Poznan University of Medical Science
Syllabus

Pathophysiology of locomotor organs - 2nd year 6MD - 1 ECTS

Faculty	Program	Specialization	Course code
Center for Medical Education in English	None	-	

1. GENERAL INFORMATION

Course name	Name of the superior course/ module	Academic year	Year of studies
Pathophysiology of locomotor organs - 2nd year 6MD - 1 ECTS	-	2020 / 2021	Second
Semester	**Year of matriculation**	**Education profile**	**Level of studies**
-	2019 / 2020	-	-
Mode of studies	**Language of teaching**	**Type of course**	**Course coordinator**
in English	English	Elective	Huber Juliusz prof. dr hab. n.med.
Superior course/module coordinator	**Person giving credit for completing the course**	**Teacher Assistants**	
-	Huber Juliusz prof. dr hab. n.med.		

2. LEARNING OBJECTIVES. GENERAL CHARACTERISTICS OF MODULE/COURSE

Main pathological phenomena diagnosed in muscles and nerves as well as in the supraspinal and spinal cord centers with the clinical neurophysiological methods are presented for students during seminars and clinical examinations with patients. They are explained during practical examinations which are performed by students on healthy volunteers and on patients (with their previous consent) for comparison. All examinations are superintended by Assistants and the Course Coordinator. In fact, this is introducing to the Evidence Based Medicine "Clinical Neurophysiology" diagnostics in cases of the neuromusclular disorders.

3. PRELIMINARY REQUIREMENTS

Anatomy, Physiology - academic level

Upon completing the course the student should be competent at:
-recognize the origin of neurogenic and myogenic pathologies in muscle motor units with EMG recordings,
-find out the pathological changes in sensory and motor fibers of nerves supplying areas of the human body with the methods of clinical neurophysiology (electroneurographical-ENG examinations of SCV, M, F, H and A waves as well as the "blink reflex" method),
-recognize the changes in afferent and efferent transmission at spinal or supraspinal levels with SEPs (somatosensory evoked potentials examinations performed with electrical pulses) and MEPs (motor evoked potentials induced with the magnetic field) in clinical neurophysiological diagnostics,
-recognize the neuromuscular transmission disorders with the method of clinical neurophysiology ("decrement" examinations of high-frequency electrical stimulation of nerves),
Have knowledge of
-general rules of practical using and proper applying the clinical neurophysiological methods to the diagnostic of sensory and motor innervations of human body areas in cases of neurogenic disorders
Be familiar with
-aspects of applying the clinical neurophysiological methods of examination to the diagnostic of sensory and motor innervation of human body in cases of different pathologies basing on the rules of differential diagnostics (EBM)

4. CURRICULAR CONTENTS

2nd year 6-year MD Program 1 ECTS credits: PATHOPHYSIOLOGY OF LOCOMOTOR ORGANS namely (CLINICAL NEUROPHYSIOLOGY) Stage of study: 3rd 4th semesters
Practicals with patients 10 hours (a group of students is subdivided into subgroups, "C" category practices)
Seminars 5 hours
Totally: 15 hours
(Extended course "more patients-more practice")
Main pathological phenomena diagnosed in muscles and nerves as well as in the supraspinal and spinal cord centers with the clinical neurophysiological methods are presented for students during seminars and clinical examinations with patients. They are explained during practical examinations which are performed by students on healthy volunteers and on patients (with their previous consent) for comparison. All examinations are superintended by Assistants and the Course Coordinator. In fact, this is introducing to the Evidence Based Medicine "Clinical Neurophysiology" diagnostics in cases of the neuromusclular disorders. Coordinator of the elective course: Professor Juliusz Huber and one Assistant (All teachers were trained and certified as the specialized neurophysiologists by The Polish Association of the Clinical Neurophysiology)

Chair/Department: Chair of Department of Pathophysiology of Locomotor Organs Karol Marcinkowski University of Medical Sciences 28 Czerwca 1956r. Street, No 135/147, 61-545 Poznań (Wiktor
Dega Orthopaedic and Rehabilitation Clinical Hospital), (enter "D", second floor, "EMG" Department) telephone: 61 8310230) http://www.orsk.ump.edu.pl/zpnr.html

Teachers: Coordinator Medical University Professor Dr Juliusz Huber (neurophysiologist) zpnr@wp.pl

http://www.orsk.ump.edu.pl/zpnr.html Coordinator’s Assistants: zpnr@wp.pl Agnieszka Wiertel-Krawczuk

Course objectives: Upon completing the course the student should be competent at: -recognize the origin of neurogenic and myogenic pathologies in muscle motor units with EMG recordings, -find out the pathological changes in sensory and motor fibers of nerves supplying areas of the human body with the methods of clinical neurophysiology (electroneurographical-ENG examinations of SCV, M, F, H and A waves as well as the “blink reflex” method), -recognize the changes in afferent and efferent transmission at spinal or supraspinal levels with SEPs (somatosensory evoked potentials examinations performed with electrical pulses) and MEPs (motor evoked potentials induced with the magnetic field) in clinical neurophysiological diagnostics, -recognize the neuromuscular transmission disorders with the method of clinical neurophysiology (“decrement” examinations of high-frequency electrical stimulation of nerves), Have knowledge of - general rules of practical using and proper applying the clinical neurophysiological methods to the diagnostic of sensory and motor innervations of human body areas in cases of neurogenic disorders Be familiar with -aspects of applying the clinical neurophysiological methods of examination to the diagnostic of sensory and motor innervation of human body in cases of different pathologies basing on the rules of differential diagnostics (EBM).

References: Kimura J.: Electrodiagnosis in diseases of nerve and muscle, Principles and Practise, Oxford University Press, 2001. Preston D.C., Shapiro B.E.: Electromyography and neuromuscular disorders, ELSEVIER, Butterworth Heinemann, 2005. Lenman J.A.R., Ritchie A.E., Clinical Electromyography, Churchill Livingstone, 1987. Form of final assessment: Ten points of multiple choice questions test (only one answer is correct). The final test will cover all material in the course. Obligatory the student must practically shows his/her skills with performing the neurophysiological clinical examination with the patient treated because of movement disorders of different origin. Evidence Based Medicine approach is cordially invited with performing examination of the patient

Department of Pathophysiology of Locomotor Organs Zakład Patofizjologii Narządu Ruchu Karol Marcinkowski University of Medical Sciences 28 Czerwca 1956r. Street, No 135/147, 61-545 Poznań (Wiktor Dega Orthopaedic and Rehabilitation Clinical Hospital), (enter "D", second floor, "EMG" Department) telephone: 61 8310230) http://www.orsk.ump.edu.pl/zpnr.html

1. Motor units based on the clinical electromyography (EMG) approach (classification, neurophysiological properties, activity of motoneurones and the muscle fibres in normal and pathological states)

2. Motor units under the neurogenic and myogenic states – differences in spontaneous discharges and during the muscle voluntary contraction

3. Peripheral motor and sensory transmission in electroneurographic studies (ENG; M, F,
H and A waves as well as SCV potentials) in normal subjects and in mononeuropathies and polyneuropathies in patients with different movement disorders

4. Supraspinal and spinal cord afferent and efferent transmission neurophysiological examinations with SEPs and MEPs

5. Diagnostic methods of clinical neurophysiology. Their applications in neurology, neuroorthopaedy, neurosurgery and neurorehabilitation: electromyography (EMG) global (surface) and elementary (needle), EMG analysis and the interference pattern, spontaneous activity recorded from muscles, neurogenic and myogenic changes in motor units, electroneurography (ENG; nerve conduction studies), MEPs and SEPs at different levels of the efferent and afferent transmission, sensory perception curves (intensity of current versus stimulus duration curves; IC-SD method) in cases of axonotmesis and neurotmesis and regeneration processes comparing with von Frey's filament method

6. Reference values in neurophysiological examinations, interpretation of results, correlations with other clinical examinations with the special reference to the high-sensitivity neuroimaging examinations

7. Examples of neurophysiological examinations (as above) among healthy volunteers

8. Neurophysiological studies of neuromuscular transmission and neuromuscular disorders (Myasthenia gravis, Lambert-Eaton syndrome)

9. Application of neurophysiological methods in degeneration and regeneration nerve studies in patients after brachial plexus injury and carpal tunnel syndrome as well as the facial nerve injuries

10. Examples of complex neurophysiological studies in peripheral mono- and some of polyneuropathies: carpal tunnel syndrome, facial nerve palsy, blink-reflex studies

5. DESCRIPTION OF ASSUMED MODULE/COURSE LEARING OUTCOMES AND VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOMES UPON COMPLETION OF THE COURSE STUDENT WILL ACHIEVE WITHIN:	Number of educational standard or program learning outcome	Reference to the second degree characteristics of Polish Qualifications Framework	Assessment / method of verification of assumed learning outcomes	Methods of realization
KNOWLEDGE				

LEARNING OUTCOMES UPON COMPLETION OF THE COURSE STUDENT WILL ACHIEVE WITHIN:	Number of educational standard or program learning outcome	Reference to the second degree characteristics of Polish Qualifications Framework	Assessment / method of verification of assumed learning outcomes	Methods of realization
know and understand the causes, symptoms, principles of diagnosis and therapeutic treatment of most common diseases of the nervous system, including: 1. headaches: migraine, tension type headache, headache syndromes and trigeminal neuralgia, 2. cerebrovascular diseases, particularly cerebral stroke, 3. epilepsy, 4. infections of the nervous system, particularly meningitis, Lyme disease, herpes simplex encephalitis, diseases of the neurotransmitter, 5. dementias, particularly Alzheimer's disease, frontotemporal lobar degeneration, vascular dementia and other dementia syndromes, 6. disorders of the basal ganglia, particularly Parkinson's disease, 7. demyelinating diseases, particularly multiple sclerosis, 8. diseases of the neuromuscular system, particularly amyotrophic lateral sclerosis and sciatica, 9. craniocerebral traumas, in particular concussion;	E.W14.	P7S_WG	final test, diagnosis of individual case	classes-A, seminars
know and understand the causes, symptoms, principles of diagnosis and therapeutic treatment of most common childhood diseases: 1. rickets, tetany, convulsions, 2. heart defects, myocarditis, endocarditis and pericarditis, cardiomyopathy, arrhythmias, heart failure, high blood pressure, syncope, 3. acute and chronic diseases of the upper and lower respiratory tract, congenital defects of the respiratory system, tuberculosis, cystic fibrosis, asthma, allergic rhinitis, urticaria, anaphylaxis, angioedema, 4. anaemia, bleeding disorders, bone marrow failures, paediatric cancers, including typical childhood solid tumours, 5. acute and chronic abdominal pain, vomiting, diarrhoea, constipation, gastrointestinal bleeding, peptic ulcer disease, non-specific bowel diseases, pancreatic disease, cholestasis and liver diseases and other acquired diseases and congenital defects of the gastrointestinal tract, 6. urinary tract infections, congenital anomalies of the urinary tract, nephrotic syndrome, kidney stones, acute and chronic renal failure, acute and chronic inflammation of the kidneys, kidney systemic diseases, urination disorders, vesicoureteral reflux, 7. growth disorders, diseases of the thyroid and parathyroid, adrenal diseases, diabetes, obesity, disorders of pubertal development and male and female gonadal functions, 8. cerebral palsy, encephalitis and meningitis, epilepsy, 9. most common childhood infectious diseases, 10. genetic syndromes, 11. connective tissue diseases, rheumatic fever, juvenile arthritis, systemic lupus, dermatomyositis;	E.W3.	P7S_WG	final test, diagnosis of individual case	classes-A, seminars

LEARNING OUTCOMES UPON COMPLETION OF THE COURSE STUDENT WILL ACHIEVE WITHIN:	Number of educational standard or program learning outcome	Reference to the second degree characteristics of Polish Qualifications Framework	Assessment / method of verification of assumed learning outcomes	Methods of realization
know and understand the causes, symptoms, principles of diagnosis and therapeutic treatment of most common internal diseases occurring in adults and their complications; 1. cardiovascular diseases including coronary heart disease, heart defects, endocarditis, myocarditis, pericarditis, heart failure (acute and chronic), vascular diseases, arterial and venous hypertension: primary and secondary, pulmonary hypertension, 2. respiratory diseases, including diseases of the respiratory tract, chronic obstructive pulmonary disease, bronchial asthma, bronchiectasis, cystic fibrosis, respiratory infections, interstitial lung disease, pleura and mediastinum diseases, obstructive and central sleep apnea, respiratory failure (acute and chronic), respiratory tract neoplasms, 3. gastrointestinal diseases, including the diseases of: the oral cavity, oesophagus, stomach and duodenum, intestine, pancreas, liver, biliary tract, gall bladder, 4. endocrine diseases, including the diseases of: hypothalamus and pituitary, thyroid, parathyroid, adrenal cortex and medulla, ovary and testis, as well as neuroendocrine tumours, polyglandular syndromes, different types of diabetes and metabolic syndromes: hypoglycemia, obesity, dyslipidemia, 5. kidney and urinary tract diseases, including: acute and chronic renal failure, glomerular diseases and interstitial renal failures, renal cysts, kidney stones, urinary tract infections, urinary tract neoplasms, especially bladder cancer and kidney cancer, 6. haematologic diseases, including bone marrow aplasia and anaemia, neutropenia and agranulocytosis, thrombocytopenia, acute leukemia, myeloproliferative and myelodysplastic-myeloproliferative neoplasms, myelodysplastic syndromes, mature B-cell and T-cell neoplasms, bleeding disorders, thrombophilia, life threatening conditions in haematology, blood disorders in diseases of other organs; 7. rheumatic diseases, including systemic connective tissue diseases, systemic vasculitis, inflammation of joints including the spine, metabolic bone diseases, especially osteoporosis and osteoarthritis, gout, 8. allergic diseases, including anaphylaxis and anaphylactic shock and angioedema, 9. fluid, electrolyte, and acid-base balance disorders: dehydration, overhydration, electrolyte imbalance, acidosis and alkalosis;	E.W7.	P7S_WG	final test, diagnosis of individual case	classes-A, seminars
know the basic concepts of transplant surgery, indications for transplantation of irreversibly damaged organs and tissues, and procedures associated with it;	F.W14.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the functioning and the regulatory mechanisms of all the organs and systems in the human body, including: circulatory, respiratory, digestive, urinary and integumentary system, and understand the dependencies between them;	B.W21.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the course and regulation of female and male reproductive functions;	B.W22.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars

LEARNING OUTCOMES UPON COMPLETION OF THE COURSE STUDENT WILL ACHIEVE WITHIN:	Number of educational standard or program learning outcome	Reference to the second degree characteristics of Polish Qualifications Framework	Assessment / method of verification of assumed learning outcomes	Methods of realization
know the mechanisms of ageing;	B.W23.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the physico-chemical and molecular basis of functioning of sensory organs;	B.W7.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the basic mechanisms of cell and tissue damage;	C.W27.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the etiology of hemodynamic disturbances, regressive and progressive changes;	C.W30.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the issues related to detailed organ pathology, macro-and microscopic imaging and the clinical course of pathological changes in various organs;	C.W31.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
describe the autosomal and heterosomal aberrations which cause diseases, including oncogenesis and cancer;	C.W7.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know the principles of health promotion, its tasks and main lines of action, with particular focus on the role of the elements of a healthy lifestyle;	D.W14.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know how to motivate patients to healthy behaviours and how to inform the patient about an unfavourable prognosis;	D.W15.	P7S_WK	diagnosis of individual case, final test	classes-A, seminars
know the historical origins of medicine, medicine of indigenous peoples and ancient civilizations, as well as the characteristics of medieval medicine;	D.W20.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
know and distinguish basic neurological syndromes;	E.W13.	P7S_WG	final test, diagnosis of individual case	classes-A, seminars
SKILLS				
associate the images of tissue and organ damages with clinical symptoms of diseases, patient interview and the results of laboratory tests;	C.U11.	P7S_UW	diagnosis of individual case, final test	classes-A, seminars
draw conclusions on relations between anatomical structures, based on intravital diagnostic tests, especially radiology tests (plain abdominal x-ray, screening with contrast agents, computed tomography and magnetic resonance imaging);	A.U4.	P7S_UW	diagnosis of individual case, final test	classes-A, seminars
inform the patient about the purpose, the course and the potential risks of the suggested diagnostic or therapeutic procedures and obtain the patient's informed consent;	D.U6.	P7S_UK	diagnosis of individual case, final test	classes-A, seminars
conduct a medical interview with an adult patient;	E.U1.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
make a differential diagnosis of most common diseases in adults and children;	E.U12.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
evaluate and describe the patient's somatic and mental state;	E.U13.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
perform functional assessment of a disabled patient;	E.U22.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars

LEARNING OUTCOMES UPON COMPLETION OF THE COURSE STUDENT WILL ACHIEVE WITHIN:	Number of educational standard or program learning outcome	Reference to the second degree characteristics of Polish Qualifications Framework	Assessment / method of verification of assumed learning outcomes	Methods of realization
suggest a rehabilitation program for most common diseases;	E.U23.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
use databases, including Internet databases, and find necessary information using available tools;	B.U10.	P7S_UW	diagnosis of individual case, final test	classes-A, seminars
explain the anatomical basis of clinical examination;	A.U3.	P7S_UW	diagnosis of individual case, final test	classes-A, seminars
interpret laboratory tests and identify the reasons for deviations;	E.U24.	P7S_WG	diagnosis of individual case, final test	classes-A, seminars
explain differences between prospective and retrospective, randomized and case-control studies, case descriptions and experimental research, and rank them according to the reliability and quality of the scientific evidence;	B.U12.	P7S_UW	diagnosis of individual case, final test	classes-A, seminars
plan and carry out simple scientific research and interpret its results and draw conclusions.	B.U13.	P7S_UW	diagnosis of individual case, final test	classes-A, seminars
COMPETENCES				

6. DIDACTIC METHODS AND STUDENT WORKLOAD

FORM OF CLASSES

TOTAL STUDENT WORKLOAD				DIDACTIC METHODS	
NUMBER OF CONTACT HOURS PLUS E-LEARNING	**NUMBER OF HOURS OF STUDENT'S INDIVIDUAL WORK**	**NUMBER OF E-LEARNING HOURS**	**ECTS POINTS (including e-learning**		
SEMINARS	3	2	0	0.16 (0.00)	discussions cases simulations with the use of computer simulations film display
CLASSES-A	12	10	0	0.84 (0.00)	simulations practical classes with the use of computer film cases observations discussions
TOTAL STUDENT WORKLOAD	**15**	**12**	**0**	**1.00 / 1.00**	

7. ASSESSMENT CRITERIA

Ten points of multiple choice questions test (only one answer is correct). The final test will cover all material in the course. Obligatory the student must practically shows his/her skills with performing the neurophysiological clinical examination with the patient treated because of movement disorders of different origin. Evidence Based Medicine approach is cordially invited with performing examination of the patient.

8. PRIMARY LITERATURE

1. Lenman J.A.R., Ritchie A.E. **Clinical Electromyography** , Churchill Livingstone, 1987.
2. Preston D.C., Shapiro B.E. **Electromyography and neuromuscular disorders** , ELSEVIER, Butterworth Heinemann, 2005.
3. Kimura J. **Electrodiagnosis in diseases of nerve and muscle** , Oxford University Press, 2001.

9. COMPLEMENTARY LITERATURE

1. Clinical neurophysiological examinations 2019 **Juliusz Huber** , Handout, 2019.

10. CLASS REGULATIONS

File added as an attachment.

11. CLASS SCHEDULE

File added as an attachment.

12. RESEARCH GROUPS

Student Research Group (Department of Pathology of Motor Organ)

13. FINAL INFORMATION

ul. 28 Czerwca 1956 r. 135/147, 61-545 Poznań

14. ASSESSMENT SYTEM

LOCAL ASSESSMENT	LOCAL DEFINITION	ECTS ASSESSMENT	ECTS DEFINITION
5	very good - excellent knowledge, skills and competences	A	excellent - outstanding achievements
4,5	better than good - very good knowledge, skills and competences	B	very good - above average standard with some mistakes
4	good - good level of knowledge, skills and competences	C	good - in general solid work with a number of noticeable mistakes
3,5	fairly good - satisfactory knowledge, skills and competences but with major shortcomings	D	acceptable - satisfactory but with major mistakes
3	satisfactory - satisfactory knowledge, skills and competences with many mistakes	E	satisfactory - results meet the minimal criteria
2	unsatisfactory - unacceptable knowledge, skills and competences	FX,F	unsatisfactory - basic shortcomings in mastering of the program