

# Comparative Literature

Primary, secondary & tertiary sources

# Primary, secondary & tertiary sources

- Primary sources are **original materials on which other research is based.**
- They are **from the time period involved and have not been filtered through interpretation or evaluation.**
- They are usually the first formal appearance of results in physical, print or electronic format. They present original thinking, report a discovery, or share new information.

# Examples:

- Literary creation: novels, short stories, poems, etc.
- Diaries;
- Interviews (e.g., oral histories, telephone, e-mail);
- Journal articles published in peer-reviewed publications;
- Letters;
- Newspaper articles written at the time;
- Proceedings of Meetings, conferences and symposia;
- Records of organizations, government agencies (e.g. annual report, treaty, constitution, government document);
- Speeches;
- Survey Research (e.g., market surveys, public opinion polls);
- Web site.

- **Secondary sources** are less easily defined than primary sources.
- Generally, they are **accounts written after the fact with the benefit of hindsight.**
- They are **interpretations and evaluations of primary sources.**
- Secondary sources are not evidence, but rather **commentary on and discussion of evidence.**
- However, what some define as a secondary source, others define as a tertiary source. Context is everything.

# Examples

- Bibliographies (also considered tertiary);
- Biographical works;
- Commentaries, criticisms;
- Dictionaries, Encyclopedias (also considered tertiary);
- Histories;
- Literary criticism such as Journal articles;
- Monographs, other than fiction and autobiography;
- Web site (also considered primary).
- Article Indexes/Databases: These can be abstracting or citation.

- Tertiary sources consist of information which is a **distillation and collection of primary and secondary sources.**

# Examples

- Dictionaries and Encyclopedias (also considered secondary);
- Directories;
- Fact books;
- Guidebooks;
- Manuals;
- Textbooks

## Research Information Timeline

(adapted from the International University of Bremen)

PRIMARY	<b>RESEARCH AND DEVELOPMENT</b> A researcher makes a discovery, develops a product or a new methodology, etc.
	<b>INVISIBLE COLLEGE, EMAIL, COLLEAGUES</b> Information about the research goes out to the "invisible college"; results/discussion is shared with the colleagues who work with the researcher, individuals in contact with the researcher via email, etc.
	<b>CONFERENCE (PROCEEDINGS/PREPRINT), RESEARCH/TECHNICAL REPORT</b> The researcher presents findings at a conference or writes a research report
	<b>JOURNAL ARTICLE</b> The finding is published in a scholarly/peer-reviewed journal. Journal articles become <b>secondary</b> sources when they are <u>review</u> articles
SECONDARY	<b>INDEXING (E.G., MEDLINE)</b> With the growing availability of electronic publishing, the indexing of some scholarly journals and conference proceedings can occur before the article is published in print, though there are some that may take longer to be indexed (e.g. foreign publications).
	<b>BOOK/TEXTBOOK</b> The research finding may be published later in book form
TERTIARY	<b>SUMMARIZATION: ENCYCLOPEDIA, ALMANACS, BIBLIOGRAPHIES</b> After several years, the finding could be summarized for an encyclopedia, manual or almanac

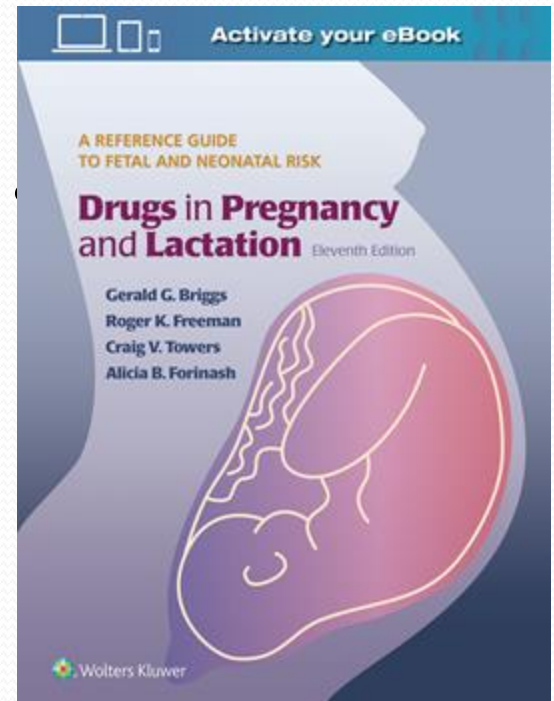


# Tertiary resources

- The first place to start when researching a medication or health related question
- Provide an overview of a topic, no details as in primary literature (Ex clinical trials)
- Provide basis for a more thorough information search
- Might not answer the questions fully

# Tertiary resources

- Many referred to as compendia, consisting of a series of monographs (drug descriptions), following a standard format
- Available electronically or in print
- Some have more specific information on medications
  - Medications use during pregnancy



# Tertiary resources

- General drug information resources
  - AHFS Drug information (American Society of Health System Pharmacists) [ahfs.org](http://ahfs.org)
    - [Ahfsdruginformation.com](http://Ahfsdruginformation.com)
    - FDA approved and off label use of drugs
  - Clinical pharmacology (Elsevier)
    - [Clinicalpharmacology.com](http://Clinicalpharmacology.com)
  - [ClinicalTrials.gov](http://ClinicalTrials.gov)
    - NIH registry of clinical studies
    - Negative data
  - DailyMed
    - [Dailymed.nlm.nih.gov](http://Dailymed.nlm.nih.gov)
    - Prescribing information for FDA approved drugs

# Tertiary resources

- General drug information resources
  - Drugs.com
    - Drug monographs, tablet identification, interactions checker
    - Limitation inclusion of ads
  - Epocrates
    - Online.epocrates.com
    - Monographs, interaction, safety, tablet identification
    - Diseases
  - Medscape
  - RxNav
    - A browser for several drug information sources
    - <https://rxnav.nlm.nih.gov>

# Tertiary resources

- General drug information resources
  - Drug facts and comparison (Wolters Kluwer Health)
    - [www.factsandcomparison.com](http://www.factsandcomparison.com)
  - Drug information handbook (Lexicomp)
  - Martindale: The Complete Drug Reference
    - Pharmapress.com
  - Micromedex
    - Micromedex.com
    - FDA approved and off label uses, PK, safety, pharmacology..
  - Prescriber's Digital Reference (PDR)
    - PDR.net

# Tertiary resources

- Information specific resources
  - Drug reactions
    - Litt's Drug Eruptions and Reactions Manual
    - Meyler's Side Effects of Drugs
    - FDABLE.com
  - Compatibility and stability of parenteral products
    - Handbook on Injectable Drugs
    - King Guide to Parenteral Admixtures
  - Drug interactions
    - Drug Interaction Facts
    - Drug interaction Analysis and Management
    - Evaluation of Drug Interactions
    - Stockley's Drug Interactions

# Tertiary resources

- Information specific resources
  - Extemporaneous compounding
    - A practical guide to Contemporary Pharmacy Practice
    - Art, Science and Technology of Pharmaceutical Compounding
    - Extemporaneous Formulations for Pediatric Geriatric and Special Needs patients
    - Pediatric Drug Formulations
    - Trissel's Stability of Compounded Formulations

# Tertiary resources-specific info

- Herbal, natural or alternative medicine
  - Natural Medicines Comprehensive Database
    - [Naturaldatabase.therapeuticsearch.com](http://Naturaldatabase.therapeuticsearch.com)
  - Natural Standard
- International drug products
  - Index Nominum: International Drug Directory
    - [www.medpharm.de](http://www.medpharm.de)
  - Martindale
  - [Identadrug.com](http://Identadrug.com)
- Pediatric dosing
  - BNF for Children
  - Harriet Lane handbook
  - Pediatric and Neonatal Dosage Handbook



# Tertiary resources

- Pregnancy and lactation
  - Drugs in Pregnancy and Lactation (Lippincott)
  - Lact-Med
  - Medications and Mother's Milk
- Therapeutics
  - Applied Therapeutics: The Clinical Use of Drugs
  - Goodman and Gilman's Pharmacological Basis of Therapeutics
  - Pharmacotherapy a Pathophysiological Approach
  - Pharmacotherapy Principles and Paractice

- LitCovid
  - PubMed articles on COVID-19 from <https://www.ncbi.nlm.nih.gov/research/coronavirus/>
- John Hopkins antibiotic guide
  - <http://hopkins-abxguide.org>

# Tertiary resource

- Benefits
  - Provide a quick summary of a topic
  - Convenient easy to use and familiar to practitioners
- Examples include:
  - Textbooks
  - Compendia
  - Review articles
  - Clinical guidelines

# Tertiary Resources

- Limitations
  - Can be outdated (especially print)
  - Can be incomplete
    - Space limitation
    - Incomplete literature search by author
  - Error in transcription
  - Human bias
  - Incorrect interpretation of information
- Review the content carefully and Consult more than one resource.

# Secondary Resources

- Used by clinicians to locate clinical studies or other original research (Primary research)
- Different secondary sources can vary in the overall number and types of journals indexed
  - Multiple secondary sources should be used for a complete search

# Secondary Resources

- Literature that indexes the primary with the goal of directing the user to relevant literature
  - Indexing providing bibliographic citation information, (title, author,..)
  - Abstracting, providing a brief description of the information provided by the article

# Searching secondary Resources

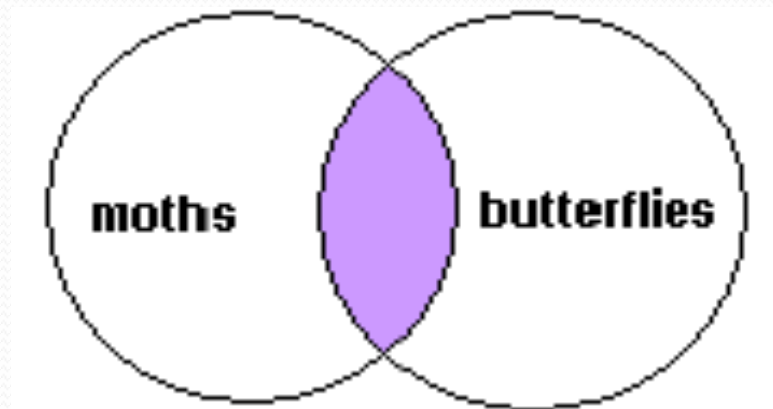
- Choose the correct terms/ keywords
- Majority of sources use the Boolean operators to broaden or limit the results obtained  
(AND, OR, and NOT)

## **AND**

- Using AND to combine search terms narrows the search
- Results that contain all of the terms are obtained



- **AND**  
**moths AND butterflies**

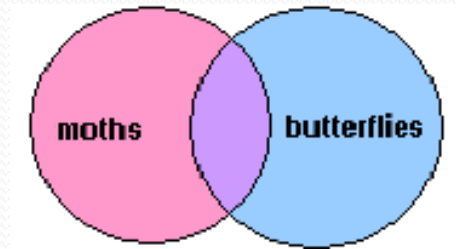


- And means less

## OR

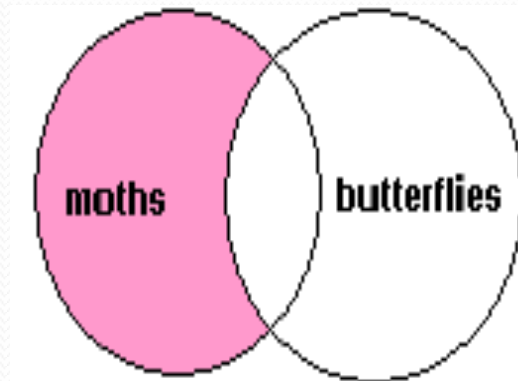
- The operator OR broadens the search to include records containing either keyword, or both. The OR search is particularly useful when there are several common synonyms for a concept, or variant spellings of a word.


- **OR**  
moths OR butterflies

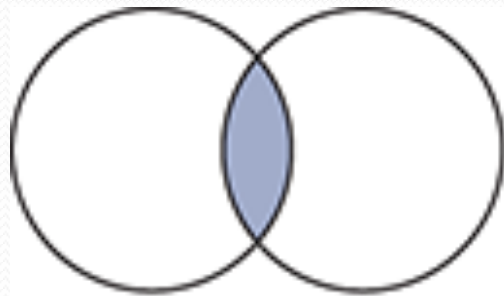


- **OR means MORE.**

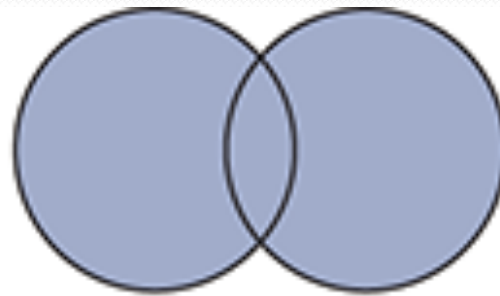
- **NOT**  
Limits the obtained results
- Should be used cautiously because it might narrow the results, missing relevant articles



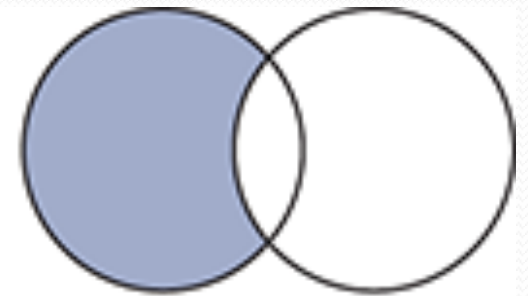
- 
- Hypertension AND propranolol OR enalapril
  - “hypertension” AND (“propranolol OR enalapril”)



AND



OR



NOT

Source: Patrick M. Malone, Meghan J. Malone, Sharon K. Park:  
*Drug Information: A Guide for Pharmacists, 6e*  
Copyright © McGraw-Hill Education. All rights reserved.

# Searching secondary Resources

- Truncation symbol

Example: pharm\*

Includes: pharmacy, pharmacies, pharmacist, pharmacology....

- Consider synonyms

Example Side effects, adverse effects, toxicity...

- Using limits:

Example: full text articles, type of publication (review, clinical trials, meta analysis), date, etc..

# Secondary resources

- [Cochrane.org](http://Cochrane.org)
  - Indexes, abstracting and systematic reviews
  - Medical treatments, conditions and alternative therapies
- [Scholar.google.com](http://Scholar.google.com)
- Medline / Pubmed
  - US National library of medicine
  - MeSH database (Medical subject heading)
- [Embase.com](http://Embase.com)
- International Pharmaceutical abstracts (IPA)
- Iowa drug information system (IDIS)




# Primary resource

- Clinical research studies and reports
  - Both published and unpublished
- Not all articles in journals are primary
  - Review articles or editorials are NOT primary literature

# Primary resource

- Advantages for using primary literature
  - Access to detailed information about a topic
  - More recent
  - Ability to personally assess the validity and applicability of study results
- Disadvantages of using primary literature alone
  - Misleading conclusions based on only one trial
  - Needed skills to evaluate the literature
  - Time needed

- 
- Assess the question being asked to determine the resource type necessary for the answer
  - For general information: Tertiary resource might be adequate
  - For specific information: A more specific resource is needed

# Alternative resources

- Sometimes a general internet search is needed when other resources do not provide the needed answers
- Criteria used to determine the quality of online material
  - Is the source credible without promoting one particular treatment?
  - Is the information accurate and current?
  - Does the site link to other nonaffiliated sites that consistently provide good information?
  - Is the information appropriately detailed and referenced?
  - Is it possible to identify and contact the author?
- <https://medlineplus.gov/evaluatinghealthinformation.html>

# Search Engines

- Search engines are programs that search documents for specified keywords and return a list of the documents where the keywords were found.
- A *search engine* is a general class of programs, however, the term is often used to specifically describe systems like Google, Bing and Yahoo! Search that enable users to search for documents on the World Wide Web.

- Search engines are the key to finding specific information on the vast expanse of the World Wide Web. Without sophisticated search engines, it would be impossible to locate anything on the Web without knowing a specific URL.

# Drawbacks..

- Not 100% accurate or specific
- irrelevant pages
- Time consuming.

# Why to evaluate online resources?

- On the Internet anyone can pose as an authority.
- There are no standards or controls on the accuracy of information available via the Internet.
- The Internet can be used by anyone as a sounding board for their thoughts and opinions



# Cont.

- Because of this variety, evaluation is essential. You need to find out if your resources are high-quality or low-rent. Although all information needs to be evaluated, pay special attention to the information you find on websites

# 1. How did you find the page?

- Was it found via a search conducted through a search engine? Unlike library databases, the accuracy and/or quality of information located via a search engine will vary greatly.
- Was it recommended by a faculty member or another reliable source?
- Was it cited in a scholarly or credible source?
- Was it a link from a reputable site?

## 2. What is the site's domain?

- Decoding the URL:
- **org** :An advocacy web site, such as a not-for-profit organization.
- **.edu** :A site affiliated with a higher education institution.
- **.gov**: A federal government site.

## 2. What is the site's domain?

In general websites maintained by governmental agencies (.gov) educational entities (.edu) or professional and nongovernmental organizations (.org) tend to provide higher-quality reliable and accurate health information

# Cont.

- **.com** : A business or commercial site.
- **.net**:A site from a network organization or an Internet service provider.;
- **.il.us** :A state government site, this may also include public schools and community colleges.
- **.uk** (United Kingdom) : A site originating in another country (as indicated by the 2 letter code).
- **~**:The tilde usually indicates a personal page.

# 3. Who is the author of the site?

- Is the author's name visible? Does the author have an affiliation with an organization or institution?
- Does the author list his or her credentials? Are they relevant to the information presented?
- Is there a mailing address or telephone number included, as well as an e-mail address?

# 4. Is the information accurate and objective?

- Are sources of factual information or statistics cited? Is there a bibliography included?
- Does the page exhibit a particular point of view or bias?
- Is the site objective? Is there a reason the site is presenting a particular point of view on a topic?

# cont

- Does the page contain **advertising**? Is there a relationship between the advertising and the content? or is the advertising simply providing financial support for the page?



# 5. Is the page current?

- this is both an indicator of the timeliness of the information and whether or not the page is actively maintained
- Is the information provided current?
- When was the page created?
- Are dates included for the last update or modification of the page?
- Are the links current and functional?

## 6. Does the page function well?

- The ease of use of a site and its ability to help you locate information you are looking for are examples of the site's functionality:
- Is the site easy to navigate? options to return to the home page, tops of pages, etc.?
- Is the site searchable?
- Does the site include a site map or index?

# 7. Is this what you need?

- Is the information relevant to your topic and assignment?
- Who is the intended audience?(customers?)
- Is the material presented at an appropriate level?  
(magic words?)
- Is the information complete? Is it unique?

# Evaluating content of internet based medication and Health information

1. Content
2. Currency
3. Author/source
4. References/documentation
5. Site design and organization

# 1. Content

- Appropriate level for the intended audience
- Accurate, complete information presented in a logical manner that is balanced and neutral
- Evidence of peer-review or editorial board.
- Overly positive or emotional words should be avoided

Ex: “Amazing results”, “miracle treatment”

- No grammatical or spelling errors
- Opinions labeled as opinions and not presented as facts
- Conclusions should be concise with factual information
- Any hyperlinks should link to relevant and reputable websites

## 2. Currency

- Date
- Review information presented
- Checking reference list

# 3. Author

- The author of the website should be identified with credentials and appropriate background
- If the author is an organization it should be reputable, and should present information related to its function
  - Ex: American Cancer Society providing chemotherapy information
- Educational purposes not product promotion
- Free of bias

# 4. References

- Complete citations so that information can be verified
- Reputable sources
- Therapy related information should refer to clinical trials in humans



# 5. Site design

- Easy navigation
- Index or topic outline for lengthy topics
- Overly flashy graphics should be avoided
- There should be a disclaimer that the health information is not intended as medical advice or to replace a healthcare provider
- Privacy policy should be available

# TIP:

- **AAOCC** criteria.
- **A: Authority** – publisher
- **A: Accuracy**- error free, statistics, evidence, references, citations.
- **O: Objectivity** -purpose, author's intentions, bias, fact vs. opinion
- **C: Currency** current information, still valid, subsequent research.
- **C: Coverage**- relevant, intended audience, complete information.

# For further information

- Medical library association

[www.mlanet.org/resources/userguide.html](http://www.mlanet.org/resources/userguide.html)

- National library of medicine MedlinePlus

[www.nlm.nih.gov/medlineplus/healthywebsurfing.html](http://www.nlm.nih.gov/medlineplus/healthywebsurfing.html)

- HONcode

<https://www.hon.ch/Global/pdf/TrustworthyOct2006.pdf>

# Useful sites for clinicians

- Government websites
  - [www.ahrq.gov](http://www.ahrq.gov)
  - [www.cdc.gov](http://www.cdc.gov)
  - [www.clinicaltrials.gov](http://www.clinicaltrials.gov)
  - <http://dietarysupplements.nlm.nih.gov/dietary>
  - [www.fda.gov](http://www.fda.gov)
  - [www.healthfinder.gov](http://www.healthfinder.gov)
  - [www.nlm.nih.gov/medlineplus](http://www.nlm.nih.gov/medlineplus)
  - [www.cancer.gov](http://www.cancer.gov)
  - <http://nccam.nih.gov>
  - <http://toxnet.nlm.nih.gov>

# Cont.

- Non-government websites
  - [www.docguide.com](http://www.docguide.com)
  - [www.mdconsult.com](http://www.mdconsult.com)
  - [www.medscape.com](http://www.medscape.com)
  - [www.rxlist.com](http://www.rxlist.com)
  - <http://nationalstandard.com>

**PLEASE DON'T  
CONFUSE YOUR  
GOOGLE SEARCH  
WITH MY**

**MEDICAL DEGREE** 🔍

# Drug Evaluation and Regulation

- Drugs are regulated in many countries by governmental agencies. In the US by the FDA.
- Before a new drug can be approved for regular therapeutic use in humans, a series of animal and experimental human studies must be carried out.
- Safety and efficacy! (even before human testing).
- The cost of developing a new drug, including false starts and discarded molecules, is often several hundred million dollars.

# The development and testing process required for a new drug


- Preclinical studies (in vitro, animal testing).  
(0-4 years) IND.
- Clinical testing (4-10 years.)

Phase 1 : healthy subjects : safety, pharmacokinetics  
(20-100 subjects)

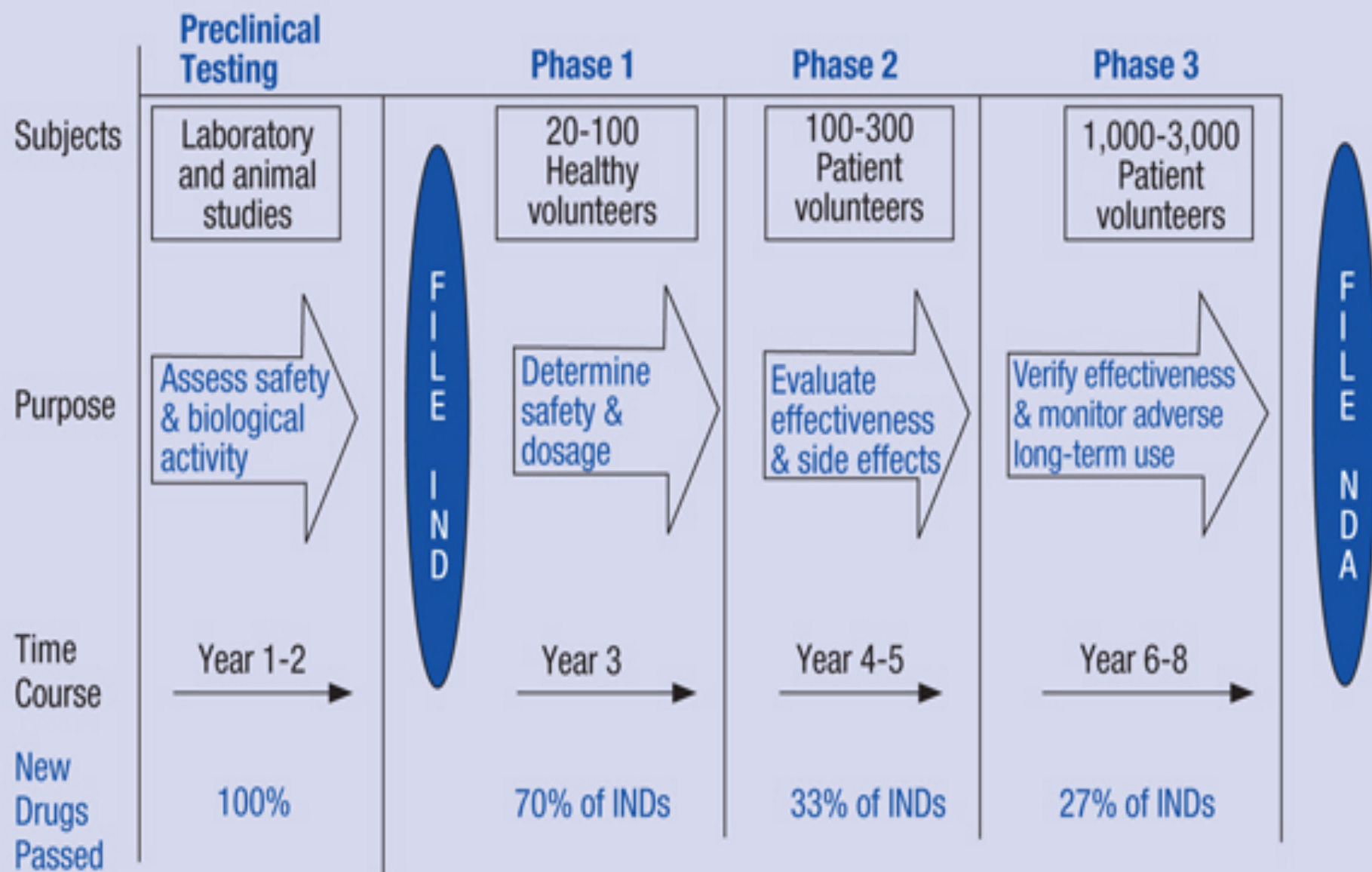
Phase 2: patients (100-200) : efficacy

Phase 3: 1000-6000 patients. Double blind study.  
Efficacy, drug metabolism.



- 
- Postmarketing : 20 years infrequent side effect or toxicity reporting.
  - 20 years patency then generics become available.
  - Generics require bioequivalent studies.

# The FDA Drug Approval Process



**It takes a new drug eight or more years of testing before gaining FDA approval.**