

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY STATE UNIVERSITY
MEDICAL INSTITUTE
Physiology and Pathophysiology Department with course of Medical Biology

PRACTICAL BOOK

FOR PRACTICAL CLASSES ON PHYSIOLOGY

For students specializing 222 «Medicine»
daily learning

STUDENT'S FULL NAME

GROUP №

Sumy

PRACTICAL CLASS #2

Date: _____

THEME: “RESTING POTENTIAL OF NERVOUS AND MUSCULAR FIBRES”**Questions to the lesson:**

1. Features of the structure of the cell membrane, the functions of its main components.
2. Differences of chemical composition of extracellular and intracellular fluids.
3. The passive transport of substances, its types and mechanisms (diffusion, osmosis).
4. The active transport of substances, its types and mechanisms (symporters and antiporters).
5. A concept of the membrane potential and resting potential. Methods of registration of resting potential and its physical characteristics.
6. The ionic mechanisms of origin of the normal resting membrane potential (diffusion potential, Nernst potential).
7. Resting membrane potential of nerves and skeletal muscle fibers. The main and additional factors, which influence on a value of the resting membrane potential.

Literature:

Guyton, Arthur C. Textbook of medical physiology – Ch.4, 5.

Practical work #1: “Preparation of a spinal frog”

Materials and equipments: small and large scissors, anatomic tweezers, a scalpel, a probe, a tripod, cotton wool, physiological solution (Ringer's solution), dissection boards, wipes, a tray, an electrostimulator with electrodes, a research object - a frog.

To study muscles and nerves physiology of a frog, the frog must be killed but its tissues kept alive. This can be accomplished by destroying or pithing the frog's central nervous system. The frog is dead but its muscles and peripheral nerves will continue to function as long as their cells remain alive. Under the proper conditions, this state can be prolonged for several hours.

Procedure:

1. Take the frog in the left hand.
2. Fix the head of the frog between the index and middle fingers, simultaneously fixing its hind legs.
3. Carry out decapitation, removing the upper jaw together with the brain at the level of the corners of the mouth (Fig. 1). The resulting preparation is called **a spinal frog**.
4. Fix the spinal frog's lower jaw on the tripod.
5. Do the repeated mechanical irritation with tweezers' tip on the rear extremity of the decapitated frog, observe the reaction (Fig. 2).
6. Destroy the spinal cord of the frog with a probe (Fig. 3). Repeat mechanical stimulation.



Fig 1.

Fig 2.

Fig 3.

Results:

- 1) What was observed when applying a mechanical irritation on the decapitated frog?
- 2) What was observed when applying a repeated mechanical irritation on the frog with destroyed spinal cord?
- 3) Draw the scheme of the experiment. 1)

2) _____

3) The scheme of experiment:

Conclusions:

- 1) What does the disappearance of reaction (after the destruction of the spinal cord) indicate?
 - 2) Where are motor centers located?
- 1.

2.
