

The Age of AI: And Our Human Future

Pharmacology Definition

Pharmacology is the study of drugs including their origins, history, uses, and properties. It mainly focuses on the actions of drugs on the body. A drug is defined a substance that is used to treat, cure, or prevent a disease or otherwise enhance physical or mental health. The word pharmacology comes from the Greek words pharmakos, meaning medicine or drug, and logos, meaning study.

History of Pharmacology

Pharmacology emerged as its own discipline in the 19th Century, branching off from research done in fields of science such as organic chemistry and physiology. Oswald Schmiedeberg, who was born in what is now Latvia in 1838, is considered the father of pharmacology. His doctoral thesis was on the measurement of chloroform levels in blood, and he went on to become a professor of pharmacology at the University of Strasburg, where he ran an institute of pharmacology. There, he studied chloroform, which was used as an anesthetic, chloral hydrate, a sedative and hypnotic, and muscarine, a compound isolated from the mushroom Amanita muscaria that stimulates the parasympathetic nervous system and has been used to treat various diseases such as glaucoma.

In 1890, John Jacob Abel became the first pharmacology chair in the United States, at the University of Michigan. He later went to Johns Hopkins University in Baltimore. Abel was the first to isolate the hormone epinephrine from the adrenal gland, isolate histamine from the pituitary gland, and make pure crystalline insulin. Animals such as dogs, cats, pigeons, and frogs were used to test pharmacological substances. Humans were even used as test subjects. Sometimes they suffered through severe adverse effects from these substances, such as when the German pharmacist Friedrich Serturmer and three of his friends had poisoning for several days from an alkaloid that Serturmer had isolated from opium. This alkaloid was later named morphine, after the Ancient Greek god of sleep, Morpheus.

Today, the most common test animal is the mouse, which is convenient to use because it is small, easy to breed, and can produce many generations in a relatively short amount of time. Guinea pigs and rabbits are also sometimes used. Once a compound has undergone enough testing to be considered reasonably safe, it is used in Phase I clinical trials on human volunteers, and eventually it may become a widely available drug.

Branches of Pharmacology

Pharmacodynamics

Pharmacodynamics is the study of the physiological or biological effects that varying concentrations of drugs have on the body over time. This branch involves the study of the localization of a drug to a specific area of the body, such as the brain. Most drugs may have effects on more than one part of the body, and some may cause unwanted side effects. Sometimes this is dependent on the dose of

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the drug. A substance may have side effects if too much of it is taken; for example, too much magnesium in the body can cause diarrhea.

Pharmacokinetics

Pharmacokinetics is the study of how the body absorbs, metabolizes, and excretes drugs. A drug may be administered orally, parenterally (such as through an injection), or intravenously (into the bloodstream, through an IV). The kidney is the main organ that filters out drugs from the body, but the lungs and sweat glands also have minor roles.

Others

Other areas in pharmacology that can involve both of the two main branches of pharmacodynamics and pharmacokinetics include:

Clinical Pharmacology : focuses on the therapeutic uses of drugs and the factors that may affect the efficacy of a drug, such as age, pregnancy, disease, and combination in use with other drugs. It is also concerned with bioavailability, which is the proportion of a drug dose that is actually absorbed by the body instead of just passing through.

: focuses on the therapeutic uses of drugs and the factors that may affect the efficacy of a drug, such as age, pregnancy, disease, and combination in use with other drugs. It is also concerned with bioavailability, which is the proportion of a drug dose that is actually absorbed by the body instead of just passing through. Toxicology: focuses on the adverse effects that drugs may have on the body. It examines side effects not only from drugs given therapeutically but also on chemicals that a person may be exposed to in their household, occupation, or environment.

Difference Between Pharmacy and Pharmacology

Pharmacology is one area that is studied by those who are in training to become pharmacists. Pharmacists are experts on medications. They have a variety of roles such as dispensing medications, educating patients on proper use of medications, advising healthcare professionals on which drugs to administer to a patient, and helping to monitor patient health. Pharmacologists conduct research on drugs in a laboratory setting in order to better understand how

these substances work and possibly develop them into pharmaceuticals. They study drugs, while pharmacists provide the final product to patients along with information about its use.

Pharmacology Careers

Pharmacology work is lab-based. With a bachelor's degree, one can work as a research technician in a laboratory. Further schooling leading to a master's degree may lead to positions with more responsibility, such as lab manager or research assistant positions. A PhD is required to be in charge of a lab and design experiments. Labs may be located in universities (where teaching may also be required), pharmaceutical companies, commercial or government-funded research centers, or medical charities. Pharmacologists often specialize in a specific area such as neuropharmacology, cardiovascular pharmacology, or veterinary pharmacology.

Pharmacology Major

Some schools offer specific majors in pharmacology. Pharmacology undergraduate programs leading to a bachelor's degree have much in common with biology programs. Students in both of these majors take general biology courses along with courses in general chemistry, organic chemistry, physics, and calculus. Pharmacology majors then take upper-level courses more specific to the field, such as biochemical pharmacology, cellular biology, developmental biology, and neurobiology. Of course, biology majors who are not going into the field of pharmacology may also take some of these upper-level courses as well. If one is interested in becoming a pharmacologist, they will often need further schooling beyond a bachelor's degree no matter which major they take, biology or pharmacology. Some people who major in chemistry may go on to study pharmacology as well. Choice of major depends on a person's specific interests and the options offered by each university.

References

Reference

[Naval Engineering: Principles and Theory of Gas Turbine Engines](#)

[Sound and Recording: Applications and Theory \(Audio Engineering Society Presents\)](#)