

FDA Approval of New Drugs

Any new prescription drug in the United States must go through an extensive review and approval process by the US Food and Drug Administration (FDA) before it can be prescribed to patients.

A drug is any product that is meant to be used in diagnosing, treating, or preventing diseases by affecting the structure or function of the body. Prescription drugs, which must be obtained with the written authorization of a licensed health care professional, are regulated by the FDA, and some over-the-counter drugs are regulated by the FDA as well. The following information does not relate to most vitamins, minerals, and herbal supplements.

The Drug Approval Process

Early testing: After a potential new drug is discovered, it is subjected to laboratory studies to test the drug's **pharmacology** (how the drug interacts with living cells) and **toxicology** (how the drug might be toxic to cells).

Animal testing: A drug that shows potential in laboratory testing may be tested on animals to investigate the drug's **safety** (what side effects the drug may have) and provide information about its **efficacy** (how well the drug works in treating what it is supposed to treat).

Investigational New Drug (IND) application: If the results of the laboratory and animal studies are encouraging, the drug sponsor submits an IND application to the FDA. The IND application summarizes information from laboratory and animal testing and provides a proposal for obtaining clinical data from human patients. The FDA team reviewing the application can be composed of doctors, scientists, and statisticians.

Clinical trials: If the FDA approves the IND application, clinical trials (studies that involve human participants) are begun. Clinical trials are divided into phases.

- **Phase 1 trials** typically involve fewer than 100 participants and focus on drug safety. Usually the participants are healthy volunteers.
- **Phase 2 trials** involve hundreds of participants and focus on the drug's optimal dose and ability to treat a specific disease or condition. Usually participants are patients with the disease or condition.
- **Phase 3 trials** involve hundreds to thousands of participants and focus on both safety and efficacy. These trials commonly compare the investigational drug with either a **placebo** (for example, an inert sugar pill that has no activity) or an already-approved drug

that is known to work for the condition being treated. More in-depth questions are examined, such as effects on certain groups of patients.

In the January 22/29, 2014, issue of *JAMA*, an article discussed the quality of phase 3 clinical trials.

New Drug Application (NDA): After the clinical trials are completed, the drug sponsor submits an NDA, which requests approval of the drug for marketing in the United States. The FDA reviews NDAs for very important new drugs within 6 months and reviews standard new drugs within 10 months. If the FDA decides to approve the drug, the official label for the drug is written, which describes what disease(s) or condition(s) the drug can be used to treat as well as the known side effects and warnings about the product.

Postmarketing monitoring: After drug approval, the label may be updated to include new information about the drug's side effects. The drug sponsor is required to submit safety updates, and doctors or patients can also report serious events related to the drug to the FDA. Drugs that cause more serious side effects than expected can be withdrawn from the market if necessary.


Drug Approval Time Frames

It takes about 8 to 10 years from initial testing of a drug to its approval by the FDA. Some special drugs enter an "accelerated" or "fast-track" pathway if they can potentially treat serious or life-threatening diseases for which there are currently no good treatments. These drugs may skip certain testing, such as phase 3 trials, and may be approved in a shorter time frame.

If a drug is not approved on the first try, the drug sponsor can resubmit the NDA after addressing the reasons for approval failure. In the January 22/29, 2014, issue of *JAMA*, an article discussed reasons for some late-stage failures in approval.

FOR MORE INFORMATION

- US Food and Drug Administration
www.fda.gov

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Correction: This article was corrected online February 7, 2014, for a factual error.

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