Discipline MCP5847
Basic and Translational Research Models in Organ Transplantation and Cardiothoracic Surgery

Concentration area: 5156

Creation: 24/04/2019

Activation: 24/04/2019

Credits: 2

Workload:

Theory (weekly)	Practice (weekly)	Study (weekly)	Duration	Total
10	6	14	1 weeks	30 hours

Professors:

Ana Cristina Breithaupt Faloppa

Luiz Felipe Pinho Moreira

Paulo Manuel Pego Fernandes

Hendrik Gerrit Derk Leuvenink

Objectives:

OBJECTIVE: Address the principles and present the main lines of research underway in the field of thoracic and cardiovascular Surgery and in the studies of the pathophysiology of organ transplantation and systemic inflammation. Discuss the models, approaches and tools in experimental research, connecting the information to several fields of knowledge, such as: cardiocirculatory and microcirculation pathophysiology, respiratory pathophysiology, molecular biology, innate immunity, hormonal regulation, among others. In this context, to analyze the existing models, highlighting their advantages and disadvantages. To provide fundamental concepts of scientific evidence and translational research, providing discussion of the levels of evidence observed in relation to the research lines currently underway.

Rationale:

RATIONALE: The approach of the main research lines, models and tools in basic and translational research allows the deepening and expansion of studies in the fields of thoracic and cardiovascular surgery, pathophysiology of organ transplantation and pathophysiology of systemic inflammation. Additionally, it provides a discussion of the various methodological aspects inherent to the experimental design and the existing tools.

Content:

CONTENT: 1. Research Lines in Cardiothoracic Surgery, Organ Transplantation and Systemic Inflammation A. Alterations triggered by brain death in grafts used in organ transplantation; B. Principles of preservation of organs for transplantation and ex-vivo perfusion; C. Therapeutic tools for the maintenance of organs for transplantation; D. Studies of local and systemic consequences of ischemia and reperfusion process; E. Influence of sex on the

immune response against the systemic inflammatory process; F. Hormonal regulation of innate immune response; G. Genetic factors and biomolecular markers related to changes in cardiovascular and respiratory systems; H. Ventricular remodeling and cardiovascular repercussions on myocardial insufficiency and pulmonary hypertension; I. Endothelial Modifications and ventilatory mechanics in the surgical treatment of advanced lung diseases; J. Circulatory and inflammatory response modifications during the use of artificial circulatory circuits. 2. Biological Models of Laboratory Research A. Models of brain death induction; B. ischemia and reperfusion Models; C. Models of transplantation and ex perfusion of thoracic and abdominal organs; D. infarction and myocardial or ventricular insufficiency models; E. Models of development of pulmonary hypertension; F. Pulmonary emphysema development Models. 3. Methods for Evaluating the Inflammatory Process and the Anatomical and Functional Alterations of the Respiratory and Cardiocirculatory Systems: A. Methods for assessing microcirculation alterations; B. Evaluation of changes in respiratory endothelium function and expression of nitric oxide synthases; C. Invasive evaluation of ventricular function by determination of pressure-volume curves; D. Ex-vivo perfusion methods of the various organs; E. Methods for quantifying local and systemic factors of the inflammatory process

Type of Assessment:

See observation field

Notes/Remarks:

EVALUATION: Evaluation of the course will be conducted from the seminars and the elaboration of a conclusion report, which should follow aspects of the research methodology discussed. NOTE: Minimum number of students: 4 Maximum number of students: 20

Bibliography:

1. Van Erp AC, Rebolledo RA, Hoeksma D, Jespersen NR, Ottens PJ, Nørregaard R, Pedersen M, Laustsen C, Burgerhof JGM, Wolters JC, Ciapaite J, Bøtker HE, Leuvenink HGD, Jespersen B. Organ-specific responses during brain death: increased aerobic metabolism in the liver and anaerobic metabolism with decreased perfusion in the kidneys. Sci Rep. 2018 Mar 13;8(1):4405.
2. Novitzki D and Cooper DKC. The Brain-Dead Organ Donor:Pathophysiology and Management. 2013 Publisher Springer-Verlag New York.
3. Rebolledo RA, Hoeksma D, Hottenrott CM, Bodar YJ, Ottens PJ, Wiersema-Buist J, Leuvenink HG. Slow induction of brain death leads to decreased renal function and increased hepatic apoptosis in rats. J Transl Med. 2016 May 19;14(1):141.
4. Al-Tarrah K, Moiemen N, Lord JM. The influence of sex steroid hormones on the response to trauma and burn injury. Burns Trauma. 2017 Sep 14;5:29.
5. Lord JM, Midwinter MJ, Chen YF, Belli A, Brohi K, Kovacs EJ, Koenderman L, Kubes P, Lilford RJ. The systemic immune response to trauma: an overview of pathophysiology and treatment. Lancet. 2014 Oct 18;384(9952):1455-65.
6. Singh RP, Massachi I, Manickavel S, Singh S, Rao NP, Hasan S, Mc Curdy DK, Sharma S, Wong D, Hahn BH, Rehimi H. The role of miRNA in inflammation and autoimmunity. Autoimmun Rev. 2013 Oct;12(12):1160-5.
7. Tucci PJ. Pathophysiological characteristics of the post-myocardial infarction heart failure model in rats. Arq Bras Cardiol. 2011;96(5):420-4.
8. Donati A, Carsetti A, Damiani E. The role of cardiac dysfunction in multiorgan dysfunction. Curr Opin Anaesthesiol. 2016 Apr;29(2):172-7.
9. Patelis N, Moris D, Schizas D, Damaskos C, Perrea D, Bakoyiannis C, Liakakos T, Georgopoulos S. Animal models in the research of abdominal aortic aneurysms development. Physiol Res. 2017 Dec 20;66(6):899-915.
10. Bueno-Beti C, Sassi Y, Hajjar RJ, Hadri L. Pulmonary Artery Hypertension Model in Rats by Monocrotaline Administration. Methods Mol Biol. 2018;1816:233-241.
11. Abarbanell AM, Herrmann JL, Weil BR, Wang Y, Tan J, Moberly SP, Fiege JW, Meldrum DR. Animal models of myocardial and vascular injury. J Surg Res. 2010;162(2):239-49