

# MeSH ON DEMAND: AN EASY WAY TO IDENTIFY RELEVANT MeSH TERMS AND RELATED ARTICLES FROM TEXT

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## Abstract

The National Library of Medicine (NLM) has developed MeSH on Demand, a Web-based tool that recommends Medical Subject Heading (MeSH) terms from text such as an abstract or grant summary using the NLM Medical Text Indexer (MTI) software. MeSH on Demand has been developed in close collaboration between MeSH, NLM Index Section, and the Lister Hill National Center for Biomedical Communications to address the authors' needs for assigning MeSH-based key terms to their manuscripts.

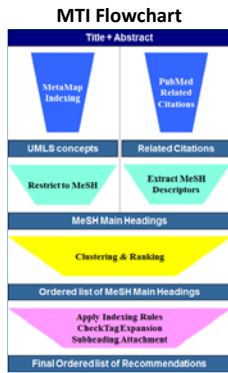
The NLM Medical Text Indexer (MTI) is the main product of the Indexing Initiative project and has been providing indexing recommendations based on the MeSH vocabulary since 2002. MTI combines human NLM Index Section expertise and Natural Language Processing technology to curate the biomedical literature more efficiently and consistently. In 2011, NLM expanded MTI's role by designating it as the first-line indexer (MTIFL) for a select number of journals where it performs particularly well; today the MTIFL workflow includes over 200 journals for which MTIFL provides initial indexing that is then curated by human indexers.

The MeSH on Demand tool is now freely available at [www.nlm.nih.gov/mesh/MeSHonDemand.html](http://www.nlm.nih.gov/mesh/MeSHonDemand.html) and requires no software downloads or prior knowledge of the MeSH vocabulary. Users simply input text in the box labelled "Text to be processed". The input text can contain up to 10,000 characters and may include a variety of text types including title, abstract, grant summary, or keywords. Well-defined sentences provide the best results. The user then selects the "Find MeSH Terms" button, and MeSH on Demand provides as a result a list of MeSH terms that MTI identifies as being relevant to the text; the terms are displayed in alphabetical order, and a link to the MeSH Browser is provided for each term. For example, with input text that contains the phrase "treatment-resistant depression," MeSH on Demand automatically identifies the MeSH heading Depressive Disorder, Treatment-Resistant. MeSH on Demand also includes links to the top ten related citations in PubMed (in text similarity-ranked order) that were used in computing the MeSH on Demand results.

Although the MeSH terms provided by MeSH on Demand are machine generated by the MTI software and do not reflect any human review, they do provide a good summary of the text.

## Background

MeSH on Demand is a freely available, simple and easy to use tool NLM made to help find MeSH terms (Descriptors; Check Tags; Publication Type; SCRs) relevant to your TEXT up to 10,000 characters and related articles in PubMed<sup>1</sup>



-without any prior knowledge of the MeSH vocabulary  
-without any downloads  
-and without ever having done indexing.

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## Objective

We will demonstrate how leveraging MeSH can help you find the most articles about your area of research. MeSH is the controlled vocabulary for MEDLINE indexing at NLM. MeSH on Demand is a sophisticated software package that finds MeSH terms in response to a user query.

Aim is to help demonstrate how to leverage MeSH to find all the articles for your research:

- Use MeSH on Demand to find MeSH terms
- Expand your MeSH search terms for systematic literature searches
- Retrieve many more articles in your area of interest

## Methods

### How to use MeSH on Demand (MoD)

There are three key areas on MeSH on Demand home page users will use:

1. Copy and paste your text in Large Text Box "Text to be Processed" → Click on "Find MeSH Terms"
2. Click on MeSH term in Result Page → Click on "New Request" to start over.
3. Click MeSH terms of interest (use 1-2 MOST IMPORTANT MeSH terms 1<sup>st</sup>)
4. Combine MeSH Heading and Entry Terms separated by "OR"
5. Add any author term as a "wildcard" term if search results in too many.

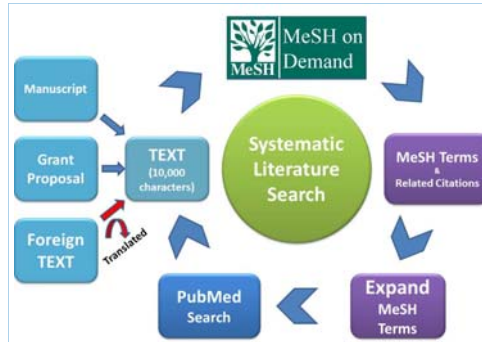
### How to Expand MeSH Terms found by MoD

### Using MoD and MeSH Browser to Expand MeSH Terms

The screenshots show the MoD Search Page with a text input box and search results. The MeSH Browser shows the expansion of a selected MeSH term (siRNA) into a list of related terms such as miRNA, piRNA, and various RNA types. The MeSH Browser interface includes search filters and a list of expanded terms with their corresponding MeSH codes.

## Results

### MeSH on Demand and Systematic Literature Search



### When to use MeSH on Demand:

1. Easily find keywords to your manuscript, grant application, etc.
2. Quickly find MeSH terms for systematic literature searches
3. Find related articles to your text in PubMed

### MeSH Term Expansion Search Result<sup>2</sup>

Search Terms	Simple	EXPANDED MeSH Terms	NON-MEDLINE articles
miRNA	36,654	43,784	
siRNA	65,514	74,653	
Neurodegenerative Diseases	233,956	242,037	
Diagnosis	8,742,742	9,804,287	
Therapy	7,436,968	12,690,355	
Diagnosis AND miRNA AND Neurodegenerative Diseases	228	360	26
Therapy AND siRNA AND Neurodegenerative Diseases	295	334	42
(miRNA OR siRNA) AND (Diagnosis OR Therapy) AND Neurodegenerative Diseases	894	1,545	104*

Acknowledgement

We would like to thank members of MeSH for constant support and editorial help; NLM team members for working on second phase MeSH on Demand improvement; members of MMS and NN/LM for help making MeSH on Demand better and better known; and countless librarians at NLM and at other medical libraries for their constructive critique and encouragement to make MeSH available more broadly.

## Find More Relevant Articles with MoD and MeSH Terms

\* Missing Articles Found by EXPANDED MeSH Term Search: siRNA or miRNA + Diagnosis or Therapy + Neurodegenerative Diseases

Circulating Biomarker Panels in Alzheimer's Disease.
Kuwano v inhibits proliferation, promotes cell survival and increases neurogenesis of neural stem cells.
Regenerative Medicine for the Aging Brain.
MicroRNA Association with Synucleinopathy Conversion in REM Behavior Disorder.
Ubiquitin 2 enhances osteosarcoma progression through resistance to hypoxic stress.
Regulation of IGF-1 signaling by microRNAs.
The Nav1.2 channel is regulated by miRNAs.
Cytoprotection against beta-amyloid (Aβ) peptide-mediated oxidative damage and autophagy by Keap1 RNAi in human glioma U87mg cells.
Fratxin knockdown in human astrocytes triggers cell death and the release of factors that cause neuronal toxicity.
Sequence-dependent off target inhibition of TLR7/8 sensing by synthetic microRNA inhibitors.

The quality of the retrieved articles using MeSH on Demand and Expanded MeSH Term strategy is striking. Of the ten most recently added articles in PubMed which are from non-MEDLINE journals, most mentions siRNA, miRNA and a neurodegenerative disease in title.

## Summary

1. MeSH on Demand can be used to easily extract MeSH terms from a text (e.g., abstract and/or title) automatically.
2. MeSH terms on RNA concepts can be easily identified by using links to the MeSH Browser on MeSH on Demand result page.
3. MeSH terms should be expanded for comprehensive and systematic literature searches to ensure all articles on your concept can be retrieved.
4. Use of MeSH terms can leverage power of MEDLINE indexing to ensure no relevant article is omitted in your searches.

## References

1. Cho D. MeSH on Demand Tool. NLM Tech Bull. 2014 May-Jun;39(8):e2.
2. Simple term expansions used in the example: Neurodegenerative Diseases → (Neurodegenerative Diseases OR Degenerative Diseases, Central Nervous System OR Degenerative Diseases, Nervous System OR Degenerative Diseases, Neurologic OR Degenerative Diseases, Spinal Cord OR Degenerative Neurologic Diseases OR Degenerative Neurologic Disorders OR Nervous System Degenerative Diseases OR Neurodegenerative Disorders OR Neurologic Degenerative Conditions OR Neurologic Degenerative Diseases OR Neurologic Diseases, Degenerative) Diagnosis → (diagnosis OR differential diagnosis OR findings OR screening OR signs OR symptoms) Therapy → (\*therap[Subheading] OR pharmacology[Subheading] OR therapy OR therapeutic OR pharmacology OR dietary management OR nutritional management OR surgery OR procedure\* OR operation OR operations OR rehabilitation OR administration) (miRNA OR siRNA) AND (Diagnosis OR Therapy) AND Neurodegenerative Diseases → (miRNAs OR siRNAs OR MicroRNA OR miRNA OR miRNAs OR pre-miRNA OR pri-miRNA OR Primary MicroRNA OR Primary miRNA OR RNA, Small Interfering OR siRNA OR RNA, Small Interfering OR siRNA OR Pwi-interacting RNA OR Pwi-interacting RNA OR Repeat-Associated siRNA OR RNA, Pwi-interacting OR RNA, Scan OR Scan RNA OR Scan RNA OR Short Hairpin RNA OR Short Interfering RNA OR siRNA OR RNA, Repeat-Associated OR siRNA, Trans-Acting OR Small Hairpin RNA OR Small Interfering RNA OR Small Scan RNA OR lasRNA OR Trans-Acting siRNA) AND (diagnosis OR differential diagnosis OR findings OR screening OR signs OR symptoms) OR (\*therap[Subheading] OR pharmacology[Subheading] OR therapy OR therapeutic OR pharmacology OR dietary management OR nutritional management OR surgery OR procedure\* OR operation OR operations OR rehabilitation OR administration) AND (Neurodegenerative Diseases OR Degenerative Diseases, Central Nervous System OR Degenerative Diseases, Nervous System OR Degenerative Diseases, Neurologic OR Degenerative Diseases, Spinal Cord OR Degenerative Neurologic Diseases OR Degenerative Neurologic Disorders OR Nervous System Degenerative Diseases OR Neurodegenerative Disorders OR Neurologic Degenerative Conditions OR Neurologic Degenerative Diseases OR Neurologic Diseases, Degenerative)

