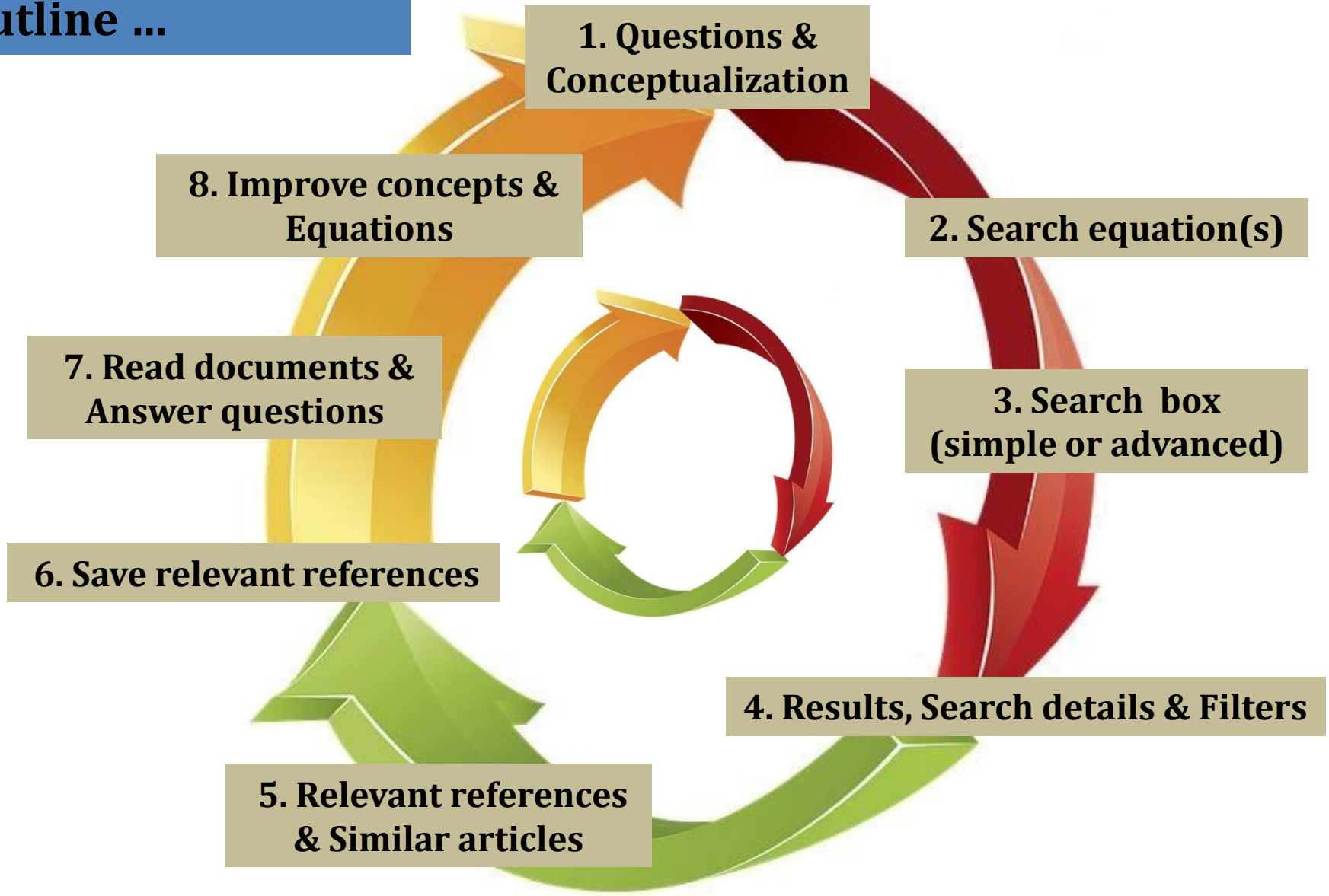
PubMed Essentials

- Introduction
- Questions & Conceptualization
- Search equation(s)
- Search box (simple or advanced)
- Results, Search details & Filters
- Relevant references & Similar articles
- Save relevant references
- Read documents & Answer questions
- Improve concepts & Equations

PubMed in short …

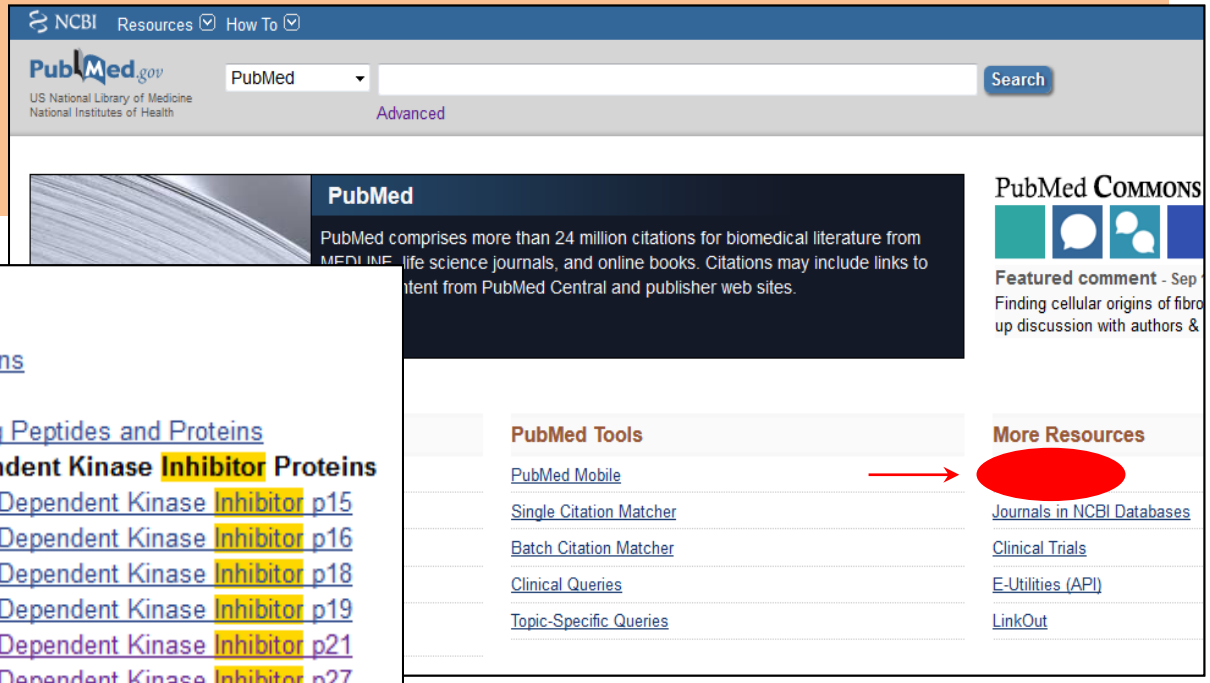
- A **free biomedical** and **life sciences citation database** since 1996
- A tool for scientists and physicians **(= experts**). General keywords will either retrieve too many results (MeSH search – automatic explosion) or too few (Non-MeSH search – general terms not mentioned in the articles). Need to define **specific subjects** and have **specific keywords/synonyms**
- **Retrieves more specific references** than Scopus, Web of Science or Google Scholar (in biomedical field)
- Sources: **MEDLINE** (90% of all PubMed citations) + "**Ahead of print**", "**In-process**" and other **non-MEDLINE** citations (10%)
- **> 25 million citations** (dating back to 1809) and **> 5'600 journals indexed**
- Available at http://www.ncbi.nlm.nih.gov/pubmed

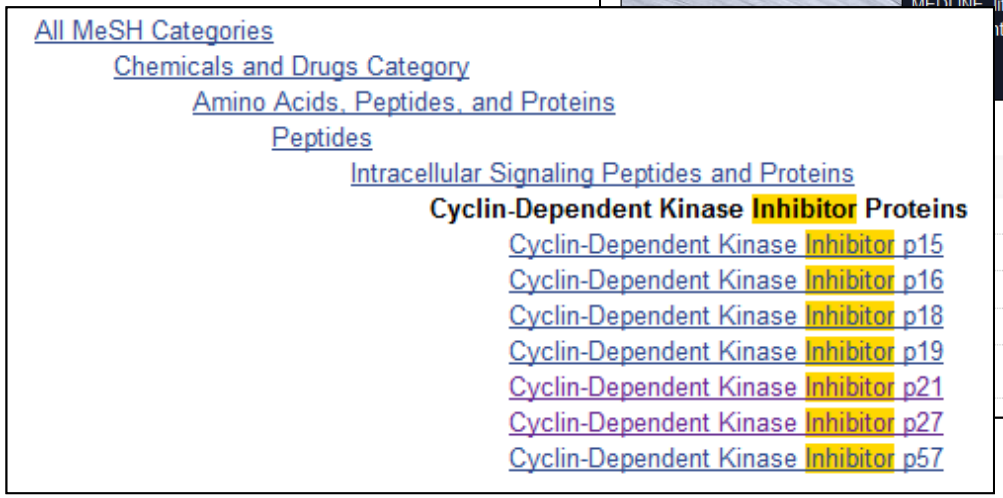
Search strategy outline ...



Search strategy outline …

- Information retrieval is an **iterative process** (in a continuous loop)
- **Keep track of your interesting findings** at different stages (reference manager)!
- PubMed offers two kind of search strategy: **MeSH** and **Non-MeSH** (Free-text)
- **Medical Subject Headings (MeSH)**
  - ✓ a **controlled/consistent vocabulary** for indexing journal articles
  - ✓ **16 main branches**, **26'853 descriptors** (main headings) and **83 qualifiers** (subheadings)
  - ✓ **manually attributed** by the NLM staff
  - ✓ tool: **MeSH Database**





Search strategy outline …

- **Advantages** of MeSH …
  - ✓ **standardization** of terms ("Entry terms" ≈ synonyms) → find articles talking about same subject but with different keywords
  - ✓ **fulltext representation** (fulltext reading to index the article)
  - ✓ **MeSH explosion** (take into account all narrower MeSH terms in the trees – to avoid automatic explosion: [Mesh:NoExp])
  - ✓ allows you to **increase the relevance** of your search (use the "MeSH Major Topic": [Majr])

- **Disadvantages** of MeSH ...
  - ✓ **all concepts** are **not represented** in the MeSH trees
  - ✓ **all articles** are **not indexed** (10% of PubMed, among which … recent articles!)

    Search: pubmednotmedline[sb]
    = citations that have been reviewed for accurate bibliographic data but will not receive MEDLINE indexing […]

    Search: inprocess[sb]
    = citations bibliographic data will be reviewed and indexed, i.e., MeSH terms will be assigned

1. Questions & Conceptualization …

- Turn your **topic into questions to be answered** (if suggested topics do not come in the form of questions)
- Conceptualize each question (using MeSH terms and keywords/synonyms)

Which CDK inhibitors have proven to be useful to treat cancer? ⟶

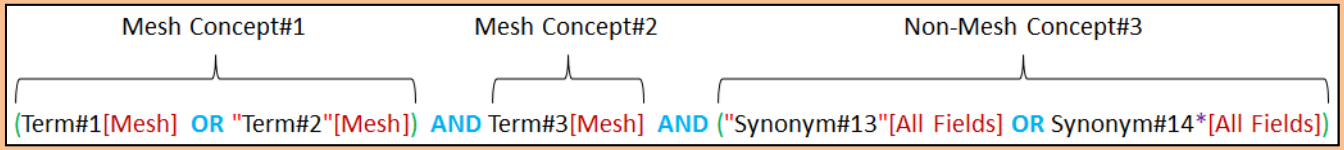
Concept#1		**Concept#2**	
Term#1 [Mesh] *(if any)*		Term#3 [Mesh] *(if any)*	
Term#2 [Mesh] *(if any)*		Term#4 [Mesh] *(if any)*	
…		…	
Keyword#1	Synonym#1 Synonym#2 …	Keyword#3	Synonym#7 Synonym#8 …
Keyword#2	Synonym#3 Synonym#4 …	Keyword#4	Synonym#9 Synonym#10 …
…	Synonym#5 Synonym#6 …	…	Synonym#11 Synonym#12 …
Concept#3		**Concept#4**	
Term#5 [Mesh] *(if any)*		Term#7 [Mesh] *(if any)*	
Term#6 [Mesh] *(if any)*		Term#8 [Mesh] *(if any)*	
…		…	
Keyword#5	Synonym#13 Synonym#14 …	Keyword#7	Synonym#19 Synonym#20 …
Keyword#6	Synonym#15 Synonym#16 …	Keyword#8	Synonym#21 Synonym#22 …
…	Synonym#17 Synonym#18 …	…	Synonym#23 Synonym#24 …
…		…	

2. Search equation(s) …

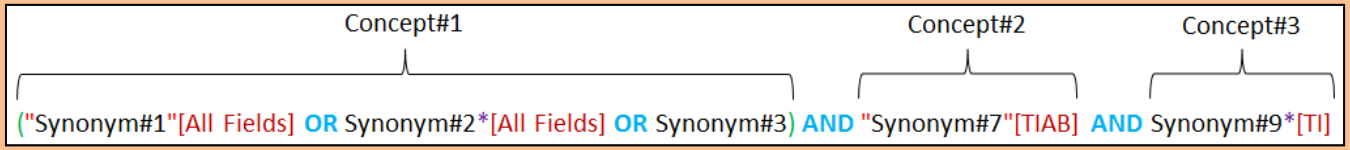
- **Syntax** …
  - ✓ boolean operators: **AND** between concepts, **OR** between MeSH terms/keywords, **NOT** to exclude terms if necessary
  - ✓ nesting : **(…)**
  - ✓ phrase searching : **"…"**

  … can all be used for information search in PubMed

- **Separate MeSH from Non-MeSH** search equations …
  - ✓ MeSH (to search 90% of PubMed references) …



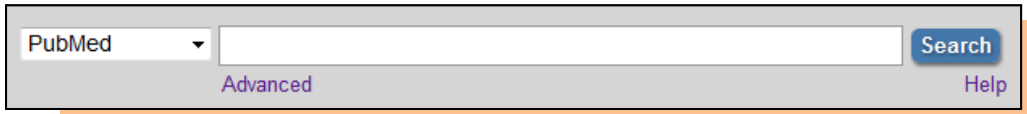
  - ✓ Non-MeSH (to search 10% of PubMed references – most recent ones) …



- **For Non-MeSH** search equations …
  - ✓ filed tags: Title **[ti]**, Title/Abstract **[tiab]**, All Fields **[all fields]**, etc.
  - ✓ truncating : *

3. Search box (simple or advanced) …

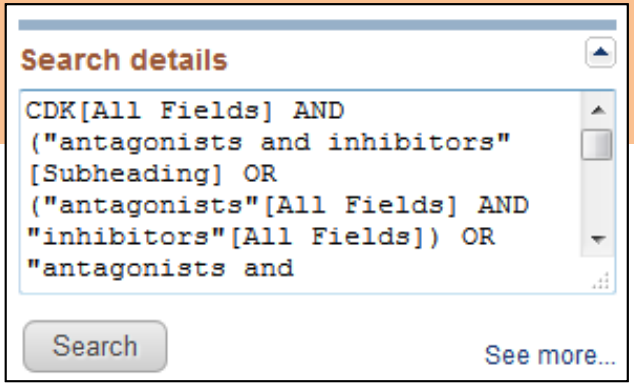
Simple Search box …



- To be used as the Google search box (list of keywords space separated)
- To be used **for quick/first search strategy** and not thorough search strategy
- **!!! Automatic Term Mapping (ATM) !!!** …

  "The process used by PubMed to **find a match to unqualified terms that are entered into the query box**. Untagged terms are matched **(in this order) against subjects** using the MeSH (Medical Subject Headings) translation table, **journals** using the Journals translation table, and **authors and investigators**, using the the Full Author translation table, Author index, Full Investigator translation table and Investigator index. If a match is found in any translation table, the mapping stops. When subject or journal matches are found, the query and individual terms are also searched in All Fields. If no match is found in any tables, terms are searched in All Fields and ANDed together.

- The **search details box** can be seen on the right of the result page



3. Search box (simple or advanced) …

Simple Search box …

Equation	Observations	Comments	Action	Numb. results	Relevant ref.
CDK inhibitors treat cancer	– Performed in Simple Search box – Search details … *CDK[All Fields] AND ("antagonists and inhibitors"[Subheading] OR ("antagonists"[All Fields] AND "inhibitors"[All Fields]) OR "antagonists and inhibitors"[All Fields] OR "inhibitors"[All Fields]) AND ("therapy"[Subheading] OR "therapy"[All Fields] OR "treat"[All Fields] OR "therapeutics"[MeSH Terms] OR "therapeutics"[All Fields]) AND ("neoplasms"[MeSH Terms] OR "neoplasms"[All Fields] OR "cancer"[All Fields])*	ATM … – Boolean operators added (AND, OR) – Mapping with MeSH terms! – Field tags […] – Nesting (…)	Try to build the same equation with corresponding MeSH terms with the Advanced Search Builder	721	Too much ref. to check!

Advanced Search Builder …

- To be used for **advanced search strategy**
- To **split up and combine** equations (History)
- **Must be on PubMed** and not MeSH (MeSH Advanced Search Builder)!

3. Search box (simple or advanced) …

Advanced Search Builder (MeSH search equations) …

Equation	Observations	Comments	Action	Numb. Results	Relevant ref.
"Cyclin-Dependent Kinase Inhibitor Proteins"[Mesh] AND "Therapeutics"[Mesh] AND "Neoplasms"[Mesh]	– Performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion	All concepts repre-sented by MeSH terms (no need to perform a free-text search for a Non-MeSH concept)	Try to improve the equation with more MeSH terms and split it up in the Advanced Search Builder	746	Too much ref. to check!
"Cyclin-Dependent Kinase Inhibitor Proteins"[Mesh] OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Mesh]	– Performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion	1st part of equation (#1)	Perform 2nd part	22700	-
"Therapeutics"[Mesh] OR "therapy"[Subheading]	– Performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion	2nd part of equation (#2)	Perform 3rd part	7120458	-
"Neoplasms"[Mesh]	– Performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion	3rd part of equation (#3)	Combine all parts in the Advanced Search Builder (History)	2687498	-

3. Search box (simple or advanced) …

Advanced Search Builder (MeSH search equations) …

Equation	Observations	Comments	Action	Numb. Results	Relevant ref.
("Cyclin-Dependent Kinase Inhibitor Proteins"[Mesh] OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Mesh]) AND ("Therapeutics"[Mesh] OR "therapy"[Subheading]) AND "Neoplasms"[Mesh]	– Combination: #1 AND #2 AND #3 – Performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion	Final equation	Apply restri-ctions to MeSH terms to lower down the number of results: [Majr], [Mesh:NoExp] or [Majr:NoExp]	3215	Too much ref. to check!
("Cyclin-Dependent Kinase Inhibitor Proteins"[Majr] OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Majr]) AND ("Therapeutics"[Majr] OR "therapy"[Subheading]) AND "Neoplasms"[Majr]	– Performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion – Restrict to MeSH terms used as Major Topic [Majr]	Final equation with restriction	Apply other restrictions or use filters on result page (to be seen in part 4: "Results, Search details & Filters")	872	Too much ref. to check!

- A glimpse at what the **history part of the Advanced Search Builder** might looks like

Query	Items found
Search **((("Cyclin-Dependent Kinase Inhibitor Proteins"[Mesh]) OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Mesh])) AND (("Therapeutics"[Mesh]) OR "therapy" [Subheading])) AND "Neoplasms"[Mesh]** Sort by: **PublicationDate**	3215
Search **"Neoplasms"[Mesh]** Sort by: **PublicationDate**	2687498
Search **("Therapeutics"[Mesh]) OR "therapy" [Subheading]** Sort by: **PublicationDate**	7120458
Search **("Cyclin-Dependent Kinase Inhibitor Proteins"[Mesh]) OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Mesh]** Sort by: **PublicationDate**	22700
Search **("Cyclin-Dependent Kinase Inhibitor Proteins"[Mesh] AND "Therapeutics"[Mesh] AND "Neoplasms"[Mesh])** Sort by: **PublicationDate**	746

3. Search box (simple or advanced) …

Advanced Search Builder (Non-MeSH search equations) …

- The MeSH search equation previously performed **does not retrieve recent references** (recently added references do not contain MeSH terms)
- A **free-text search strategy** need to be performed to retrieve recently added references
- Free-text search strategies do not use MeSH terms but **keywords/synonyms searched for in title and abstracts**
- **The more keywords/synonyms** for a concept, **the more relevant results** to be found
- **Truncating** (represented by the * symbol) **might be used to cover plural forms** (to be used very cautiously – explosion of keywords!)
- Like previously shown, use the Advanced Search Builder to **split up and combine** equations (History)

3. Search box (simple or advanced) …

Advanced Search Builder (Non-MeSH search equations) …

Equation	Observations	Comments	Action	Numb. Results	Relevant ref.
("Cyclin-Dependent Kinase Inhibitors"[ti] OR "cyclin-dependent kinase inhibitor"[ti] OR "CDK inhibitors"[ti]OR "CDK inhibitor"[ti]) AND (treatment[tiab] OR treatments[tiab] OR therapeutic*[ti] OR therapy[tiab] OR therapies[tiab]) AND (cancer[tiab] OR neoplasm*[tiab] OR tumor[tiab] OR tumour[tiab])	– Combination of several smaller equations performed in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated)	Incomplete equation	Play with the [ti]/[tiab] field tags to lower down the number of results	250	Too much ref. to check!
("Cyclin-Dependent Kinase Inhibitors"[ti] OR "cyclin-dependent kinase inhibitor"[ti] OR "CDK inhibitors"[ti] OR "CDK inhibitor"[ti]) AND (treatment[tiab] OR treatments[tiab] OR therapeutic*[tiab] OR therapy[tiab] OR therapies[tiab]) AND (cancer[ti] OR neoplasm*[ti] OR tumor[ti] OR tumour[ti])	– Edition of the field tags in the Advanced Search Builder – Search details shows the exact equation (ATM deactivated)	Final equation	Still possible to … – Exclude references found with the MEDLINE equation (with NOT in the Advanced Search Builder) – Apply filters (to be seen in part 4: "Results, Search details & Filters")	119	Possible to check this limited number of ref.

4. Results, Search details & Filters …

On the **same page** …

✓ **filters**

Article types
Clinical Trial
Review
Customize …

Text availability
Abstract
Free full text
Full text

Publication dates
5 years
10 years
Custom range…

Species
Humans
Other Animals

Clear all

Show additional filters

✓ **results**

Results: 1 to 200 of 3215

<< First < Prev Page 1 of 17 Next > Last >>

1. Risk stratification by p16 immunostaining of CIN1 biopsies: a retrospective study of patients from the quadrivalent HPV vaccine trials.
Mills AM, Paquette C, Castle PE, Stoler MH.
Am J Surg Pathol. 2015 May;39(5):611-7. doi: 10.1097/PAS.0000000000000374.
PMID: 25602791
Similar articles

2. Entinostat, a novel histone deacetylase inhibitor is active in B-cell lymphoma and enhances the anti-tumour activity of rituximab and chemotherapy agents.
Frys S, Simons Z, Hu Q, Barth MJ, Gu JJ, Mavis C, Skitzki J, Song L, Czuczman MS, Hernandez-Ilizaliturri FJ.
Br J Haematol. 2015 May;169(4):506-19. doi: 10.1111/bjh.13318. Epub 2015 Feb 23.
PMID: 25712263
Similar articles

3. Phase 2 trial of the cyclin-dependent kinase 4/6 inhibitor palbociclib in patients with retinoblas
protein-expressing germ cell tumors.
Vaughn DJ, Hwang WT, Lal P, Rosen MA, Gallagher M, O'Dwyer PJ.
Cancer. 2015 May 1;121(9):1463-8. doi: 10.1002/cncr.29213. Epub 2014 Dec 18.
PMID: 25522918
Similar articles

4. CDK4/6 Inhibitor PD 0332991 Sensitizes Acute Myeloid Leukemia to Cytarabine-Mediated Cytotoxicity.
Yang C, Boyson CA, Di Liberto M, Huang X, Hannah J, Dorn DC, Moore MA, Chen-Kiang S, Zhou P.
Cancer Res. 2015 May 1;75(9):1838-45. doi: 10.1158/0008-5472.CAN-14-2486. Epub 2015 Mar 5.
PMID: 25744718

✓ **Search details**

Search details

```
(("Cyclin-Dependent Kinase
Inhibitor Proteins"[Mesh] OR
"Cyclin-Dependent
Kinases/antagonists and
inhibitors"[Mesh]) AND
("Therapeutics"[Mesh] OR
```

Search See more…

4. Results, Search details & Filters …

Using filters (MeSH search equation) …

Equation	Observations	Comments	Action	Numb. Results	Relevant ref.
("Cyclin-Dependent Kinase Inhibitor Proteins"[Majr] OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Majr]) AND ("Therapeutics"[Majr] OR "therapy"[Subheading]) AND "Neoplasms"[Majr]	– Performed in Advanced Search Builder – Search details shows the exact equation (ATM deactivated) – MeSH term explosion – Restrict to MeSH Major Topic [Majr] – "Review" filter in result page – Use more filters if necessary (languages, publication dates, etc.)	Final equation with restrictions and filters	Skim through the result page to find matching references	101	Many

Using filters (Non-MeSH search equation) …

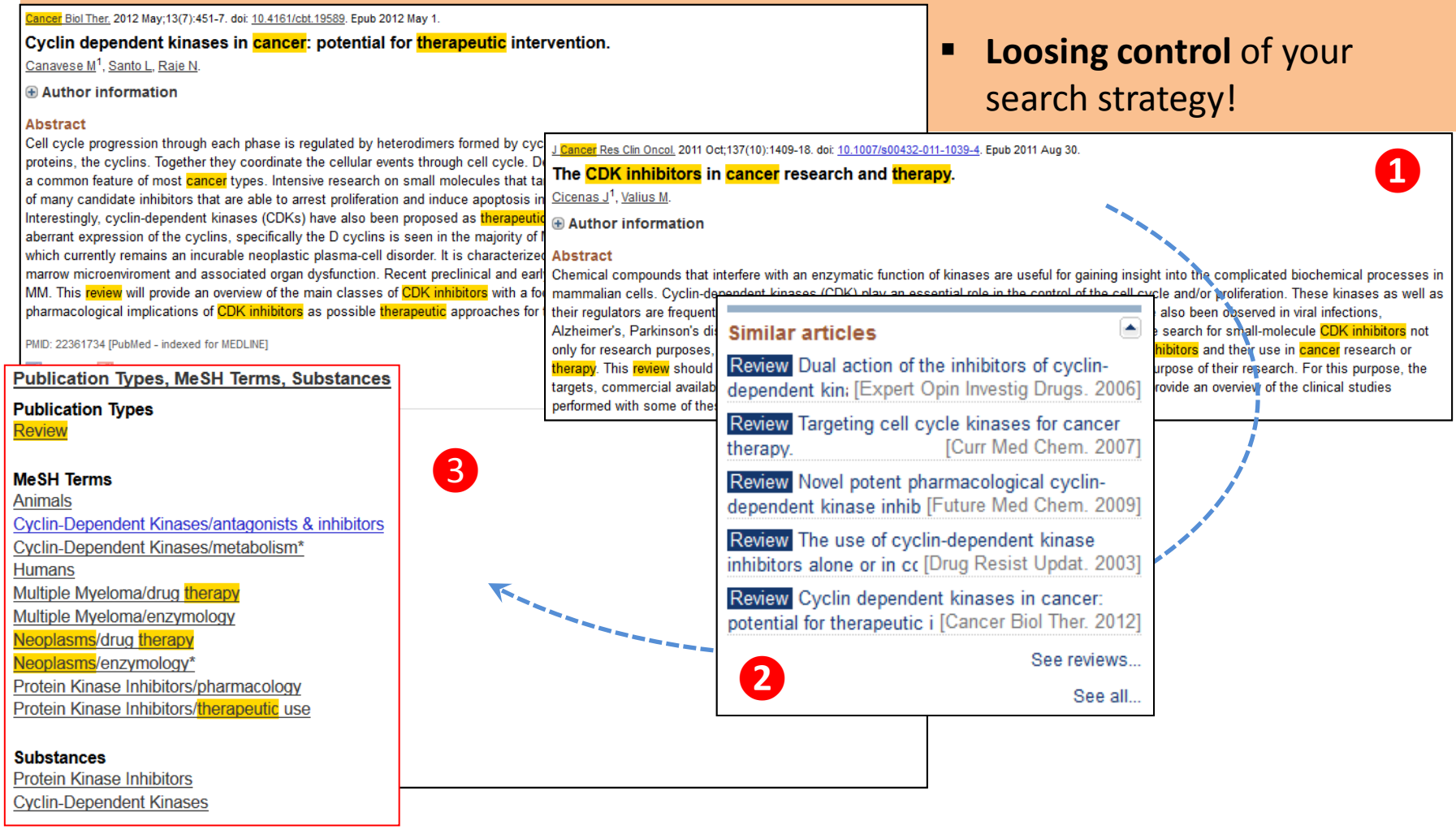
Equation	Observations	Comments	Action	Numb. Results	Relevant ref.
("Cyclin-Dependent Kinase Inhibitors"[ti] OR "cyclin-dependent kinase inhibitor"[ti] OR "CDK inhibitors"[ti] OR "CDK inhibitor"[ti]) AND (treatment[tiab] OR treatments[tiab] OR therapeutic*[tiab] OR therapy[tiab] OR therapies[tiab]) AND (cancer[ti] OR neoplasm*[ti] OR tumor[ti] OR tumour[ti])	– Search details shows the exact equation (ATM deactivated) – "Review" filter in result page – Use more filters if necessary (languages, publication dates, etc.)	Final equation with restrictions and filters	Skim through the result page to find matching references	18	Many

5. Relevant references & Similar articles …

Similar articles (bouncing) …

- For every relevant citation, **use the "Similar articles" to get out of the loop** and try to find **new MeSH terms, keywords/synonyms**

- **Loosing control** of your search strategy!



6. Save relevant references …

- Like previously shown, use **Zotero** (a reference manager) **to keep track** of relevant references found **and share** them with group members

7. Read documents & Answer questions …

Read relevant documents …

- For highly relevant references, access the document (fulltext) and **read it to see if it contains the information to answer your question** to **find new keywords/synonyms**
- **Think of the bibliography** to discover new relevant references

REVIEW

Cancer Biology & Therapy 13:7, 451-457; May 2012; © 2012 Landes Bioscience

Cyclin dependent kinases in cancer
Potential for therapeutic intervention

Miriam Canavese, Loredana Santo and Noopur Raje*

MGH Cancer Center; Massachusetts General Hospital; Harvard Medical School; Boston, MA USA

Keywords: cyclin-dependent kinases, cell cycle, CDK inhibitors, multiple myeloma, targeted therapies

Abbreviations: CDK, cyclin-dependent kinases; CDKI, CDK inhibitor; MM, multiple myeloma

Cell cycle progression through each phase is regulated by heterodimers formed by cyclin-dependent kinases (CDKs) and their regulatory partner proteins, the cyclins. Together they coordinate the cellular events through cell cycle. De-regulation of cell cycle control due to aberrant CDK activity is a common feature of most cancer types.

Intensive research on small molecules that target cell cycle regulatory proteins has led to the identification of many candidate inhibitors that are able to arrest proliferation and induce apoptosis in neoplastic cells as a promising strategy to treat cancer. Interestingly, cyclin-dependent kinases (CDKs) have also been proposed as therapeutic targets for Multiple Myeloma (MM). Overexpression and aberrant expression of the cyclins, specifically the D cyclins is seen in the majority of MM underscoring the value of exploring CDK inhibition in MM which currently remains an incurable neoplastic plasma-cell disorder. It is characterized by clonal proliferation of malignant plasma cells in the bone marrow micro-environment and associated organ dysfunction. Recent preclinical and early clinical data explore several CDK inhibitors in the context of MM.

This review will provide an overview of the main classes of CDK inhibitors with a focus on their mechanism of action and discuss clinical and pharmacological implications of CDK inhibitors as possible therapeutic approaches for the treatment of cancer with specific consideration to MM.

Introduction

Cyclin-dependent kinases (CDKs) are specific serine/threonine kinases that play an essential role in cell cycle regulation allowing transition between its different phases.[1] Many of the genes involved in cell cycle progression are frequently mutated in human cancers leading to uncontrolled cell division and tumor growth. Furthermore, several components of the CDK machinery are deregulated in different malignancies.[2] This knowledge provides a rationale for considering the cell cycle and its complex regulation system as potential targets for new drug development in cancer therapeutics. Hence, in the last decade there has been increasing interest in the development of selective inhibitors of CDKs and mitotic kinases.[3] A number of CDK inhibitors (CDKIs) with different mechanisms of action have been evaluated. Yet, it is not clear which CDK or spectrum of CDKs should be targeted. Based on preclinical data it seems clear that compensatory roles of certain CDKs in cancer cell types may influence the biology of specific cancers that would be considered good targets for these compounds.[1]

Limited clinical activity has been observed in most-single agent studies with CDKIs along with remarkable toxicity.[1] Newer molecules with more favorable pharmacokinetics, a better understanding of the biology and mechanisms of action of these drugs and the use of CDKIs in combination with conventional cytotoxics seem promising areas that are being currently explored. In addition, new kinases involved in cell cycle regulation have been recently identified and represent promising alternative therapeutic targets. Results from ongoing trials, the incorporation of more selective targeted agents and a more profound understanding of the cell cycle and its regulatory mechanisms, will hopefully bring some light to this complex field of anticancer drug development.[4,5]

Here we review the role of CDKIs in malignancy, with particular attention to multiple myeloma (MM) and we discuss the most relevant CDKIs in clinical development as possible therapeutic approaches in cancer therapy.

Cyclin Dependent Kinases: From the Bench to the Clinic

The cell cycle is an ordered series of events required for the faithful duplication of one eukaryotic cell into two genetically identical daughter cells. It is now well-established that, although growth and protein synthesis occur almost constantly throughout the cycle, DNA synthesis takes place only at determinate times. The Gap intervals (G_1, G_2) between the S phase and M phase are no longer considered idle periods, but rather represent critical regulatory phases where information from the extracellular environment is integrated along with all intracellular changes.[1,6] The coordinated transitions between cell cycle phases depend on one family of evolutionarily conserved proteins, called CDKs. These are binary proline-directed serine/threonine-specific kinases that consist of a catalytic subunit (the CDK) and a regulatory subunit (the cyclin) as shown in **Figure 1**.

The mammalian genome has 12 loci encoding CDKs, although only five of them—CDK1, CDK2, CDK3, CDK4 and

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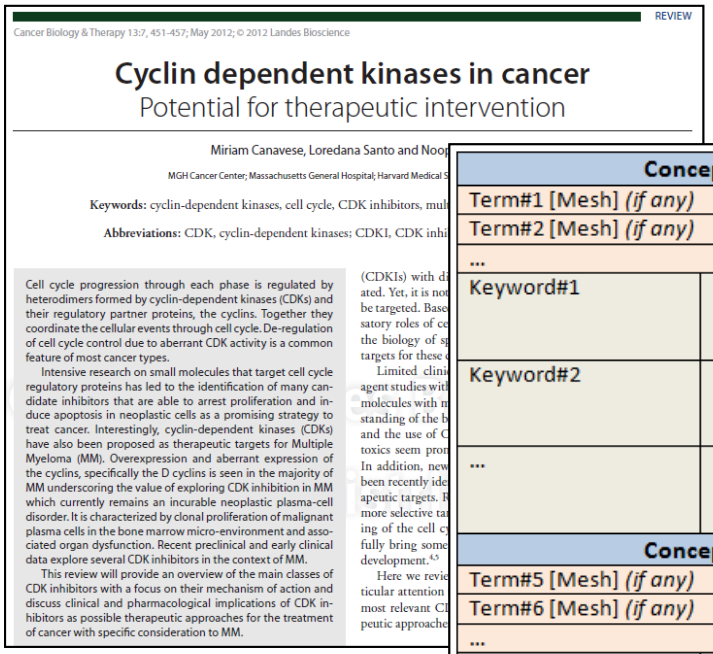
Submitted: 01/20/12; Accepted: 02/03/12
http://dx.doi.org/10.4161/cbt.19589

8. Improve concepts & Equations …

Concepts …



REVIEW

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Potential for therapeutic intervention

Miriam Canavese, Loredana Santo and Noo

MGH Cancer Center; Massachusetts General Hospital; Harvard Medical S

Keywords: cyclin-dependent kinases, cell cycle, CDK inhibitors, mul

Abbreviations: CDK, cyclin-dependent kinases; CDKI, CDK inhi

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Intensive research on small molecules that target cell cycle regulatory proteins has led to the identification of many candidate inhibitors that are able to arrest proliferation and induce apoptosis in neoplastic cells as a promising strategy to treat cancer. Interestingly, cyclin-dependent kinases (CDKs) have also been proposed as therapeutic targets for Multiple Myeloma (MM). Overexpression and aberrant expression of the cyclins, specifically the D cyclins is seen in the majority of MM underscoring the value of exploring CDK inhibition in MM which currently remains an incurable neoplastic plasma-cell disorder. It is characterized by clonal proliferation of malignant plasma cells in the bone marrow micro-environment and associated organ dysfunction. Recent preclinical and early clinical data explore several CDK inhibitors in the context of MM.

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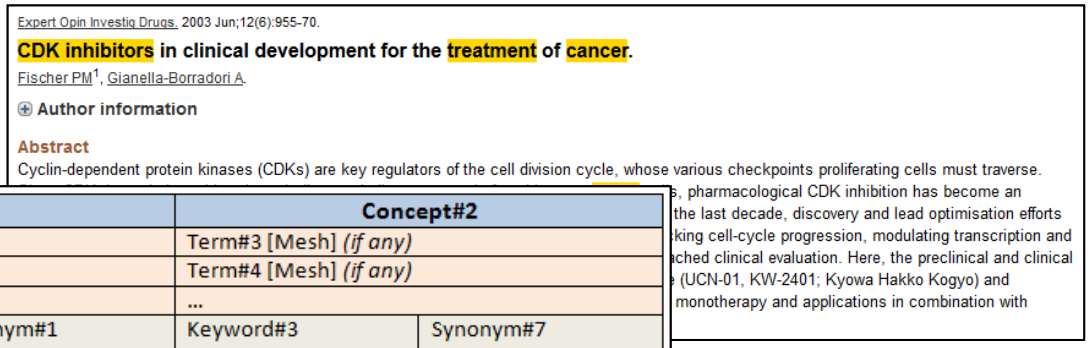


Expert Opin Investig Drugs. 2003 Jun;12(6):955-70.

CDK inhibitors in clinical development for the treatment of cancer.

Fischer PM[1], Gianella-Borradori A.

⊕ Author information

Abstract

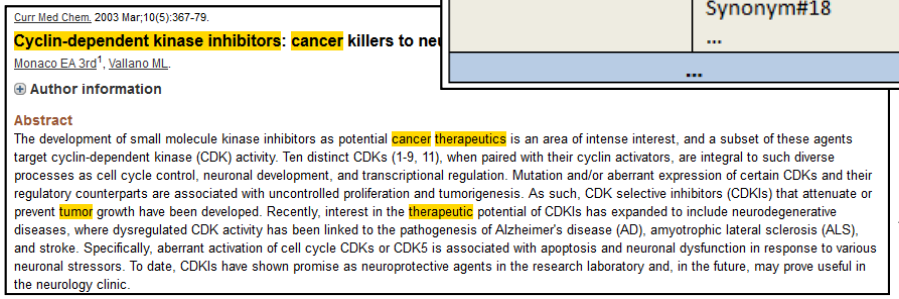
Cyclin-dependent protein kinases (CDKs) are key regulators of the cell division cycle, whose various checkpoints proliferating cells must traverse.
s, pharmacological CDK inhibition has become an
the last decade, discovery and lead optimisation efforts
king cell-cycle progression, modulating transcription and
ched clinical evaluation. Here, the preclinical and clinical
(UCN-01, KW-2401; Kyowa Hakko Kogyo) and
monotherapy and applications in combination with

Concept#1		Concept#2	
Term#1 [Mesh] *(if any)*		Term#3 [Mesh] *(if any)*	
Term#2 [Mesh] *(if any)*		Term#4 [Mesh] *(if any)*	
…		…	
Keyword#1	Synonym#1 Synonym#2 …	Keyword#3	Synonym#7 Synonym#8 …
Keyword#2	Synonym#3 Synonym#4 …	Keyword#4	Synonym#9 Synonym#10 …
…	Synonym#5 Synonym#6 …	…	Synonym#11 Synonym#12 …
Concept#3		**Concept#4**	
Term#5 [Mesh] *(if any)*		Term#7 [Mesh] *(if any)*	
Term#6 [Mesh] *(if any)*		Term#8 [Mesh] *(if any)*	
…		…	
Keyword#5	Synonym#13 Synonym#14 …	Keyword#7	Synonym#19 Synonym#20 …
Keyword#6	Synonym#15 Synonym#16 …	Keyword#8	Synonym#21 Synonyr …
…	Synonym#17 Synonym#18 …	…	Synonyr Synonyr …
…		…	

+ MeSH terms

Complete or improve search equations

+ keywords/synonyms



Curr Med Chem. 2003 Mar;10(5):367-79.

Cyclin-dependent kinase inhibitors: cancer killers to ne

Monaco EA 3rd[1], Vallano ML.

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Abstract

The development of small molecule kinase inhibitors as potential cancer therapeutics is an area of intense interest, and a subset of these agents target cyclin-dependent kinase (CDK) activity. Ten distinct CDKs (1-9, 11), when paired with their cyclin activators, are integral to such diverse processes as cell cycle control, neuronal development, and transcriptional regulation. Mutation and/or aberrant expression of certain CDKs and their regulatory counterparts are associated with uncontrolled proliferation and tumorigenesis. As such, CDK selective inhibitors (CDKIs) that attenuate or prevent tumor growth have been developed. Recently, interest in the therapeutic potential of CDKIs has expanded to include neurodegenerative diseases, where dysregulated CDK activity has been linked to the pathogenesis of Alzheimer's disease (AD), amyotrophic lateral sclerosis (ALS), and stroke. Specifically, aberrant activation of cell cycle CDKs or CDK5 is associated with apoptosis and neuronal dysfunction in response to various neuronal stressors. To date, CDKIs have shown promise as neuroprotective agents in the research laboratory and, in the future, may prove useful in the neurology clinic.

+ MeSH terms & Keywords/synonyms

Search ("Cyclin-Dependent Kinase Inhibitor Proteins"[Majr] OR "Cyclin-Dependent Kinases/antagonists and inhibitors"[Majr]) AND ("Therapeutics"[Majr] OR "therapy"[Subheading]) AND "Neoplasms"[Majr]

7. To be kept in mind …

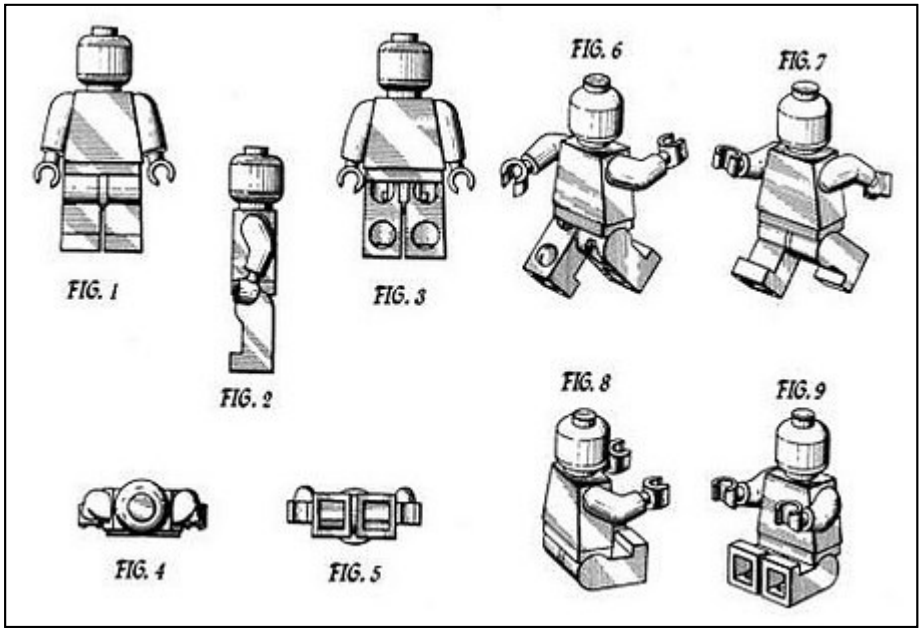
- Information retrieval is an **iterative process**
- PubMed might be used like Google(Scholar) **BUT there is more to it** (search details)
- **Split questions** into concepts (with MeSH terms, keywords/synonyms) and **build equations**
- **Separate MeSH** (MeSH + free-text search strategies for non-MeSH concepts) **from Non-MeSH** (free-text search strategies) equations
- Build your equations with the **Advanced Search Builder** (using **OR**, **AND**, **NOT**)
- **Keep track of your interesting findings** at different stages (reference manager)
- **Use the "Similar articles"** feature **to get out of the loop** and try to find **new MeSH terms and keywords/synonyms**
- **Continuously improve the concepts and equations** with new found MeSH terms and keywords/synonyms
- **Information retrieval** is an activity that **requires a lot of practices to be mastered**

Questions

PATENT DATABASES

"A patent is a **State-delivered intellectual property (IP) right** that allows the applicant to prevent others from commercially exploiting the invention for a specific period of time. In return, **the applicant must disclose how the invention works**. Patents usually **cover products or processes containing new functional or technological aspects**. Patents therefore deal with how something functions, what it does, how it does something or how and from what it is produced."

Source: https://www.ige.ch/en/service/glossary.html?tx_contagged[source]=default&tx_contagged[uid]=213



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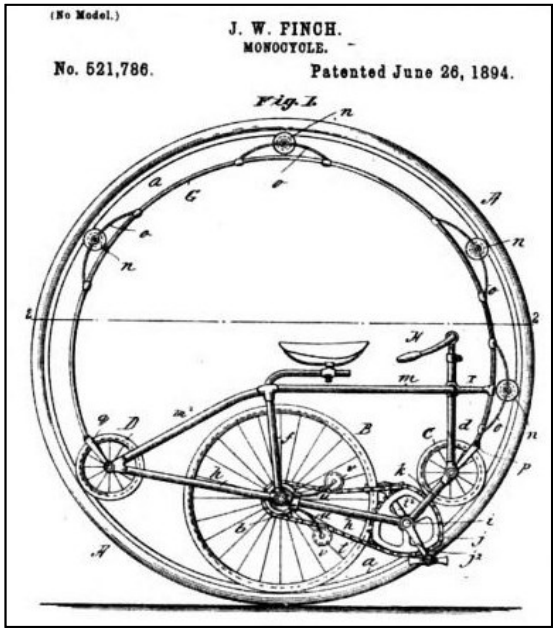

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PATENT DATABASES

The information in a patent document refers to the following …

- **Applicant**: the name of the individual or company applying to have a particular technology protected
- **Inventor**: the name of the person or persons who invented and developed the invention
- **Description**: a clear and concise explanation of known existing technologies and problems associated with them and how the new technology is applied to solve these problems[…]
- **Claims**: a statement defining the scope of the protection sought or granted through the patent
- **Citation and references**: certain patent documents also include references to related technology information uncovered by the applicant or by a patent examiner during the patent granting procedure […]

Source: http://www.wipo.int/edocs/pubdocs/en/patents/434/wipo_pub_l434_02.pdf

PATENT DATABASES

- **Espacenet** (free)
  http://worldwide.espacenet.com/advancedSearch?locale=en_EP
- **Derwent Innovations Index** (paywall – available at EPFL)
  http://www.isiknowledge.com
- **Google Patents** (free)
  http://www.google.com/patents
- **Scifinder** (paywall – limited access at EPFL http://library.epfl.ch/databases/en)
  http://scifinder.cas.org

- **Finding Technology Using Patents - An Introduction** (guide)
  http://www.wipo.int/edocs/pubdocs/en/patents/434/wipo_pub_l434_02.pdf
- **WIPO Guide to Using Patent Information**
  http://www.wipo.int/edocs/pubdocs/en/patents/434/wipo_pub_l434_03.pdf

CITATION & PLAGIARISM

- **Citation**
  http://citation.epfl.ch/home

  The website citation.epfl.ch is intended for students, PhD candidates, researchers, and instructors

- The **consequences of committing plagiarism**
  http://citation.epfl.ch/copyright/consequences

> 3 Plagiarism or self-plagiarism, whether committed intentionally or by omission, constitutes misconduct, which gives rise to the launching of an internal disciplinary procedure.
>
> 4 Other consequences : plagiarism brings discredit to its author, which has repercussions on his research team, negates the value of the work carried out and brings disgrace on the institution involved. It may also give rise to external procedures.

Source: Directive concerning research integrity and good scientific practice at EPFL, art. 18, par. 3-4
http://research-office.epfl.ch/files/content/sites/research-office/files/Research%20Ethics/3.3.2_principe_integrite_recherche_an(11).pdf