

*TTUHSC Libraries*  
*presents*

*Searching PubMed®*

To begin...

Texas Tech University Health Sciences Center ::  
www.ttuhscc.edu/libraries/

**TEXAS TECH UNIVERSITY  
HEALTH SCIENCES CENTER™**

**RESOURCES...**

- About the Libraries
- Site Map
- Contact the Libraries
- Ask A Librarian
- Audio Guides
- Guides & Tutorials
- Distance Students
- EBM OSCE Instruction
- Library Courses
- HEALTH SCIENCES CENTER...**
- HSC Home
- Welcome to the HSC

**Libraries**

**FACTS AT A GLANCE**

What's New:

- MDConsult is now Clinical
- Librarian LiveChat (has been launched)
- More news...

The TTUHSC Delia ...-Gallo Library of El Paso ... the Paul L. Foster School of Medicine, the Gayle Greve Hunt School of Nursing, and health professionals throughout the

**RESEARCH TOOLS...**

- Library Catalog
- Textbooks
- Databases**
- Dissemination
- eJournals
- Online Multimedia
- Public (non-TTUHSC) Access
- Other Resources

**LIBRARY SERVICES...**

- Bibliographic Tools
- Downloads and Tools
- Interlibrary Loan (ILL)
- Reference Services
- Librarians @ Your Service

**NEWS & ANNOUNCEMENTS...**

- Ask A Librarian
- Off-campus Login (via eRaider)
- Mobile Resources
- Medline Plus
- TeamViewerQS 8 - Win [ZIP]
- TeamViewerQS 8 - Mac [ZIP]
- NIH Clinical Alerts
- Library Cards

**SEARCH...**

Search TTUHSC **GO**

- directory
- maps
- general contacts
- site map

**Accreditation**

- The Daily Dose
- Emergency Preparedness
- Compliance Hotline

**Search:**  **Go**

☒ Keywords ☐ MeSH ☐ PubMedID (PMID)

**Popular resources by school**

Allied Health Biomedical Medicine Nursing Pharmacy

**We're social!**

Facebook Twitter News Events Outages

Hover mouse over Databases

Texas Tech University Health Sciences Center ::  
www.ttuhscc.edu/libraries/

# TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER™

**RESOURCES...**


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- Site Map
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- EBM OSCE Instruction
- Library Courses

**HEALTH SCIENCES CENTER...**

- HSC Home
- Welcome to the HSC
- Office of the President
- Campuses
- Schools
- HSC Info For
- Centers & Institutes
- Research
- Administration
- Human Resources
- Libraries
- Accreditation
- The Daily Dose
- Emergency Preparedness
- Compliance Hotline

## Libraries

**FACTS AT A GLANCE**



Education Building (N)

**PubMed** eJournals

**Search:**  
Keywords

**Allied Health Bi**

**We're social!**

Facebook Twitter News Events Outages

**RESEARCH TOOLS...**

- Library Catalog
- Textbooks
- Maximum Simultaneous Use
- Databases
  - eBooks, Theses, & Dissertations
  - eJournals
  - Online Multimedia
  - Public (non-TTUHSC) Access
- Resources
- LIBRARY SERVICES
  - Bibliography
  - Downloads and
  - Interlibrary Loan (I)
  - Reference Service
  - Librarians @ Your
- NEWS & ANNOUNCEMENT
  - Ask A Librarian
  - Off-campus Login (via eRaider)
  - Mobile Resources
  - Medline Plus
  - TeamViewerQS 8 - Win [ZIP]
  - TeamViewerQS 8 - Mac [ZIP]
  - NIH Clinical Alerts
  - Library Cards

**SEARCH...**

Search TTUHSC GO

- directory
- maps
- general contacts
- site map

**Evidence Based >>**

- PubMed**
- CINAHL Plus with Full Text
- Clinical Key [MD Consult]
- EMBASE
- Entrez
- ISI Web of Knowledge
- MICROMEDEX
- OT Search
- Ovid
- Scopus
- TexShare
- All Databases >>

Click PubMed



NCBI Resources How To Sign in to NCBI

**PubMed**  
US National Library of Medicine National Institutes of Health

PubMed

Advanced

Search

Help

**PubMed**

PubMed comprises more than 22 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

**PubReader**

A whole new way to read scientific literature at PubMed Central

**Using PubMed**

[PubMed Quick Start Guide](#)

[Full Text Articles](#)

[PubMed FAQs](#)

[PubMed Tutorials](#)

[New and Noteworthy](#)

**PubMed Tools**

[PubMed Mobile](#)

[Single Citation Matcher](#)

[Batch Citation Matcher](#)

[Clinical Queries](#)

[Topic-Specific Queries](#)

**More Resources**

[MeSH Database](#)

[Journals in NCBI Databases](#)

[Clinical Trials](#)

[E-Utilities](#)

[LinkOut](#)

You are here: NCBI > Literature > PubMed

Write to the Help Desk

**GETTING STARTED**  
NCBI Education

**RESOURCES**  
Chemicals & Bioassays

**POPULAR**  
PubMed

**FEATURED**  
Genetic Testing Registry

**NCBI INFORMATION**  
About NCBI

# PubMed Home Page

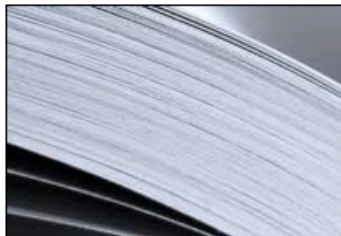
Training & Tutorials  
Variation

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National Center for Biotechnology Information, U.S. National Library of Medicine  
8600 Rockville Pike, Bethesda MD, 20894 USA



# Searching PubMed



## PubMed

PubMed comprises more than 22 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

## PubReader

A whole new way to read scientific literature at PubMed Central



### Using PubMed

[PubMed Quick Start Guide](#)[Full Text Articles](#)[PubMed FAQs](#)[PubMed Tutorials](#)[New and Noteworthy](#) 

### PubMed Tools

[PubMed Mobile](#)[Single Citation Matcher](#)[Batch Citation Matcher](#)[Clinical Queries](#)[Topic-Specific Queries](#)

### More Resources

[MeSH Database](#)[Journals in NCBI Databases](#)[Clinical Trials](#)[E-Utilities](#)[LinkOut](#)

Click MeSH Database

# MeSH Database

Terms in the database are called

*Medical Subject Headings* or *MeSH*.

is a “controlled vocabulary list” of more than 25,000 subject headings.

10-15 *MeSH* are assigned to each article in *PubMed*.

The *MeSH* index of 10-15 subject headings is like a keyword abstract of the article.

*MeSH* are updated annually in December.

# *Frequently Used Mesh Categories – 2011*

## **A Anatomy**

- A1 Body Regions
- A2 Musculoskeletal System
- A3 Digestive System
- A4 Respiratory System
- A5 Urogenital System
- A6 Endocrine System
- A7 Cardiovascular System
- A8 Nervous System
- A9 Sense Organs
- A10 Tissues
- A11 Cells
- A12 Fluids and Secretions
- A13 Animal Structures
- A14 Stomatognathic System
- A15 Hemic and Immune Systems
- A16 Embryonic Structures
- A17 Integumentary System
- A18 Plant Structures
- A19 Fungal Structures
- A20 Bacterial Structures
- A21 Viral Structures

## **B Organisms**

- B1 Eukaryota
- B2 Archaea
- B3 Bacteria
- B4 Viruses
- B5 Organism Forms

## **C Diseases**

- C1 Bacterial Infections & Mycoses
- C2 Virus Diseases
- C3 Parasitic Diseases
- C4 Neoplasms
- C5 Musculoskeletal Diseases
- C6 Digestive System Diseases
- C7 Stomatognathic Diseases
- C8 Respiratory Tract Diseases
- C9 Otorhinolaryngologic Diseases
- C10 Nervous System Diseases
- C11 Eye Diseases
- C12 Male Urogenital Diseases
- C13 Female Urogenital Diseases  
& Pregnancy Complications
- C14 Cardiovascular Diseases
- C15 Hemic & Lymphatic Diseases
- C16 Congenital, Hereditary, &  
Neonatal Diseases & Abnormalities
- C17 Skin & Connective Tissue Diseases
- C18 Nutritional & Metabolic Diseases
- C19 Endocrine System Diseases
- C20 Immune System Diseases
- C21 Disorders of Environmental Origin
- C22 Animal Diseases
- C23 Pathologic Conditions,  
Signs, and Symptoms
- C24 Occupational Diseases
- C25 Substance-Related Disorders
- C26 Wounds and Injuries

## **D Chemicals & Drugs**

- D1 Inorganic Chemicals
- D2 Organic Chemicals
- D3 Heterocyclic Compounds
- D4 Polycyclic Compounds
- D5 Macromolecular Substances
- D6 Hormones, Hormone Substitutes,  
& Hormone Antagonists
- D8 Enzymes, & Coenzymes
- D9 Carbohydrates
- D10 Lipids
- D12 Amino Acids, Peptides,  
& Proteins
- D13 Nucleic Acids, Nucleotides,  
& Nucleosides
- D20 Complex Mixtures
- D23 Biologic Factors
- D25 Biomedical and Dental Materials
- D26 Pharmaceutical Preparations
- D27 Chemical Actions and Uses

## ***Other Categories Include:***

**Analytical, Diagnostic, & Therapeutic Techniques & Equipment**

**Psychiatry and Psychology**

**Biological Sciences**

**Natural Sciences**

**Anthropology, Education, Sociology & Social Phenomena**

**Technology, Industry, Agriculture**

**Information Science**

**Named Groups**

**Health Care**

**Publication Characteristics**

**Geographic Locations**

# *Create a Search Strategy Plan*

Identify the question and key concepts:

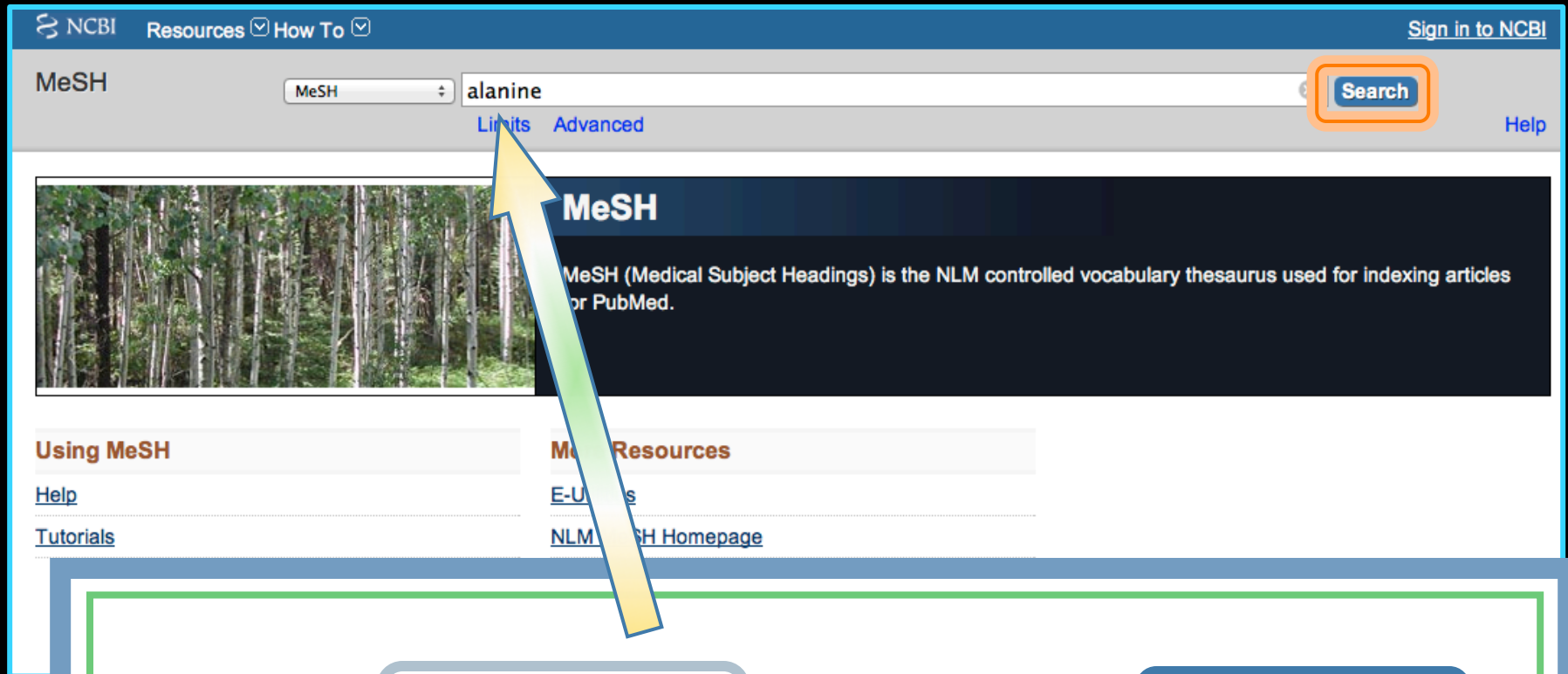
*alanine or threonine in the  
genetics of neoplasms*

Write the search program using  
medical subject headings (MeSH)

NCBI Resources ▾ How To ▾ Sign in to NCBI

MeSH MeSH alanine Search

[Limits](#) [Advanced](#) [Help](#)



**MeSH**

MeSH (Medical Subject Headings) is the NLM controlled vocabulary thesaurus used for indexing articles or PubMed.

**Using MeSH**

[Help](#)

[Tutorials](#)

**MeSH Resources**

[E-Updates](#)

[NLM MeSH Homepage](#)

Enter **alanine** and click **Search**

(Note: If there is a Boolean OR relationship, start with the "OR" statement first.)



NCBI Resources How To Sign in to NCBI

MeSH MeSH alanine Search Save search Limits Advanced Help

Display Settings: Summary, 20 per page Send to:

**Alanine**

1. A non-essential amino acid that occurs in high levels in its free state in plasma. It is produced from pyruvate by transamination. It is involved in sugar and acid metabolism, increases IMMUNITY, and provides energy for muscle tissue, BRAIN, and the CENTRAL NERVOUS SYSTEM.

**beta-Alanine**

2. An amino acid formed in vivo by the degradation of dihydrouracil and carnosine. Since neuronal uptake and neuronal receptor sensitivity to beta-**alanine** have been demonstrated, the compound may be a false transmitter replacing GAMMA-AMINOBUTYRIC ACID. A rare genetic disorder, hyper-beta-alaninemia, has been reported.  
Year introduced: 1992

**Alanine Transaminase**

3. An enzyme that catalyzes the transfer of an amino group from an amino acid to a keto acid.  
Nomenclature, 1992) E.C. 2.6.1.1  
Year introduced: 1998(1998)

PubMed search builder

Add to search builder AND Search PubMed

Find related data

Database: Select Find items

ails

# Term Definitions

1) Check the box next to the MeSH heading.



Display Settings ☒ Summary, 20 per page

Results 1 to 20 of 609

<< First < Prev Page 1 of 31 Next > Last >>

[Alanine](#)

1. A non-essential amino acid that occurs in high levels in its free state in plasma. It is produced from pyruvate by transamination. It is involved in sugar and acid metabolism, increases IMMUNITY, and provides energy for muscle tissue, BRAIN, and the CENTRAL NERVOUS SYSTEM.

☐ [beta-Alanine](#)

2. An amino acid formed in vivo by the degradation of dihydrouracil and carnosine. Since neuronal uptake and neuronal receptor sensitivity to beta-**alanine** have been demonstrated, the compound may be a false transmitter replacing GAMMA-AMINOBUTYRIC ACID. A rare genetic disorder, hyper-beta-alaninemia, has been reported.  
Year introduced: 1992

☐ [Alanine Transaminase](#)

3. An enzyme that catalyzes the conversion of L-**alanine** and 2-oxoglutarate to pyruvate and L-glutamate. (From Enzyme Nomenclature, 1992) EC 2.6.1.2.  
Year introduced: 1998(1966)

Sign in to NCBI

Search

Help

Send to: ☐

PubMed search builder

Add to search builder AND ☐

Search PubMed

Find related data

Database:

Find items

2) Then click

Add to search builder

NCBI Resources How To Sign in to NCBI

MeSH MeSH alanine Search Save search Limits Advanced Help

Display Settings: Summary, 20 per page Send to:

Results: 1 to 20 of 609 Selected: 1 << First < Prev Page 1 of 31 Next > Last >>

☒ [Alanine](#)

1. A non-essential amino acid that occurs in high levels in its free state in plasma. It is produced from pyruvate by transamination. It is involved in sugar and acid metabolism, increases IMMUNITY, and provides energy for muscle tissue, BRAIN, and the CENTRAL NERVOUS SYSTEM.

☐ [beta-Alanine](#)

2. An amino acid formed in vivo by the degradation of dihydrouracil and carnosine. Since neuronal uptake and neuronal receptor sensitivity to beta-**alanine** have been demonstrated, the compound may be a false transmitter replacing GAMMA-AMINOBUTYRIC ACID. A rare genetic disorder, hyper-beta-alaninemia, has been reported.  
Year introduced: 1992

PubMed search builder

"Alanine"[Mesh]

Add to search builder AND Search PubMed

Find related data

Database: Select

The first MeSH term is in  
the search program "box"



(Note: If there is a Boolean OR relationship, start with the "OR" statement first.)

1) Check the box next to the MeSH heading.

2) Select **OR**

The screenshot shows the NCBI MeSH search results for 'threonine'. The interface includes a search bar with 'threonine' entered, a 'Search' button, and links for 'Save search', 'Limits', and 'Advanced'. Below the search bar, there are options for 'Display settings' (Summary, 20 per page) and 'Send to' (PubMed search builder). The results list shows 'Threonine' as the first result, with a checkbox next to it. The description for 'Threonine' is: 'An essential amino acid occurring naturally in the L-form, which is the active form. It is found in eggs, milk, gelatin, and other proteins.' Below this, there is a second result, 'Protein-Serine-Threonine Kinases', with a checkbox next to it. The description for 'Protein-Serine-Threonine Kinases' is: 'A group of enzymes that catalyzes the phosphorylation of serine or threonine residues in proteins, with ATP or other nucleotides as phosphate donors. Year introduced: 1993'. On the right side of the interface, there is a 'PubMed search builder' section. It contains a text box with '"Alanine"[Mesh]' and a button labeled 'Add to search builder'. Below this button is a button labeled 'Search PubMed'. A large 'OR' button is also visible. Annotations include a green arrow pointing from the first instruction box to the checkbox next to 'Threonine', a blue arrow pointing from the second instruction box to the 'OR' button, and a yellow arrow pointing from the third instruction box to the 'Add to search builder' button.

NCBI Resources How To

MeSH MeSH threonine Search

Save search Limits Advanced Help

Display settings: Summary, 20 per page Send to: PubMed search builder

Results: 1 to 20 of 228 << First < Prev Page 1 of 12 Next > Last >>

☒ **Threonine**  
An essential amino acid occurring naturally in the L-form, which is the active form. It is found in eggs, milk, gelatin, and other proteins.

☐ **Protein-Serine-Threonine Kinases**  
2. A group of enzymes that catalyzes the phosphorylation of serine or **threonine** residues in proteins, with ATP or other nucleotides as phosphate donors.  
Year introduced: 1993

Add to search builder Search PubMed

OR

3) Then click **Add to search builder**

NCBI Resources How To Sign in to NCBI

MeSH MeSH threonine Search

Save search Limits Advanced Help

Display Settings: Summary, 20 per page Send to:

Results: 1 to 20 of 228 Selected: 1 << First < Prev Page 1 of 12 Next > Last >>

☒ [Threonine](#)

1. An essential amino acid occurring naturally in the L-form, which is the active form. It is found in eggs, milk, gelatin, and other proteins.

☐ [Protein-Serine-Threonine Kinases](#)

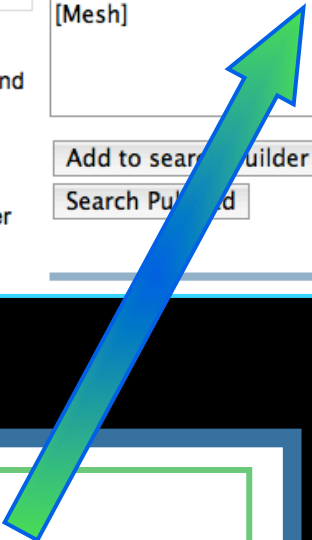
2. A group of enzymes that catalyzes the phosphorylation of serine or **threonine** residues in proteins, with ATP or other nucleotides as phosphate donors.  
Year introduced: 1993

PubMed search builder

("Alanine"[Mesh]) OR "Threonine"[Mesh]

Add to search builder OR

Search PubMed



The second MeSH term is in  
the search program "box"

## *Boolean Logic - OR*



*alanine*   OR   *threonine*

NCBI Resources How To Sign in to NCBI

MeSH MeSH neoplasms Search

Save search Limits Advanced Help

Display Settings: Summary, 20 per page Send to:

Results: 1 to 20 of 228 << First < Prev Page 1 of 12 Next > Last >>

☒ [Threonine](#)

1. An essential amino acid occurring naturally in the L-form, which is the active form. It is found in eggs, milk, gelatin, and other proteins.

☐ [Protein-Serine-Threonine Kinases](#)

2. A group of enzymes that catalyzes the phosphorylation of serine or threonine residues in proteins, with ATP or other nucleotides as phosphate donors.

Year introduced: 1993

PubMed search builder

("Alanine"[Mesh]) OR "Threonine"[Mesh]

Add to search builder OR

Search PubMed

Enter

neoplasms

and click

Search



NCBI Resources ☒ How To ☒ Sign in to NCBI

MeSH   [Save search](#) [Limits](#) [Advanced](#) [Help](#)

[Display Settings:](#) ☒ Summary, 20 per page [Send to:](#)

**Results: 1 to 20 of 177** << First < Prev Page 1 of 9 Next > Last >>

☒ [Neoplasms](#)  
Neoplasms are abnormal growth of tissue. Malignant **neoplasms** show a greater degree of anaplasia and have the properties of invasion and metastasis, compared to benign **neoplasms**.  
Year introduced: /diagnosis was NEOPLASM DIAGNOSIS 1964-1965

☐ [Neoplasms, Second Primary](#)  
2. Abnormal growths of tissue that follow a previous neoplasm but are not metastases of the latter. The second neoplasm may have the same or different histological type and can occur in the same or different organs as the previous neoplasm but in some cases arises from an independent oncogenic event. The development of the second neoplasm may or may not be related to the treatment for the previous neoplasm since genetic risk or predisposing factors may actually be the cause.  
Year introduced:

**PubMed search builder**   
("Alanine"[Mesh]) OR "Threonine"[Mesh]

**Find related data**   
Database:

Click the underlined term

MeSH

MeSH ▾

Search

[Limits](#) [Advanced](#)[Help](#)[Display Settings:](#) ▾ Full[Send to:](#) ▾**Neoplasms**

New abnormal growth of tissue. Malignant neoplasms show a greater degree of anaplasia and have the properties of invasion and metastasis, compared to benign neoplasms.

Year introduced: /diagnosis was NEOPLASM DIAGNOSIS 1964-1965

PubMed search builder options

[Subheadings:](#)

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> analysis                   | <input type="checkbox"/> ethnology              | <input type="checkbox"/> psychology        |
| <input type="checkbox"/> anatomy and histology      | <input type="checkbox"/> etiology               | <input type="checkbox"/> radiation effects |
| <input type="checkbox"/> antagonists and inhibitors |   |  |
| <input type="checkbox"/> blood                      |   |  |
| <input type="checkbox"/> blood supply               |   |  |
| <input type="checkbox"/> cerebrospinal fluid        |   |  |
| <input type="checkbox"/> chemically induced         |   |  |
| <input type="checkbox"/> chemistry                  |   |  |
| <input type="checkbox"/> classification             |   |  |
| <input type="checkbox"/> complications              |   |  |
| <input type="checkbox"/> congenital                 |   |  |
| <input type="checkbox"/> cytology                   |   |  |
| <input type="checkbox"/> diagnosis                  |   |  |
| <input type="checkbox"/> diet therapy               |   |  |
| <input type="checkbox"/> drug therapy               |   |  |
| <input type="checkbox"/> economics                  | <input type="checkbox"/> nursing                | <input type="checkbox"/> transplantation   |
| <input type="checkbox"/> education                  | <input type="checkbox"/> parasitology           | <input type="checkbox"/> ultrasonography   |
| <input type="checkbox"/> embryology                 | <input type="checkbox"/> pathology              | <input type="checkbox"/> ultrastructure    |
| <input type="checkbox"/> enzymology                 | <input type="checkbox"/> physiology             | <input type="checkbox"/> urine             |
| <input type="checkbox"/> epidemiology               | <input type="checkbox"/> physiopathology        | <input type="checkbox"/> veterinary        |
|   | <input type="checkbox"/> prevention and control | <input type="checkbox"/> virology          |

☐ Restrict to MeSH Major Topic.☐ Do not include MeSH terms found below this term in the MeSH hierarchy.

Tree Number(s): C04

Entry Terms:

**PubMed search builder**

("Alanine"[Mesh]) OR "Threonine"  
[Mesh]

[Add to search builder](#)[AND ▾](#)[Search PubMed](#)

Scroll screen down to view...

[neoplasms \(177\)](#)

MeSH

[Anal Gland Neoplasms](#)

MeSH

[anal gland neoplasms \(1\)](#)

MeSH

[threonine \(228\)](#)

MeSH

[alanine \(609\)](#)

All MeSH Categories

Diseases Category

**Neoplasms**

Cysts

Arachnoid Cysts

Bone Cysts +

Branchioma

Breast Cyst

Bronchogenic Cyst

MeSH terms arranged in  
tree structure hierarchy

Neoplasms by Site

Abdominal Neoplasms +

Anal Gland Neoplasms

Bone Neoplasms +

Breast Neoplasms +

Digestive System Neoplasms +

Endocrine Gland Neoplasms +

Eye Neoplasms +

Head and Neck Neoplasms +

Hematologic Neoplasms +

Mammary Neoplasms, Animal +

Nervous System Neoplasms +

Pelvic Neoplasms

Skin Neoplasms +

Soft Tissue Neoplasms +

Splenic Neoplasms

Thoracic Neoplasms +

Urogenital Neoplasms +

Terms are listed from  
broadest to narrowest.  
If *Abdominal Neoplasms*  
yields zero results, try using a  
broader term: *Neoplasms by Site*.

[Neoplasms, Vascular Tissue](#) +  
[Nevi and Melanomas](#) +  
[Odontogenic Tumors](#) +

[Neoplasms by Site](#)

[Abdominal Neoplasms](#) +  
[Anal Gland Neoplasms](#)  
[Bone Neoplasms](#) +  
[Breast Neoplasms](#) +  
[Digestive System Neoplasms](#) +  
[Endocrine Gland Neoplasms](#) +  
[Eye Neoplasms](#) +  
[Head and Neck Neoplasms](#) +  
[Hematologic Neoplasms](#) +  
[Mammary Neoplasms, Animal](#) +  
[Nervous System Neoplasms](#) +  
[Pelvic Neoplasms](#)  
[Skin Neoplasms](#) +  
[Soft Tissue Neoplasms](#) +  
[Splenic Neoplasms](#)  
[Thoracic Neoplasms](#) +  
[Urogenital Neoplasms](#) +

[Neoplasms, Experimental](#)

[Carcinoma 256, Walker](#)  
[Carcinoma, Brown-Pearce](#)  
[Carcinoma, Ehrlich Tumor](#)

**Note:**

PubMed automatically  
OR's indented terms  
under a broader term...

... *unless* you select  
the following command

☐ epidemiology

☐ physiopathology

☐ prevention and control

☐ Restrict to MeSH Major Topic.

☒ Do not include MeSH terms found below this term in the MeSH hierarchy.



MeSH

MeSH ▾

[Limits](#) [Advanced](#)

Search

[Help](#)[Display Settings:](#) ▾ Full[Send to:](#) ▾

## Neoplasms

New abnormal growth of tissue. Malignant neoplasms show a greater degree of anaplasia and have the properties of invasion and metastasis, compared to benign neoplasms.

Year introduced: /diagnosis was NEOPLASM DIAGNOSIS 1964-1965

PubMed search builder options

[Subheadings:](#)

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> analysis                   | <input type="checkbox"/> ethnology                     | <input type="checkbox"/> psychology                    |
| <input type="checkbox"/> anatomy and histology      | <input type="checkbox"/> etiology                      | <input type="checkbox"/> radiation effects             |
| <input type="checkbox"/> antagonists and inhibitors | <input type="checkbox"/> genetics                      | <input type="checkbox"/> radiography                   |
| <input type="checkbox"/> blood                      | <input type="checkbox"/> growth and development        | <input type="checkbox"/> radionuclide imaging          |
| <input type="checkbox"/> blood supply               | <input type="checkbox"/> history                       | <input type="checkbox"/> radiotherapy                  |
| <input type="checkbox"/> cerebrospinal fluid        | <input type="checkbox"/> immunology                    | <input type="checkbox"/> rehabilitation                |
| <input type="checkbox"/> chemically induced         | <input type="checkbox"/> injuries                      | <input type="checkbox"/> secretion                     |
| <input type="checkbox"/> chemistry                  | <input type="checkbox"/> innervation                   | <input type="checkbox"/> statistics and numerical data |
| <input type="checkbox"/> classification             | <input type="checkbox"/> isolation and purification    | <input type="checkbox"/> supply and distribution       |
| <input type="checkbox"/> complications              | <input type="checkbox"/> legislation and jurisprudence | <input type="checkbox"/> surgery                       |
| <input type="checkbox"/> congenital                 | <input type="checkbox"/> metabolism                    | <input type="checkbox"/> therapeutic use               |
| <input type="checkbox"/> cytology                   | <input type="checkbox"/> microbiology                  | <input type="checkbox"/> therapy                       |
| <input type="checkbox"/> diagnosis                  | <input type="checkbox"/> mortality                     | <input type="checkbox"/> transmission                  |
| <input type="checkbox"/> diet therapy               | <input type="checkbox"/> nursing                       | <input type="checkbox"/> transplantation               |
| <input type="checkbox"/> drug therapy               | <input type="checkbox"/> parasitology                  | <input type="checkbox"/> ultrasonography               |
| <input type="checkbox"/> economics                  | <input type="checkbox"/> pathology                     | <input type="checkbox"/> ultrastructure                |
| <input type="checkbox"/> education                  | <input type="checkbox"/> physiology                    | <input type="checkbox"/> urine                         |
| <input type="checkbox"/> embryology                 | <input type="checkbox"/> physiopathology               | <input type="checkbox"/> veterinary                    |
| <input type="checkbox"/> enzymology                 | <input type="checkbox"/> prevention and control        | <input type="checkbox"/> virology                      |

- ☐ Restrict to MeSH Major Topic.
- ☐ Do not include MeSH terms found below this term in the MeSH hierarchy.

Tree Number(s): C04

Entry Terms:

### PubMed search builder

("Alanine"[Mesh]) OR "Threonine"  
[Mesh]

Add to search builder

AND ▾

Search PubMed

### Related information

[PubMed](#)

[PubMed - Major Topic](#)

[Clinical Queries](#)

[NLM MeSH Browser](#)

[dbGaP Links](#)

[MedGen](#)

### Recent activity

[Turn Off](#) [Clear](#)

- neoplasms (177) MeSH
- Anal Gland Neoplasms MeSH
- anal gland neoplasms (1) MeSH
- threonine (228) MeSH
- alanine (609) MeSH

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MeSH MeSH Search Limits Advanced Help

Display Settings: ▾ Full Send to: ▾

### Neoplasms

New abnormal growth of tissue. Malignant neoplasms show a greater degree of anaplasia and have the properties of invasion and metastasis, compared to benign neoplasms.  
Year introduced: /diagnosis was NEOPLASM DIAGNOSIS 1964-1965

PubMed search builder options

Subheadings:

<input type="checkbox"/> analysis	<input type="checkbox"/> ethnology	<input type="checkbox"/> psychology
<input type="checkbox"/> anatomy and histology	<input type="checkbox"/> embryology	<input type="checkbox"/> radiation effects
<input type="checkbox"/> antagonists and inhibitors	<input type="checkbox"/> genetics	<input type="checkbox"/> radiography
<input type="checkbox"/> blood	<input type="checkbox"/> development	<input type="checkbox"/> radionuclide imaging
<input type="checkbox"/> blood supply	<input type="checkbox"/> history	<input type="checkbox"/> radiotherapy
<input type="checkbox"/> cerebrospinal fluid	<input type="checkbox"/> immunology	<input type="checkbox"/> rehabilitation
<input type="checkbox"/> chemically induced	<input type="checkbox"/> injuries	<input type="checkbox"/> secretion
<input type="checkbox"/> chemistry	<input type="checkbox"/> innervation	<input type="checkbox"/> statistics and numerical data
<input type="checkbox"/> classification	<input type="checkbox"/> isolation and purification	<input type="checkbox"/> supply and distribution
<input type="checkbox"/> complications	<input type="checkbox"/> legislation and jurisprudence	<input type="checkbox"/> surgery
<input type="checkbox"/> congenital	<input type="checkbox"/> metabolism	<input type="checkbox"/> therapeutic use
<input type="checkbox"/> cytology	<input type="checkbox"/> microbiology	<input type="checkbox"/> therapy
<input type="checkbox"/> diagnosis		

PubMed search builder

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MeSH

MeSH

Tree Entry

*Sub-headings* narrow the "meaning" of a **MeSH** term. They are a "subset" of all the articles under the **MeSH** term: *Neoplasms*.

## **83 SUBHEADINGS:**

abnormalities  
administrations & dosage  
adverse effects  
agonists  
analogs & derivatives  
analysis  
anatomy & histology  
antagonists & inhibitors  
biosynthesis  
blood  
blood supply  
cerebrospinal fluid  
chemical synthesis  
chemically induced  
chemistry  
classification  
complications  
congenital  
contraindications  
cytology  
deficiency  
diagnosis  
diagnostic use  
diet therapy  
drug effects  
drug therapy  
economics  
education

embryology  
enzymology  
epidemiology  
ethics  
ethnology  
etiology

genetics

growth & development  
history  
immunology  
injuries  
innervation  
instrumentation  
isolation & purification  
legislation & jurisprudence  
manpower  
metabolism  
methods  
microbiology  
mortality  
nursing  
organization & administration  
parasitology  
pathogenicity  
pathology  
pharmacokinetics  
pharmacology

physiology  
physiopathology  
poisoning  
prevention & control  
psychology  
radiation effects  
radiography  
radionuclide imaging  
radiotherapy  
rehabilitation  
secondary  
secretion  
standards  
statistics & numerical data  
supply & distribution  
surgery  
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transmission  
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## Neoplasms

New abnormal growth of tissue. Malignant neoplasms show a greater degree of anaplasia and have the properties of invasion and metastasis, compared to benign neoplasms.

Year introduced: /diagnosis was NEOPLASM DIAGNOSIS 1964-1965

PubMed search builder options

[Subheadings:](#)

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> analysis                   | <input type="checkbox"/> ethnology              | <input type="checkbox"/> psychology                    |
| <input type="checkbox"/> anatomy and histology      | <input type="checkbox"/> etiology               | <input type="checkbox"/> radiation effects             |
| <input type="checkbox"/> antagonists and inhibitors | <input checked="" type="checkbox"/> genetics    | <input type="checkbox"/> radiography                   |
| <input type="checkbox"/> blood                      | <input type="checkbox"/> growth and development | <input type="checkbox"/> radionuclide imaging          |
| <input type="checkbox"/> blood supply               | <input type="checkbox"/> history                | <input type="checkbox"/> radiotherapy                  |
| <input type="checkbox"/> cerebrospinal fluid        | <input type="checkbox"/> immunology             | <input type="checkbox"/> rehabilitation                |
| <input type="checkbox"/> chemically induced         | <input type="checkbox"/> injury                 | <input type="checkbox"/> secretion                     |
| <input type="checkbox"/> chemistry                  | <input type="checkbox"/> innervation            | <input type="checkbox"/> statistics and numerical data |
|   |   | <input type="checkbox"/> supply and distribution       |
|   |   | <input type="checkbox"/> surgery                       |
|   |   | <input type="checkbox"/> therapeutic use               |
|   |   | <input type="checkbox"/> therapy                       |
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1) Check the box next to the subheading.

2) Select

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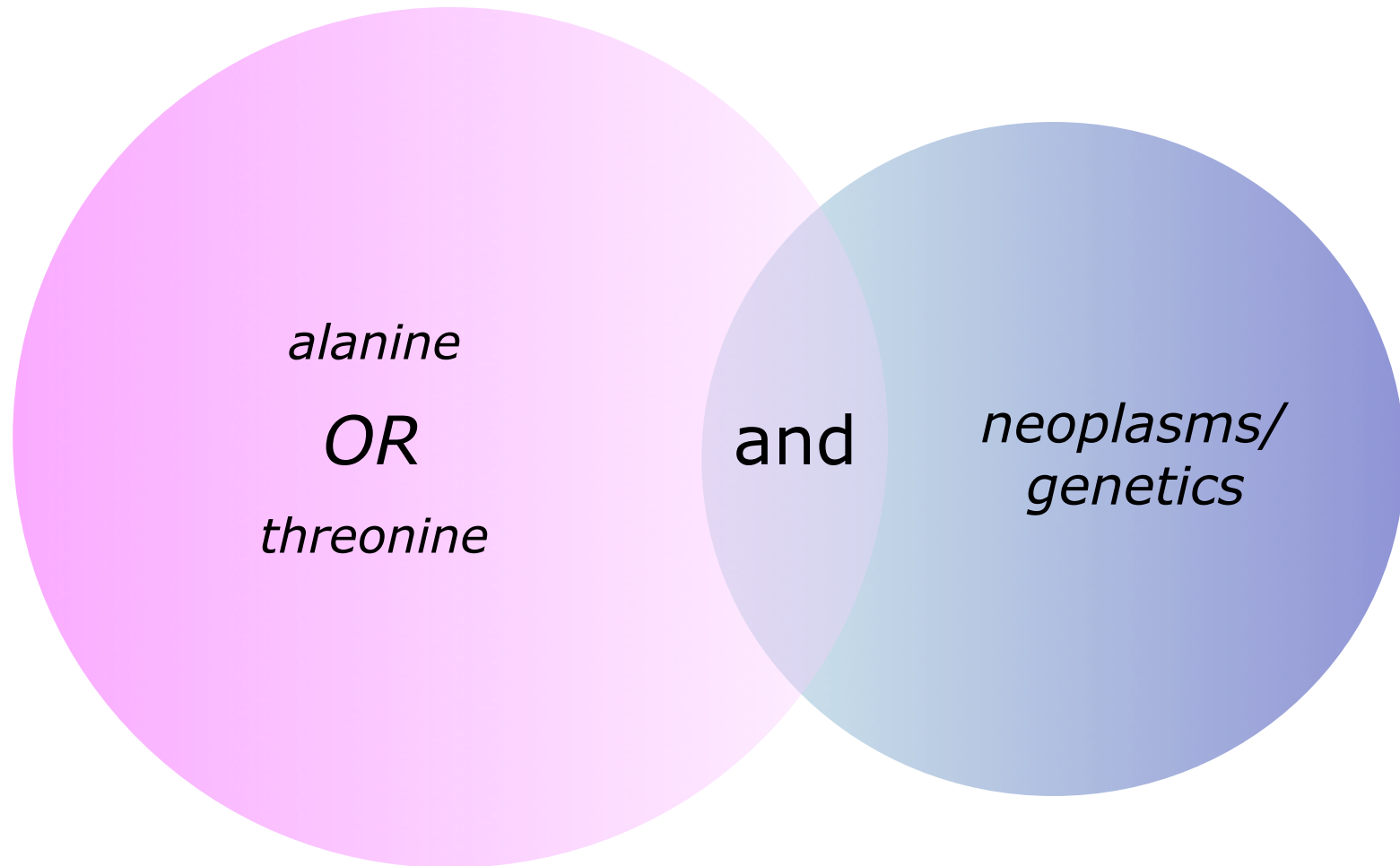
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Year introduced: /diagnosis was NEOPLASM DIAGNOSIS 1964-1965

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| <input type="checkbox"/> antagonists and inhibitors | <input checked="" type="checkbox"/> genetics    | <input type="checkbox"/> radiography          |
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Neoplasms

MeSH

neoplasms (177)

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J Med Chem. 2012 Nov 26;55(22):7333-46. doi: 10.1021/jm301188x. Epub 2012 Nov 1.  
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3. Rashid M, et al.  
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J Cell Biol. 2012 Dec 10;199(6):931-49. doi: 10.1083/jcb.201205115. Epub 2012 Dec 3.  
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Li Y, Shen M, Zhang Z, Luo J, Pan X, Lu X, Long H, Wen D, Zhang F, Leng F, Li Y, Tu Z, Ren X, Ding K.  
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**3. Fc gamma R1 gamma subunits with both polar or non-polar amino acids at position of T22 are capable of restoring surface expression of the high-affinity IgE receptor and degranulation in gamma subunit-deficient rat mastocytic leukemia cells.**  
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Li Y, Shen M, Zhang Z, Luo J, Pan X, Lu X, Long H, Wen D, Zhang F, Leng F. PLoS One. 2012 Sep 5;7(9):e44202. doi: 10.1371/journal.pone.0044202. Epub 2012 Sep 5. PMID: 22940006 [PubMed - indexed for MEDLINE] [Free PMC Article](#) [Related citations](#)

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1. Li Y, Shen M, Tu Z, Ren X, J Med Chem. Nov 1. PMID: 230886

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de Giuseppe PO, Martins NH, Meza AN, dos Santos CR, Pereira HD, Murakami MT. PLoS One. 2012;7(9):e44282. doi: 10.1371/journal.pone.0044282. Epub 2012 Sep 5. PMID: 22957058 [PubMed - indexed for MEDLINE] Free PMC Article

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J Med Chem. 2012 Nov 26;55(22):10033-46. doi: 10.1021/jm301188x. Epub 2012 Nov 1.

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1. Li Y, Shen M, Zhang J, Guo J, Pan X, Lu X, Long H, Wen D, Zhang F, Leng F, Li Y, Tu Z, Ren X, Ding K. J Med Chem. 2012 Nov 15;55(22):10033-46. doi: 10.1021/jm301188x. Epub 2012 Nov 1. PMID: 23088644 [PubMed - indexed for MEDLINE] [Related citations](#)

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Threonine/chemistry

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Adenosine

Acyclovir

Tubercidin

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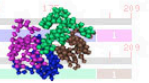
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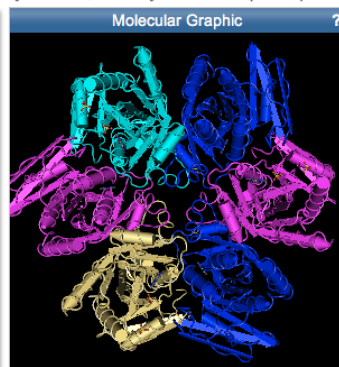
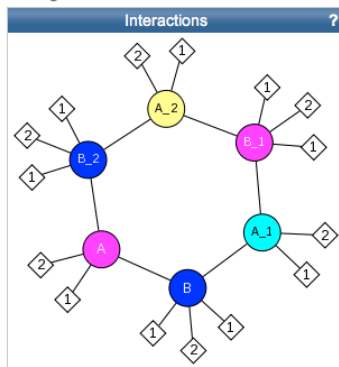
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	6	Purine Nucleoside Phosphorylase Deod-type deod PNP_UDP_1 superfamily Udp	Adenine Purine Nucleoside Phosphorylase Deod- Sulfate Ion
Chemicals and interactions (18 molecules)			
①	12	Sulfate Ion	Purine Nucleoside Phosphorylase Deod-
②	6	Adenine	Purine Nucleoside Phosphorylase Deod-

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exploited for the design of competitive inhibitors. Our data also corroborated the competitive inhibition mechanism of hexameric PNPs by tubercidin and suggested that the acyclic nucleoside ganciclovir is a better inhibitor for hexameric PNPs than aciclovir. Furthermore, comparative structural analyses indicated that the replacement of Ser(90) by a threonine in the *B. cereus* hexameric adenosine phosphorylase (Thr(91)) is responsible for the lack of nucleoside cooperativity of phosphate binding in this enzyme.

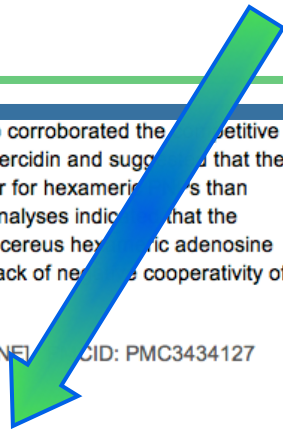
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<sup>1</sup> Laboratório Nacional de Biotecnologia (LNBio), Centro Nacional de Pesquisa em Energia e Materiais, Campinas, São Paulo, Brazil, <sup>2</sup> Instituto de Física de São Carlos, Universidade de São Paulo, São Carlos, São Paulo, Brazil

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## Introduction

Purine nucleoside phosphorylases (PNPs; EC 2.4.2.1) are versatile enzymes that catalyze the reversible phosphorolysis of purine (2'-deoxy)ribonucleosides producing bases and (2'-deoxy)ribose 1-phosphate [1]. Their key role in the purine salvage pathway made PNPs attractive targets for drug design against several pathogens, such as *Mycobacterium tuberculosis* [2,3], *Plasmodium falciparum* [4–7], *Trichomonas vaginalis* [8–10] and *Schistosoma mansoni* [11,12], which lacks the *de novo* pathway for purine nucleotides synthesis. Due to their catalytic function, PNPs have also been investigated for the synthesis of nucleoside analogues (NAs) [13] and the activation of prodrugs in anti-cancer gene therapies [14].

NAs can be used in the treatment of a range of human viral infections, such as those caused by HIV, herpesvirus and hepatitis B/C virus [15–19]. They are among the first cytotoxic molecules to be used in the treatment of cancer [20] and have been studied as potential drugs against tuberculosis [21,22], malaria [7,23], trichomoniasis [24] and schistosomiasis [25]. The chemical

synthesis of these compounds is generally a costly process that includes several protection and deprotection steps [13,26]. This has encouraged the development of new methods for the synthesis of NAs using PNPs and other enzymes as biocatalysts [13,27,28]. The main advantages of this approach are stereospecificity, regioselectivity and efficiency of enzyme employment usually dispenses group protection and purification steps, optimizing the process [13].

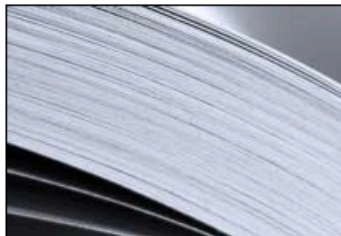
The differences in substrate specificity regarding the hexameric PNPs have allowed the development of several therapies strategies against solid tumors [14,29]. Triphosphates are mainly found in mammalian species and are substrates for guanine and hypoxanthine (2'-deoxy)ribonucleoside phosphorylases. Hexameric PNPs are prevalent in bacteria and accept well as guanine and hypoxanthine (2'-deoxy)ribonucleoside substrates [1]. Thus, nontoxic adenosine analogues, poor substrates for human PNP, can be cleaved to cytosine specifically in tumor cells transfected with the bacterial

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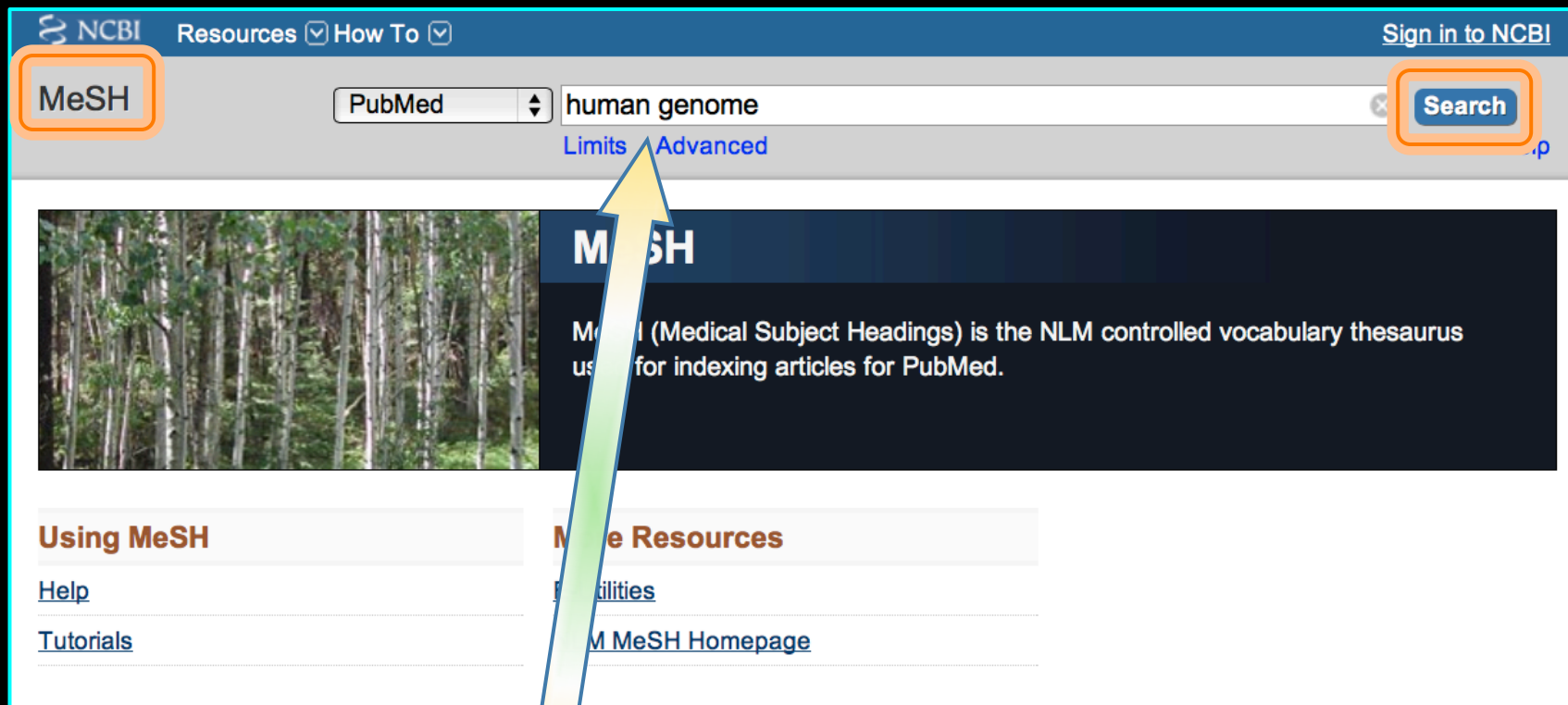
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MeSH (Medical Subject Headings) is the NLM controlled vocabulary thesaurus used for indexing articles for PubMed.

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Enter

human genome

and click

Search

1) Check the box next to the MeSH heading

2) Select AND

The screenshot shows the NCBI MeSH search interface. At the top, there's a search bar with 'MeSH' selected and 'human genome' entered. Below the search bar, there are links for 'Save search', 'Limits', and 'Advanced'. On the left, there's a 'Display Settings' section with a 'Summary' option checked. The search results are displayed as a list. The first result, 'Genome, Human', is highlighted with a green checkmark in a box. To the right of the results, there's a 'Send to' section with a dropdown menu. Below this, there's a 'PubMed search builder' section. It contains a text box with '"Genome, Human"[Mesh]' and a button labeled 'Add to search builder' with a dropdown menu showing 'AND'. Below that is a 'Search PubMed' button. At the bottom right, there's a 'Find related data' section with a 'Database' dropdown menu.

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Results: 4 Selected: 1

☒ [Genome, Human](#)  
The complete genetic complement contained in the DNA of a set of CHROMOSOMES in a HUMAN. The length of the human genome is about 3 billion base pairs.  
Year introduced: 1990

☐ [Human Genome Project](#)  
2. A coordinated effort of researchers to map (CHROMOSOME MAPPING) and sequence (SEQUENCE ANALYSIS) the human GENOME.  
Year introduced: 1990

Send to: PubMed search builder

"Genome, Human"[Mesh]

Add to search builder AND

Search PubMed

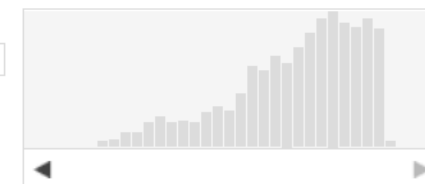
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1. Altman RB, Clayton EW, Lane IS, Malin BA, Roden DM.  
Science. 2013 Mar 1;339(6123):1032-3. doi: 10.1126/science.339.6123.1032-c. No abstract available.

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2. Gutmann A.  
Science. 2013 Mar 1;339(6123):1032-3. doi: 10.1126/science.339.6123.1032-c. No abstract available.

PMID: 23449576 [PubMed - indexed in MEDLINE]

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3. van der Oost J.  
Science. 2013 Feb 15;339(6123):1032-3. doi: 10.1126/science.339.6123.1032-c. No abstract available.

PMID: 23413345 [PubMed - indexed in MEDLINE]

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An integrated encyclopedia of DNA elements in the human genome [Nature. 2012]

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☐ [Data re-identification: societal safeguards.](#)  
1. Altman RB, Clayton EW, Kohane IS, Malin BA, Rothberg DM.  
Science. 2013 Mar 1;339(6123):1032-3. doi: 10.1126/science.339.6123.1032-c.  
No abstract available.  
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2. Gutmann A.  
Science. 2013 Mar 1;339(6123):1032. doi: 10.1126/science.339.6123.1032-b.  
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The sequence of the human genome. [Science. 2001]  
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Enter

AND "dark matter"

and click

Search

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Search: "Genome, Human"[Mesh] AND "dark matter"

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3. van Bakel H, Nislow C, Blencowe BJ, Hughes TR. PLoS Biol. 2010 May 18;8(5):e1000371. doi: 10.1371/journal.pbio.1000371. PMID: 20502517 [PubMed - indexed for MEDLINE]  
[Related citations](#)
- ☐ [Comparative analysis of genome tiling array data reveals novel specific functional RNAs in human.](#)  
4. Zhang Z, Pang AW, Gerstein M. BMC Evol Biol. 2007 Feb 8;7 Suppl 1:S14. PMID: 17288572 [PubMed - indexed for MEDLINE]  
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- ☐ [Exploring genomic dark matter: a critical assessment of the performance of homology search methods on noncoding RNA.](#)  
5. Freyhult EK, Bollback JP, Gardner PP. Genome Res. 2007 Jan;17(1):117-25. Epub 2006 Dec 6. PMID: 17151342 [PubMed - indexed for MEDLINE] **Free PMC Article**  
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6. Ponting CP, Lunter G. Hum Mol Genet. 2006 Oct 15;15 Spec No 2:R170-5. Review. PMID: 16987880 [PubMed - indexed for MEDLINE] **Free Article**  
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  1. Courties G, Nahrendorf M.  
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  2. Cole F, Keeney S, Jasin M.  
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  3. Lin X, Tang W, Ahmad S, Lu J, Colby CC, Zhu J, Yu Q.  
Hear Res. 2012 Jun;288(1-2):67-76. doi: 10.1016/j.heares.2012.01.004. Epub 2012 Jan 14. Review.  
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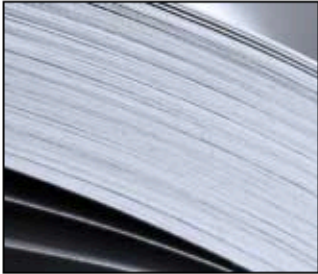
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