

**Human Body Function Experiment(part 2)**

（For fifth grade medical professional use）

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Write by Laboratory of Human body function

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**Introduction**

1.Basic information

Course Name: Human Body Function Experiment（part 2）

Class hours and credits: total credits 3 points, total class hours 48 class hours

Applicable Specialty: five-year medical specialty

Prerequisite courses: anatomy, histology and Embryology

2.Course introduction

Physiology is an important basic course in medical education, and much knowledge of physiology is obtained from experiments, so physiological experiment is the absolutely necessary composition in the process of physiology education.

The objectives of the course of Human Body Function Experiment is to enable students to manage basic methods used in physiology experiments through practice, to apprehend the scientific pathway to gain physiology knowledge and to testify important theories applied in physiology .

Another weighty objective of this course is to nourish the students’ ability in discovering, analyzing and solving problems for which practice of experiment is very important. Almost all physiology knowledge can be obtained by carrying out experiments with specific purposes. By attending experiment course, students are expected to learn the reasoning the pioneer scientists adopted in raising and analyzing problems, and ultimately designing scientific experiments in an attempt to verify and solve them. In other words, the aim of experiment course is to deliver students a scientific methodology as a new approach to obtain knowledge. The key to the success of the experiment course depends on the students’ ability in discovering, analyzing and solving problems.

Through the teaching of physiology experiments students can get the following several advantages:

(1)prove some theories of foundation;

(2)study basic techniques and skills;

(3)improve the ability of analyzing and solving problems;

(4)train for the serious attitude and the honest attitude for work;

(5)know how to design the experiments; build the foundation for clinical research work.

In order to improve the teaching of experiments, reach the teaching goal, we demand that:

Before experiment:

(1)read the Experiment Manual of Physiology carefully,

(2)review the associated theories related to experiment, expect the possible result in the experiment.

During experiment:

(1)according the steps do the experiment carefully ; observe the change of every phenomena carefully and record it, and think it actively;

(2)the group members should divide the work properly and cooperate well with others, do best to reduce the errors;

(3)during observing the experiment, record the physiological processes exactly, and write it down in words. Pay more attention to the state of animals.

After experiment:

(1)clean the instruments, if destroy something please inform the teacher in time.

(2)collect the results, review the necessary theory, and finish the report independently.

According to the education plan of Chongqing Medical University, there are 54 periods in the physiology experiments in clinical specialty for international students. There are 9 experiments altogether in our physiology teaching. Classical verification experiments are 30 teaching hours, accounting for 56%; comprehensive experiment are 24 teaching hours, accounting for 44%.

3.Course objectives

(1)Ideological, moral and professional quality objectives

1) Cultivate the noble sentiment of loving life and devoting oneself to the cause of human medicine. Establish the spirit of humanistic care, have good medical ethics, develop good professional ethics and the spirit of dedication to the medical cause.

2) Establish the concept of loving experimental animals and life.

3) Master the standard experimental operation and form a rigorous scientific style and innovative consciousness of seeking truth from facts.

4) Through the cooperation of group members in the experimental operation, improve the team spirit of students' pursuit of unity and cooperation.

(2) Knowledge objectives

1) Be able to understand the basic concepts of human function, master the normal functions of human systems and organs, as well as the pathophysiological changes, drug action mechanism and regulation under disease conditions.

2) Master the basic surgical skills and learning methods of human function, so as to lay a foundation for learning clinical courses.

(3)Skill objectives

1) Be able to understand and preliminarily master the basic skills of human functional experiment operation. Learn the basic methods of observing, recording and analyzing experimental results and writing experimental reports. Through experimental operation, experimental design and comprehensive analysis of the results, cultivate the ability of independent thinking and independent work.

2) Be able to understand the scientific research methods of human function and preliminarily have the ability of scientific research thinking.

3) Be able to design and implement relevant experiments with human functional knowledge, apply what you have learned on this basis, analyze some specific cases or practical problems, and deeply understand the relationship between foundation and clinic.

4.Teaching requirements

This course not only pays attention to the cultivation of students' post competence, but also pays more attention to the cultivation of students' professional core competence, and pays attention to students' learning ability, organization and coordination ability, unity, cooperation, communication and expression ability and sustainable development ability. Therefore, in the design and implementation of this course, we pay attention to cultivating students' Ideological and moral and professional quality, and pay attention to the requirements of knowledge and ability.

After learning this course, students can understand the basic concepts of human function, master the normal functions of human systems and organs, pathophysiological changes under disease conditions, drug action mechanism and regulation. Lay the foundation for learning other professional courses.

Be able to preliminarily master the basic skills of human functional experiment operation. Learn the basic methods of observing, recording and analyzing experimental results and writing experimental reports. Be able to form the ability of independent thinking and independent work through experimental operation, experimental design and comprehensive analysis of the results.

At the same time, the society is required to have a serious scientific attitude, rigorous scientific thinking method and rigorous scientific style after course learning. Have the benevolence of understanding and caring for patients and the ability to devote themselves to the medical cause.

5. Assessment method

The usual experimental report and experimental class performance are 50 points, and the final experimental operation test is 50 points.

**Reference**

周岐新.人体机能学实验.第2版.北京：科学出版社，2013

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**Teaching hours distribution table**

**（totally 48 teaching hours）**

|  |  |  |
| --- | --- | --- |
| **Content of courses** | **Experimental teaching hours** | **Experimental forms** |
| Experiment 1 basic operation on experimental animals | 4 | Basic experimental operation |
| Experiment 2 poisoning of organophosphates and rescue | 5 | Replication experiment |
| Exprement 3 effect of efferent nervous drugs on activity of musculus rectus abdominis from toad | 5 | Complicative experiment |
| Experiment 4 effect of efferent nervous drugs on blood pressure of anesthetic rabbits | 5 | Complicative experiment |
| Experiment 5 analgesic effect of morphine | 5 | Replication experiment |
| Experiment 6 Establishment of animal model of human disease | 5 | Complicative experiment |
| Experiment 7 Expeimental acidosis  | 5 | Complicative experiment |
| Experiment 8 Experimental hypoxia and factors involved in tolerance to hypoxia | 4 | Complicative experiment |
| Experiment 9 Expeimental hemorrhagic shock | 5 | Complicative experiment |
| Experiment 10 Acute right heart failure | 5 | Complicative experiment |
| total | 48 |  |

**Experiment 1 Basic Operation on Experimental Animals**

**【Experimental form】**Basic experimental operation

**【Objective and require】**

1.Familiar：Correct grasp of animals：Mouse and rabbit

2.Understand：

①mice：Oral gavage， Subcutaneous injection，Muscle ，injection ，Tail vein injection for a mouse，

②Rabbit: Oral gavage， Subcutaneous injection，Muscle injection ，The abdominal cavity injection.

3.Grasp：

①mice：The abdominal cavity injection，

②Rabbit：Rabbit ear vein injection

**【Experimental teaching hours】**4 teaching hours.

**【Experimental contents】**

1. movie of basic operation on experimental animals.

2. teaching basic operation on experimental animals.

3. operation：

(1)Correct grasp of animals：Mouse and rabbit.

(2)drug administration：

①mice：Oral gavage， Subcutaneous injection，Muscle injection ，The abdominal cavity injection，Tail vein injection for a mouse

②Rabbit：Oral gavage， Subcutaneous injection，Muscle injection ，The abdominal cavity injection, Rabbit ear vein injection

**【Experimental group】**

5 persons / group

**Experiment 2 Poisoning of Organophosphates and Rescue**

**【Experimental form】**Replication experiment

**【Objective and require】**

1.Familiar：the poisoning symptoms caused by organophosphates.

2.Understand：the poisoning of organophosphates and rescue

in Clinic.

3.Grasp：the reversal effect of atropine and pralidoxime.

**【Experimental teaching hours】**4 teaching hours.

**【Experimental contents】**

1.introduction the poisoning of organophosphates and rescue

in Clinic.

2. induce poisoning of organophosphates.

3. treatment poisoning of organophosphates.

**【Experimental group】**

5 persons / group

**Exprement 3 Effect of Efferent Nervous Drugs on Activity of Musculus Rectus Abdominis from Toad**

**【Experimental form】** complicativeexperimental operation

**【Objective and require】**

1.Familiar：the preparation of *musculus rectus abdominis*

2.Understand：the operation of BL-420 bio-functional system.

3.Grasp：the effect of cholinomimetic and anticholinergic drugs on the tension of the muscle.

**【Experimental teaching hours】**4 teaching hours.

**【Experimental contents】**

1.preparation of musculus rectus abdominis.

2.Installation of isolated preparation.

3.operation of BL-420 bio-functional system

4.drug administration and observation of the effects of the drugs.

**【Experimental group】**

5 persons / group

**Experiment4 Effect of Efferent Nervous Drugs on Blood Pressure of Anesthetic Rabbits**

**【Experimental form】**complicative experimental operation

**【Objective and require】**

1.Familiar：the of receptors of efferent nervousdrugs affecting on the blood pressure.

2.Understand：To learn blood pressure recording method in anesthesia animals.

3.Grasp：To determine the effects of autonomic nervous system drugs, and their interactions on blood pressure.

**【Experimental teaching hours】**5 teaching hours.

**【Experimental contents】**

1.preparation of experimental animal

 ⑴ rabbit anesthesia

⑵filling heparin normal saline into triple tube.

2.operation on the rabbit

3.operation of BL-420 bio-functional system

4.drug adminstration and record the effect of the drugs.

**【Experimental group】**

5 persons / group

**Experiment5 Analgesic Effect of Morphine**

**【Experimental form】**Replication experiment

**【Objective and require】**

1.Familiar：method of pain-testing hot plate experiment

2.Understand：positive response of analgesic effect,and the symptoms of euphoria.

3.Grasp：oberve the time course of analgesic effect of morphine.

**【Experimental teaching hours】**4 teaching hours.

**【Experimental contents】**

1. adjust the pain-testing hot plate
2. select qualified mouse and group.
3. test the normal pain threshold
4. Drug administration
5. test the normal pain threshold in 5,10,20,30,40,60,80min after drugs given.
6. Calculation of elevating pain threshold according the formular：

Elevating pain threshold=[（pain threshold after drugs given-normal pain threshold）/normal pain threshold]×100%

**【Experimental group】**

5 persons / group

**Experiment 6 Establishment of Animal Models of Human Diseases**

**【Experimental form】**Complicative experiment

**【Objectives and requirements】**

1.To master basic experimental operations of establishing animal models of human diseases. To master observation, measurement and analysis of results, and writing reports.

2.To be familiar with the operation of commonly used instruments.

**【Experimental hours】 5**

**【Main contents】**

1. The methods to catch, fix and anaesthetize animals.

2.The methods of subcutaneous injection, vein injection, intraperitoneal injection.

3.Encheiresis of carotid artery, femoral artery and ureter.

4.General introduction to establish different animal models of pathological process.

5.Introduction of BL-410 bio-signal collecting system. Measurement and observation of common parameters (blood pressure, heart rate , respiration, etc.)

6.Analysis of results and writing reports.

**【Experimental group】**

5 persons / group

**Experiment 7 Experimental Acidosis**

**【Experimental form】**Complicative experiment

**【Objectives and requirements】**

1.To master the method of establishing animal model of metabolic acidosis. To observe the alterations of blood pressure, heart rate and respiration, and the compensatory reactions during acidosis.

2.To be familiar with the essential laboratory parameters for acid-base assessment.

**【Experimental hours】 5**

**【Main contents】**

1.Operation for measurement of parameters on animals.

2.Establishment of animal model of mild metabolic acidosis, observation and measurement of parameters, to analyse the mechanisms of alterations of function and metabolism.

3.Establishment of animal model of severe metabolic acidosis, observation and measurement of parameters, to analyse the mechanisms of alterations of function and metabolism.

**【Experimental group】**

5 persons / group

**Experiment 8 Experimental Hypoxia and Factors Involved in Tolerance to Hypoxia**

**【Experimental form】**Complicative experiment

**【Objectives and requirements】**

1.To master the method of establishing animal model of hypotonic hypoxia and hemic hypoxia. To master the characteristics of different types of hypoxia and the related alterations in body.

2. To be familiar with the factors involved in tolerance to hypoxia (age and situation of central nervous system).

**【Experimental hours】 4**

**【Main contents】**

1. Establishment of animal model of hypotonic hypoxia, observation and measurement of parameters, alterations of function and metabolism analysis. Observation and analysis of the effects of age and central nervous system situation on hypoxia intolerance.

2. Establishment of animal model of hemic hypoxia, observation and measurement of parameters, alterations of function and metabolism analysis.

**【Experimental group】**

5 persons / group

**Experiment 9 Experimental Hemorrhagic Shock**

**【Experimental form】**Complicative experiment

**【Objectives and requirements】**

1.To master the method of establishing animal model of hemorrhagic shock. To master clinical manifestations and mechanisms of early stage shock.

2.To be familiar with measurement of hematocrit (HCT).

**【Experimental hours】 5**

**【Main contents】**

1.Operation for measurement of parameters on animals.

2.Establishment of animal model of hemorrhagic shock, observation and measurement of parameters of early stage shock, analysis of mechanisms.

3. Observation and measurement of parameters of late stage shock, analysis of mechanisms.

4.Observation the significance of expansion of blood volume in shock treatment.

**【Experimental group】**

5 persons / group

**Experiment 10 Experimental Acute Right Heart Failure**

**【Experimental form】**Complicative experiment

**【Objectives and requirements】**

1.To master the method of establishing animal model of acute right heart failure. To master alterations of function and metabolism and compensation during acute right heart failure.

2.To be familiar with measurement of central venous pressure (CVP).

**【Experimental hours】 5**

**【Main contents】**

1.Animal operation.

2.Establishment of animal model of acute right heart failure by increasing pressure load, observation and measurement of parameters of early stage acute right heart failure, analysis of mechanisms.

3.Establishment of animal model of acute right heart failure by increasing volume load, observation and measurement of parameters of late stage acute right heart failure, analysis of mechanisms.

4.Observation of hydrothorax, ascites and alterations of organs in enterocoelia.

**【Experimental group】**

5 persons / group