

Information Infrastructure of Toxicology

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March 12, 2019

What is Information Infrastructure?

Shared, evolving, open, standardized and heterogeneous base all of the people, processes, procedures, tools, facilities and technologies which support the creation, use, transport, storage, access, and destruction of information



- **Different perspectives to look at toxicology**

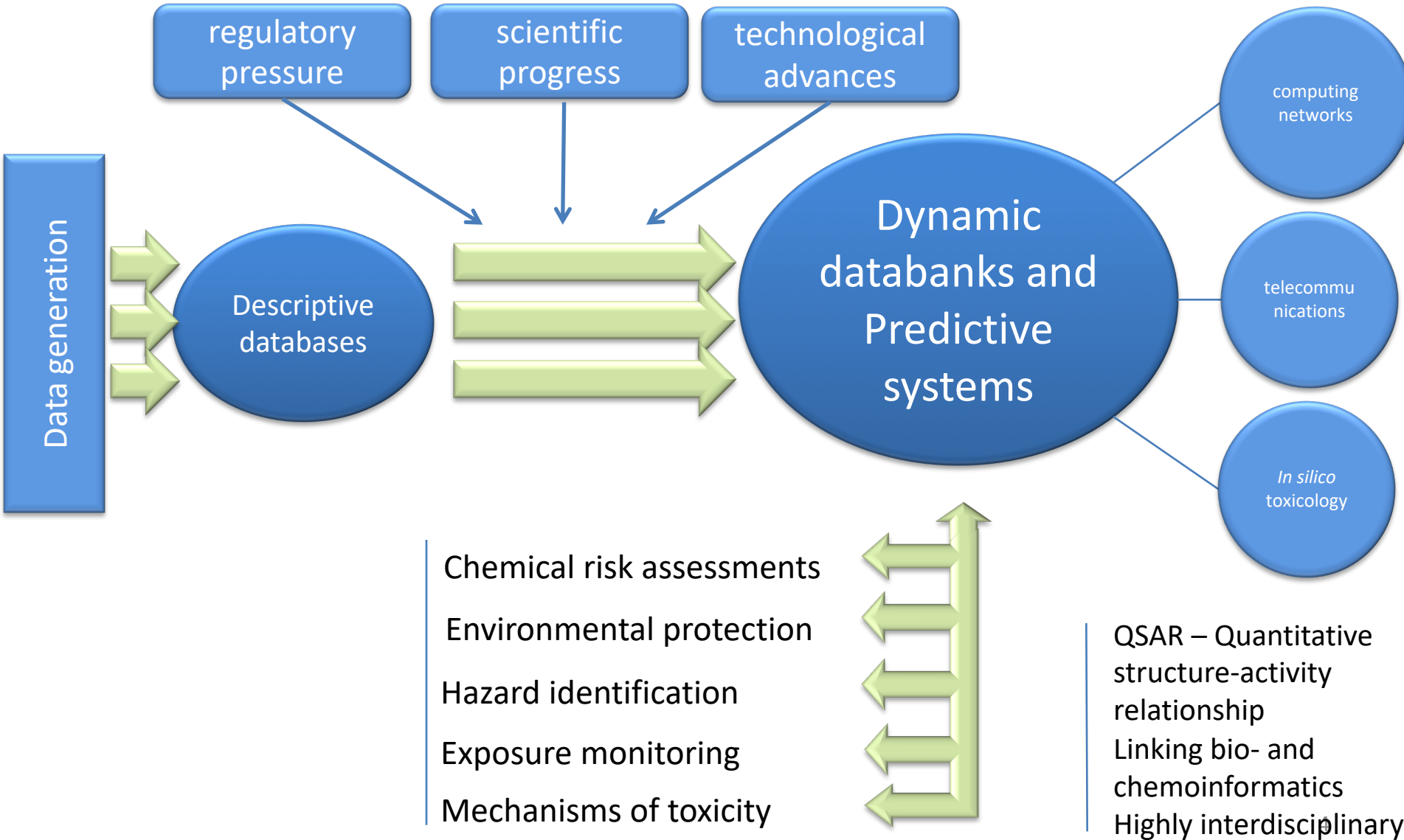
- Chemical
- Physical
- Biological agents
- Pharmacodynamics
- Subject susceptibilities
- Acute or chronic?
- Occupational exposure
- Consumer protection
- Regulatory and legal frameworks

- **Various data formats**

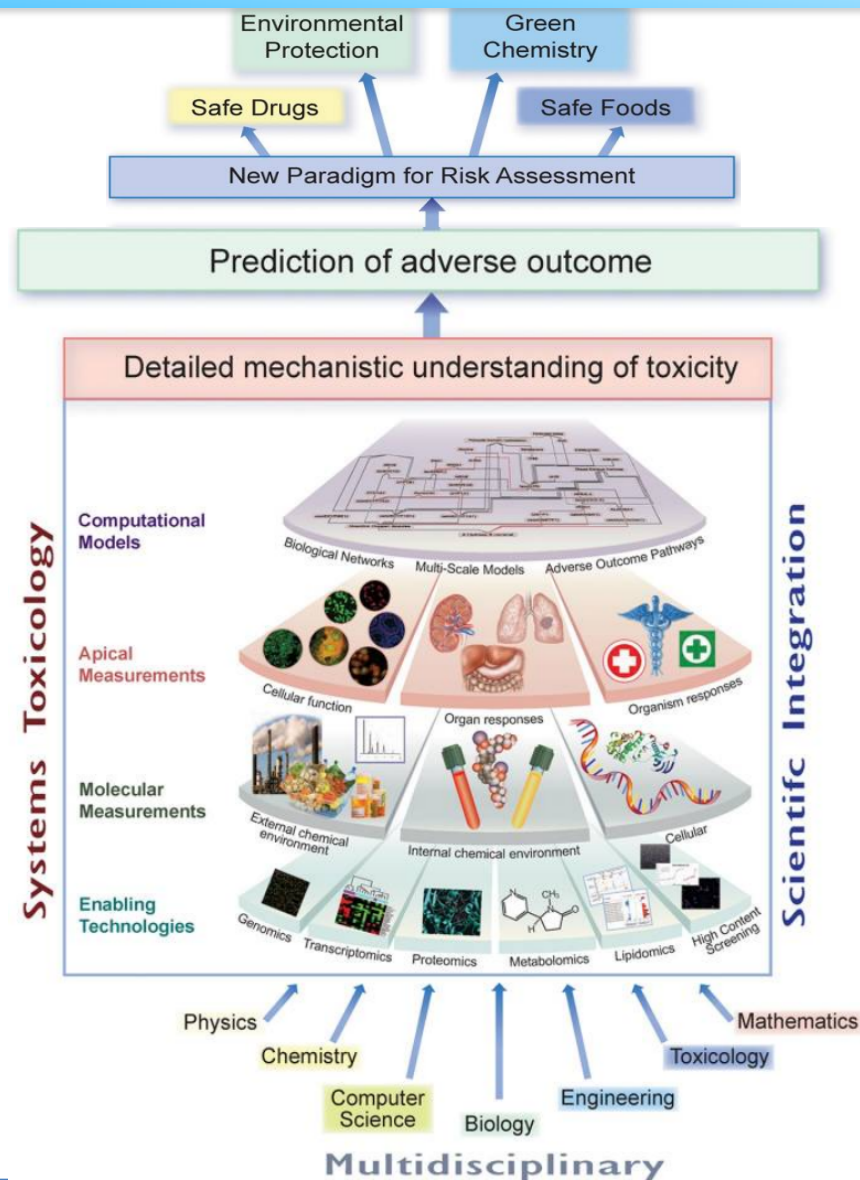
- Study reports
- Monographs
- Statutes
- Regulations
- Journal articles
- Raw data

Toxicological data is widespread and often scattered across scientific disciplines

Concept of toxicological information infrastructure

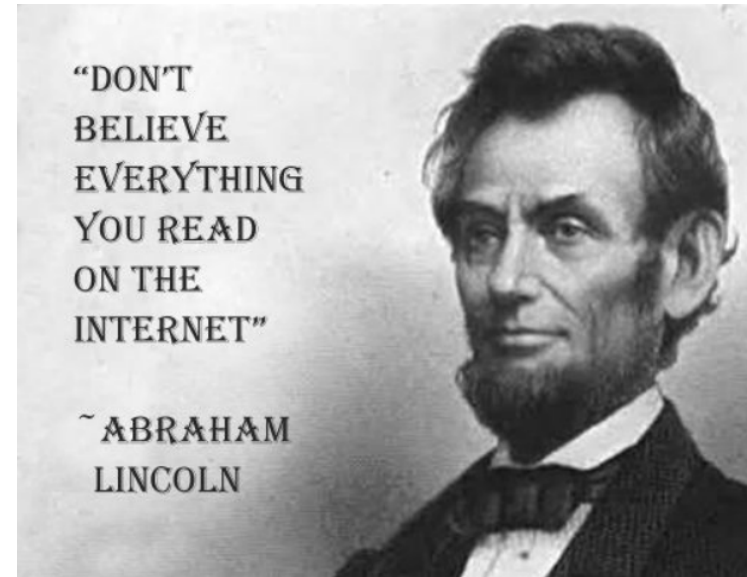


- Integration of classical toxicology with quantitative analysis of multidimensional, biological networks
- Shows perturbations caused by exposure
- Develops predictive mathematical models of toxicological processes



Age of disinformation

„The lines demarcating one kind of information from another are increasingly blurring, as more and more packaged and synthesized information, not to mention raw data, and the invariable unsubstantiated musings of would-be experts are democratically finding their way onto the web“



-Apply critical and skeptical thinking!

-Guidelines for evaluating the reliability of toxicology information can be found at National Library of Medicine

<https://medlineplus.gov/evaluatinghealthinformation.html>

- **TOXNET**

- Meta-database covering toxicology, hazardous chemicals, environmental health, and related areas

- <http://www.toxnet.nlm.nih.gov>

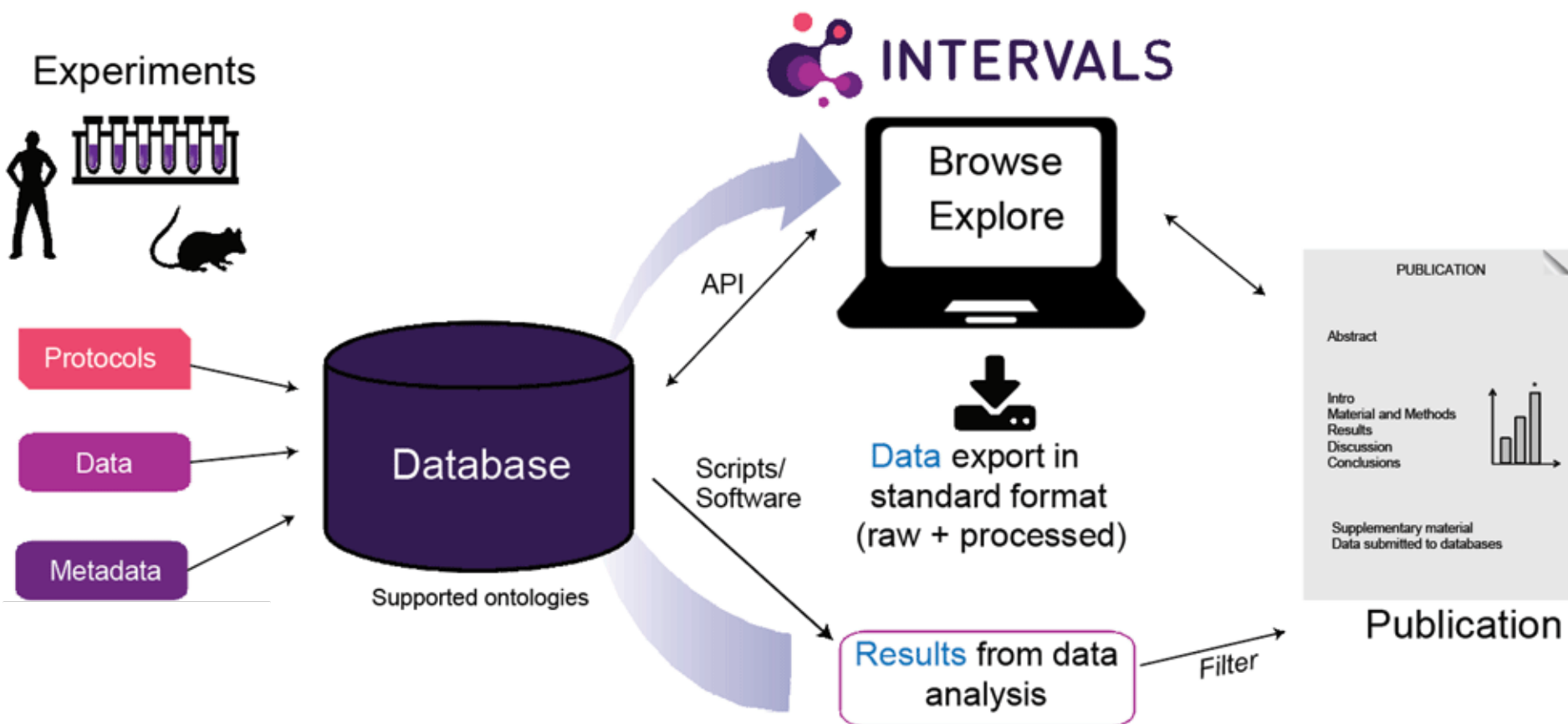
- **DSSTox** - Distributed Structure-Searchable Toxicity

- <http://www.epa.gov/ncct/dsstox/index.html>

- **ECHA** – European Chemicals Agency

- <https://echa.europa.eu/information-on-chemicals/registered-substances>

INTERVALS - proof-of-concept database and website developed to share results from both *in vivo* inhalation toxicological studies and *in vitro* studies conducted by Philip Morris International R&D to assess candidate MRTPs



Concepts of infrastructure and data sharing

INTERVALS - proof-of-concept database and website developed to share results from both *in vivo* inhalation studies and *in vitro* studies conducted by Philip Morris International R&D to assess candidate MRTPs



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STUDIES



PROTOCOLS

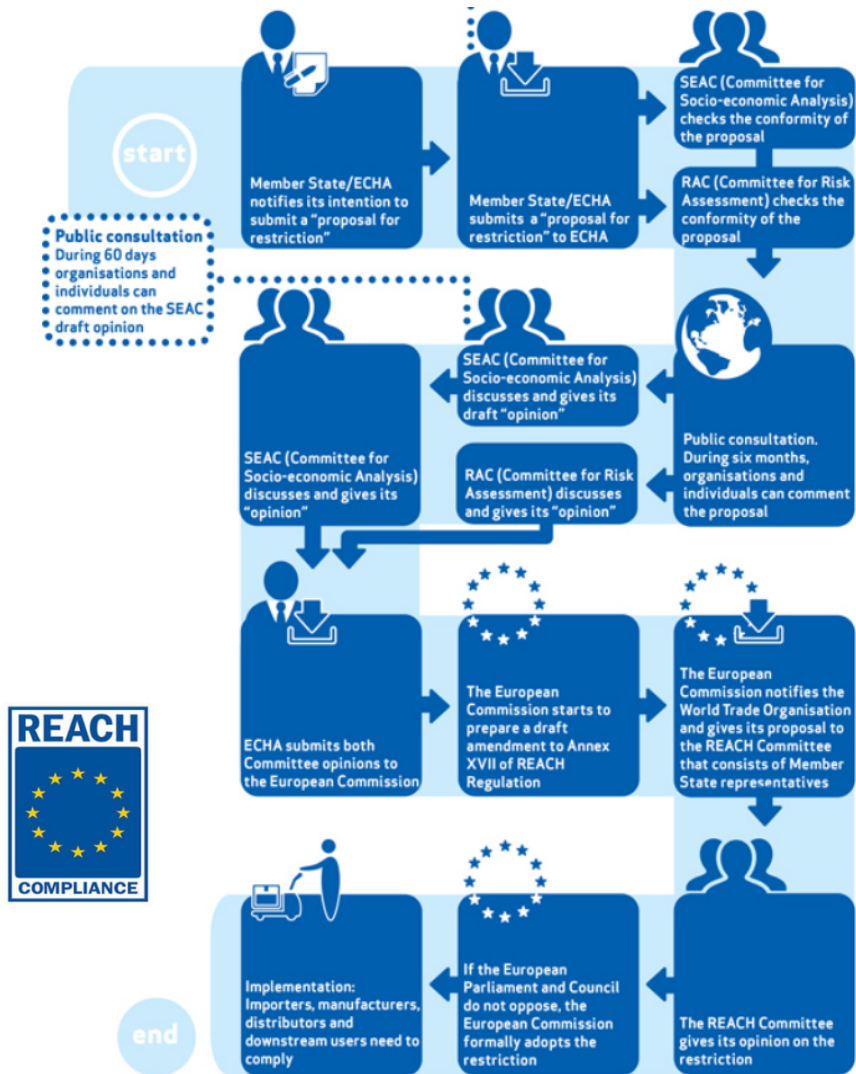


DISEASES & PATHWAYS



DATASETS

- Regulation of the European Union
- **Main objective:** to improve protection of health and the environment from risks that can be posed by chemicals
- Other objectives:
 - Enhancing competitiveness of chemical industries
 - Promoting alternative methods for the hazard assessment
 - Companies are responsible for identification and management of chemicals-derived risks
- If the risk cannot be managed, authorities can restrict their use



- **Annual Review of Pharmacology and Toxicology**
<https://scialert.net/jhome.php?issn=1816-496x>
- **Trends in Pharmacological Sciences**
<https://www.journals.elsevier.com/trends-in-pharmacological-sciences/>
- **Particle and Fibre Toxicology**
<https://particleandfibretoxicology.biomedcentral.com/>
- **Critical Reviews in Toxicology**
<https://www.tandfonline.com/loi/itxc20>
- **Clinical Toxicology**
<https://www.scimagojr.com/journalsearch.php?q=4000148406&tip=sid&clean=0>
- **Inhalation Toxicology**
<https://www.tandfonline.com/toc/iiht20/current>

- Society of Toxicology (SOT)
 - Organization of scientists who practice toxicology in many areas



<http://www.toxicology.org/>

- American College of Toxicology (ACT)
 - Educate and lead professionals in toxicology related areas

<https://www.actox.org/index.asp>



- International Association of Forensic Toxicologists (TIAFT)
 - Promote cooperation and coordination of efforts among members and to encourage research in forensic toxicology

<http://www.tiaft.org/>

- Society for Risk Analysis (SRA)
 - Addressing all areas of risk analysis related to human health and the environment

<http://www.sra.org>





- European Chemical Industry Council (Cefic)
 - Forum and the voice of the European chemical industry
 - Assist companies in implementing compliance with REACH

<http://www.cefic.org/>

- The International Council of Chemical Associations (ICCA)
 - Main channel of communication between the industry and various international organizations that are concerned with health

<http://www.icca-chem.org/>



- **European Chemicals Agency (ECHA)**  **EUROPEAN CHEMICALS AGENCY**
 - Driving force among European regulatory authorities in implementing chemicals legislations (REACH in 2007)

<https://www.echa.europa.eu/>

- **U.S. Environmental Protection Agency (EPA)**
 - Processes human health and ecological risk assessments
 - Promotes pollution prevention, safer chemicals, risk reduction, and public understanding

<http://www.epa.gov/>



- **U.S. National Institutes of Health (NIH)**
 - Its component, National Library of Medicine, manages TOXNET
 - Houses National Toxicology Program (NTP), which overall goal is to provide toxicological evaluations on substances of public health concern; develop and validate test methods; develop approaches and generate data that strengthen the scientific basis for risk assessments – **Tox21**

<https://www.nih.gov/>

<https://ntp.niehs.nih.gov/results/tox21/>



- **U.S. Food and Drug Administration (FDA)**
 - Regulates biological products for disease prevention and treatment
 - Ensures that new medical devices are safe and effective before they are marketed and ensures that radiation-emitting products (i.e. TV, microwaves) meet radiation safety standards
 - Evaluates all drugs before they are sold and serves as a consumer watchdog for marketed drugs to be sure that they continue to meet the highest standards.
 - Operate systems for rapid identification and control of outbreaks of foodborne diseases

<https://www.fda.gov/>



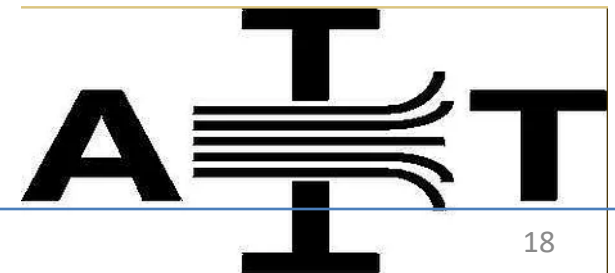
- **International Programme on Chemical Safety (IPCS)**
 - Part of WHO
 - promotes development, harmonization, and use of widely acceptable methodologies for the risk evaluation to human health and the environment from exposure to chemicals

<https://www.who.int/ipcs/en/>



- **Association of Inhalation Toxicologists**
 - association for practising inhalation toxicologists and those with interest in inhaled drug development

<https://www.aitoxicology.org/>





- **International Union of Toxicology**



- 61 affiliated societies, over 25,000 toxicologists
- seeks to increase the knowledge base of toxicological issues facing humankind and to extend this knowledge to developing societies and nations.

<https://www.iutox.org/index.asp>

- **Toxicology Excellence for Risk Assessment (TERA)**

- develops risk values; improves methods for human health risk assessment through their research program; sponsors expert review of risk assessments

<https://www.tera.org/>



TERA
TOXICOLOGY EXCELLENCE FOR RISK ASSESSMENT

Thank you for your attention!



Literature

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