

National Library of Medicine

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ICCVAM Public Forum

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U.S. National Library of Medicine (NLM)

NLM's Mission: Collect, organize, preserve, and disseminate health-related information.

- World's largest biomedical library
- Services: PubMed, MedlinePlus, and many others
- Research and Development
 - Biomedical informatics and communications
- Quite new focus: **Disaster information**

PubMed Commons

Developed to allow the sharing of opinions and information about publications in PubMed

All authors in PubMed are eligible to become members

Commons authors can comment on any publication, rate the helpfulness of comments, and invite other eligible authors to join

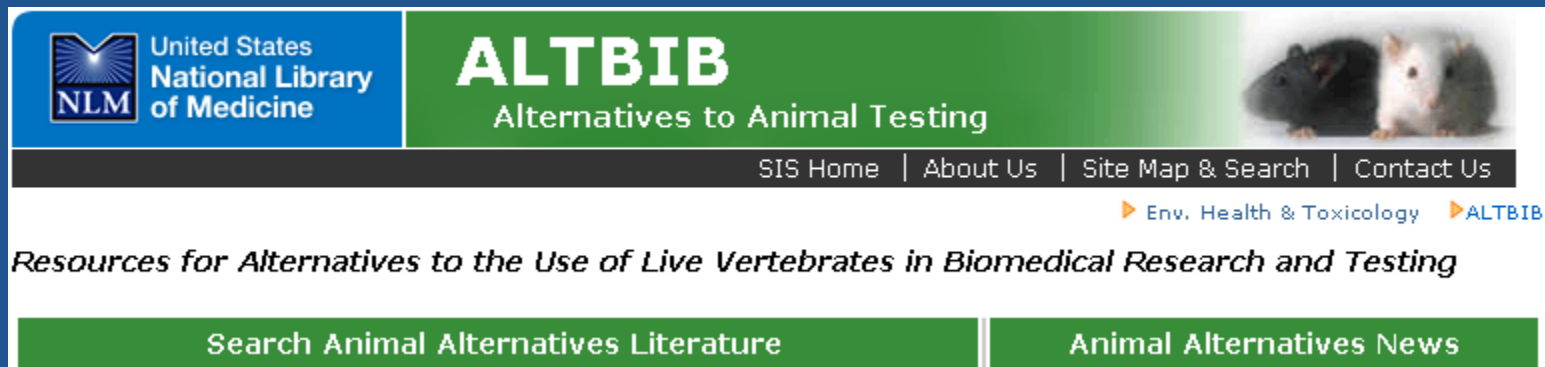
Includes a Journal Clubs option

The screenshot shows the PubMed Commons website. At the top, there is a navigation bar with 'NCBI Resources' and 'How To' links, and a 'Sign in to NCBI' button. Below this is the 'PubMed.gov' logo and a search bar with a 'Search' button. The main content area features the 'COMMONS' logo and the tagline 'A forum for scientific discourse'. There are several colorful icons representing different features. A 'PubMed Commons Blog' section is visible on the right, with a post titled 'Introducing PubMed Commons Journal Clubs' dated December 17, 2014. The post text describes the journal club as a major intellectual investment and a long-standing form of post-publication evaluation. Below the blog post, there are links for 'Get Started', 'Guidelines', 'FAQ', and 'Journal Clubs'. A 'Top comments now' section is also present, featuring a comment by Rafael Najmanovich on a review of Normal Mode Analysis (NMA) methods.

<https://www.ncbi.nlm.nih.gov/pubmedcommons/>

ALTBIB[®] Web portal

- Provides access to information on *in silico*, *in vitro*, and improved (refined) animal testing methods
- Information on the testing strategies incorporating these methods and other approaches
- <https://toxnet.nlm.nih.gov/altbib.html>



The screenshot shows the ALTBI B Web portal interface. On the left, there is a blue box with the NLM logo and the text "United States National Library of Medicine". To the right of this is a green banner with "ALTBIB" in large white letters and "Alternatives to Animal Testing" below it. Further right is a small image of two mice, one black and one white. Below the banner is a navigation bar with links: "SIS Home", "About Us", "Site Map & Search", and "Contact Us". Below the navigation bar is a breadcrumb trail: "Env. Health & Toxicology" and "ALTBIB". Below the breadcrumb trail is the text "Resources for Alternatives to the Use of Live Vertebrates in Biomedical Research and Testing". At the bottom, there are two green buttons: "Search Animal Alternatives Literature" and "Animal Alternatives News".



Resources for Alternatives to the Use of Live Vertebrates in Biomedical Research and Testing

Search Animal Alternatives Literature

Links to PubMed citations on more than seventeen alternative methods categories

Search PubMed using ALTBIB animal alternatives search strategy

Search input field with Search and Clear buttons

(e.g. Corrositex, "androgen receptor binding assay")

Limit search:

- Limit search options: Citations from 2000 to present, Citations with Animal Use Alternatives as the main topic, Citations from the PubMed Toxicology Subset

View/Edit PubMed Search Strategy

Search ALTBIB 1980-2000

ALTBIB citations have been selected from articles, books, book chapters, and technical reports published from 1980 to 2000. These citations examine methods, tests, assays, and procedures that may be useful in establishing alternatives to the use of intact vertebrates.

ALTBIB Support

- Support resources: Fact Sheet, Help, Download ALTBIB Issues (1992 - 2001), The Principles of Humane Experimental Technique by W.M.S. Russell and R.L. Burch, Guide for the Care and Use of Laboratory Animals Eighth Edition (2011), Conducting a literature search for alternatives to painful/distressful procedures

Animal Alternatives News

News from...

- News sources: ICCVAM/NIEHS: Interagency Coordinating Committee for the Validation of Alternative Methods, Altweb News: Johns Hopkins University, US EPA: Computational Exposure Science publication

Additional Resources

- Additional resources: AltTox.org - Non-animal Methods for Toxicity Testing, Altweb - Alternatives to Animal Testing on the Web, Animal Welfare Information Center (USDA), EURL ECVAM - European Reference Laboratory for Alternatives to Animal Testing, FRAME - Fund for the Replacement of Animals in Medical Experiments, NTP Interagency Center for the Evaluation of Alternative Toxicological Methods (HHS/NIH/NIEHS), Center for Alternatives to Animal Testing (Johns Hopkins University), Center for Animal Alternatives (UC Davis), SOT In Vitro and Alternative Methods Specialty Section (Society of Toxicology), U.S. EPA National Center for Computational Toxicology (EPA), American Society for Cellular and Computational Toxicology (ASCCT)

Evaluation/Acceptance of Test Methods

- Evaluation/Acceptance resources: Regulatory Acceptance of Alternative Methods (ICCVAM), U.S. and International Milestones in Alternative Test Method Development and Evaluations (ICCVAM)

Searches



News



Organizations



Guides and other "support"



Methods



https://toxnet.nlm.nih.gov/altbib.html

A new
teaching
tool is the
updated
and
enhanced
Tox Tutor

Welcome to ToxTutor

Introduction

ToxTutor is a self-paced tutorial covering key principles of toxicology for users of the National Library of Medicine (NLM) chemical and toxicology databases.

Certificate of Completion

If you need a certificate of tutorial completion, please [register and complete the tutorial](#) through our free learning management system.

Topics Covered in this Course

ToxTutor is divided into the following sections:

1. [Introduction to Toxicology](#)
2. [Dose and Dose Response](#)
3. [Toxic Effects](#)
4. [Interactions](#)
5. [Toxicity Testing Methods](#)
6. [Risk Assessment](#)
7. [Exposure Standards and Guidelines](#)
8. [Conclusion](#)

Each section of ToxTutor contains one or more related content pages. *Next* and *Back* buttons are provided to allow you to navigate through these pages. For more information, see the "Getting Around" section below.

The basic principles of toxicology described in ToxTutor are similar to those taught in university programs and are well described in toxicology literature. A list of the textbooks used as the primary resources for the tutorials is found in the [Bibliography](#).

<https://toxxtutor.nlm.nih.gov/index.html>



On this page...

Finding Information about Alternatives to Animal Testing

Animal Tests

Future Approaches and Methods

Testing for and Assessing Toxicity

Alternatives to animal testing have emerged in recent years. 

Since about 1990, numerous attempts have been made around the world to reduce the use of and replace laboratory animals in toxicology and other studies. These efforts have involved finding alternatives to animal testing and incorporating the "3Rs" concept (Replacement, Reduction and Refinement), which means using test methods that:

- **replace** the use of animals with other types of studies and approaches
- **reduce** the number of animals in studies
- **refine** the procedures to make studies less painful or stressful to the animals

Regulatory authorities, companies, and others have endorsed the principle of the 3Rs, and alternative testing methods have been and are being developed. An international group that has played a key role is the International Cooperation on Alternative Test Methods (ICATM). Established in 2009, ICATM includes representatives of [organizations from various countries](#).

Finding Information about Alternatives to Animal Testing

Many countries including the United States, Canada, and the European Union member states, require that a comprehensive search for possible alternatives be completed before some or all research involving animals is begun. Because numerous Web resources are now available to provide guidance and other information on *in vitro* and other alternatives to animal testing, completing such searches and keeping current with information associated with alternatives to animal testing is much easier than it used to be.



On this page...

Finding Information about Alternatives to Animal Testing

Animal Tests

Future Approaches and Methods

Future Approaches and Methods

In the future, there will likely be additional and refined *in vitro* methods, and the emergence of *in silico* and "chip" approaches.

Many current efforts are underway to refine, develop, and validate *in vitro* methods.

In Silico Methods

Also emerging are *in silico* methods, meaning "performed on computer or via computer simulation." This term was developed as an analogy to the Latin phrases *in vivo* and *in vitro*.

Advanced computer models called "Virtual Tissue Models" are being developed by the U.S. EPA's [National Center for Computational Toxicology \(NCCT\)](#). The EPA's Virtual Tissue Models are described as using "new computational methods to construct advanced computer models capable of simulating how chemicals may affect human development. Virtual tissue models are some of the most advanced methods being developed today. The models will help reduce dependence on animal study data and provide much faster chemical risk assessments" ([source](#)).

One example is the Virtual Embryo ([i-Embryo](#)) [of](#) research effort, aimed at developing prediction models to increase our understanding of how chemical exposure may affect unborn children. Researchers are integrating new types of *in vitro*, *in vivo*, and *in silico* models that simulate critical steps in fetal development. Virtual Embryo models simulate biological interactions observed during development and predict chemical disruption of key biological events in pathways that is believed to lead to adverse effects.

"Chip" Models

Also emerging are "chip" models, such as an "organ on a chip." Chip models include human cell cultures that are placed on a computer chip and studied there. The [Wyss \(pronounced "Veese"\) Institute for Biologically Inspired Engineering](#) [is](#) a helpful resource for more information.

For example, the "Lung-on-a-chip" [is](#) described as "combining microfabrication techniques with modern tissue engineering, lung-on-a-chip offers a new *in vitro* approach to drug screening by mimicking the complicated mechanical and biochemical behaviors of a human lung" ([source](#)). To learn more, watch a [video](#) [of](#) from the Wyss Institute that uses the chip to mimic fluid accumulation on the lungs (pulmonary edema).



Figure 5. Lung-on-a-chip used to mimic pulmonary edema (Image Source: The Wyss Institute for Biologically Inspired Engineering)

How to find information

Toxicology Data Network (TOXNET): One Example

Hazardous Substances Data Bank

Comprehensive toxicological information on almost 6,000 substances (human and animal toxicity, safety and handling, environmental fate, and more). Scientifically peer-reviewed.

NIH U.S. National Library of Medicine TOXNET TOXICOLOGY DATA NETWORK

Mobile | Help | FAQs | TOXNET Fact Sheet | Training Manual & Schedule

TOXNET Home > HSDB Share

HSDB
A TOXNET DATABASE

Hazardous Substances Data Bank (HSDB)

SEARCH HSDB BROWSE HSDB ADVANCED SEARCH

Support

Resources
Help
Fact Sheet

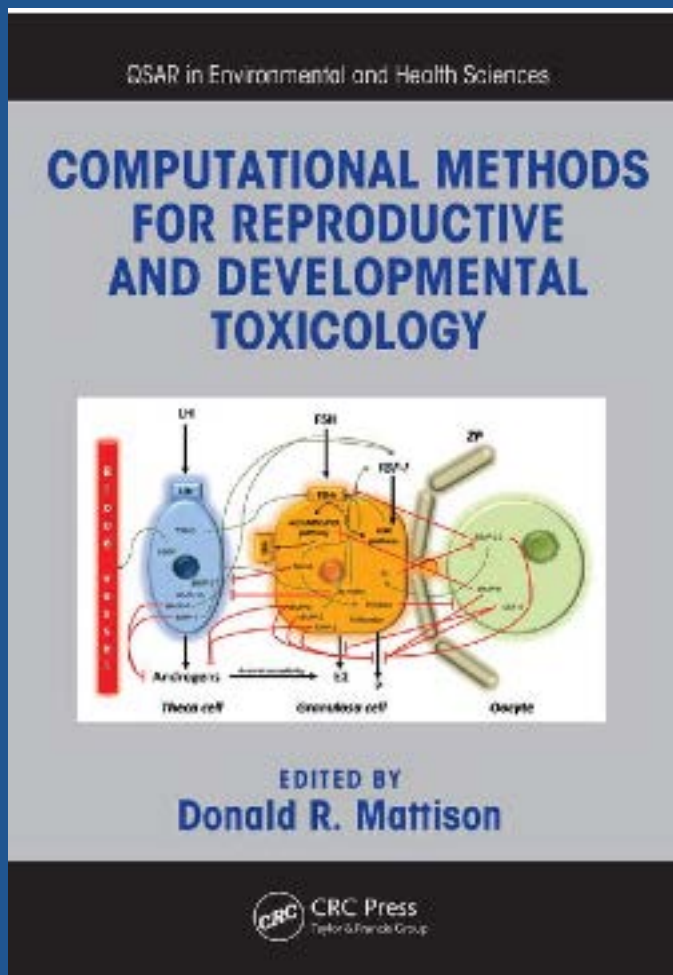
e.g. benzene, endocrine disruptor Search

Search Term Records with

About HSDB **Did y**

/ALTERNATIVE and IN VITRO TESTS/ In vitro exposure of murine RAW 264.7 macrophages to single-walled carbon nanotubes (SWCNT) triggered TGF-beta1 production similarly to zymosan but generated less TNF-alpha and IL-1beta. SWCNT did not cause superoxide or nitric oxide production, active SWCNT engulfment, or apoptosis in RAW 264.7 macrophages. /Single-walled carbon nanotubes/ [Shvedova AA et al; Am J Physiol Lung Cell Mol Physiol 289 (5): L698-708 (2005)] **PEER REVIEWED PubMed Abstract**

Quite Recent Publication



Chapter 9 U.S. National Library of Medicine Resources for Computational Toxicology 189

Pertti J. Hakkinen

Chapter Outline:

Summary

1. Introduction
2. Selected NLM Resources for Computational Toxicologists and Others
3. Other NLM Resources to Consider
4. Case Study of NLM Database Results Relevant to PBPK Modeling
5. Recommendations and Future Resources
6. Acknowledgments
7. References

<https://www.crcpress.com/Computational-Methods-for-Reproductive-and-Developmental-Toxicology/Mattison/9781439861073>

Other Recent NLM Efforts/Support

December 2016 **Webinar** (Publicker and Hakkinen) with the NN/LM National Training Center on “Using ALTBIB: What, Why and How”

Society of Toxicology (SOT) March 2017 exhibit and talk

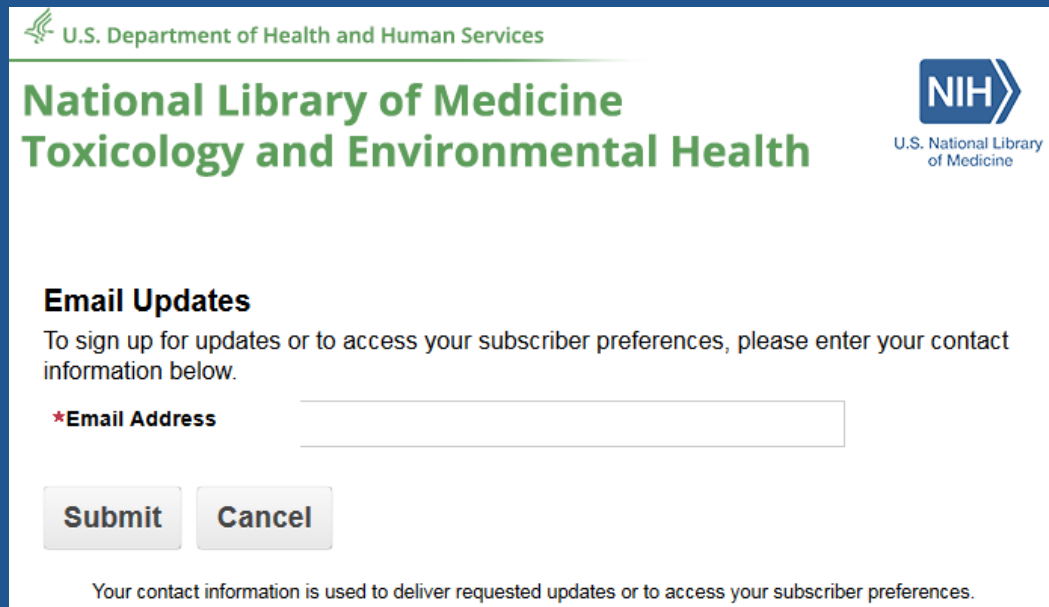
NLM (Hakkinen and Fonger) can help with ICCVAM-relevant identification and compilation of information from publications for working groups and others

Ongoing enhancement (Publicker, Hakkinen, and others) of ToxTutor

2016 – 2017 participation (Hakkinen) on JaCVAM peer review panels for eye and embryotoxicity methods

Twitter and email updates

[@NLM SIS](#) – Clinical and non-clinical toxicology, environmental health and disaster information updates



The screenshot shows a web form for signing up for email updates. At the top left, it says "U.S. Department of Health and Human Services". The main header reads "National Library of Medicine Toxicology and Environmental Health" in green. To the right is the NIH logo and "U.S. National Library of Medicine". The section is titled "Email Updates" and includes the instruction: "To sign up for updates or to access your subscriber preferences, please enter your contact information below." There is a text input field labeled "*Email Address". Below the field are "Submit" and "Cancel" buttons. At the bottom, a small note states: "Your contact information is used to deliver requested updates or to access your subscriber preferences."

<https://service.govdelivery.com/accounts/USNLMTEH/subscriber/new>

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*Please feel free to stay in touch about
anything you want to publish related to NLM
resources*