

Google strategically and evaluate results critically – some tips & tricks to help you do so

Search specifically

- use “+” or “and” to only get results that contain matches to multiple things
 - *mRNA + translation* will give results that include both these words, but in any order or context
- use **quotation marks** to get direct matches to an entire phrase
 - “mRNA translation” will give results that include the phrase “mRNA translation” (in that order)
 - Also really helpful for troubleshooting coding error messages!
- can include “*” as a wildcard character
 - “* excision repair” will give results for “base excision repair” and “nucleotide excision repair”

Search for science-y results!

Remember, Google doesn’t think with a scientist as the key audience. So you need to help it out

- **Include a related science- specific word** in your search terms by using “+” or “and”
 - Rather than searching for *translation*, which will give you a bunch of language converters, search for something like *translation + mRNA*
 - include *mechanism* and/or *structure* if you’re trying to find out how a specific drug works
 -
- **Exclude** non-science-y terms in your results by using “-”
 - *translation -language* will filter out some of those results you don’t want
- Can even do both together!
 - *translation + mRNA -language*
- And can include &/or exclude multiple things at once
 - *Translation + mRNA + initiation*
- Avoid slang, abbreviations, and brand names
 - use generic names for pharmaceutical drugs when possible
 - e.g. nusinersen instead of Spinraza
- Use “OR” or “|” to search for multiple things at once
 - Really helpful if a process or molecule goes by multiple names and/or has different names in different organisms
 - “*ribosome profiling*” OR “*ribosome footprinting*” OR “*Riboseq*”
 - *Spinraza* OR *nusinersen*

Filtering results

- filter results by file type using filetype:
 - “0.5M EDTA” recipe filetype:pdf
- filter results by publication year
 - “mRNA translation” after: 2020
 - “mRNA translation” before: 1980
 - “mRNA translation” 1980:2020 (this will give you results published between 1980 and 2020)

Other tips for getting more helpful results

- Look at the images tab to find sites & papers that look like they might have the type of thing you’re looking for
- Search the “News” tab to see if there are any updates on approval, etc. for a drug
- Search within Google Scholar to get research articles
- Use “primer” and/or “review” to search for review articles on a topic
 - *spinal muscular atrophy + primer* OR *review*
- Search within a single site by including site:url
 - *spinal muscular atrophy site:ncbi.nlm.nih.gov/books/*

- Search for “stock solution” when trying to figure out what strength of stock solutions people commonly make
 - *EDTA stock solution* will let you see that people commonly prepare a 0.5M EDTA stock solution
- Include “recipe” to find out how to make various solutions - although it’s important to be able to do the calculations yourself (and you might need to scale any recipe you find), it’s also important to see if there are any solution-specific things you need to know, such as that you need to adjust the pH to get EDTA to dissolve!
 - “0.5M EDTA” recipe
- Use “~” to include synonyms
 - but remember that Google’s idea of synonyms is more things like large/massive/huge, rather than “ribosome profiling”/“ribosome footprinting”/“Riboseq”, so it’s better to be explicit by using “OR”

Remember that not all results are created equally!

Think critically about whatever you find! - use that scientific frame of mind!

No matter how helpful Google is, it is no replacement for a quality education! These tips, and Google in general, can help you find “information,” but, once you find it, you have to:

- 1) figure out whether it’s actually *information* or just junk and if it is information
- 2) interpret what it means

The first is largely “just” media literacy, but the second might entail a very solid foundation of scientific knowledge. The stronger your foundation, the more you can truly get out of Google as a scientist. So, when you’re learning, focus on getting the fundamentals down. Then, there’s a vast world of information accessible to you!!!