Obtaining Scientific Information

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➢ Scientific or Medical Literature Information

- **They are classified into:**
  - **Primary**: **Original research & analysis**
  - **Secondary**: **No interpretation, just helps you find sources**
  - **Tertiary:** **Interpretation of primary data**

- **Information must be:**
  - **Current**: **Up to date**
  - **Critically examined**: **Reviewed, more than one resource,……**
  - **Relevant and specific:** **As related to the subject of interest**

➢ Primary Resources

Ex. Journals Original articles, NOT Review articles

Benefits:

1. **Up to date and keep up with new advances/development**
2. **Enhance communications and share opinions with other healthcare professionals**
3. **Obtain continuing education**

Limitations:

- **Although publication of an article is well known, respected journal enhances the credibility of information contained in an article, this does not guarantee that the article is accurate.**

➢ Secondary Resources

Ex.: Indexing and abstracting services

Benefits:

Valuable tools for quick and selective screening of the primary literature for specific information, data, citation, and articles.

Examples:

***PubMed*; Google Scholar; Scopus; Ovid; Web of Science; Embase; Cochrane Library; OpenMD; Pharmaceutical News Index; International Pharmaceutical Abstracts; ClinAlert; ……**

Limitations:

- **May not contain all articles**
- **Lag time *(i .e. , the interval between the publication of an article and the citation of that article in an index).***
- **May require subscription**

➢ Tertiary Resources

Ex.: Textbooks

Benefits:

- **Provide easy and convenient access to a broad spectrum of related topics**
- **Background information on drugs and diseases is often available.**

Limitations:

1) **Not recent, it could take several years to publish a text book**
2) **The author of a textbook might not have conducted a thorough search of the literature.**

➢ Tertiary Resources

Ex. : Databases and Internet

Benefits:

- **Convenient, easy to use, and referenced.**
- **Similar to textbooks, but updated more frequently.**
- **Useful resources for drug monographs, pill identifications, drug interactions, and various therapeutic calculations**
- **Information must be obtained only from accredited/peer-reviewed known websites**

Limitations:

- **Lag time, my not as complete, depends on author interpretation**
- **May require subscription**

Examples:

Micromedex, Lexi-Comp, UptoDate, NICE.org.uk, NHS.org.uk, FDA.gov, CDC.gov, Guideline.gov, clinicaltrials.gov, Mayo.edu, Medscape.com, Emedicine.com, Drugs.com, Rxlist.com, Druginfo.com, Cancer.gov, NIH.gov, Webmed.com,, PDR.com, AHFS, PDR, USP Drug Information, Drug Facts and Comparisons, Martindale: The Complete Drug Reference.

Note:

Several databases are available as mobile apps.

➢ Scientific Information Resources

- Ease of use:

Tertiary → Secondary → Primary

- Most Current:

Primary → Secondary → Tertiary

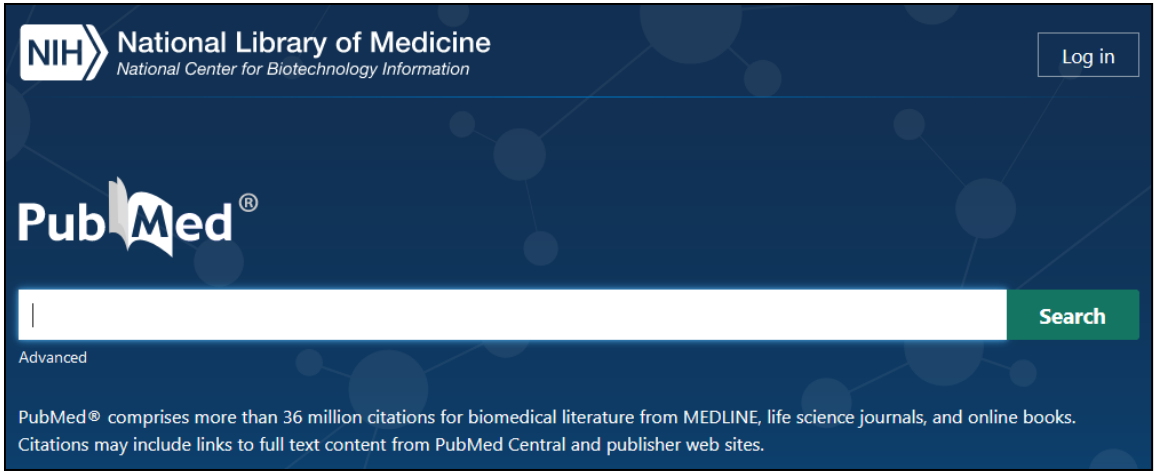
➢ Searching Tips

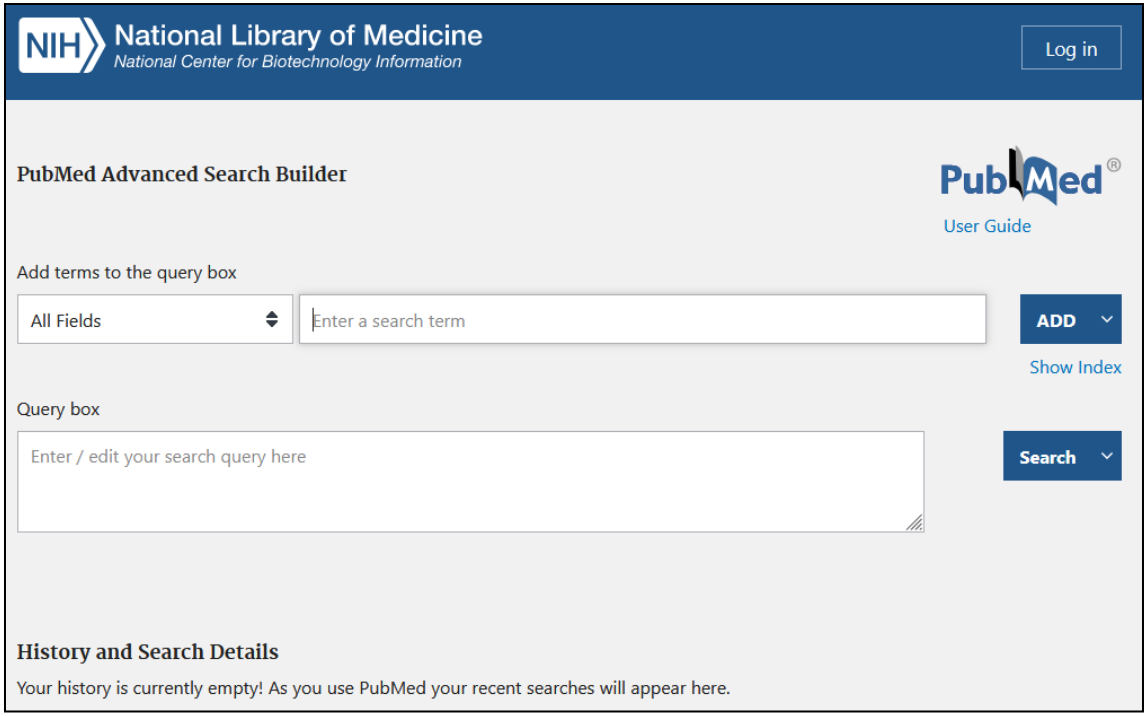
- **Use specific keywords:**
  - **Ex: Inflammation, acute kidney injury (AKI), liver, fibrosis, cytokines, interleukins, oxidative, hepatic stellate cell, TGF, ...**
  - **Avoid common words (a, an, the…….) and punctuation**
  - **Use root of word ex: decrease not decreasing**

- **Search all related terms:**
  - **Ex: oxidative/redox/antioxidant/glutathione/SH/NADPH oxidase (NOX).....**
  - **Inflammation/cytokines/interleukines/**
  - **liver/hepatic/biliary/NAFLD/NASH/HCC/HBV/HCV.....**
  - **insulin/diabetes/obesity/hyperglycemia/GLUT-4/GLUT-2.....**
  - **kidney/renal/glomerular/proteinuria/AKI/CKI/.....**
  - **Heart/arrhythmia/dysrhythmia/bradycardia/tachycardia/CK-MB/cTnI/cardiac output....**

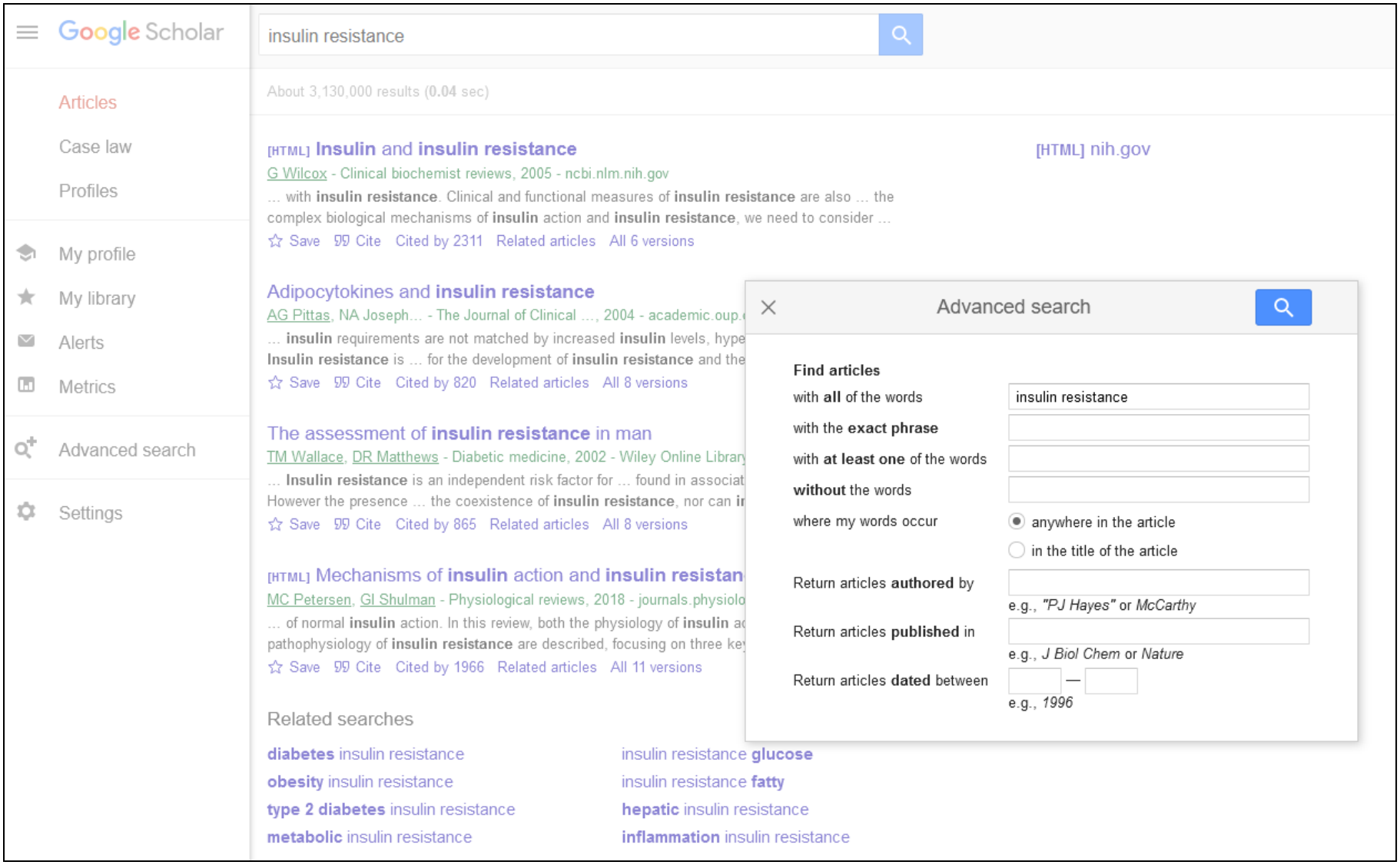
- **Take care of variants:**
  - **Ex: hyperten* for both hypertension and hypertensive;**
  - **diabet*;**
  - **oxidati*;**
  - **Inflammat*;**

➢ Scientific Information Resources

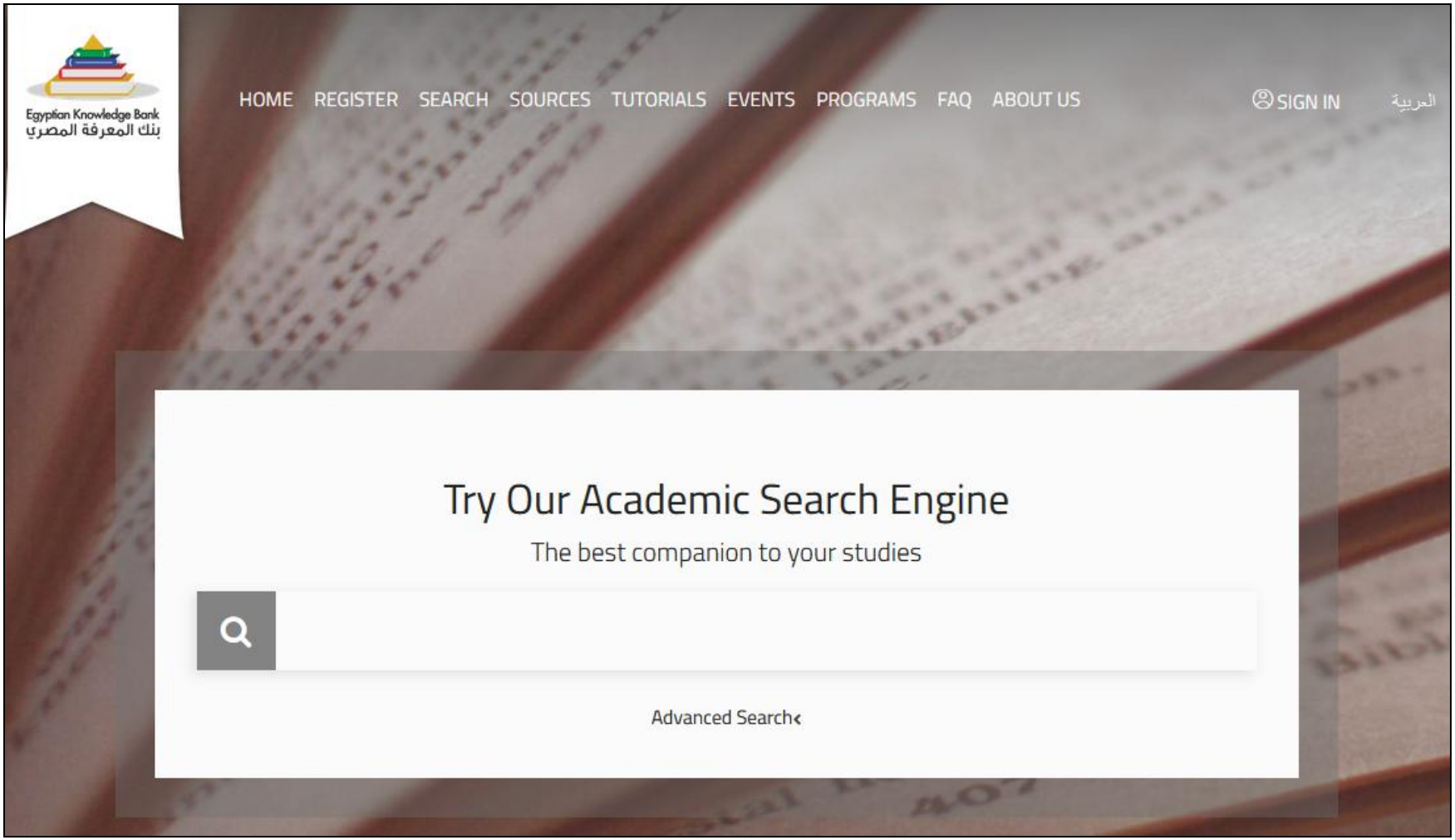




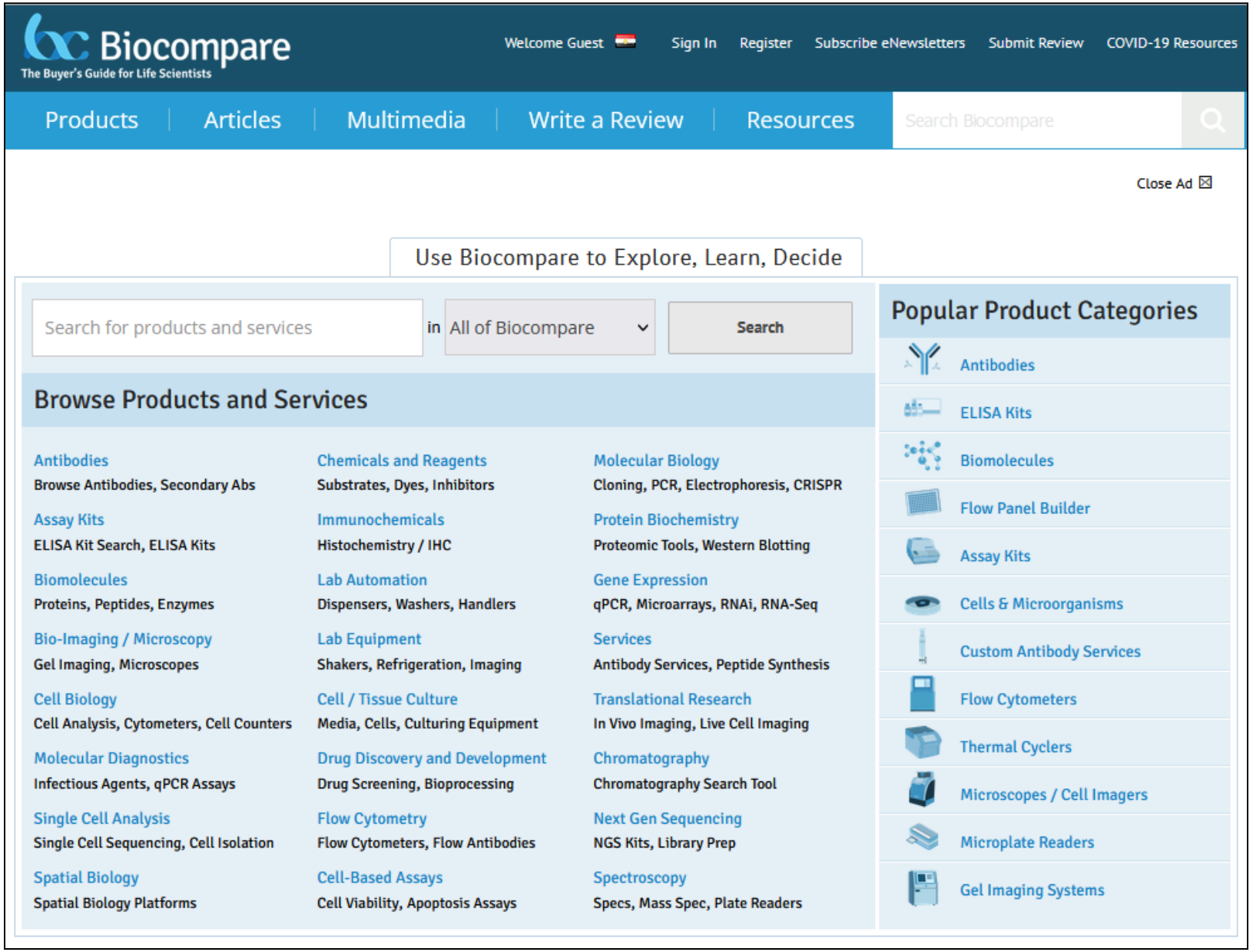
➢ Scientific Information Resources



➢ Scientific Information Resources



➢ Scientific Information Resources



➢ Choosing a research pathway

➢ What is your aim?

- What is your specific target? (treatment, prevention, decrease complications,…)
- Is it acute or chronic?
- Are current therapies not sufficient? What is missing/disadvantages?
- What is the main advantage(s) your aim will add to current situation?
- Always look for the current and future treatments if available for your disease

➢ Example:

- Insulin Resistance
- Liver Fibrosis
- Acute inflammation
- Acute kidney injury
- ……..

➢ Choosing a research pathway

➢ Choosing your model?

- **Clinical or Experimental?**
- **What research animal is suitable and resemble human disease model?**
  - **Ex. Can rodents be used for dyslipidemia/atherosclerosis?**
- **How to induce the disease or the dysfunction?**
  - **Ex. Chemical , surgical, genetic, ……**
- **What is the shortcomings of the model compared to other models?**
  - **Ex. LPS vs CLP; thioacetamide vs BDL; Bleomycin-induced lung fibrosis injection vs Intratracheal …….**
- **Availability**
- **Duration**
- **Cost**

➢ Choosing a research pathway

➢ Choosing your pathway?

- What are the possible pathways/mechanisms that can treat or prevent this disease or its complications?
- See what pathway your intervention (Ex. Drug) can specifically affect
- Try to follow this pathway using key biomarkers, be specific.
- Can you measure this pathway markers? Are they available? What alternatives?
- Examples

➢ Choosing a research pathway

➢ Choosing your biomarkers?

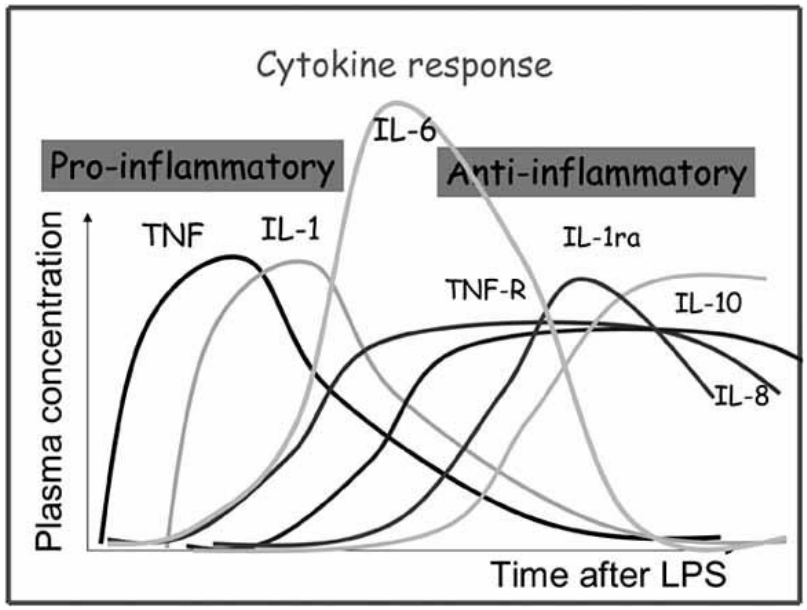
– **Always check that your model already express biomarkers for the disease? And which ones will your intervention affect?**

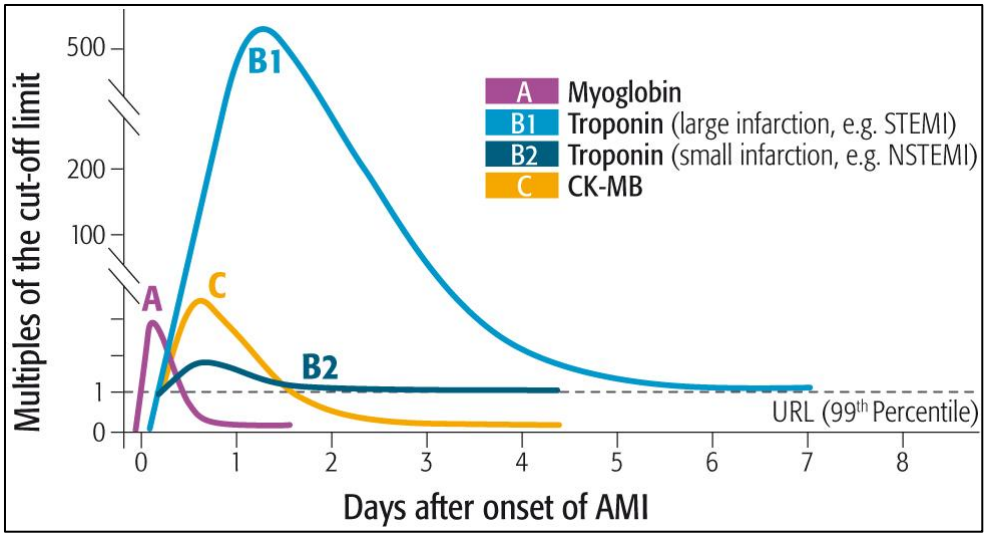
- **Ex. Insulin resistance: HOMA-IR, TGs, Insulin, glucose, GLUT-4, HB_{A1C}, *New Biomarkers* ……**
- **Liver fibrosis: α-SMA, Masson's trichrome stain, TGF-β1, PDGF, TIMP-1, TIMP-2, MMP-2, adeponectin, leptin, *New Biomarkers*……**
- **Acute kidney injury: Cystatin-c, KIM-1, NGAL, microalbuminuria, creatinine clearance, GFR, *New Biomarkers*……**
- **Acute inflammation: IL-1, IL-6, IL-13, IL-10, TNF-α, CRP, *New Biomarkers*……**
- **Oxidative stress: Total antioxidant, Lipids (MDA, isoprostanes, oxLDL, …), Proteins (nitrotyrosine, carbonyl assay, ….), DNA (DNA breaks, 8-OHdG, …), NOX, *New Biomarkers*……**
- **Apoptosis: Tunnel assay, Annexin V, BAX/BCL2, Caspase-3, *New Biomarkers*……**

➢ Choosing a research pathway

➢ Choosing your biomarkers?

- **Can you measure these biomarkers? What method is better?**
  - **Ex. NFκB regulation is through translocation to nucleus not by changing expression**
  - **Measure activity (Ex. Phosphorylation by WB), protein expression (ELISA, WB), mRNA expression (real time PCR), ……**
- **Is there a specific profile/time frame to measure these biomarkers?**





➢ Choosing a research target / biomarkers

Review
Pathophysiology

Diabetes Metab J 2022;46:15-37
https://doi.org/10.4093/dmj.2021.0280
pISSN 2233-6079 · eISSN 2233-6087

dmj
DIABETES & METABOLISM JOURNAL

Check for updates

Insulin Resistance: From Mechanisms to Therapeutic Strategies

Shin-Hae Lee[1], Shi-Young Park[1], Cheol Soo Choi[1,2,3]

➢**Insulin Resistance**

➢ Choosing a research target / biomarkers

REVIEW ARTICLE OPEN

Targeting fibrosis: mechanisms and clinical trials

Manyu Zhao[1], Liqun Wang[1], Mengzhu Wang[1], Shijie Zhou[2], Ying Lu[2], Huijie Cui[1], Alexandra C. Racanelli[3,4], Ling Zhang[5], Tinghong Ye[2], Bisen Ding[6], Ben Zhang[1], Jinliang Yang[2]✉ and Yuqin Yao[1,2]✉

Fibrosis is characterized by the excessive extracellular matrix deposition due to dysregulated wound and connective tissue repair response. Multiple organs can develop fibrosis, including the liver, kidney, heart, and lung. Fibrosis such as liver cirrhosis, idiopathic pulmonary fibrosis, and cystic fibrosis caused substantial disease burden. Persistent abnormal activation of myofibroblasts mediated by various signals, such as transforming growth factor, platelet-derived growth factor, and fibroblast growh factor, has been recongized as a major event in the occurrence and progression of fibrosis. Although the mechanisms driving organ-specific fibrosis have not been fully elucidated, drugs targeting these identified aberrant signals have achieved potent anti-fibrotic efficacy in clinical trials. In this review, we briefly introduce the aetiology and epidemiology of several fibrosis diseases, including liver fibrosis, kidney fibrosis, cardiac fibrosis, and pulmonary fibrosis. Then, we summarise the abnormal cells (epithelial cells, endothelial cells, immune cells, and fibroblasts) and their interactions in fibrosis. In addition, we also focus on the aberrant signaling pathways and therapeutic targets that regulate myofibroblast activation, extracellular matrix cross-linking, metabolism, and inflammation in fibrosis. Finally, we discuss the anti-fibrotic drugs based on their targets and clinical trials. This review provides reference for further research on fibrosis mechanism, drug development, and clinical trials.

Signal Transduction and Targeted Therapy (2022)7:206 ; https://doi.org/10.1038/s41392-022-01070-3

➢ Liver Fibrosis

➢ Choosing a research target / biomarkers

CRITICAL REVIEWS IN CLINICAL LABORATORY SCIENCES
https://doi.org/10.1080/10408363.2021.1879000

Taylor & Francis
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REVIEW ARTICLE

Check for updates

Current concepts and advances in biomarkers of acute kidney injury

Yumeng Wen and Chirag R. Parikh

Division of Nephrology, Johns Hopkins University School of Medicine, Baltimore, MD, USA

➢ **AKI**

➢ Choosing a research target / biomarkers

BRAZ J INFECT DIS 2020;24(6):552–560

Sociedade Brasileira de Infectologia

The Brazilian Journal of
INFECTIOUS DISEASES

www.elsevier.com/locate/bjid

Review article

Molecular mechanisms of organ damage in sepsis: an overview

Grażyna Sygitowicz [a,*], *Dariusz Sitkiewicz* [a,b]

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[b] *Lazarski University, Faculty of Medicine, Warsaw, Poland*

➢ **Acute Inflammation**

➢ Choosing a research target / biomarkers

International Journal of
Molecular Sciences

MDPI

Review

Biomarkers and Mechanisms of Oxidative Stress—Last 20 Years of Research with an Emphasis on Kidney Damage and Renal Transplantation

Karol Tejchman [1], Katarzyna Kotfis [2,*] and Jerzy Sieńko [1]

➢ **Oxidative Stress**

Thank you