

### 13. Pharmacology Education and Technology

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**13.001 Experimental Model of nebulization for small rodents** Lima PDL<sup>1</sup>, Mardock CBJ<sup>1</sup>, Bengtson KL<sup>2</sup>, Rodrigues IAS<sup>1</sup>, Rocha CRO<sup>2</sup>, Rocha ABM<sup>1</sup>, Oliveira MHB<sup>2,1</sup>UEPA, <sup>2</sup>CESUPA

**Introduction:** Respiratory diseases are a major world health problem, representing an important cause of illness and death in adults and children, and the high prevalence of these diseases equals a major cost to society in terms of treatment. Many current lung medicines are distributed through inhalation. That route of administration allows inoculation of drugs directly into the lungs, preventing invasive way and reducing the total level of drugs. Thus, this study aimed to create an experimental model for this purpose. **Methods:** This study was approved by the Ethics Committee of Animals Use (CEUA) of State University of Pará (UEPA). The experimental model consists of a nebulizer, extension cord, container/measurer, bulkhead, engine head, plastic cylindrical inhalation chamber (radius: 9 cm; height: 16 cm) and a wooden support. 25 female Wistar rats (*Rattus norvegicus*), weighing between 180-230 grams, were submitted to inhalation procedure. They were randomly distributed in five groups, according to the colored substance used to observe the existence of deposit in the lung, the Blue methylene Group (GA), Eosin Group (GE), Violet gentian Group (GV) and Nankin Paint Group (GN). The euthanasia was performed on the 6th day of the procedure, and the lungs were removed for macroscopic and histological analysis. **Results:** GN was the only group in which was possible to observe the impregnation of the dye in the alveolar lumen and alveolar macrophages by macroscopic and microscopic examination of the lung tissue. **Conclusion:** It can be concluded that the experimental model of inhalation for small rodents developed is effective for the study of drugs that use this route of administration, and thus may contribute to better study the efficacy and toxicity of such treatment. **References:** SCHMID, O. *J Aerosol Med Pulm Drug Deliv.*, v.21, p.291. 2008 STURM, R. *Ann Transl Med.* v.3, n.19, p.281. 2015. VAISH, M. *J Biomechan Eng*, v.137. 2015 AHMED, A. *J Aerosol Med Pulm Drug Deliv.* v.25, n.3, 2012. SCHLUGER, NW. *Ann Am Thorac Soc.*v.11, n.3, p.407. 2014. BOUSQUET, J. *Eur Respir J.* v.36, p.990. 2010 DOLOVICH, MB. *Lancet.* v. 377, p. 1032. 2011. RUBIN, BK. *Respir Care* v. 56, n. 9, p. 1411. 2011. **Financial support** and acknowledgements: **Financial support** from LCE/UEPA. The Ethics Committee in the Use of Animals approved the research, protocol 29/2014

**13.002 A piece of pharmacology rescued from the digitalis information in the bibliography available at the first School of Pharmacy in Brazil.** Grabe-Guimarães A, Santos V, Assis LGS, Borges I, Leite R UFOP

**Introduction:** The Pharmacy School of Ouro Preto, Minas Gerais, was founded in April 04 1839 and was the first established school to hold an independent pharmacy course in both Brazil and South America. To initiate the education in 1840, many French and Portuguese books were acquired to teach topics including chemical, physical, pharmaceutical and pharmacological properties of medicines, and their application in pharmacy practice at that time. The objective of the present work was to identify the bibliography containing pharmacology contents from the end of the 19th century until the beginning of the 20th century, using “digitalis” as a model to describe the evolution of these historical books contents. According to a review using “Medline Database”, the published scientific information about digitalis started to appear in the middle of the 19th century. **Methods:** Among the 12.000 books registered as historical collection, seventeen were selected to be initially studied. Four books have been revised so far and the information about digitalis is briefly described. **Results:** 1. “Les Médicaments, Alfred Martinet, Editeur C. Naud, Paris, 1903” described the digitalis as medicines that act on the circulatory system, in particular blood vessels, myocardium and cardiac innervation. And yet, that according to the dose and the situation the digitalis may exert on circulation a regulatory, calming, tonic, and stimulant action. 2. “J. Mineiro, Curso de Farmacologia 1911 and 1925”, the author was a professor at the Pharmacy School of Ouro Preto from 1889 until 1930. He described several medicines, their purification, preparation and contaminant detection methods, as well as the therapeutic uses. About Digitalis, he briefly describes as a medicine used for cardiac disease treatment when tachycardia, arrhythmias and hypo-systole are present, acting by improving the tonic effect and normalizing heart rhythm, as well as by its diuretic properties, mainly the macerated form, used against ascites and some renal diseases. The author also describes its toxicity. 3. “P. Marfori. Tratado de Farmacología y Terapéutica (Toxicología y Farmacognosia), 4a Ed. Española, M. Marin Ed., Barcelona, 1935” described in detail aspects of chemistry, pharmacognosy, phytochemistry, formulations, experimental studies in dogs, clinical parameters, pharmacokinetics, pharmacology and therapeutics of digitalis. It shows the great importance of these compounds for the knowledge of the cardiovascular system. 4. “D`Allyre Chassevant, Précis de Pharmacologie, 1907” presenting drug information as a therapeutic guide. For digitalis it shows the botanical and phytochemistry identification methods, therapeutic properties, pharmacokinetics, physiological effects, toxicity, and pharmaceutical formulations. **Conclusion:** The richness of content about digitalis in historical collection books from the beginning of the 20th century reflects the greatest importance of these class of drugs to the cardiovascular pharmacology. The study of many different classes of drugs from the large historical collection of books preserved at the Pharmacy School of Ouro Preto will be very important to rescue part of the Brazilian pharmacology teaching history and aspects throughout the last 3 centuries.

**13.003 Case report: teaching Pharmacology to High School Students from the Coxilha Rica Rural Community, State of Santa Catarina, Brazil.** Linder AE<sup>1</sup>, Pavesi E<sup>1</sup>, Silva ML<sup>1</sup>, Scoz-Silva R<sup>1</sup>, Tonussi CR<sup>1</sup>, Ramos A<sup>2</sup> <sup>1</sup>UFSC Farmacologia, <sup>2</sup>UFSC – Biologia, Embriologia e Genética

**Introduction:** The Imagine Project was first idealized by a group of professors from the Universidade Federal de Santa Catarina (UFSC) aiming to promote scientific inclusion in non-urbanized areas of developing countries. The project includes three different thematic modules: “DNA, diversity and heredity” and “Energy” have already been executed in different isolated regions, such as Coxilha Rica (Lages, SC, Brazil), the Guarani Tekoa’Uy’A Village (Major Gercino, SC, Brazil) and Calca in Peru; the third module “Medicines: how do we know they are good for us?” was hosted in Coxilha Rica (CR). The creation of this module was part of a subject offered by the Pharmacology Graduate Program from UFSC. Graduate students and professors worked together during 4 months discussing topics about scientific popularization and developing activities intended to engage high school students (HSS) in learning pharmacological topics. CR is a small rural community with limited access by car, telephone or internet. There are no close available medical care or pharmacy services, therefore, people from this community preserve the popular traditional use of plants and natural resources as alternative treatments for various diseases. The module was conceived as a way to stimulate a critical view and attitude towards natural or synthetic remedies and to provide knowledge about the source of bioactive products and their targets, toxic and therapeutic effects, as well as possible placebo effect. The aim is to report how the third thematic module was carried out at the itinerant school in CR. **Methods:** A group of 3 professors, 2 graduate and 4 undergraduate students spent 5 days at CR to apply the module. **Results:** 10 regular HSS attended the week of activities after previous agreement. Firstly, students were instructed to search in the neighboring areas for as many plants as they knew could be used as remedies, in order to construct an ethnobotanical table. From the material collected, they elected a single plant (*Petiveria alliacea*) to undergo different extraction procedures and compound detection by thin layer chromatography. The potential toxicity of the plant extracts was tested *in vivo* in *Artemia salina* preparation. The concept of pharmaceutical formulation was discussed while testing the solubility of commercial pills in different pH solutions. Anxiolytic placebo effect and distraction-induced analgesia were also demonstrated. The diversity of medicinal plants known by the HSS was large, some of the plants were known by more than one popular name or the same popular name was given to different species. Their knowledge about medicinal plants was not different from the ones reported in other regions. Nonetheless, most of them were neither aware of the possible toxic effects of the plants nor that powerful therapeutic outcomes could be achieved with placebo. **Conclusion:** The HSS from CR responded very well to all the topics approached by the module with interest and curiosity. The students were granted the chance to come to UFSC for a visit and some of them displayed the desire to attend university in the near future. Educational tools will be developed and will be digitally available as Open Educational Resources. Supported by Sinter and PROEX-UFSC.

### **13.004 Case to Instigate (CI) Method in 5 steps: an active methodology to teach Pharmacology in a Medical school.** Nascimento FP Unila – Ciências Médicas

**Introduction:** Pharmacology is a daily applied science by majority of physicians. However, usually it is considered a basic science in the curriculum of Brazilian medical schools. Then, Pharmacology normally is taught in the first two years of medical school using traditional methodology classes, in other words, traditional lecture, which one put the student as a viewer in the teaching and learning process. This induces a learning far from clinical context and in a poor interest from student point of view. As consequence, the young physician when is graduated has a poor knowledge related to drugs and their actions, that can induce ineffective treatments, serious cases of toxicity and drug interactions (Souza et al., 2012). Then, this study has the objective to propose a new method to teach Pharmacology in a way to put closer this issue to clinical practice. **Methods:** a) Case to Instigate Methodology (CI): To teach a particular subject in a 140 minutes class, the teaching and learning process is divided in 5 steps. Step1: previously to the class the professor indicates bibliographic material for students have a pre-reading; step 2: At class day the teacher starts the class with a CI which can be clinical case, a news report, a song lyrics, a poetry, etc, and give between 6 and 10 guiding questions (learning objectives) to be answered related to CI; step 3: the students discuss the questions resolutions in groups with 5-8 students for 30-50 min; step 4: a expository/discussed class guided by guiding questions; step 5: the class conclusion is based on CI or based in an open discussion related to class subject arose from steps 3 or 4. b) Evaluation of CI method by students. Questionnaires were applied to 36 students from 4th semester of Medicine from Universidade Federal da Integração Latinoamericana (UNILA), placed in Foz do Iguaçu, Brazil. Six questions were made. 1) In your preference, which is the better methodology to be used in the teaching-learning process?; 2) In your opinion, which methodology makes easier your Pharmacology learning?; 3) Which methodology allows you to understand and to view better the Pharmacology application in the medical clinical context? 4) Which methodology instigates more you to study Pharmacology? For the questions 1 – 4 the possible answers were a) Traditional Methodology; b) Case to Instigate; c) indifferent. The question 5 was: Does the “pre-reading” make easier the resolution of the guiding questions of CI?; and 6) Does the group discussion with your colleagues help you to understand better the class subject in comparison with the individual study? For the stions 5 and 6 the possible answers were a): yes; b) no and c) indifferent. **Results:** the main results were: 67% of students prefer the CI method in comparison with 19% who prefer the TM method; 97% of students believe that CI enables better comprehension and vision of Pharmacology in the clinical context, against 3% who chose TM; 86% of students believe that they learn Pharmacology better with CI in comparison to 8% who chose TM; 64% of students admit that CI induces more interest to study Pharmacology, against 14% chose TM. **Conclusions:** The Case to Instigate is an alternative method to teach Pharmacology in Medical Schools, because it shows very good acceptance by students and demonstrates be a methodology capable to enhance the learning, the interest of students as well as the contextualization of Pharmacology in the clinical practice.