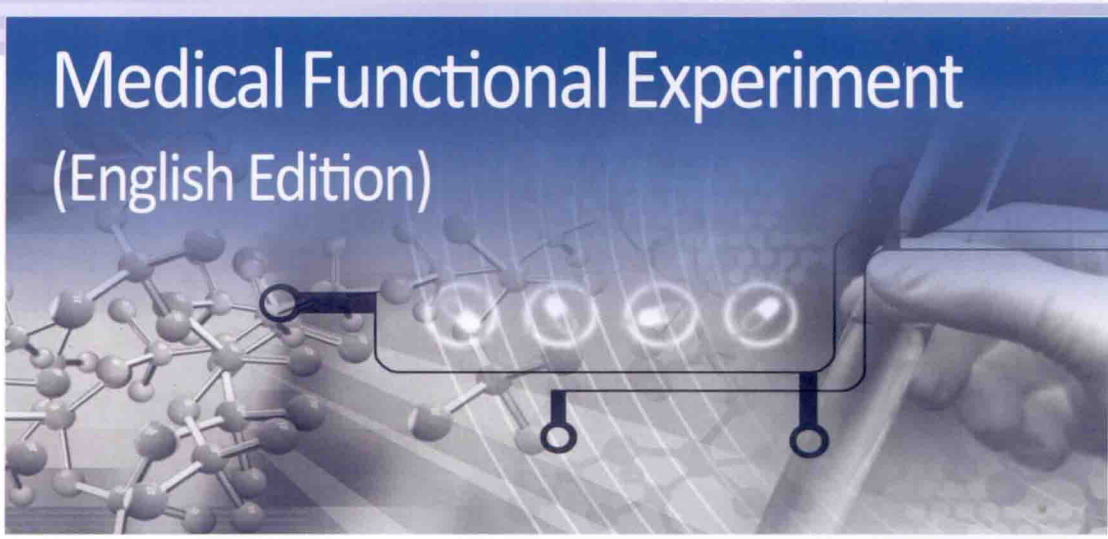
医学机能实验
(英文版)



刘爱明　张俊芳　主编

ZHEJIANG UNIVERSITY PRESS
浙江大学出版社

医学机能实验（英文版）

Medical Functional Experiment (English Edition)

刘爱明　张俊芳　主　编

ZHEJIANG UNIVERSITY PRESS
浙江大学出版社

图书在版编目（CIP）数据

医学机能实验：英文 / 刘爱明，张俊芳主编. — 杭州：浙江大学出版社，2016.1
ISBN 978-7-308-15323-2

Ⅰ. ①医… Ⅱ. ①刘… ②张… Ⅲ. ①实验医学－高等学校－教材－英文 Ⅳ. ①R-33

中国版本图书馆CIP数据核字(2015)第266183号

医学机能实验：英文

刘爱明　张俊芳　主编

责任编辑　张凌静（zlj@zju.edu.cn）
责任校对　赵黎丽
封面设计　十木米
出版发行　浙江大学出版社
（杭州市天目山路148号　　邮政编码　310007）
（网址：http://www.zjupress.com）
排　　版　杭州林智广告有限公司
印　　刷　杭州杭新印务有限公司
开　　本　787mm×1092mm　1/16
印　　张　10.75
字　　数　261千
版 印 次　2016年1月第1版　2016年1月第1次印刷
书　　号　ISBN 978-7-308-15323-2
定　　价　28.00元

编委会

前　言

在高等教育国际化的大背景下，国内主要医学院校的国际化发展势头迅猛，临床医学等专业的留学生招生规模不断扩大，在校生数量不断增加。这些留学生入校后虽然通常都接受了系统的汉语培训，但是在专业学习中接受全中文教学仍存在相当大的困难。因此，在教学实践中，教师和学生对全英文的专业教材都有较强的需求。另外，教学管理部门一直在鼓励和推动中文母语学生的双语教学和全英文教学，虽然理论课教学使用了双语教学或全英文教学，但是在实验课中大多仍延续中文教学，所使用的教材也是中文教材，如果能够在本科实验教学中使用全英文版教材，对于培养中文母语学生用英语进行读、写、听、说的能力会产生良好的促进作用。

国内临床医学教学中已经形成了一套设计简单、操作可行的“生理学”和“药理学”实验教学项目，且已经配备了相应的设备、设施和试剂。近几年的教学改革中，越来越多的院校将两部分实验整合为医学机能实验。本书中的实验设计参考了国内主要医学院校生理学和药理学传统实验项目的设计，编排顺序参考了“生理学”和“药理学”理论课程的授课顺序，符合系统化教学要求；同时，增加部分创新设计实验和能力拓展型实验，为提升留学生培养质量、引导部分学生独立设计和开展探索性科学实验预置了空间，可以满足国外留学生、双语教学学生、医学专业7年制学生“生理学”和“药理学”两门专业课程实验教学的应用要求。

本书主要编写人员均为生理学、药理学理论及实验课程的一线骨干老师，绝大部分具有海外留学经历，并有英语母语教学人员参与语言校对。在本书的编写过程中，得到了宁波大学教务处、宁波大学医学院领导的大力支持，以及浙江大学出版社的关心和帮助，还得到了“浙江省精品课程建设项目”的支持；“2015年宁波大学教材建设项目（JCJSx201517）”资助了本书的出版，兹一并向他们表示感谢。

虽然我们作出了很大努力，但由于水平有限，错误和疏漏之处在所难免，恳请同行和读者予以批评指正，期待本书再版时以更高的质量与读者见面。

编 者

2015年9月

Contents

Chapter 4 / 066 /
Physiological-Pharmacological Experiments

Chapter 1 Basics of Physiological-Pharmacological Experimentation

Unit 1 *Objectives and Requirements of Physiological-Pharmacological Experiment*

Physiology is a sub-discipline of biology. Its focus is on how organisms, organ systems, organs, cells, and bio-molecules carry out the chemical or physical functions that exist in a living system. Pharmacology is the study of how drugs and medicines work at the cellular and molecular level to produce their therapeutic (and sometimes harmful) effects in man. Physiology and Pharmacology are closely connected with each other, and both are compulsory courses for students of Medicine, Pharmacy, Nursing and many other majors. To be able to safely use a drug in clinic, we need to appreciate not only the rationale and context for its use but also the chemistry of the drug. How the physiological, biochemical and genetic make-up of the individual may affect the way that person responds to the drug.

1. Objectives

The most important objectives of Physiological-Pharmacological Experiment are to enable students to manage basic methods used in experiments through practice, grasp the scientific pathway, gain physiology and pharmacology knowledge, and consolidate important theories applied in the two courses. This experimental course is of great importance to help students understand the basic concepts and knowledge of Physiology and Pharmacology.

Another important objective of this course is to nourish the students' ability in discovering, analyzing and solving problems where practice is extremely important. The foundations of Physiology and Pharmacology are built upon scientifically designed experiments. By conducting experiments, students are expected to learn how pioneer scientists raise, analyze and solve problems. In other words, the aim of experimentation course is to help students recognize the scientific methodology as a key approach to study underlying mechanisms. The success of this course depends on the students' determination

to consolidate their comprehensive ability. Additionally, it is important for medical students to develop a serious scientific attitude and to establish their preliminary scientific research ability through experimentation courses. This will help towards the success of their medical studies and subsequent career.

2. Requirements

The following requirements should be satisfied in order to realize the objectives mentioned above.

(1) Before Experiments

1) Read through the experimentation books, understand the purposes, requirements, methodology, procedures and the principles of experiments.
2) Go over the physiology and pharmacology information used in the experiments, and predict the reactions of the animals following the administration of drugs.
3) Integrate the observations and review the underlying mechanisms associated with pharmacology, toxicology and physiology.
4) Get the instruments, reagents and animals prepared for the experiments.

(2) During Experiments

1) Organize and assemble the experimentation devices in good order.
2) Strictly follow the procedures in the experimentation protocol and accurately calculate the amount of drugs.
3) Seriously and carefully observe, accurately record the time point, duration, presentation and evolution of the reactions to the drugs used. Deliberate the results and their relationship to the teaching materials provided in class.
4) Use the experiment materials cautiously, to reduce expenses and avoid wasting.

(3) After Experiments

1) Promptly preserve preliminary data, organize experimentation results, perform statistical analysis, make conclusions and print out experimentation reports.
2) Clean used instruments, keep hygiene in the laboratory, and correctly allocate animals, alive or dead, to designated areas.
3) Make comparison between experimental results and mechanisms in theoretical courses, deepen your understanding of relevant Physiology and Pharmacology.

Unit 2 *Process of Experiment Data and Production of Experiment Reports*

Managing experimentation results and developing reports is critical to help improve students' integrative ability to observe and analyze. To draw scientific conclusions based upon studies is the most vital part of the experimentation courses. By drawing conclusions scientifically, perceptual knowledge obtained during the experiment is transformed to rational knowledge. Problems left unsolved or new findings in the experiments as well as the experimentation designs and procedures are also very important.

Additionally, the experimentation reports also reflect the practice and theory standard of students. The reports can provide others with experiences and serve as important information for the experimenter's future reference, which can act as a solid basis for post-graduation research. Therefore, the importance of this key procedure in scientific subjects taught at school should be greatly appreciated.

1. Management of Experiment Data

Upon completion of an experiment, preliminary results should be managed and analyzed. Pharmacology experiment results include quantitative data (e.g. blood pressure, heart rate, pupil size, body temperature, biochemical examination data, onset time, etc.), qualitative data (e.g. positive reaction or negative reaction, numbers of deaths or alive, etc.), descriptive curves, electrocardiogram, electroencephalogram, pictures and image records.

All measurable and calculated data should be presented quantitatively with appropriate units and accurate digits without any ambiguity. If necessary, statistical analysis should be used to ensure the reliability of the conclusion. Whenever possible, data should be presented in tables or statistical diagrams, in order to highlight the major results for easy comprehension, comparison and analysis.

For a table, it should be designed in a way which can best reflect the changing status of the animals. When recording the reactions of a single animal, observation items are usually listed on the left side of the table from top to bottom, while the changes emerged during the experiment should be recorded in the table from left to right in a timely order. An example is shown in Table 1-2-1.

Table 1-2-1 An example table for recording the observations of an experiment

	Animal ID	Observation 1	Observation 2	Observation 3	...
Group A	1				...
	2				...
	...				...
Group B	1				...
	2				...
	...				...

In preparing results from different animals or different groups of animals, grouping of the animals should be indicated on the left side of the table and the observation should be orderly recorded on the right side. For a diagram, the values of the x-axis (Horizontal) and y-axis (Vertical) should be clearly identified with specified units. The intensity of reaction is usually represented by the y-axis, while the time or dosage represented by the x-axis. Experimental conditions should also be indicated in the legend of the diagram. Bar chart can be used in cases other than continuous variation.

When a curve is used, captions should be specified clearly on the curve diagram, including the title of the experiment, type, sex, body weight of experiment animals used, dosage given and other experimental conditions. For a long curve diagram, section of typical variation can be chosen, cut, pasted and reserved. Precautions should be taken to ensure an absolutely objective manner is used when carrying out cutting activities. Samples should always be freshly isolated and kept under right conditions, regardless of the results that are within or beyond expectations.

2. Production of Experiment Reports

When the report is produced after each experiment, it should be submitted to the supervisor for assessment. Integrity, good organization, usage of standardized terminology, appropriate depth of description, scientific and logical descriptions are the basic requirements for the following items.

(1) Title

The title of an experiment is generally composed of the drug and animals used in the experiment and the major content, etc. For example, "Analysis of the anti-hypertensive action of propranolol on anesthetized dogs", "Local anesthetic action of and toxicity rescue after intra-muscular injection of procaine in mice", "Anti electricity-induced arrhythmia

actions of quinidine in frogs", etc.

(2) Objectives

To clearly list the objectives of the experiment.

(3) Materials and Methods

When the procedures are carried out completely according to the protocol, repetitive description of the experiment method can be omitted. If amendments are made immediately prior to the experimentation procedures, or problems associated with techniques occur, descriptions should be amended accordingly.

(4) Results

The results of experiment, of which authenticity should be absolutely assured, are the most important part of the experiment report. All phenomena observed during the experiment should be recorded on a draft copy.

After completion of each experimentation section, experiment results should be managed promptly. Management of experiment results after prolonged delay, relying solely on memory, will probably cause missing in data or errors. The experiment report should only list generalized and managed results. Raw data should always be kept for reference.

(5) Discussions

The discussion should focus on the phenomena and results observed during the experiment and it can then be related to theoretical knowledge and published information for further analysis and discussion. Theories should not be discussed unless they are closely relevant. Experimentation results should be highlighted if they are within or beyond expectations. If the experimentation results are beyond expectations, possible reasons should be mentioned.

The following format should be followed when compiling the discussion. Firstly, phenomenon observed during the experiments should be described. Then, personal views or inference with respect to the observed phenomena should be mentioned. Finally, reference books and literature should be cited to analyze the underlying mechanism.

If some new phenomena are observed in animals following drug administration, the action mechanism of the drug may be suggested. If, at the same time, certain receptors of the drug have been reported in literature, relationships between the action mechanism and the receptors can be preliminarily suggested.

(6) Conclusions

The conclusion is a final judgment drawn, based on the results and statistical analysis. It is also the integration of the problems addressed in the experiment, the experimentation outcomes, the verification of theory and concept. In the conclusion part, there is no need to repeat the detailed results. Theoretical hypotheses without supportive evidence should not be included. In most cases, it is always right to make moderate and prudent conclusions.