EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

ČVUT
ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

F7DIPPCS

PHYSIOLOGY AND PATHOPHYSIOLOGY OF CARDIOVASCULAR SYSTEM

Short- and long-term control of hemodynamics

Mgr. Ksenia Sedova, Ph.D.

Introduction

Control of hemodynamics is vital circulatory function to control blood flow in proportion to tissues and organs specific metabolic needs. Central nervous system provides short-term global control of hemodynamics by redistributing blood flow to different areas of the body, increasing or decreasing pumping activity by the heart, and providing rapid control of systemic arterial pressure. The long-term control provided mainly by kidneys and endocrinal regulation of water balance by regulating water and sodium retention.

Objective:

The analysis of main mechanisms of hemodynamic parameters regulation. Nervous regulation of the circulation and rapid control of arterial pressure. The role of the kidney in long-term regulation of hemodynamics: integrated system for pressure control. Cardiovascular parameters for evaluation of circulation.

Exercises

Using a protocol bellow perform the follow tasks:

1. Describe system which is controlling global hemodynamics in short-term. List main reflexes maintaining normal arterial pressure.
2. Describe principal mechanisms for long-term control of hemodynamics. Portray by diagram or other graphical solutions these mechanisms.
3. Describe cardiovascular parameters for evaluation of circulation. Portray their relationships in formulas.

Literature:

[1] J.Hall. Guyton and Hall Textbook of Medical Physiology. 13th ed. Elsevier (2016);
[2] L.Lilly. Pathophysiology of Heart Disease. 6th ed. Wolters Kluwer (2016);

Short- and long-term control of hemodynamics

Protocol

1. Short-term control of hemodynamics

Describe what is autonomic nervous system, its main components and structure:

_____
_____
_____
_____
_____
_____
_____

Effects of sympathetic stimulation:

_____
_____
_____
_____

Effects of parasympathetic stimulation:

_____
_____
_____
_____

Reflex mechanisms for maintaining normal arterial pressure (scheme):

2. Long-term control of hemodynamics

Main mechanisms:

- Pressure diuresis (scheme):

- Vasopressin (scheme):

- Aldosterone (scheme):

3. Cardiovascular parameters for evaluation of circulation

Main parameters:

Formulas:

Created by: _____ Date: _____

Assessed by: _____ Date: _____