Introduction: What is MeSH?

This brief tutorial is designed to help you:

* Understand the purpose and structure of the Medical Subject Headings (MeSH) and
* Use MeSH to search MEDLINE®/PubMed® for medical literature and information.

[**MeSH**](https://www.nlm.nih.gov/mesh/meshhome.html)**is:**

* an acronym for **Medical Subject Headings**.
* the U.S. National Library of Medicine's controlled vocabulary (thesaurus).
* a vocabulary that gives uniformity and consistency to the indexing and cataloging of biomedical literature.
* a distinctive feature of [MEDLINE](https://www.nlm.nih.gov/bsd/medline.html).
* arranged in a hierarchical manner called the MeSH Tree Structures.
* updated annually

**Who uses MeSH?**

* Searchers of MEDLINE/PubMed, library catalogs, and other databases use MeSH to assist with subject searching.
* National Library of Medicine (NLM) indexers use MeSH to describe the subject content of journal articles for MEDLINE (see the [MEDLINE Indexing Online Training Course](https://www.nlm.nih.gov/bsd/indexing/training/USE_010.html)).
* Catalogers use MeSH to describe books and audiovisuals in the NLM and other medical library collections (see the [Using Medical Subject Headings (MeSH®) in Cataloging](https://www.nlm.nih.gov/tsd/cataloging/trainingcourses/mesh/) online training course).

**MeSH Vocabulary includes four types of terms:**

* Headings
* Subheadings
* Supplementary Concept Records
* Publication Characteristics (or Types)

The following pages describe each of these types of terms.

**MeSH headings** (also called "main headings" or "descriptors") represent concepts found in the biomedical literature.

Examples:

* Body Weight
* Kidney
* Dental Cavity Preparation
* Self Medication
* Radioactive Waste
* Brain Edema

[Subheadings](https://www.nlm.nih.gov/mesh/topsubscope.html) — (also called qualifiers) are attached to MeSH headings to describe a specific aspect of a concept

Examples:

* adverse effects
* diagnosis
* metabolism
* therapy

Supplementary Concept Records are terms in a separate thesaurus from the Medical Subject Headings. These are primarily substance terms, but also include some protocols and rare disease terms. These terms are updated weekly.

Examples:

* cordycepin
* valspodar
* tacrolimus binding protein 4
* MOPP protocol
* Snyder Robinson syndrome

[Publication Characteristics](https://www.nlm.nih.gov/mesh/pubtypes.html) or (Publication Types) describe the type of publication being indexed (i.e., the format of the publication) or characteristics of the research (i.e., the research design).

Examples:

* Letter
* Review
* Randomized Controlled Trial

There are also Publication Type terms that describe what type of organization funded the research

# MeSH Tree Structures

MeSH headings are organized in a "tree" with 16 main branches:

A. Anatomy  
B. Organisms  
C. Diseases  
D. Chemicals and Drugs  
E. Analytical, Diagnostic and Therapeutic Techniques and Equipment  
F. Psychiatry and Psychology  
G. Phenomena and Processes  
H. Disciplines and Occupations  
I. Anthropology, Education, Sociology and Social Phenomena  
J. Technology, Industry, Agriculture  
K. Humanities   
L. Information Science   
M. Named Groups  
N. Health Care  
V. Publication Characteristics   
Z. Geographicals

Each branch has many levels of sub-branches, and each heading has a position in the hierarchy.

* Anatomy
  + Body Regions
    - Torso
      * **Back**
        + Lumbosacral Region
        + Sacrococcygeal Region

Some terms appear in more than one branch of the tree. For example:

* Anatomy
  + Body Regions
    - Head
      * **Ear**
* Anatomy
  + Sense Organs
    - **Ear**
      * Ear, External +
      * Ear, Middle +
      * Ear, Inner +

The hierarchy allows a MEDLINE/PubMed search of a broader term to include the narrower terms in all branches automatically. This is known as "exploding." For example, a search of ear in PubMed would automatically explode to include records indexed with Ear, External; Ear, Middle; and Ear, Inner, as well as all narrower terms under each of these.

**Subheading Groupings**

Subheadings are arranged in [logical hierarchical groupings](https://www.nlm.nih.gov/mesh/subhierarchy.html) (families). For example:

* therapeutic use
  + administration & dosage
  + adverse effects
  + poisoning

A search of the subheading therapeutic use in PubMed would automatically explode to retrieve citations indexed with the subheadings administration & dosage, adverse effects, and poisoning.

Not all subheadings are placed in these groupings (as they do not logically fit)

To better understand how to use MeSH when searching MEDLINE, it is helpful to understand the basic principles of subject indexing for MEDLINE.

### **Subject indexing includes:**

* reviewing a journal article (or other material such as a letter or editorial)
* determining its subject content, and
* describing that content using a controlled vocabulary.

### **The purpose of indexing with controlled vocabulary is:**

* to facilitate search retrieval by eliminating (or accounting for) the use of variant terminology for the same concept

### **The types of vocabulary terms are:**

* MeSH headings ("descriptors")
* Subheadings ("qualifiers")
* Check tags
  + A special class of MeSH headings that must be considered routinely for every article
    - Primarily headings covering species (including Humans), sex, and human age groups
    - Also cover:
      * historical time periods
      * pregnancy
  + Usually are indexed even if merely mentioned, unlike other MeSH headings
  + For review articles, usually are indexed only if the main point of the article
  + Humans is not selected for articles involving institutions that serve humans, e.g., clinics, hospitals
  + Some check tags (e.g., Animals, Humans, Male, Female) can never be designated as the main point of the article
* Publication Characteristics (or Types): describe the item being indexed rather than its topic.   There are 3 main categories:
  + Publication Components, e.g., English Abstract
  + Publication Formats, e.g., Lectures, Letter
  + Study Characteristics, e.g., Clinical Trial, Twin Study
* Supplementary Concept Records: allow the indexing and searching of non-MeSH headings, primarily substances but also some protocols and rare disease terms

### **The philosophy of MEDLINE indexing is that:**

* The content and format of each item are fully and adequately described,
* The most specific vocabulary terms are used,
* The indexer's job is only to index, not to interpret, evaluate or diagnose

The MEDLINE Indexing Process: Determining Subject Content

NLM's MEDLINE indexers use the following steps to determine the subject content of an article:

1. Read carefully and understand the title.
2. Read the introduction, looking for the purpose of the article.
3. Scan the body of the article, focus on the Materials & Methods section and the Results section.
4. Note section headings, paragraph headings; italics, boldface; charts, plates, tables, illustrations; laboratory methods, case reports, etc.
5. Select for indexing only those subjects actually discussed as opposed to those subjects merely mentioned.
6. Read the summary or conclusions of the author to determine whether the stated purpose was achieved. Do not index implications or suggested future applications. Do not index conclusive statements not supported by the text.
7. Scan the abstract for items missed, verifying that the text supports indexing these concepts.
8. Scan the author's own indexing or the keywords supplied by the publisher to see whether the concepts chosen are actually discussed in the text.
9. Scan the bibliographic references supplied by the author for clues and further corroboration

NLM's MEDLINE indexers use the [MeSH Browser](https://www.nlm.nih.gov/mesh/MBrowser.html), an online vocabulary look-up aid with virtually complete MeSH records, to find the term that best describes the concept to be indexed. They view the full record: scope note, annotation, See Also terms, etc., for hints on indexing.

Indexers use the most specific term available to describe a concept.

Example:

"The liver disease, chronic hepatitis B" is indexed as:

**Hepatitis B, Chronic**

rather than Liver Diseases or Hepatitis or Hepatitis B

Indexers use more than one heading if a single heading does not cover the concept (see [Coordination](https://www.nlm.nih.gov/bsd/disted/meshtutorial/principlesofmedlinesubjectindexing/coordination/index.html)).

Example:

"Mucinous adenocarcinoma of the ovary" is indexed as:

**Adenocarcinoma, MucinousOvarian Neoplasms**

If an exact heading does not exist, indexers use the MeSH Browser and the hierarchy to find the most specific heading available.

Example:

"Cranial radiation therapy" is indexed as

**Cranial Irradiation**

which is under the Radiotherapy branch of the MeSH tree

Major Topics

* Asterisks on MeSH headings and subheadings (e.g., Wound Healing/radiation effects\*) designate that they are the major topics of the article, usually obtained from the title and/or statement of purpose
* Non-major (non-asterisked) headings and subheadings are usually additional topics substantively discussed within the article, terms added to qualify a major topic, or [check tags](https://www.nlm.nih.gov/bsd/disted/meshtutorial/principlesofmedlinesubjectindexing/principles/03.html#check). Check tags are never major topics.
* The only indexed MEDLINE citations without an asterisked heading are some biographies in which the subject’s name may be considered the only major point.
* Supplementary concept headings cannot be asterisked or carry subheadings.   However, they are mapped to a MeSH heading that is automatically added to the citation. The mapped MeSH heading can carry those attributes.

**Gene Links**

Citations for articles in which the function of one or more genes and/or proteins is a major topic are linked to entries in the NCBI [Gene](https://www.ncbi.nlm.nih.gov/gene)database

Coordination

Most concepts cannot be adequately described with a single MeSH term. Coordination is the use of a combination of the appropriate MeSH headings, subheadings, and check tags to index a concept as specifically as possible.

Coordination can be accomplished by:

* Using a subheading to describe a specific aspect of a MeSH heading
* Using two MeSH headings
* Coordinating subheadings on two or more headings
* Coordinating a major (asterisked) MeSH heading with a non-major (non-asterisked) MeSH heading that further describes the concept
* Coordinating a heading with one or more check tags
* Indexing a "pre-coordinated" MeSH heading which combines two concepts into one

The following pages show examples of each type of coordination.

Using a subheading to describe a specific aspect of a MeSH heading:

**Example:**

"Diagnosis of a cough" is indexed as:

**Cough/diagnosis**

Using two MeSH headings:

**Example:**

"The medical staff in teaching hospitals" is indexed as:

**Medical Staff, Hospital  
Hospitals, Teaching**

Coordinating subheadings on two or more headings:

/drug therapy on a disease term usually requires /therapeutic use on one or more drug terms.

**Example:**

"Treatment of HIV infections with HIV protease inhibitors" is indexed as:

**HIV Infections/drug therapy  
HIV Protease Inhibitors/therapeutic use**

/metabolism on an endogenous compound may require /metabolism on an organ, an organism, and/or a disease term.

**Example:**

"Inability to metabolize copper" (as in Wilson's Disease) is indexed as:

**Copper/metabolism  
Liver/metabolism  
Hepatolenticular degeneration/metabolism**

/pathology on a disease term often requires /pathology on an organ term.

**Example:**

**Myopia/pathology  
Cornea/pathology**