minh Duc trinh.minh.duc@seznam.cz	1	5
19	A	Changes in peripheral blood flow and muscle strength in human model of atherosclerosis.	Experimental/research work. Hypothesis: Peripheral blood flow nad muscle strength decrease with arterial blood flow obstruction. Methods: Upper limb ischemisation (tonometer cuff) with a simultaneous recording of peripheral blood flow (fingers using plethysmography method. The experiment will include non-significant atherosclerosis (60% stenosis), hemodynamically significant stenosis (90%) and complete acute arterial occlusion (100%). Muscle strength will be recorded in parallel in the ischemized limb using a dynamometer. Basic statistics, results, discussion. N=10	Doc. MUDr. Jan Polák, PhD jan.polak@lf3.cuni.cz	2	5
20	B	Causes of gastroesopahgeal reflux.	Student will summarize 3 original scientific papers in this field. The papers will be summarized in accordance with mentors manual. The summary text should fill at least one A4 page.	MUDr. Otakar Raška, PhD. raskaota@gmail.com	2	1
21	B	Molecular mechanisms underlying mucosal damage by Helicobacter pylori.	Student will summarize 3 original scientific papers in this field. The papers will be summarized in accordance with mentors manual.	MUDr. Otakar Raška, PhD. raskaota@gmail.com	2	1
22	B	How much intensive physical activity changes alcohol metabolism?	Student will summarize 3 original scientific papers in this field. The papers will be summarized in accordance with mentors manual.	MUDr. Otakar Raška, PhD. raskaota@gmail.com	2	1
23	B	Epileptic seizure and its impact on memory.	Student will summarize 3 original scientific papers in this field. The papers will be summarized in accordance with mentors manual.	MUDr. Otakar Raška, PhD. raskaota@gmail.com	2	1
24	B	Peripheral nerve regeneration.	Student will summarize 3 original scientific papers in this field. The papers will be summarized in accordance with mentors manual.	MUDr. Otakar Raška, PhD. raskaota@gmail.com	2	1

25	B	EEG monitoring during sleep.	Student will summarize 3 original scientific papers in this field. The papers will be summarized in accordance with mentors manual.	MUDr. Otakar Raška, PhD. raskaota@gmail.com	2	1
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