

PhARMA

New Medicines. New Hope.



Food and Drug Administration (FDA) 101

What is the Food and Drug Administration (FDA)?

The FDA is an agency within the U.S. Department of Health and Human Services that is responsible for protecting the public health by:

- 1) Ensuring the safety and efficacy of human and veterinary drugs, biological products, medical devices
- 2) Ensuring the safety and security of our nation's food supply, products that emit radiation
- 3) Regulating the manufacture, marketing, and distribution of tobacco products.

FDA also promotes the public health by striving to foster innovative approaches and solutions for some of our nation's most compelling health and medical challenges.



FDA Structure: Product Centers & Support Divisions



Office of the Commissioner
Provides leadership and direction

Center for Drug Evaluation and Research
Prescription, OTC drugs, and therapeutic biologics

Center for Biologics Evaluation and Research
Vaccines, blood, gene therapeutics

Center for Devices and Radiological Health
Medical devices and radiation-emitting products

Office of Regulatory Affairs
Conducts inspections, enforces FDA regulation

National Center for Toxicological Research
Supports Product Centers with technology, training, and technical expertise

Center for Veterinary Medicine
Feed, drugs, devices for animals

Center for Food Safety and Applied Nutrition
Foods other than meat and poultry, infant formulas, dietary supplements, cosmetics

Center for Tobacco Products
Tobacco products



Drugs and Biologics Regulation



Center for Drug Evaluation and Research (CDER)



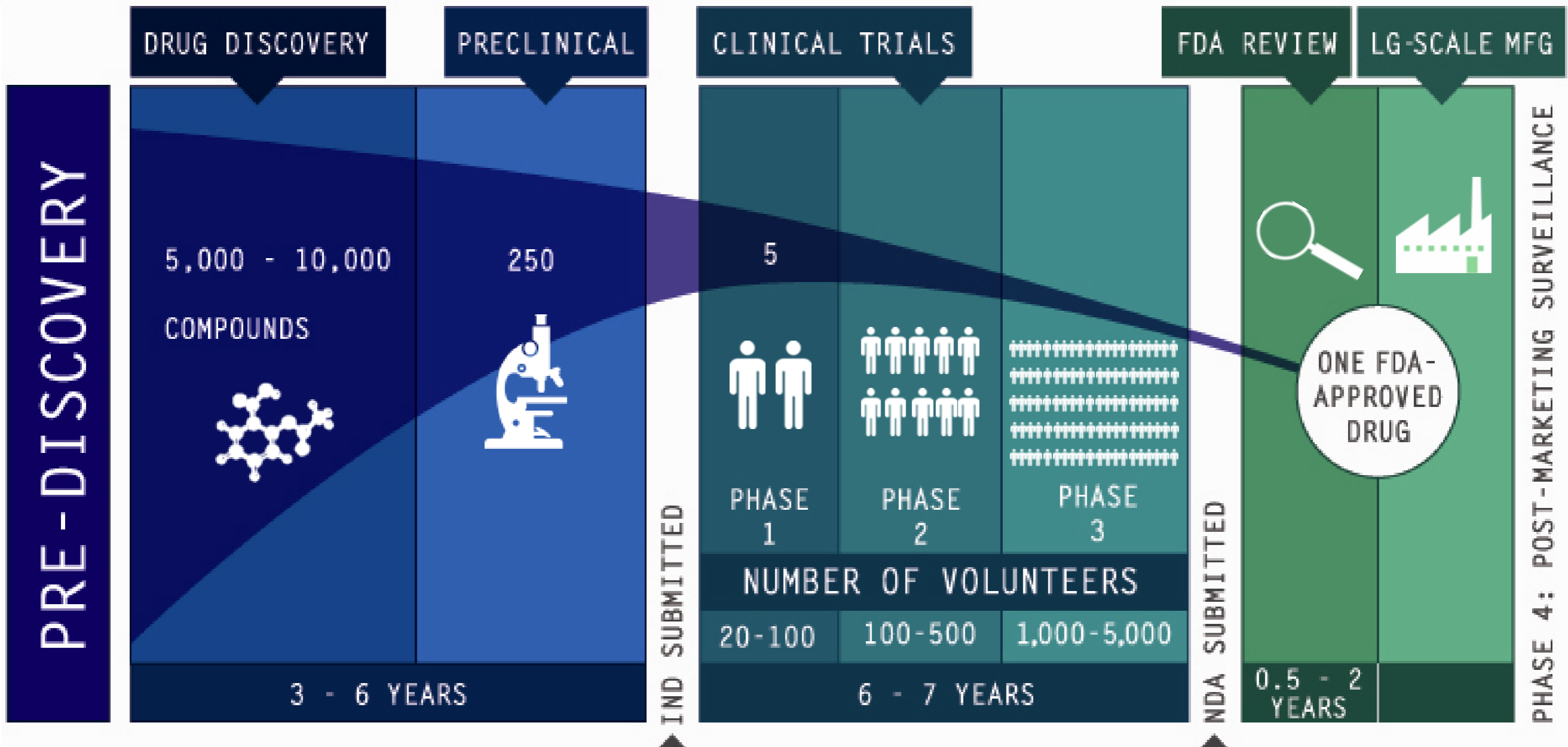
REGULATES:
Drugs, therapeutic biologics, some consumer products that are also considered “drugs”

Center for Biologics Evaluation and Research (CBER)



REGULATES:
Blood, vaccines, and gene therapeutics

Drug Discovery & Development Overview: A Difficult Road



Source: Drug Discovery and Development: Understanding the R&D Process. www.innovation.org

Drug Review and Approval Process: Clinical Testing



Testing in humans to determine if the drug is safe and effective for the treatment of a disease

TIMEFRAME: 6-7 Years

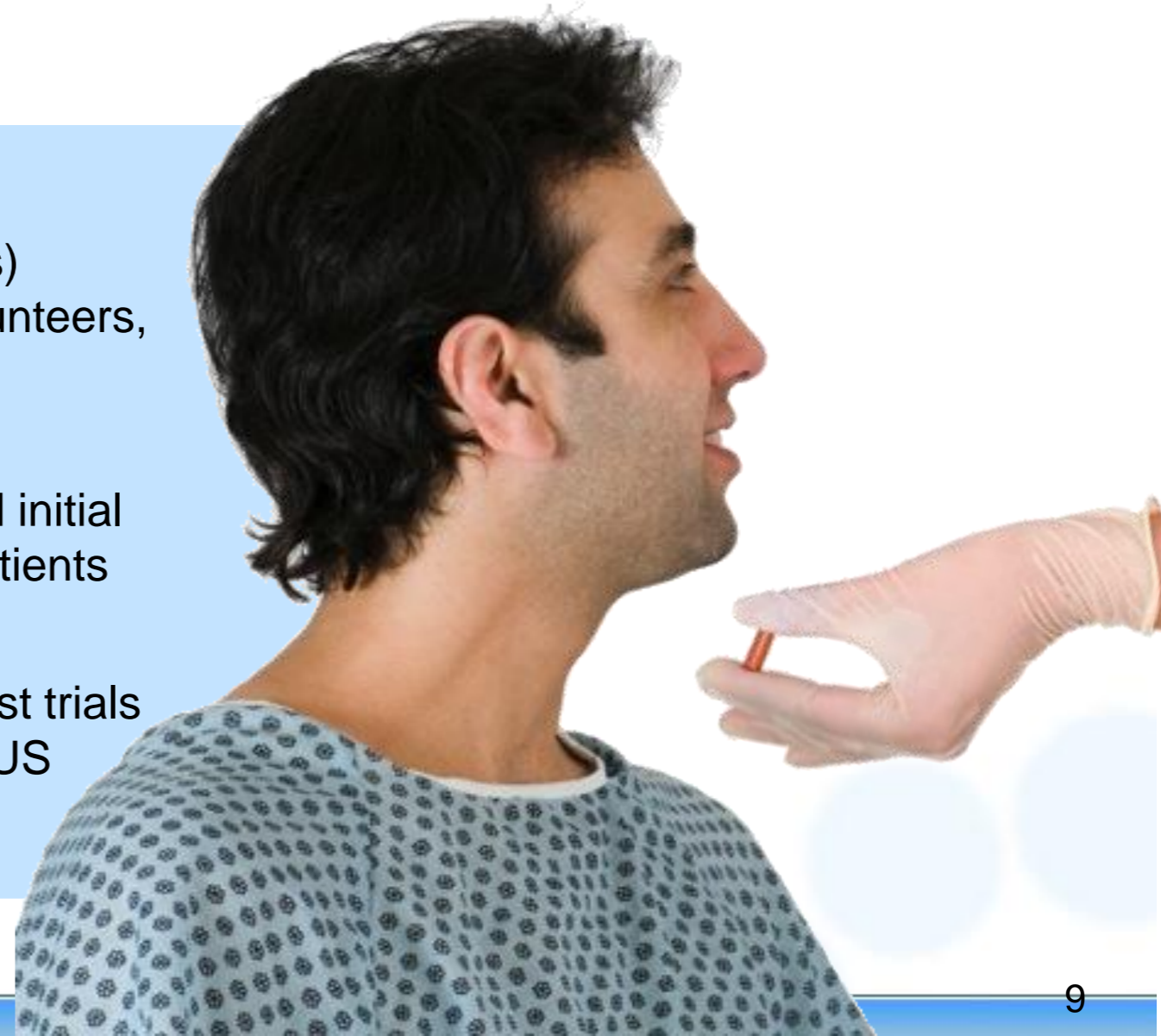
Physicians carry out each trial working with patients in hospitals, offices and clinics, and coordinating closely with the sponsor company. Expensive and time-consuming, trials end more often in failure than success.

PHASES:

Phase 1 Clinical Trial: (20 to 100 healthy volunteers)
Determine tolerability and initial safety in healthy volunteers, Pharmacokinetics.

Phase 2 Clinical Trial: (100 to 500 patients)
Study a drug's effectiveness; testing dose range and initial efficacy; define initial safety & tolerability profile in patients

Phase 3 Clinical Trial: (1,000 to 5,000 patients)
To confirm safety and efficacy. The longest and largest trials and often take place in hundreds of sites across the US and throughout the world.



Drug Review and Approval Process: Application to FDA



If testing shows the medicine is safe and effective for the treatment, mitigation or prevention of a disease, the manufacturer submits the information to FDA for review and approval of a new medicine:



THE APPLICATION CONTAINS:

- Clinical trial results demonstrating safety and efficacy
- Toxicology and Manufacturing information
- Proposed label- including effective uses, possible risks, and usage information



For **DRUGS** it's called a **New Drug Application (NDA)**

For **Therapeutic BIOLOGICS** it's a **Biologics License Application (BLA)**

*Both of these go to the **Center for Drug Evaluation and Research***

CDER



For most **BIOLOGICS (VACCINES, BLOOD, and GENE THERAPEUTICS)** applications are **Biologics License Applications (BLA)**

*They go to the **Center for Biologics Evaluation and Research***

CBER

Drug Review and Approval Process: Review of Applications



If a review by FDA physicians and scientists shows a drug's benefits outweigh its risks, and if the FDA feels that the drug can be manufactured in a way that ensure a quality product, the drug is approved and can be made available to doctors and patients in the United States.



Post-Market: Further Safety Monitoring

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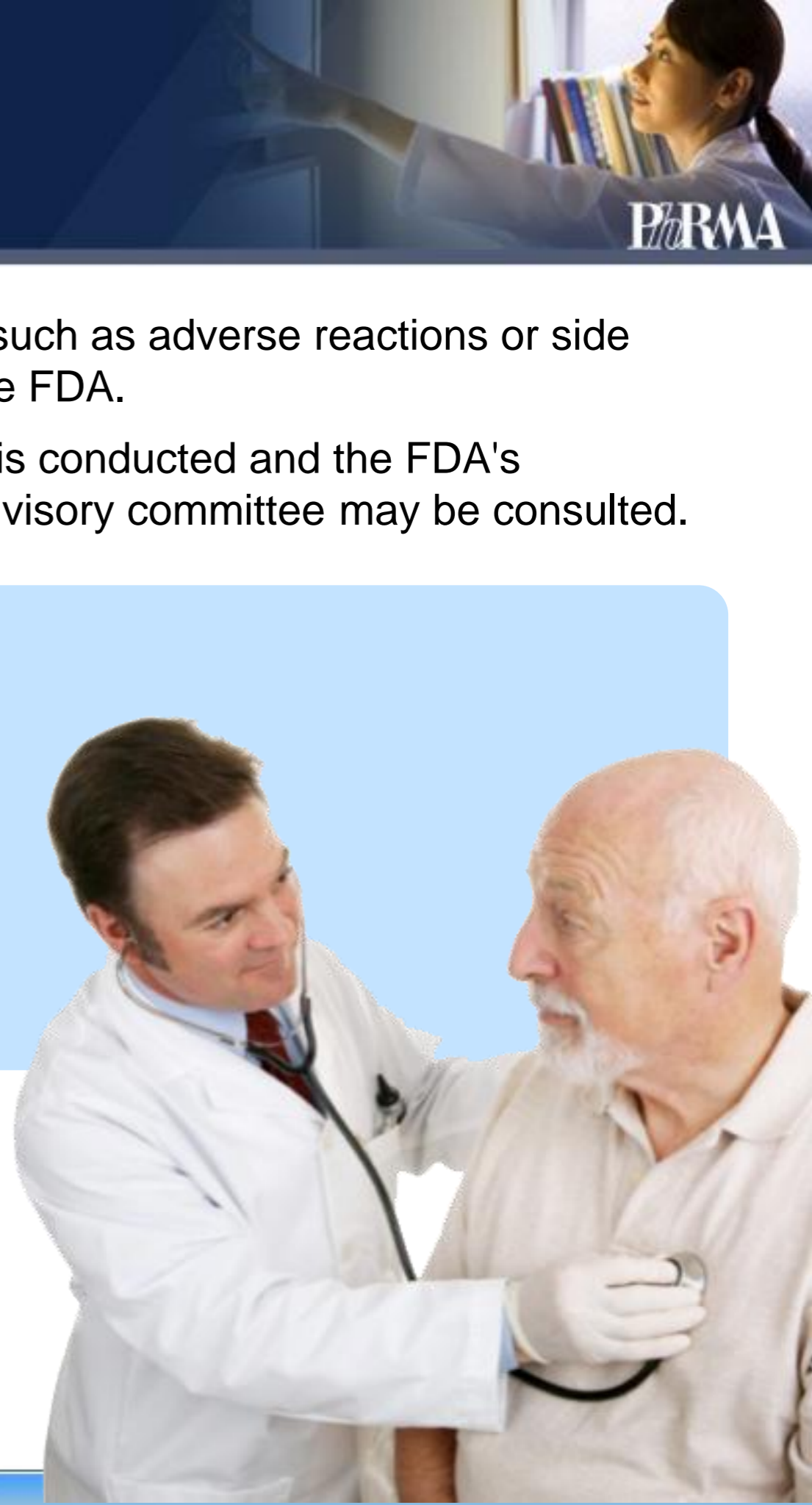
FDA monitors and reviews additional data on a medicine such as adverse reactions or side effects found in clinical use or post-approval studies by the FDA.

If a potential drug safety concern arises, a prompt review is conducted and the FDA's independent Drug Safety Oversight Board or an expert advisory committee may be consulted.

POTENTIAL FDA ACTIONS INCLUDE:

- Revision to product labeling (e.g., add warnings)
- Require additional studies on an approved drug (“Phase 4”)
- Risk Evaluation and Mitigation Strategy (REMS) to ensure that the benefits of a drug outweigh the risks; may include additional training, medication guide, patient package insert, or communication plan

*FDA Also works closely with the **Centers for Disease Control and Prevention (CDC)** to monitor adverse effects in VACCINES*



Prescription Drug User Fee Act, 1992-2012

Two Decades of Success



Drug Review and Approval Process: Large Scale Manufacturing



Going from small-scale to large-scale manufacturing is a major undertaking, often requiring construction of a new facility.

Each facility is inspected by FDA and must meet strict guidelines for **Good Manufacturing Practices (GMP)** to ensure consistent identity, strength, and purity in production.

FDA routinely inspects domestic and foreign plants for compliance with GMP and continues to do so throughout the medicine's life cycle.



Post-Market: Continued Oversight of Manufacturing and Distribution



FDA CONTINUES TO MONITOR FOR QUALITY AND SAFETY:

- Active Ingredients
- Bulk Product
- Manufacturing Process & Conditions
- Packaging/Labeling
- Distribution chain



POSTMARKET SURVEILLANCE AND ENFORCEMENT:

Penalties for adulteration or misbranding include seizure, civil and criminal penalties, withdrawal of approval, and injunctions.

Drug Review and Approval Process: Pre-Discovery



Understanding the disease

Before any potential new medicine can be developed, scientists must work to understand the disease and its underlying causes. Researchers from government, academia and industry are typically involved. This stage often takes many years of work, and often leads to frustrating dead ends. Even successful research requires many years of work to develop a basic understanding of a disease's function into a new treatment.

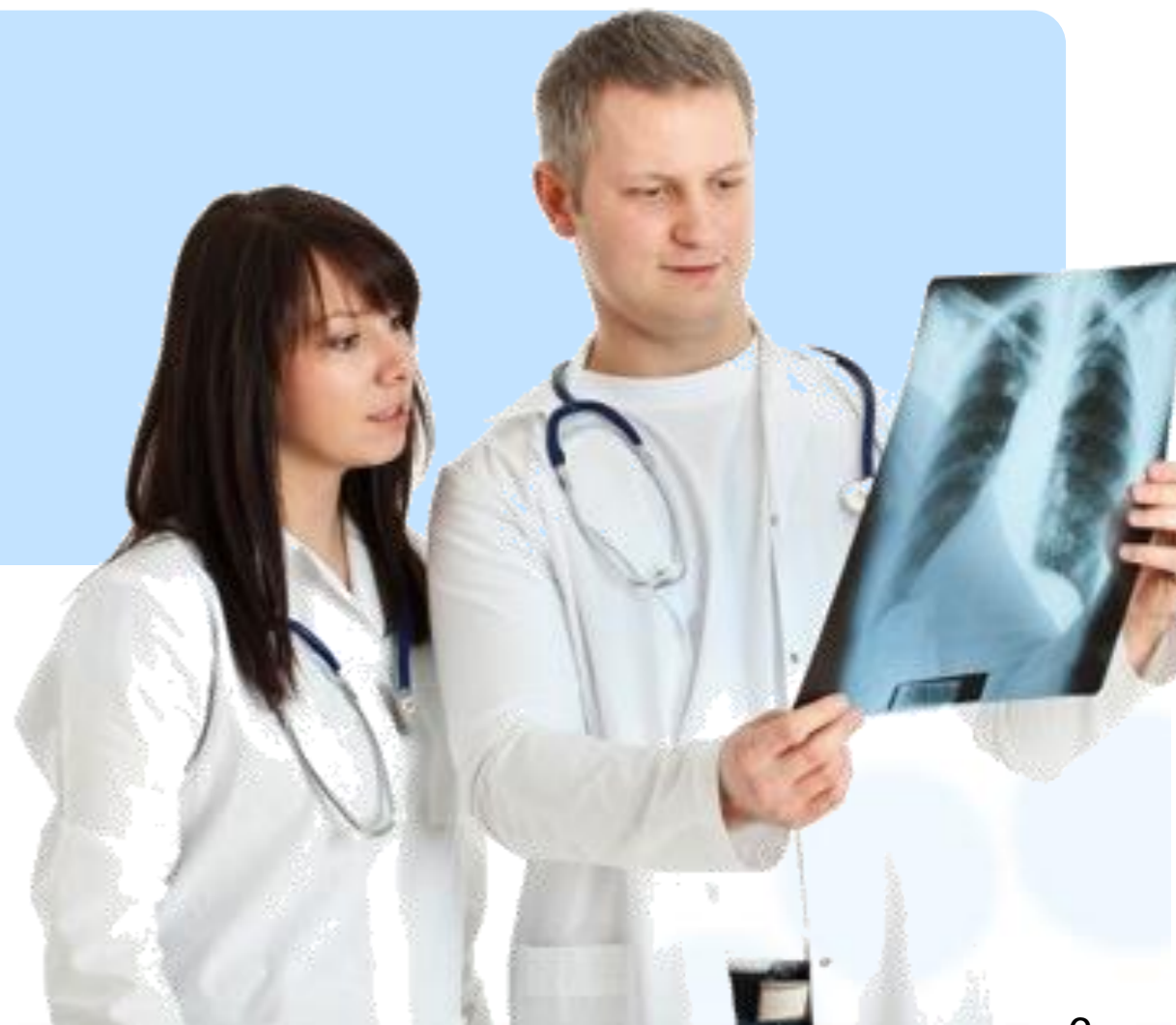
SCIENTISTS MUST UNDERSTAND:

- Underlying causes of the disease
- Physiological changes
- Best way to target the disease
- How the disease affects the patient

The Pre-Discovery stage also includes:

Target Identification: Choosing a biochemical process or specific molecule to target with a new medicine

Target Validation: Testing the target and confirming its effect in modifying the disease



Drug Review and Approval Process: Drug Discovery



Finding promising molecules that could become a new medicine

Armed with their understanding of the disease, scientists are ready to begin looking for a molecule that may act on their target to alter the disease course. This is called a **LEAD COMPOUND**. If successful over long odds and years of testing, the lead compound can ultimately become a new medicine.

SOURCES OF LEAD COMPOUNDS INCLUDE:

Nature: found in bacteria, plants, etc.

De Novo Synthesis: molecules designed in the laboratory

High-throughput Screening: the most common way that leads are found- automated testing of hundreds of thousands of compounds from a chemical library

Biotechnology: genetically engineer living cells to produce disease-fighting biological molecules



The Drug Discovery stage also includes:

Early Safety and Toxicology Tests on promising compounds

Lead Optimization, altering the structure of lead candidate to make it more suitable for use as a human medicine

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Questions?

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Thank You.