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Editorial

A REVIEW ON PHARMACOLOGY & TOXICOLOGY

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EDITORIAL

Pharmacology is the scientific discipline that studies the mechanisms by which drugs alter biological systems in an attempt to improve health and alleviate disease, whereas toxicology is the study of mechanisms by which drugs and chemicals in the environment produce unwanted effects. Together these disciplines encompass the molecular basis of drug action, the actions of drugs on cells, organs, and organisms, the genetic variations in drug action, and drug discovery.

Since more drugs will be introduced in the next ten years than have been discovered in the last one hundred, and since there are increasing needs for selective drug therapeutics, research in pharmacology and toxicology are at the forefront of medical science. The Department of Pharmacology and Toxicology at Indiana University School of Medicine is actively involved in research and in medical and graduate education.

Pharmacology is the study of drugs. It involves examining the interactions of chemical substances with living systems, with a view to understanding the properties of drugs and their actions, including the interactions between drug molecules and drug receptors and how these interactions elicit an effect. Our pharmacology courses examine the different classes of drugs, how they are used therapeutically, their mechanisms of action, how they are handled by the human body, and their role in society. Pharmacology provides the scientific basis and principles for a variety of special applications, such as the study of drug actions in the health sciences, the use of drugs as therapeutic agents in medicine or as tools in scientific research, and the development and regulation of pharmaceuticals. Pharmacology is a multi-disciplinary

science with many subspecialties including clinical pharmacology, cardiovascular pharmacology, behavioural pharmacology, neuropsychopharmacology, pharmacogenetics, and pharmacoeconomics, to name a few.

Toxicology is the study of the adverse effects of chemicals (including drugs) on living systems and the means to prevent or ameliorate such effects. In addition to therapeutic agents, toxicologists examine many environmental agents and chemical compounds that are synthesized by humans or that originate in nature. The toxic effects of these agents may range from disturbances in growth patterns, discomfort, disease or death of individual organisms or on whole ecosystems. There are many subspecialties of toxicology including: clinical toxicology, regulatory toxicology (both of these found in the pharmaceutical and toxicology industry), forensic toxicology, occupational toxicology, and risk assessment. The current need for toxicologists is outlined in a recent online Science publication.

Pharmacology programs are distinct programs from the Pharmacy program. Pharmacology programs are joint undergraduate programs between the Faculty of Arts and Science and the Faculty of Medicine. Students graduating with an undergraduate Specialist or Major program in Pharmacology receive a Bachelor of Science degree. Pharmacy is a professional degree program offered by the Faculty of Pharmacy that prepares students to become licensed pharmacists. A license is required to legally dispense drugs.

Pharmacology and toxicology are very similar disciplines that require an understanding of basic properties and actions of chemicals. However, pharmacology places more emphasis on the therapeutic effects of chemicals (particularly drugs) while toxicology focusses more on the adverse effects of chemicals and risk assessment.

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