

## How to Be an Engineer (Careers for Kids)

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pharmacology, branch of medicine that deals with the interaction of drugs with the systems and processes of living animals, in particular, the mechanisms of drug action as well as the therapeutic and other uses of the drug.

The first Western pharmacological treatise, a listing of herbal plants used in classical medicine, was made in the 1st century ad by the Greek physician Dioscorides. The medical discipline of pharmacology derives from the medieval apothecaries, who both prepared and prescribed drugs. In the early 19th century a split developed between apothecaries who treated patients and those whose interest was primarily in the preparation of medicinal compounds; the latter formed the basis of the developing specialty of pharmacology. A truly scientific pharmacology developed only after advances in chemistry and biology in the late 18th century enabled drugs to be standardized and purified. By the early 19th century, French and German chemists had isolated many active substances—morphine, strychnine, atropine, quinine, and many others—from their crude plant sources. Pharmacology was firmly established in the later 19th century by the German Oswald Schmiederberg (1838—1921). He defined its purpose, wrote a textbook of pharmacology, helped to found the first pharmacological journal, and, most importantly, headed a school at Strasbourg that became the nucleus from which independent departments of pharmacology were established in universities throughout the world. In the 20th century, and particularly in the years since World War II, pharmacological research has developed a vast array of new drugs, including antibiotics, such as penicillin, and many hormonal drugs, such as insulin and cortisone. Pharmacology is presently involved in the development of more effective versions of these and a vast array of other drugs through chemical synthesis in the laboratory. Pharmacology also seeks more efficient and effective ways of administering drugs through clinical research on large numbers of patients.

During the early 20th century, pharmacologists became aware that a relation exists between the chemical structure of a compound and the effects it produces in the body. Since that time, increasing emphasis has been placed on this aspect of pharmacology, and studies routinely describe the changes in drug action resulting from small changes in the chemical structure of the drug. Because most medical compounds are organic chemicals, pharmacologists who engage in such studies must necessarily have an understanding of organic chemistry.

Important basic pharmacological research is carried out in the research laboratories of pharmaceutical and chemical companies. After 1930 this area of pharmacological research underwent a vast and rapid expansion, particularly in the United States and Europe.

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The work of pharmacologists in industry deals also with the exhaustive tests that must be made before promising new drugs can be introduced into medical use. Detailed observations of a drug's effects on all systems and organs of laboratory animals are necessary before the physician can accurately predict both the effects of the drug on patients and their potential toxicity to humans in general. The pharmacologist does not himself test the effects of drugs in patients; this is done only after exhaustive tests on animals and is usually conducted by physicians to determine the clinical effectiveness of new drugs. Constant testing is also required for the routine control and standardization of drug products and their potency and purity.

## Reference

[Introduction to Industrial and Systems Engineering](#)

[Engineering Trustworthy Systems: Get Cybersecurity Design Right the First Time](#)