



[www.HumanToxicologyProject.org](http://www.HumanToxicologyProject.org)

## Advancing a New Paradigm for Chemical Safety Assessment

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OF THE UNITED STATES



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The Humane Society family of organizations are together the world's largest animal protection organization, driving transformational change in the U.S. and around the world to create a humane world for people and animals alike.

Our approach is to work with vested stakeholders to achieve find solutions and achieve common goals.

### ***Animal testing***

***Expert team:*** toxicology, ecotoxicology, pharmacology, regulatory science, endocrinology, biochemistry, neuroscience, law, etc.

***Global presence:*** Brazil, United States, Canada, Mexico, Central America, European Union, India, Japan, South Korea, Viet Nam, Australia, Africa and beyond

***Approach:*** Working with policy makers, regulators, companies, scientists, and other stakeholders to build partnerships for progress

”Transform toxicity testing *from a system based on whole animal testing* to one founded *primarily on in vitro methods* that evaluate changes in biologic processes using cell, cell lines, or cellular components, preferably of human origin.”

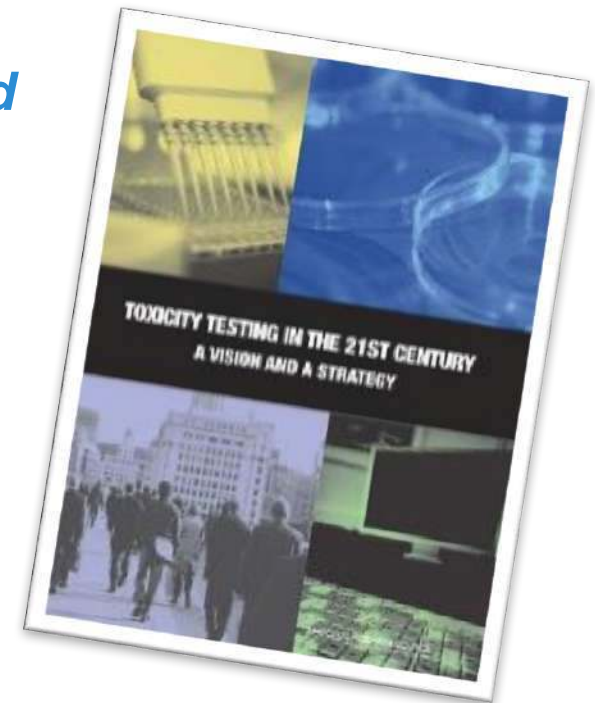
**2009**

Identified need for a multi-stakeholder group to accelerate this transition with this goal in mind.

Martin Stephens – HSUS

Melvin Andersen – Hamner

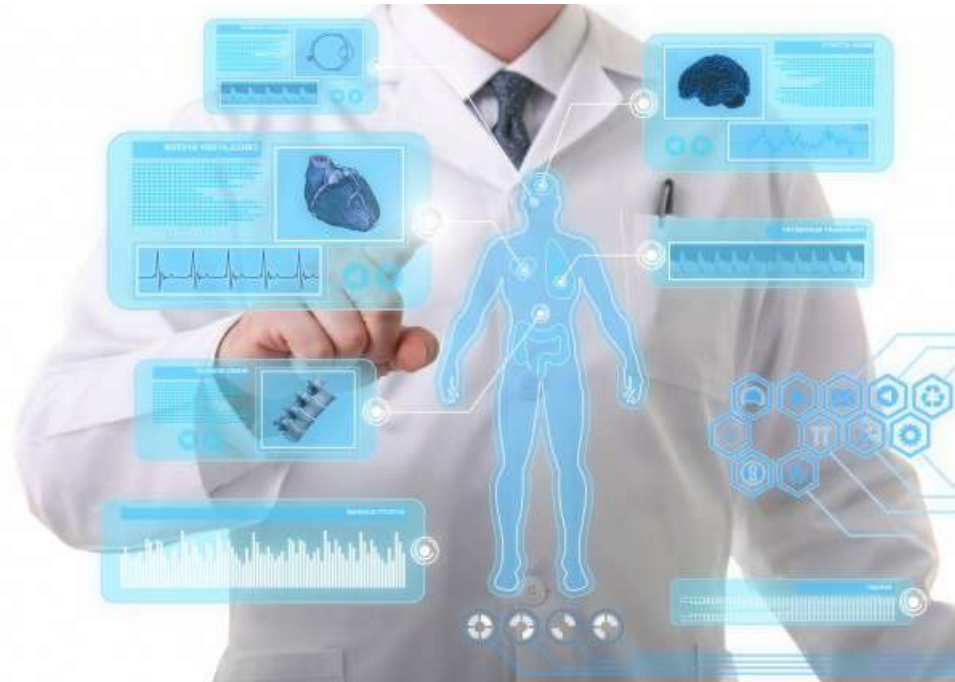
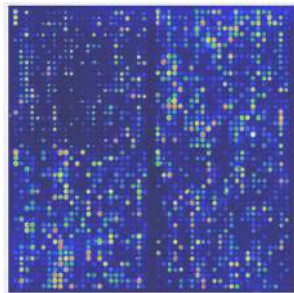
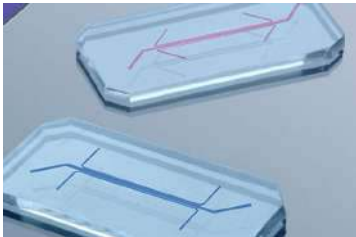
Others



National Academy  
of Sciences, 2007

# A multi-stakeholder coalition dedicated to accelerating global implementation of a new paradigm in toxicity testing

**Mission:** To serve as a catalyst for the prompt, global, and coordinated implementation of pathway-based science, which will better safeguard human health and hasten the replacement of animal use in toxicology.





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# HTPC: Tripartite Approach

## *Promoting the Science*

Consortium members and partners are working together to accelerate technical and scientific advances in pathway-based approaches to chemical safety assessment.

**Workshops • Presentations • Papers • Sponsorship**

## *Communication*

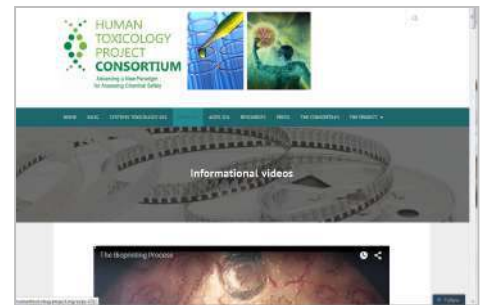
Effective communication facilitates consensus-building among stakeholders and is essential to building confidence in new approaches to chemical and drug safety.

**Website • Articles • Videos**

## *Advocacy*

The Consortium works to effect policy changes and cultivate funding opportunities that support pathway-based approaches in the U.S. and internationally.

**Policy • Bill language • Appropriations**





## ***Promoting the Science***

### **Scientific presentations**

Toward a 21st-century Roadmap for Biomedical Research and Drug Discovery. Presented at the 3<sup>rd</sup> International Conference on Toxicity Testing Alternatives & Translational Toxicology, July 9 - 12, 2017, Nanjing, China.

The Use of Adverse Outcome Pathways (AOPs) to Support Chemical Safety Decisions within the Context of Integrated Approaches to Testing and Assessment (IATA). Presented at The Asian Congress on Alternatives and Animal Use in the Life Sciences, 2017 Karatsu, Japan.

### **Webinars**

Introduction to the concept of Adverse Outcome Pathways and Integrated Approaches to Testing and Assessment according to the Organization of Economic Cooperation and Development. Webinar presented by the In Vitro and Alternative Methods Specialty Section, Society of Toxicology, 27 January 2016.



## Workshops:

SETAC Pellston Workshop: Advancing the Adverse Outcome Pathway Framework: an International Horizon Scanning Approach. The NAV Center, Cornwall, Ontario, Canada, 2 – 6 April 2017.

## Scientific presentations:

**Willett, C. 2017.** Toward a 21st-century Roadmap for Biomedical Research and Drug Discovery. Presented at the 3<sup>rd</sup> International Conference on Toxicity Testing Alternatives & Translational Toxicology, July 9 - 12, Nanjing, China.

**Willett, C. 2016.** The Use of Adverse Outcome Pathways (AOPs) to Support Chemical Safety Decisions within the Context of Integrated Approaches to Testing and Assessment (IATA). Presented at The Asian Congress on Alternatives and Animal Use in the Life Sciences, Karatsu, Japan.



## Selected peer-reviewed publications:

Willett, C, Fitzpatrick S, Meek, B, Westmoreland, C. Use of Adverse Outcome Pathways (AOPs) in human risk assessment and toxicology. In: *to Systems Biology Approaches for Advancing Adverse Outcome Pathways for Risk Assessment*, Springer Publishing Company, New York, NY. In press.

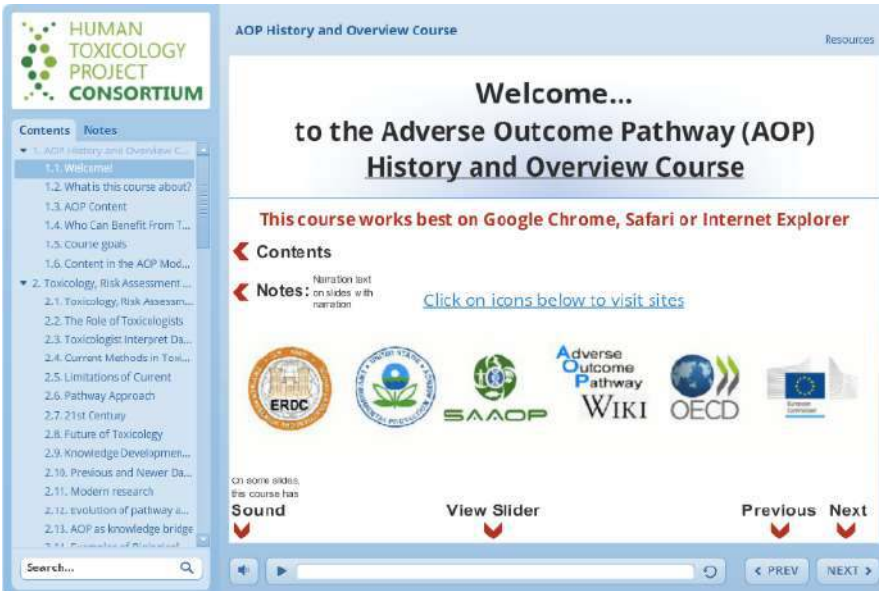
LaLone CA, Ankley GT, Belanger SE, Embry MR, Hodges G, Knapen D, Munn S, Perkins EJ, Rudd MA, Villeneuve DL, Whelan M, Willett C, Zhang X, Hecker M. 2017. Advancing the adverse outcome pathway framework-An international horizon scanning approach. *Environ Toxicol Chem.* 2017 Jun;36 (6):1411-1421. doi: 10.1002/etc.3805

Langley, G., I. Adcock, F. Busquet, K. Crofton, E. Csernok, C. Giese, T. Heinonen, K. Herrmann, M. Hofmann-Apitius, B. Landesmann, L. Marshall 11, E. McIvor, A. Muotri, F. Noor, K. Schutte, T. Seidle, A. van de Stolpe, H. Van Esch, C. Willett, and G. Woszczek. 2016. *Towards a 21st century roadmap for biomedical research and drug discovery: Consensus report and recommendations.*

# AOP training

## AOPs 101 and 201

- collaboration with PCRMM
- *Scientific conferences (e.g. SOT, WC10)*
- *US, Mexico, Japan, China*
- *Online: AOP Learning Channel*
- <https://humantoxicologyproject.org/about-pathways-2/>

The screenshot shows the "AOP History and Overview Course" website. The page features a "Welcome..." message and a "This course works best on Google Chrome, Safari or Internet Explorer" notice. Below this, there are navigation links for "Contents" and "Notes". A "Notes" section contains a "Narration text on slides with narration" and a link to "Click on icons below to visit sites". The icons represent various organizations: ERDC, SAAOP, AOP Wiki, OECD, and the European Union. At the bottom, there are "View Slider", "Sound", "Previous", and "Next" buttons.

## Download:

<https://humantoxicologyproject.org/about-pathways-2/aop-online-course/>

## Run:

<https://aopwiki.org/>

# BIO MED<sup>21</sup>

A HUMAN PATHWAYS-  
BASED APPROACH TO  
DISEASE RESEARCH

NIH Conference Center  
Bethesda, 26-27 June 2017

WORKSHOP *Final Report*



## Objectives of this workshop:

- to explore existing systems biology projects and approaches and how these projects might be better coordinated to optimally improve disease understanding and interventions
- by bringing together experts from several of these projects with stakeholders to identify barriers and opportunities and make recommendations regarding what is needed to achieve the goal of fully implementing a human systems-biology platform for understanding disease and improving interventions.

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the promise of the new technologies. The global community has been aware of the shortcomings of current approaches to disease models and drug development for some time. To this end, the BioMed21 Initiative and global scientific workshop series<sup>1,2,4,5</sup> was launched by Humane Society International to bring together all stakeholders, with the overall aim of understanding how to leverage existing projects to develop human systems biology-based roadmaps for health research. The U.S. workshop was hosted by the National Institutes of Health (NIH) with organizational

**Keynote lecture: Dr Chris Austin, NIH/NCATS**  
**Speakers: Dr Francois Pognan, Novartis; Dr Warren Casey, NIH/NIEHS; Dr Bruce Cuthbert, NIH/NIMH; Dr Suzanne Fitzpatrick, FDA; Dr Rebecca Clewell ScitoVation; Dr Ian Adcock, Imperial College London; Dr Daniel Levner, Emulate Inc.**

Standardization of data reporting, in line with current Food and Drug Administration (FDA) requirements for clinical trial data, could enable analysis of the dormant

<sup>1</sup> Scannell et al, 2012, Nat Rev Drug Discovery Diagnosing the decline in pharmaceutical R&D efficiency. 11:191-200. doi:10.1038/nrd3681  
<sup>2</sup> Langley G, et al. Environ Health Perspect. 2015;11:A266-72.

<sup>3</sup> Langley G, et al. Drug Discov Today. 2016;22:327-39.  
<sup>4</sup> <https://ntp.niehs.nih.gov/gc/biomed21>  
<sup>5</sup> <http://www.biomed21.org>

## Venue

- National Institutes of Health



A HUMAN PATHWAY-BASED APPROACH TO DISEASE AND MEDICINE

## Participants:

- Government, industry, academia, NGO, consulting
- US government: 6 NIH institutes, 5 FDA centers, EPA

## Recommendations (report in progress):

- International and inter-agency collaboration
- Funding agency focus on human-based biology and open access data
- Collaborative, open-access high-quality databases
- Common reporting formats and common ontologies
- Better cross-sector communication
- Creation of case studies to show applications

# Communications

Website: [HumanToxicologyProject.org](http://HumanToxicologyProject.org)

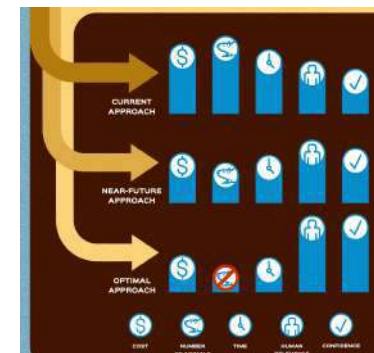
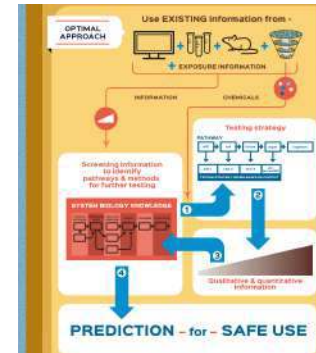
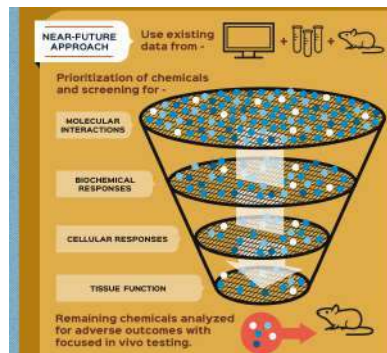
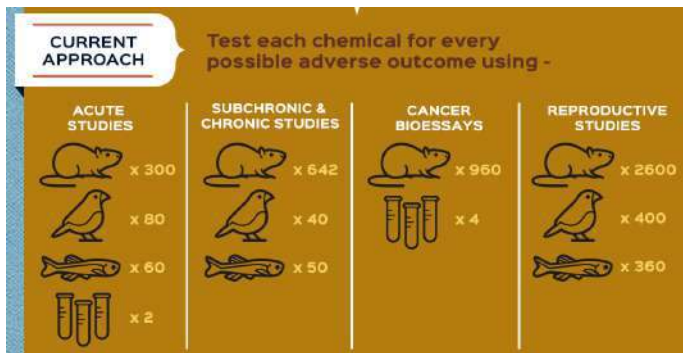
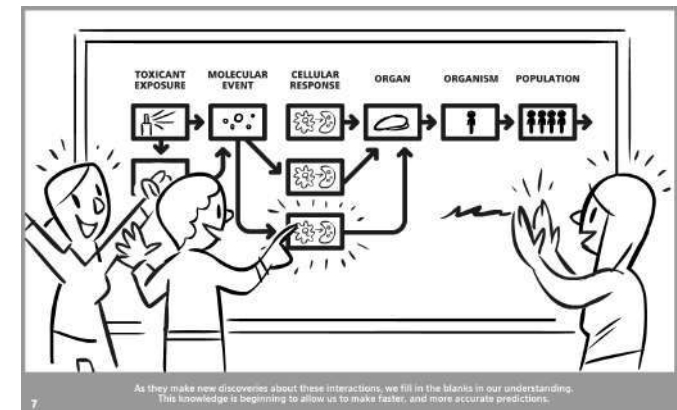
Instructional videos: The AOP Learning Channel

Educational videos:

- The Future of Toxicology
- A “pathway-based” approach?

*Others coming soon*

Infographic: The Future of Toxicology



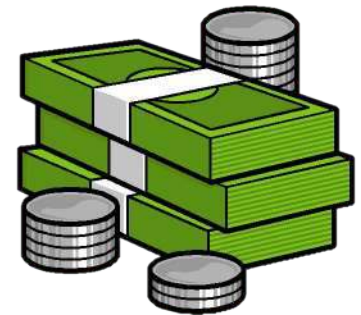
## Advocacy:

Public Law 114-182, H.R.2576 - Frank R. Lautenberg Chemical Safety for the 21st Century Act, an update to the Toxic Substances Control Act: introduced language that reduces testing on vertebrate animals, and supports development and implementation of alternative methods.



## Appropriations

Report language to prioritize TT21C projects  
President's budget FY2016 to increase NIH and EPA TT21C projects



# Thank you!

## Catherine Willett, PhD

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