DESCRIPTION OF COURSE UNIT FOR DOCTORAL STUDIES AT VILNIUS UNIVERSITY

Scientific Area/eas, Field/ds of Science	Medical and Health Sciences M 000, Medicine M001			
Faculty, Institute, Department/Clinic	Medical faculty Institute of Clinical Medicine Clinic of Cardiovascular Diseases			
Course unit title (ECTS credits, hours)	**Myocardial Perfusion Metabolism Function** 6 credits (162 hours)			
Study method	**Lectures**	**Seminars**	**Consultations**	**Self-study**
Number of ECTS credits	-	-	2	4
Method of the assessment (in 10-point system)	Evaluation of the presentation given by the doctoral student. The presentation to be prepared on a given topic (the doctoral student is expected to analyse, review, and present the latest scientific publications related to the given topic, illustrating the given topic with respective clinical examples). Criteria for the evaluation of the presentation: the topic is reflected (0.3 x evaluation in the ten-point system), the latest literature is reviewed (0.3 x evaluation in the ten-point system), illustrated with high-quality and appropriate clinical examples (0.4 x evaluation in the ten-point system). The final score is the arithmetic sum of all three scores.			

PURPOSE OF THE COURSE UNIT

To provide in-depth knowledge on the assessment methods of myocardial function, perfusion and metabolism and their role in the diagnosis of cardiovascular disease, clinical decision-making and evaluation of treatment effectiveness.

THE MAIN TOPICS OF COURSE UNIT

- Two-dimensional echocardiography (2DE): evaluation of LV and RV sizes and segmental and global function; determination of LV mass; principles of segmental LV function analysis; methods to assess LV ejection fraction; evaluation of LV geometry; principles of diagnosis of cardiomyopathies (CMPs) (hypertrophic, restrictive, dilated, arrhythmogenic right ventricular and unspecified); principles of diagnostics of infiltrative and inflammatory myocardial diseases; differentiation of ischemic and non-ischemic CMP; principles of differential diagnosis of restrictive CMP and constrictive pericarditis.
- Doppler echocardiography (DE): assessment of diastolic function; assessment of diastolic function in patients with atrial fibrillation, sinus tachycardia, implanted pacemaker; assessment of valvular hemodynamics; diagnosis of pulmonary hypertension; cardiac cycle analysis; methods of assessing aortic and mitral valve regurgitations; assessment of ischemic mitral valve regurgitation by PISA method; methods for assessing mitral and aortic valve stenoses.
- Myocardial Doppler Analysis (MDA): quantitative assessment of myocardial velocities; assessment of myocardial deformation using speckle tracking method; assessment of diastolic function; principles of diagnosis of myocardial ischemia.
- Contrast echocardiography (CE): indications for contrast echocardiography; principles of the method; contrast media.
- Stress echocardiography (SE): indications, contraindications, methodologies for exercise echocardiography and dobutamine stress echocardiography; the physiological basis of exercise – ischemic "cascade"; diagnostic criteria of myocardial ischemia, assessment of myocardial viability and haemodynamic

significance of valvular heart diseases; diagnostic and prognostic value of SE in CAD; value in the assessment of diastolic function; evaluation of LVOT obstruction in hypertrophic CMP.

- Cardiac computed tomography (CT): assessment of coronary calcification; coronary artery computed tomography angiography; assessment of myocardial perfusion; advantages and disadvantages of CT; diagnostic and prognostic value of CT; indications for anatomical evaluation of coronary arteries by CT method; hybrid methods, their indications and principles.
- Cardiac magnetic resonance imaging (CMR): indications, contraindications, appropriateness criteria, methodology; evaluation of LV and RV sizes and segmental and general function; calculation of LV mass; principles of segmental LV functional analysis; methods of estimating the LV ejection fraction; evaluation of LV geometry; principles of diagnosis of CMP (hypertrophic, restrictive, dilated, arrhythmogenic right ventricular, unspecified); differentiation of different CMPs based on the late gadolinium enhancement (LGE) methodology; differentiation of ischemic and non-ischemic CMP; principles of differential diagnosis of restrictive CMP and constrictive pericarditis; principles of diagnosis of myocarditis and infiltrative myocardial diseases (sarcoidosis, amyloidosis, etc.); assessment of myocardial viability after myocardial infarction using LGE methodology; principles and applications of magnetic resonance spectrometry. Gadolinium-based contrast agents: classification, toxicity, dosage, principle of myocardial distribution, risk of nephrogenic systemic fibrosis, and contraindications. Principles of parametric T1, T2, T2 * mapping, assessment of extracellular volume fraction, four-dimensional (4D) flow: principles and indications. Stress CMR: diagnostic methods and techniques for the assessment of myocardial ischemia and viability.
- Myocardial perfusion scintigraphy (MPS): principles of the method; radiopharmaceuticals; diagnostic and prognostic value in the diagnosis of ischemia; advantages and disadvantages; comparison of different methods for assessing myocardial perfusion; hybrid methodologies, their place in the diagnosis of CAD.
- Positron emission tomography (PET): principles for myocardial ischemia and viability assessment; principles for assessment of the inflammatory process; radiopharmaceuticals; diagnostic and prognostic value in case of CAD; advantages and disadvantages of the method.
- Value of echocardiography, CMR, CT, MPS, PET: 1) in the diagnosis of ischemia and viability; 2) in the assessment of hemodynamic parameters; 4) in the choice of treatment tactics; 4) for the follow-up of patients; 5) selecting patients for electrophysiological and transcatheter procedures and following them after such procedures; 6) selection of patients for cardiac surgery; 7) evaluating the indications for heart transplantation; 8) monitoring the course of treatment.

RECOMMENDED LITERATURE SOURCES

1. Otto C. Practice of Clinical Echocardiography. Elsevier, 2017. ISBN: 0-323-40125-2; ISBN: 0-323-48242-2.
2. Čelutkienė J., Grabauskienė V., Rudys A., Misiūra J. Krūvio echokardiografija: Mokomoji priemonė. Vilnius: UAB "Vaistų žinios", 2008. ISBN 978-9955-884- 12-5.
3. Cardiovascular magnetic resonance: a companion to Braunwald's heart disease / [edited by] Warren J. Manning, Dudley J. Pennell. Third edition. - Philadelphia, PA: Elsevier, 2019. ISBN 9780323415613.
4. Širdies ir stambiųjų kraujagyslių magnetinio rezonanso tomografija: mokomoji knyga. N.Valevičienė, S.Glaveckaitė, D.Palionis, A.Laucevičius.- Vilnius: Eugrimas, 2011. ISBN 978-609-437-065-6.

5. Glaveckaitė S. Cardiovascular Magnetic Resonance for the Assessment of Viability. Cardiovascular Magnetic Resonance for the Prediction of Left Ventricular Functional Recovery after Revascularisation. Saarbrücken, Germany: LAP Lambert Academic Publishing AG & Co KG, 2012, 52 p. Book: ISBN 978-3-8465-2685-9.
6. Glaveckaitė S, Valevičienė N. Širdies magnetinio rezonanso tomografija krūvio sąlygomis. Vilnius:Vaistų žinios, 2013. ISBN 978-9955-884-68-2.
7. Glaveckaitė, Sigita; Palionis, Darius; Zaremba, Tomas; Balčiūnaitė, Giedrė; Valevičienė, Nomeda Rima; Aidietis, Audrius; Ručinskas, Kęstutis; Šerpytis, Pranas; Sogaard, Peter. Cardiovascular magnetic resonance parametric mapping: methodological recommendations. Vilnius: Vilniaus universiteto leidykla, 2021. 64 p. ISBN 9786090705629. eISBN 9786090705636.
8. Nuclear Cardiology and Multimodal Cardiovascular Imaging: a companion to Braunwald's heart disease / [edited by] Marcelo F. Di Carli - Philadelphia, PA: Elsevier, 2022. ISBN: 9780323763035; ISBN: 0323763030; EISBN: 9780323763042; EISBN: 0323763049.
9. Cardiac CT, PET and MR. Dilsizian, V; Pohost GM. Second Edition. - John Wiley & Sons, Incorporated, 2010. ISBN: 1405185538; ISBN: 9781405185530; ISBN: 144432389X; ISBN: 9781444323894; EISBN: 1444323903; EISBN: 9781444323900; OCLC: 669993358.
10. Sadauskienė, Eglė; Čiburienė, Eglė; Matačiūnas, Mindaugas; Vajauskas, Donatas. Branduolinė kardiologija: mokomoji priemonė. Vilnius: Vaistų žinios, 2011. 32 p. ISBN 9789955884392.

CONSULTING LECTURERS

1. Coordinating lecturer: Sigita, Glaveckaitė (Prof. Dr.).
2. Diana Zakarkaitė (Prof. Dr.).
3. Nomeda Valevičienė (Prof. Dr.).

APPROVED:

By Council of Doctoral School of Medicine and Health Sciences at Vilnius University: 29th of September 2022

Chairperson of the Board: Prof. Janina Tutkuvienė