



U.S. Food and Drug Administration
Protecting and Promoting Public Health

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Drug Development Overview

FDA: Basic Research to Clinical Use

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Outline

- **Therapeutic Drug vs Diagnostic Imaging Agent Development**
- **Preclinical Research to Clinical Studies**
 - **Appropriate FDA submission(s)**
 - **Introduction of upcoming talks in this session**

Therapeutic Drugs

\$800 million, 14 years

Basic Research, Target ID

Chemical Synthesis, Screening, Lead Selection

Preclinical Testing & Lead Optimization

Phase 1-3 Trials

NDA Review & Approval

Post-marketing Surveillance

\$3.4 B annual revenue

\$150 million, 10 years

Chemical Synthesis

Assays & Preclinical Testing

Lead Optimization

Phase 1-3 Trials

NDA Review & Approval

Post-marketing Surveillance

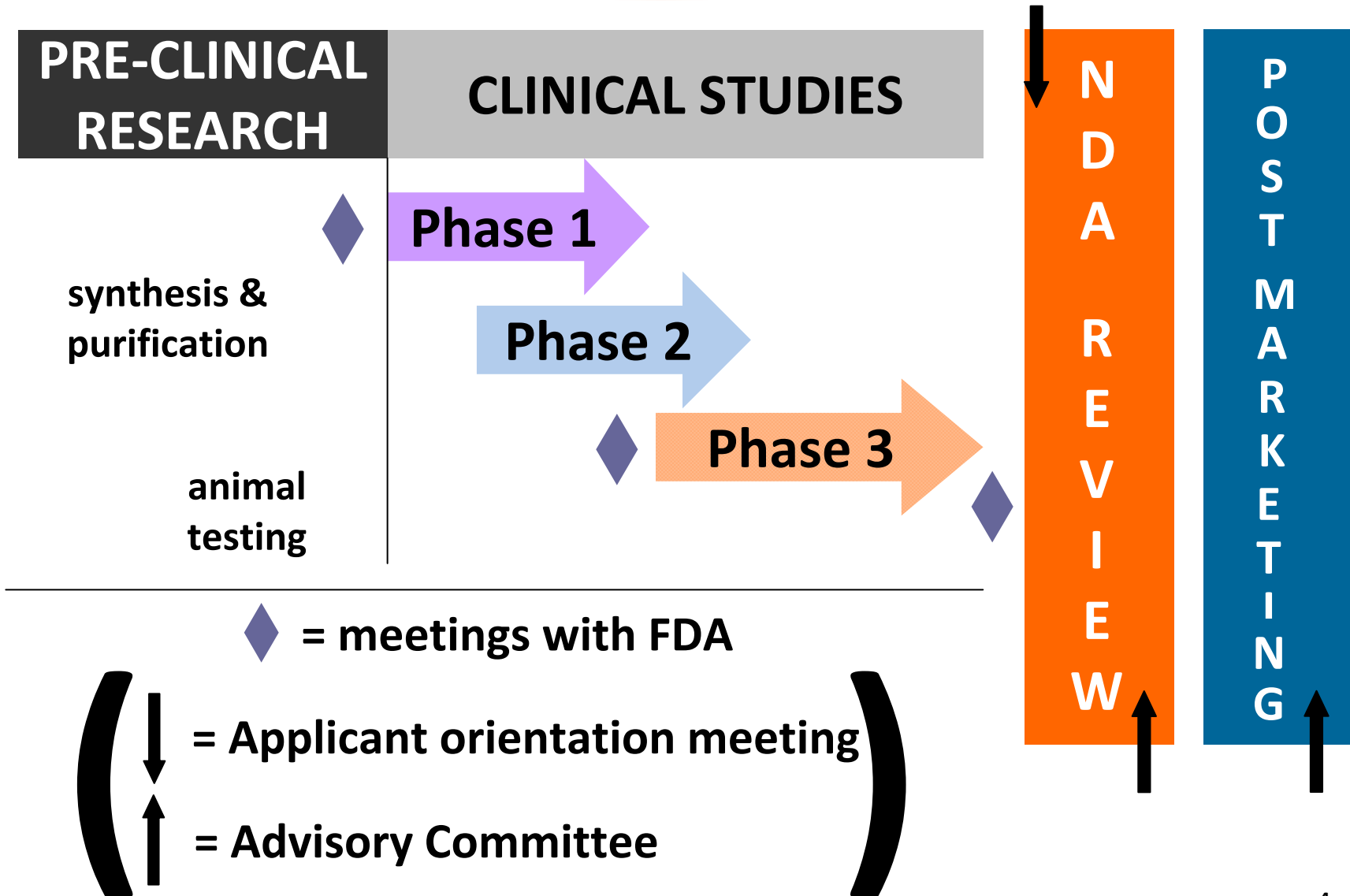
\$400 M annual revenue

Diagnostic Imaging Agents

ID of Diagnostic Opportunity

Lead Selection

New Drug Development Process



New Drug Development Process



**PRE-CLINICAL
RESEARCH**

CLINICAL STUDIES

Phase 1

**Transitioning from
eIND to Traditional IND**

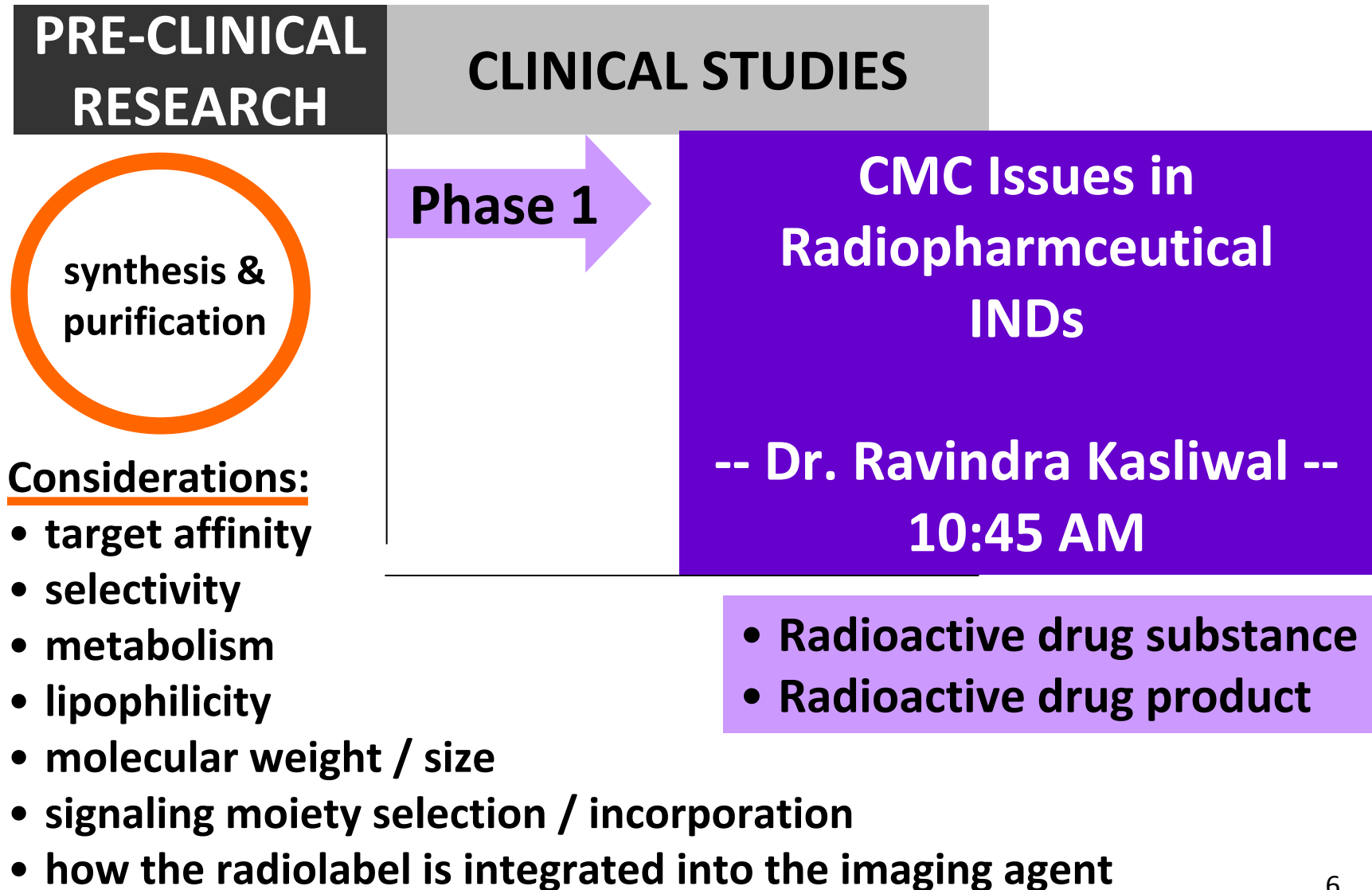
**-- Dr. Siham Biade --
10:00 AM**

**animal
testing**

- PK and
- proof of mechanism / concept
- toxicity
- translation to humans

**What are the preclinical
requirements for
toxicology / pharmacology?**

New Drug Development Process



New Drug Development Process



PRE-CLINICAL RESEARCH

synthesis & purification

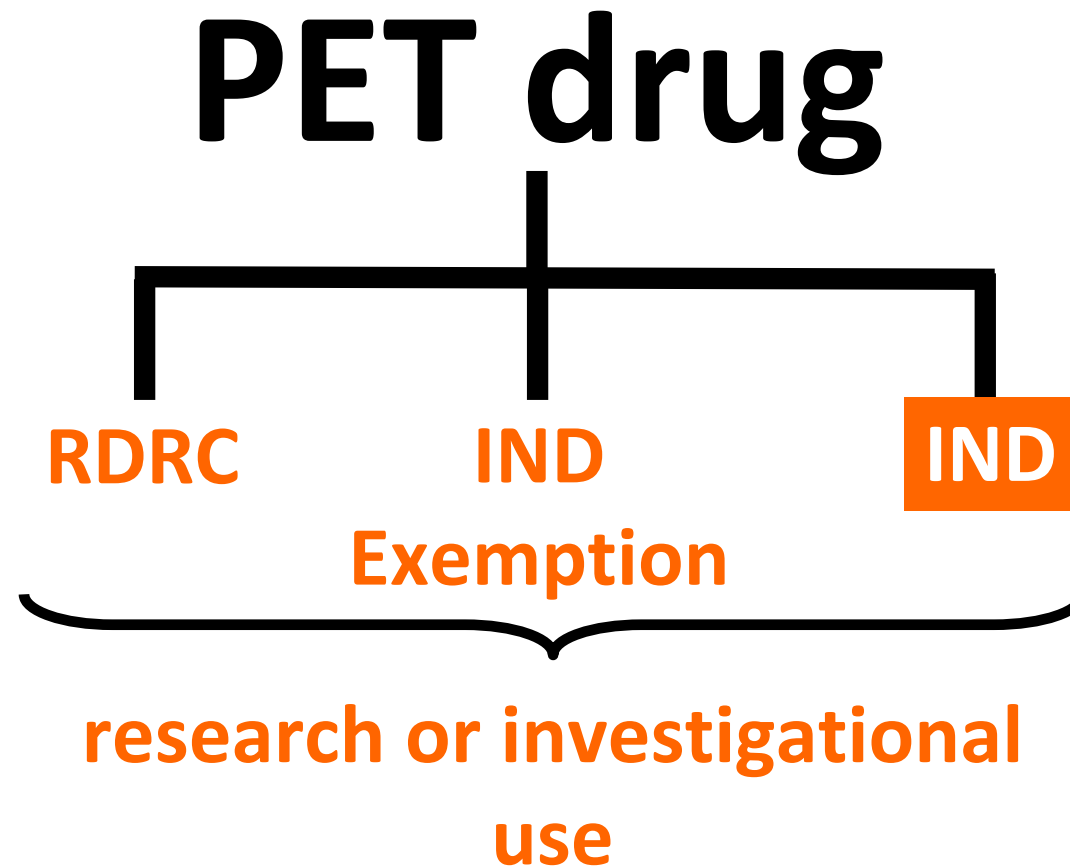
animal testing

What do I submit to FDA before starting human studies?

CLINICAL STUDIES

Phase 1

Which submission is most appropriate?



Definitions

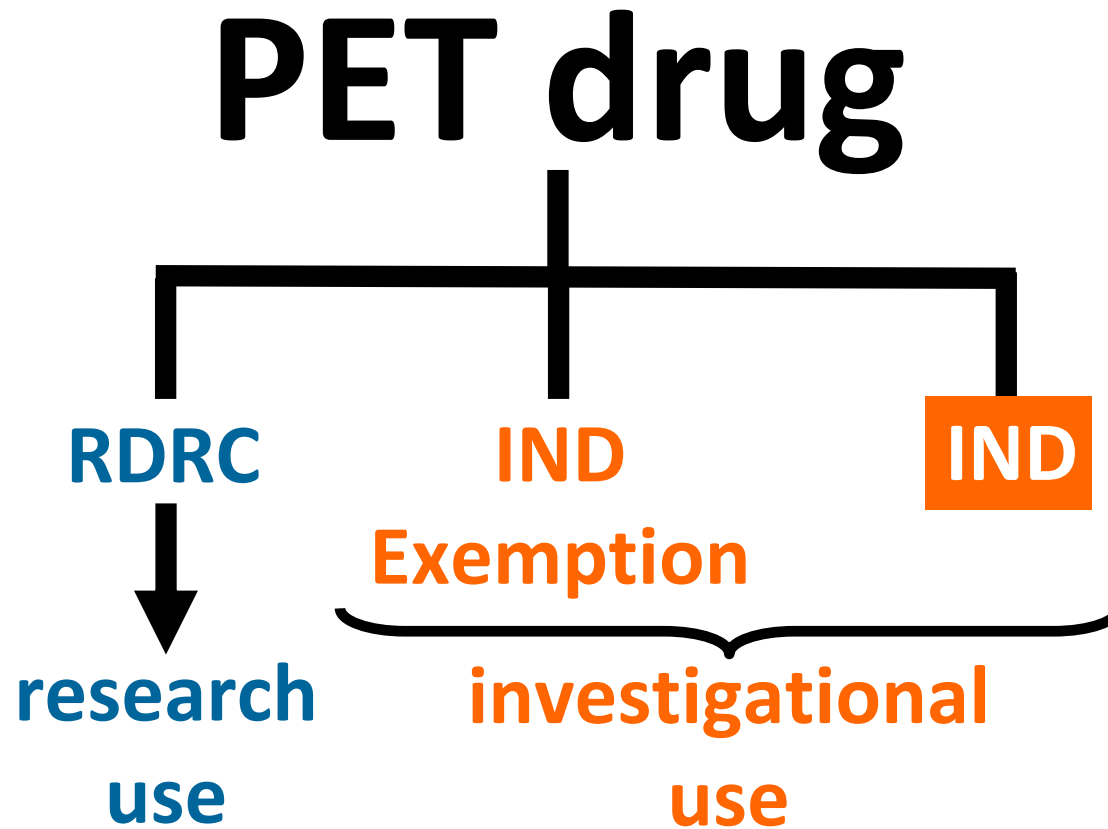
Research use

- For basic science research
- Not using for immediate therapeutic, diagnostic, or similar purpose
- No intent to determine safety or effectiveness for clinical use

Investigational use

- To establish the safety or effectiveness of a new use of the drug to support approval

Which submission is most appropriate?



RDRC

NOT for 1st in human study!

*IND not needed if study is approved by a
Radioactive Drug Research Committee (RDRC)*

RDRC research limited to:

- **Basic science**
- **Not for diagnostic or therapeutic purpose**
- **Not an evaluation of drug's safety/efficacy**
- **Dose known not to cause any pharmacologic effect**
- **Radiation dose within specific limits**

IND Exemption

Before December 12, 2015

CRITERIA

- PET drug used in the trial is made at a facility included in a submitted NDA/ANDA
- No intent to support new indication, labeling change, or advertising change
- No intent to promote/commercialize the drug
- No significant risk increase (e.g. dose, route of administration, patient population)
 - Compliant with IRB/consent process

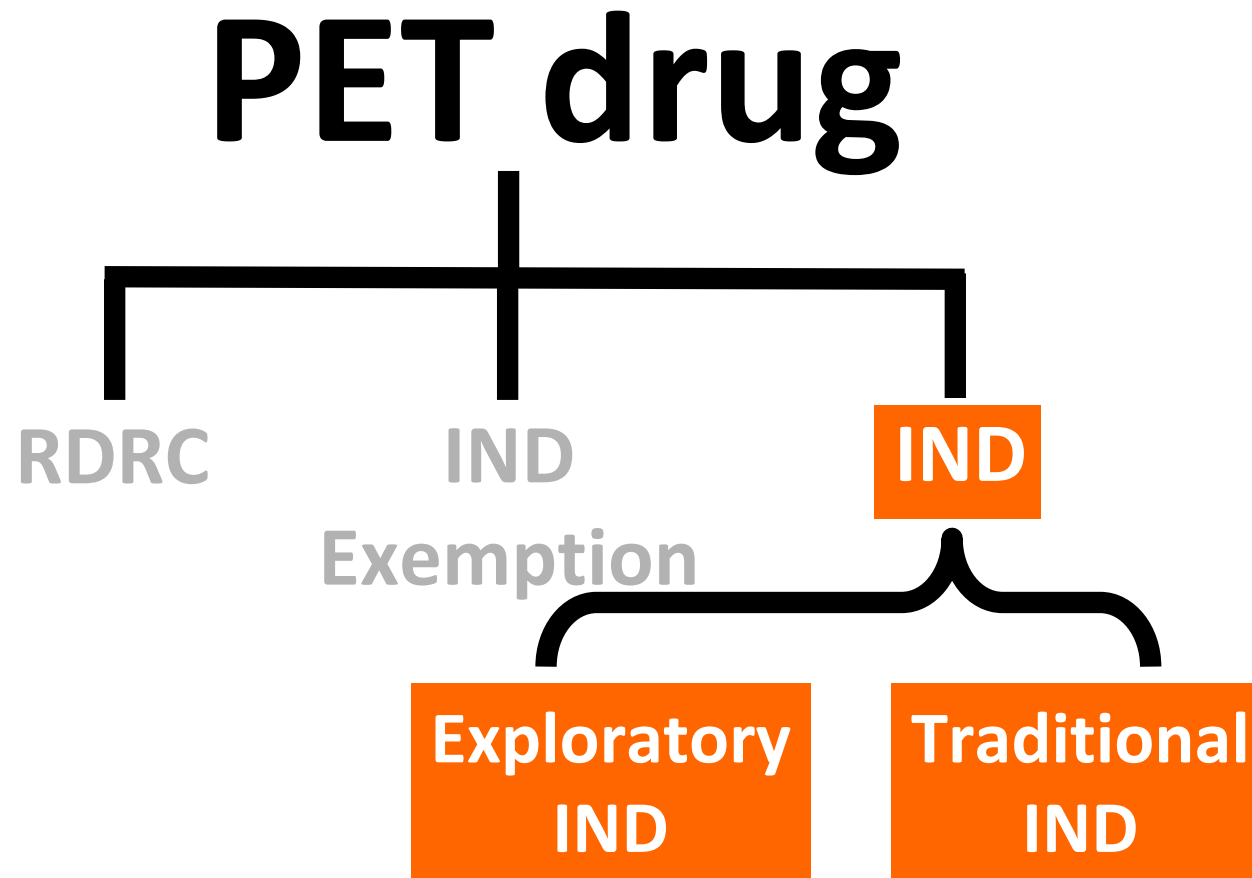
IND Exemption

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Which IND type is most appropriate?



Exploratory IND

P U R P O S E

- An early Phase 1 approach to help distinguish earlier in the process those candidates that hold promise from those that do not.

Potential A D V A N T A G E over Traditional IND

- **Involve fewer resources than traditional IND;**
- **Sponsors can move ahead more efficiently with the development of promising candidates.**

Exploratory IND

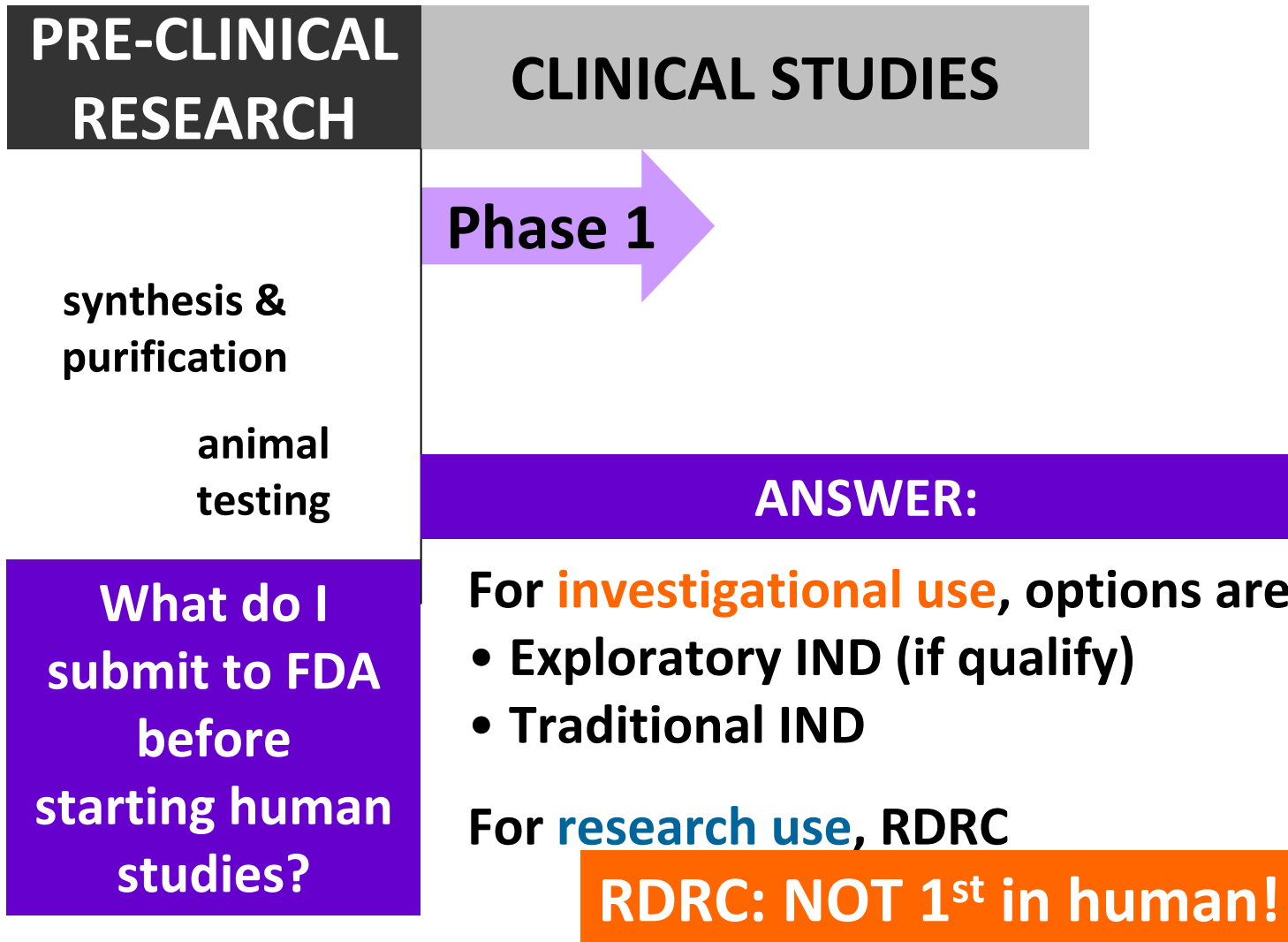
C R I T E R I A

- **Early Phase 1 study**
- **Assesses feasibility for further drug development**
- **Involves very limited human exposure**
- **Has no therapeutic or diagnostic intent (e.g. screening study, microdose study)**

How Can an Exploratory IND Study Help Sponsors?

- **Determine mechanism of action:** same in humans and experimental system?
- **Provide pharmacokinetics information**
- **Select most promising lead product**
- **Explore biodistribution**

New Drug Development Process



New Drug Development Process



CLINICAL STUDIES

- for radio-pharmaceutical

Phase 1

----- WHO? -----

- small group of people (20-80)
- healthy participants and/or patients

----- WHAT? -----

- initial human studies
- evaluate **safety**
- determine radiation absorbed dose
- determine safe mass dose
- determine metabolism
- determine pharmacokinetics
- gain early evidence of efficacy

New Drug Development Process



**PRE-CLINICAL
RESEARCH**

CLINICAL STUDIES

Phase 1

**Radiation Dose:
What Do We Want?**

**-- Dr. Orhan Suleiman --
10:15 AM**

How is human radiation dose estimated?

New Drug Development Process



CLINICAL STUDIES

----- WHO? -----

- larger groups of people
- patients with disease or condition under study

Phase 2

----- WHAT? -----

- controlled clinical study
- evaluate **efficacy** of drug for a particular indication
- determine common short-term **side effects** and risks
- refine dose, population
- develop image reading method

New Drug Development Process



CLINICAL STUDIES

WHO?

- even larger groups of people

■ for imaging agent

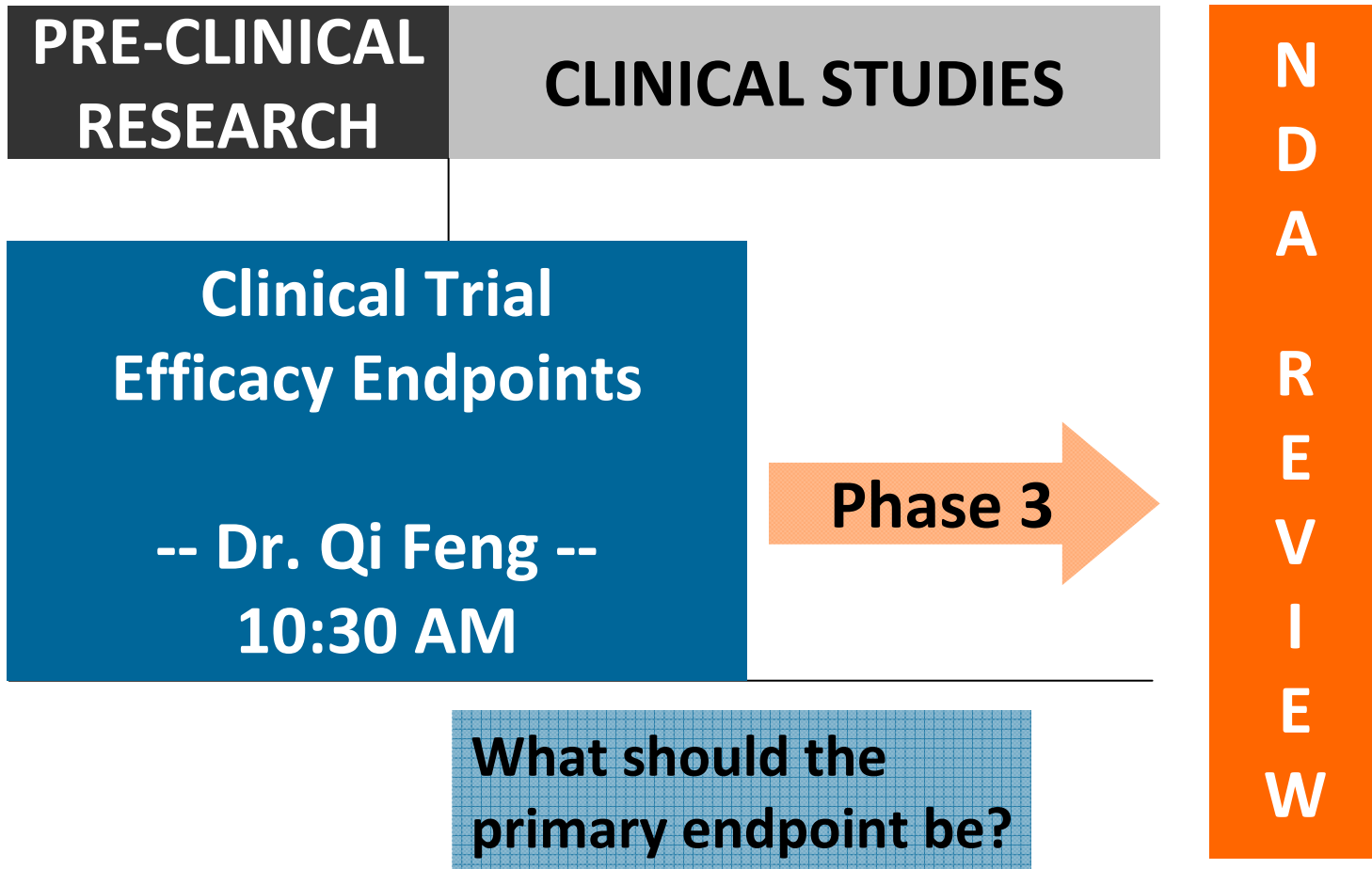
Phase 3

though the sample size may depend on the study design

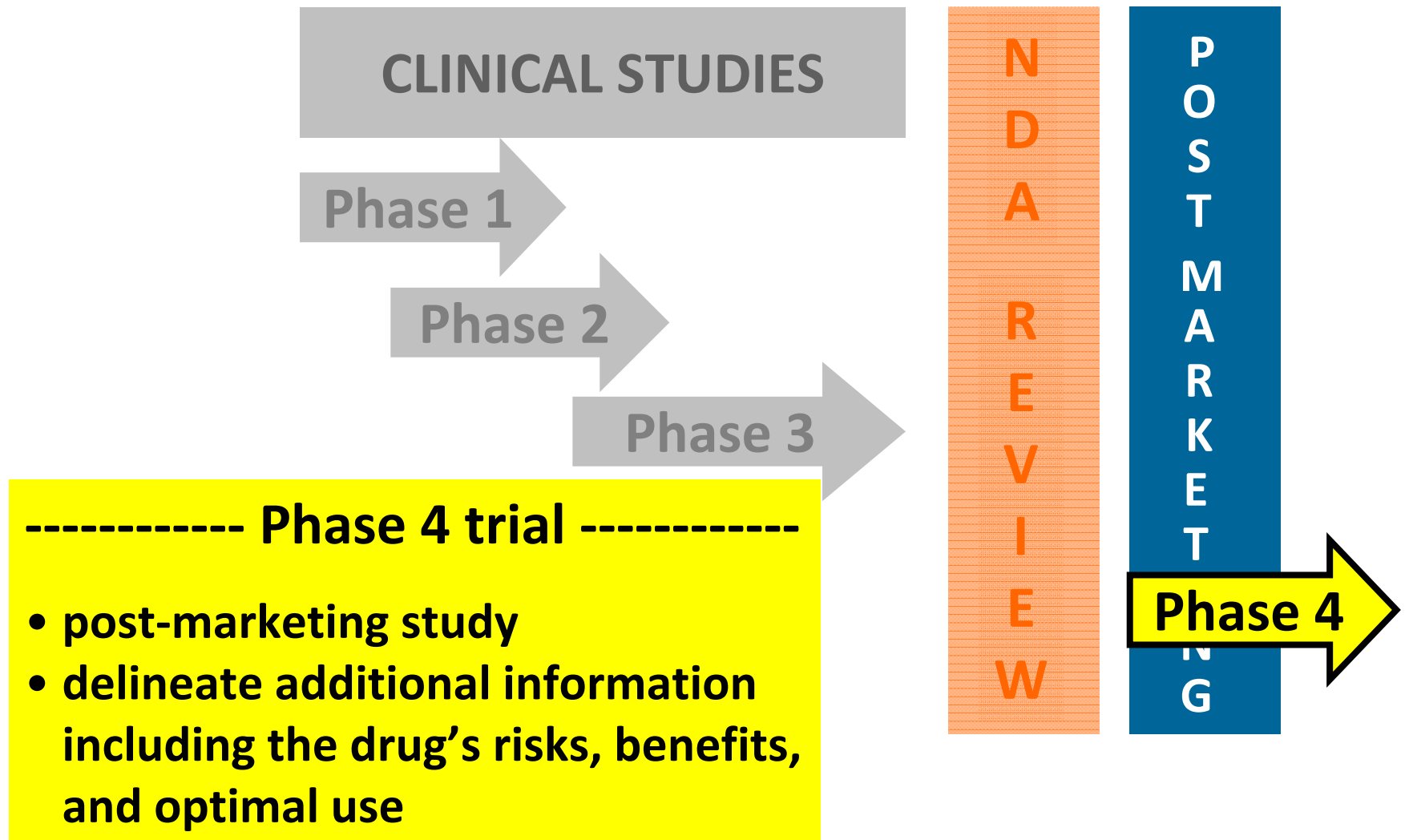
WHAT?

- expanded controlled and uncontrolled trials
- **confirm efficacy**, monitor side effects
- compare to commonly used treatments
- evaluate overall benefit-risk relationship of the drug
- gather data to inform adequate basis for labeling

New Drug Development Process



New Drug Development Process



New Drug Development

www.fda.gov

In search box, “New Drug Development and Review”

The screenshot shows the FDA website's search interface. At the top, the FDA logo and name are displayed. A search bar contains the text "New Drug Development and" with a "SEARCH" button to its right. Below the search bar, a navigation menu includes links for Home, Food, Drugs, Medical Devices, Vaccines, Blood & Biologics, Animal & Veterinary, Cosmetics, Radiation-Emitting Products, and Tobacco Products. The "Drugs" link is highlighted. Below the navigation menu, the page title "New Drug Development and Review Process" is shown. The main content area contains three paragraphs of text describing the CDER's mission, the benefits of the pharmaceutical system, and the drug approval process. On the left side, there is a sidebar with a "Development & Approval Process (Drugs)" section containing links for "Small Business Assistance" and "General Information on Small Business Assistance". Below this is a "Resources for You" section with a link for "Stay Informed about Small Business".

Development & Approval Process (Drugs)

- Small Business Assistance
- General Information on Small Business Assistance

Resources for You

- Stay Informed about Small Business

New Drug Development and Review Process

The mission of FDA's Center for Drug Evaluation and Research (CDER) is to assure that safe and effective drugs are available to the American people. This section has definitions and interactive charts which provide basic information for small business and others who are unfamiliar with the new drug development and approval process.

American consumers benefit from having access to the safest and most advanced pharmaceutical system in the world. The main consumer watchdog in this system is CDER. The center's best-known job is to evaluate new drugs before they can be sold. The center's evaluation not only prevents quackery, but also provides doctors and patients the information they need to use medicines wisely. CDER ensures that drugs, both brand-name and generic, work correctly and that their health benefits outweigh their known risks.

Drug companies seeking to sell a drug in the United States must first test it. The company then sends CDER the evidence from these tests to prove the drug is safe and effective for its intended use. A team of CDER physicians, statisticians, chemists, pharmacologists, and other scientists reviews the company's data and proposed labeling. If this independent and unbiased review establishes that a drug's health benefits outweigh its known risks, the drug is approved for sale. The center doesn't actually test drugs itself, although it does conduct limited research in the areas of drug quality, safety, and effectiveness standards.

Before a drug can be tested in people, the drug company or sponsor performs laboratory and animal tests to discover how the drug works and whether it's likely to be safe and work well in humans. Next, a series of tests in people is begun to determine whether the drug is safe when used to treat a disease and whether it provides a real health benefit.



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Thank you!

New Drug Development Process

