Overview of AOPs and their development at the OECD

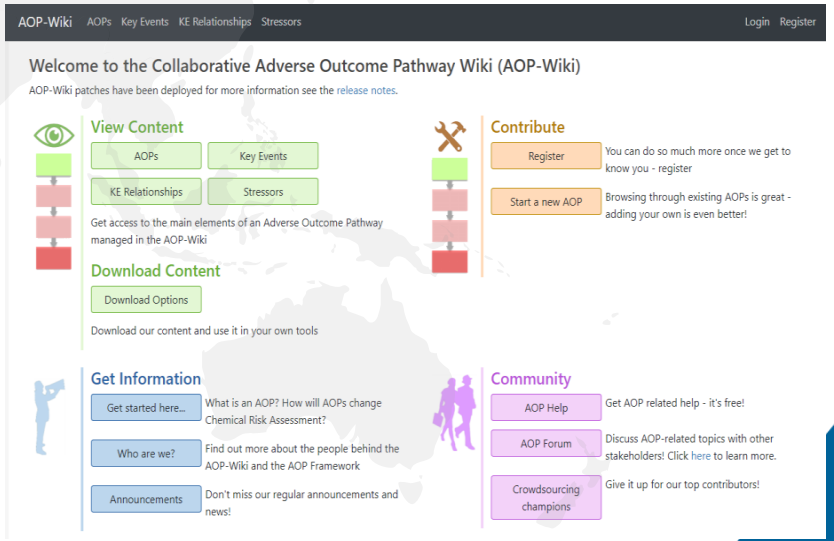
Nathalie Delrue, OECD
Environment, Health and Safety division; Environment Directorate
Webinar - AOPs: A tool to include NAMs into regulatory testing
11 April 2024

BETTER POLICIES FOR BETTER LIVES

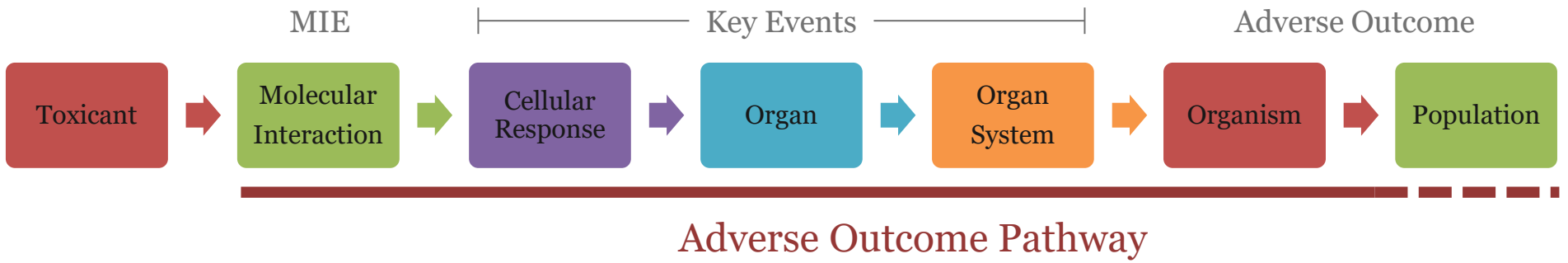
OECD Chemical Safety programme

- Objectives of the OECD Chemical Safety programme
  - Develop harmonised tools and instruments to help member countries implement national chemical safety policies (e.g. OECD Test Guidelines)
  - Promote best practices across member countries to facilitate data sharing, knowledge management, and to avoid duplication of resources in chemicals management

- The OECD AOP Development Programme is one of these tools
- Based on multi-stakeholders cooperation



Organising Frameworks: Adverse Outcome Pathways



- AOPs developed as organising frameworks for:
  - building predictive methods,
  - building integrated testing strategies,
  - guiding next steps for chemical safety testing
  - identifying gaps in information

A-O-P-Wiki AOPs Key Events KE Relationships Prototypical Stressors Developers' Handbook Login Register

Welcome to the Collaborative Adverse Outcome Pathway Wiki (AOP-Wiki)

Version 2.7 was released on March 30, 2024. More details regarding the new release are available here: Release 2.7.

Interested in helping plan for Version 3.0? Please submit your ideas on the AOP Forum here.

View Content

AOPs | Key Events | KE Relationships | Prototypical Stressors

Get access to the main elements of an Adverse Outcome Pathway managed in the AOP-Wiki

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Get started here... What is an AOP? How will AOPs change Chemical Risk Assessment?

Who are we? Find out more about the people behind the AOP-Wiki and the AOP Framework

Announcements Don't miss our regular announcements and news!

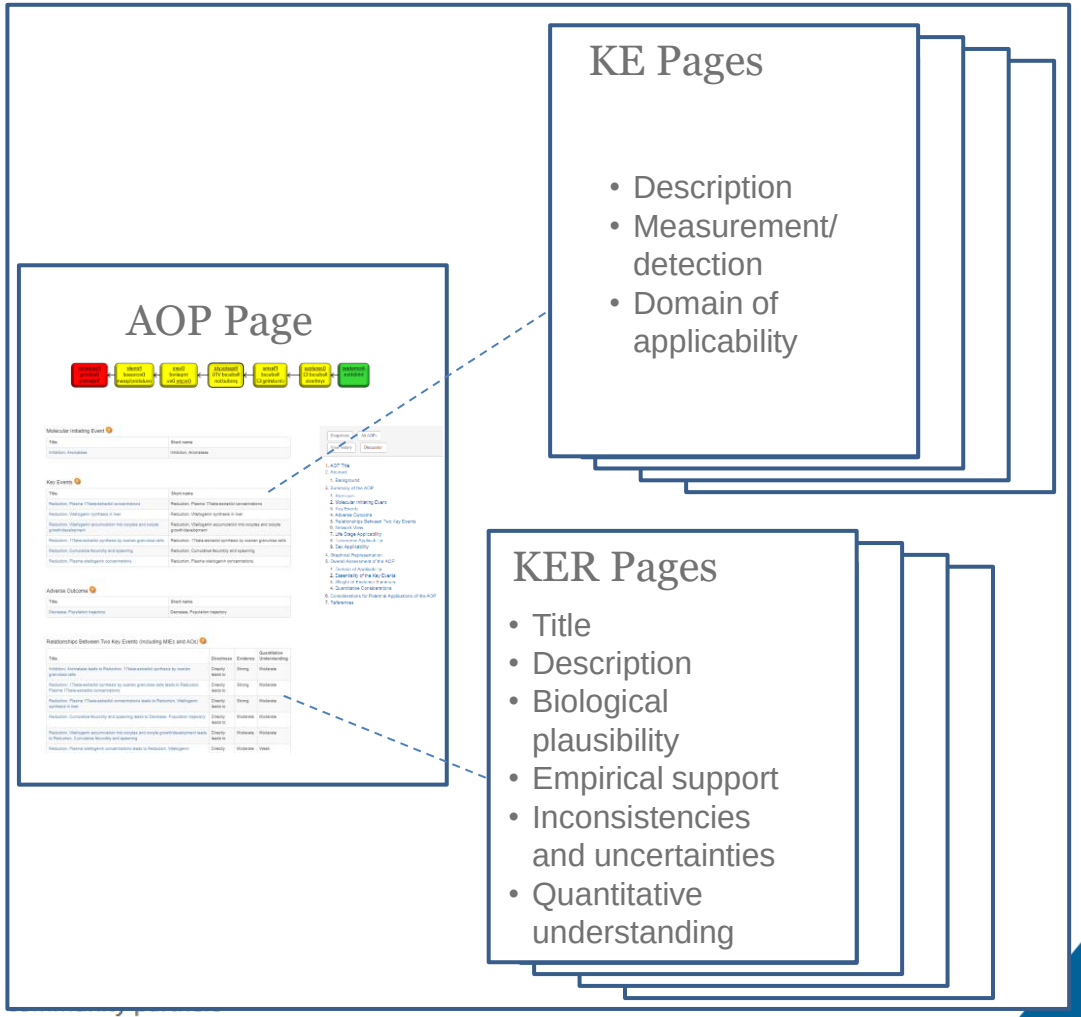
AOP Training Learn about training materials and opportunities

Community

AOP Help

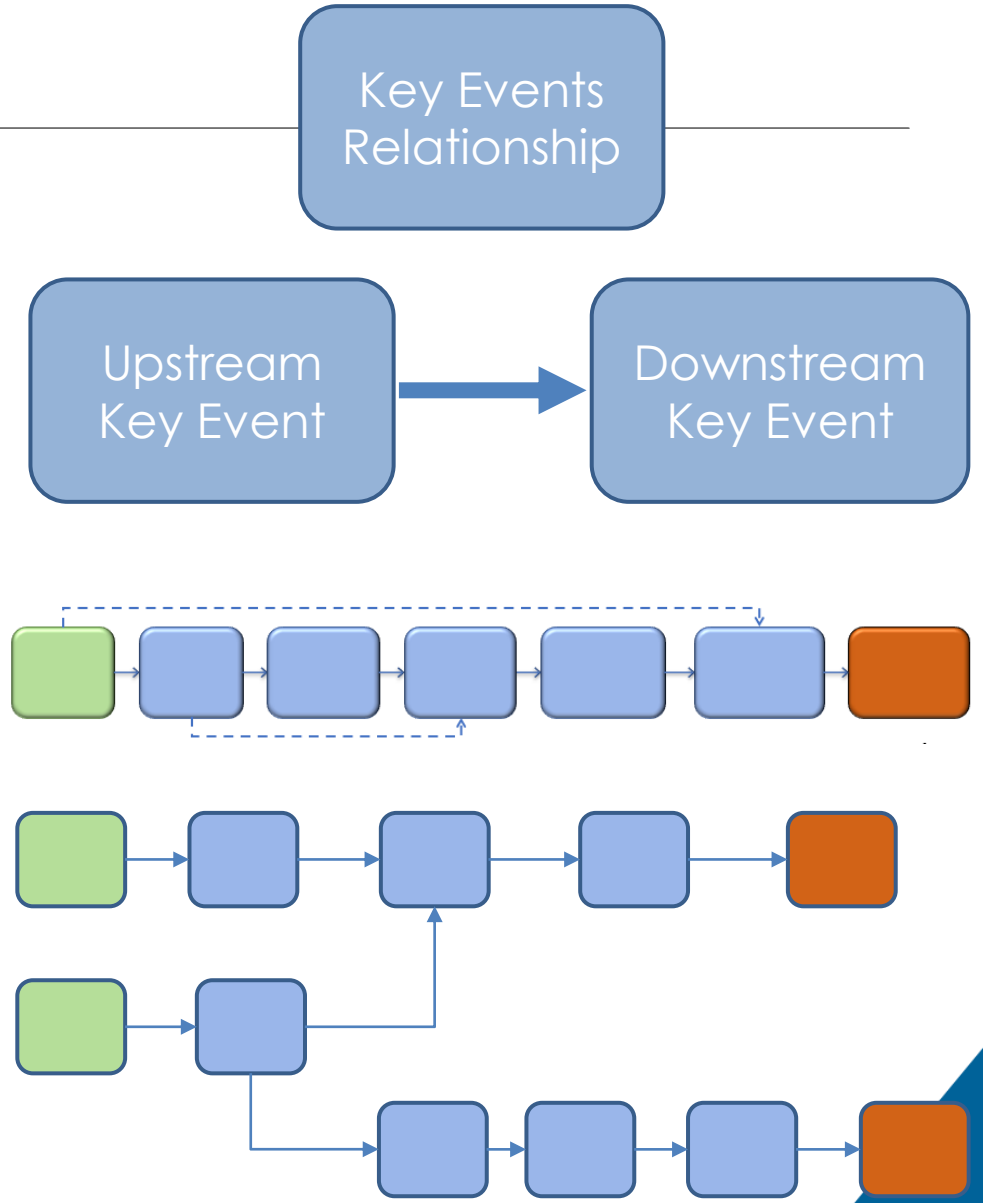
AOP Forum

Third Party Tools

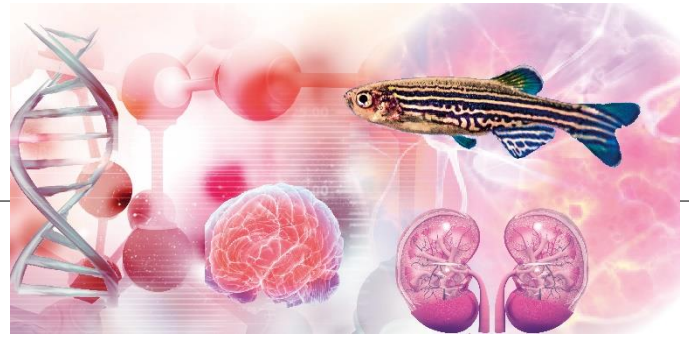


Principles of AOP development

1. AOPs are not stressor-specific – intended to capture generalizable biological phenomenon
2. AOPs are modular
3. An individual AOP is a pragmatic unit of development and evaluation – a single series of events linking one cause to one outcome of concern
4. Greater complexity is captured via networks of AOPs that share common KEs and/or KERs.
5. AOPs are living documents and are expected to evolve over time (knowledge synthesis)



OECD webinars on AOPs



Missed our previous webinars on AOPs? Watch the video recordings

Adverse Outcome Pathway co-operative activities between Scientific journals and the OECD - 25 January 2022

Training needs, resources and opportunities for adverse outcome pathways (AOPs) - 30 November 2020

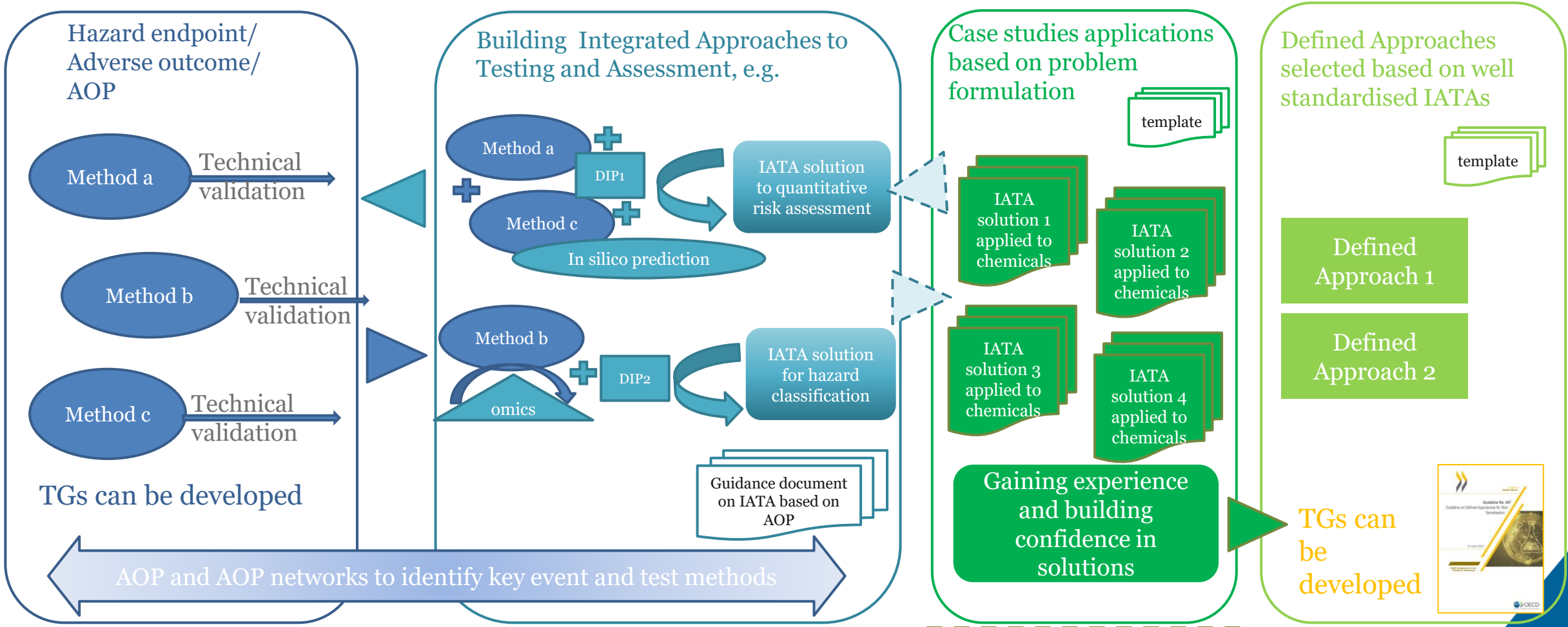
Adverse Outcome Knowledge Base (AOP-KB) and AOP developing tips - Thursday 30 January 2020

Adverse Outcome Pathways: Assembling and evaluating weight of evidence and quantitative understanding - Wednesday 15 January 2020

Adverse Outcome Pathways Framework - Tuesday 30 April 2019

AOPS APPLICATIONS
–
A FEW EXAMPLES OF AOPS SUPPORTING OECD ACTIVITIES

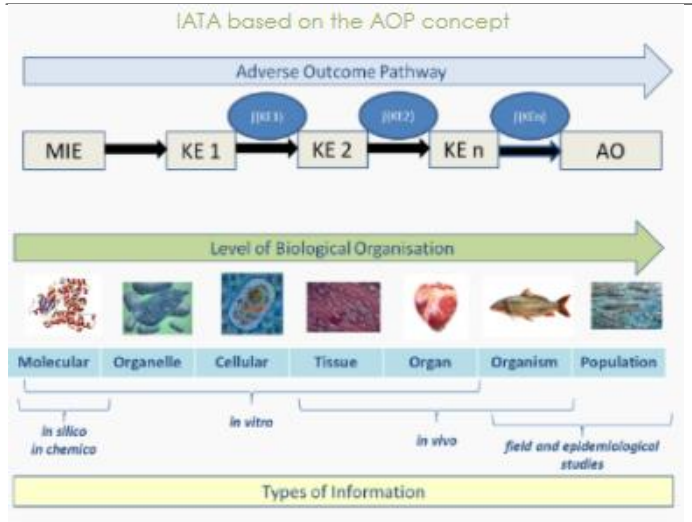
AOP applications



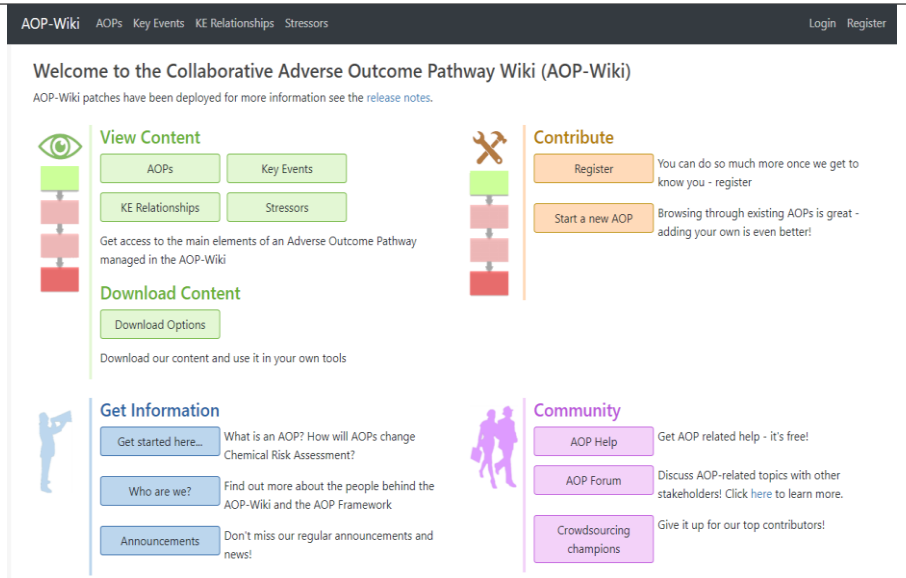
Technical validation: detailed SOP,
Testing of reference chemicals, lab transferability, between lab reproducibility

IATA case studies is not only about "technically validated methods"

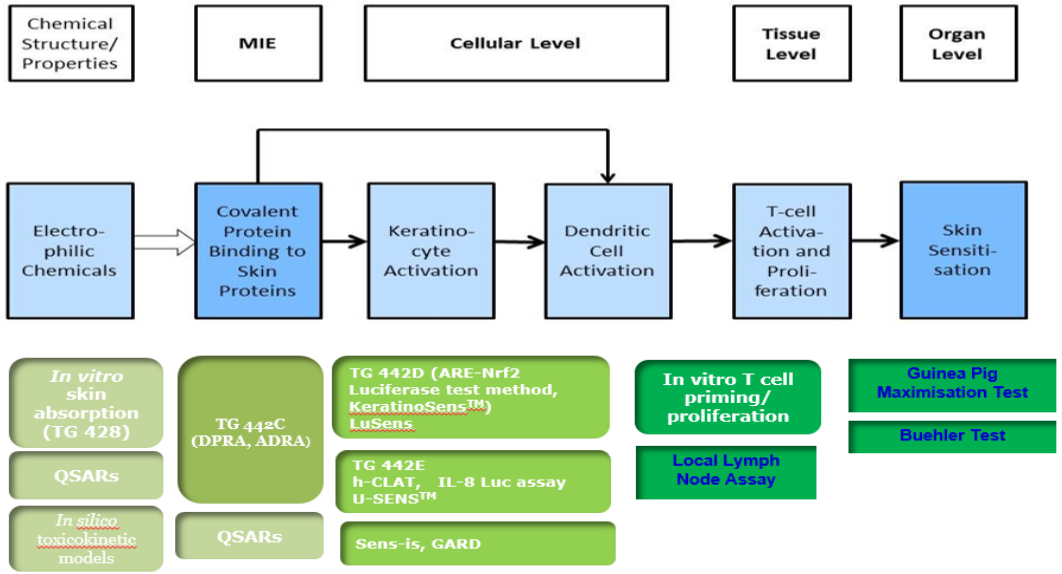
TG 497: Defined Approaches on Skin Sensitisation - full replacement based on the Adverse Outcome Pathway Concept



https://aopwiki.org/



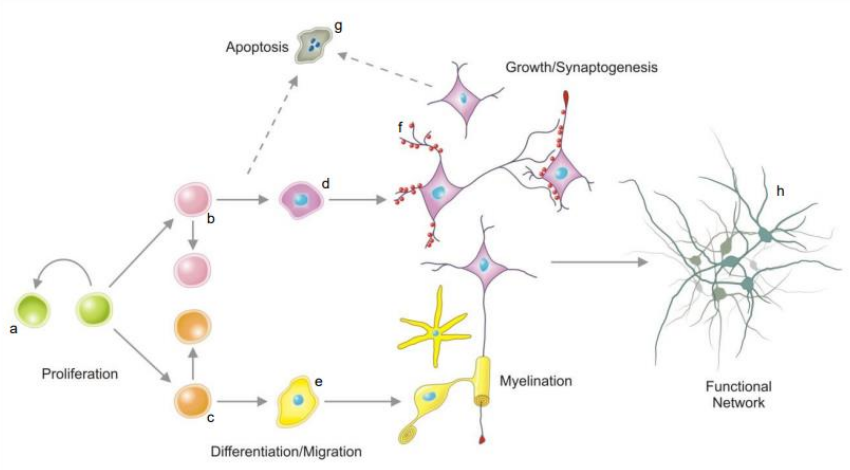
Concrete application into key event-based TGs

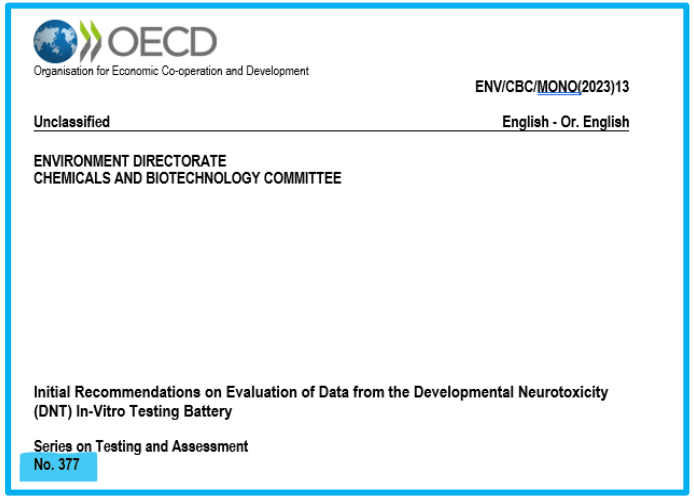


TG 442C, TG 442D, TG 442E
TG 497: Defined Approaches on Skin Sensitisation

Example of AOP networks supporting more complex enpoints

- Initial Recommendations on the Evaluation of Data from a DNT in vitro testing battery

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ENV/CBC/MONO(2023)13

Unclassified — English - Or. English

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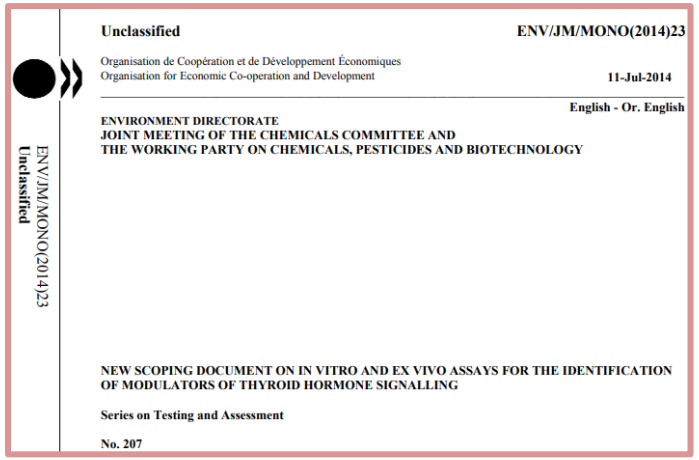
CHEMICALS AND BIOTECHNOLOGY COMMITTEE

Initial Recommendations on Evaluation of Data from the Developmental Neurotoxicity (DNT) In-Vitro Testing Battery

Series on Testing and Assessment
No. 377

- Thyroid disruption in vitro methods, on-going work


Unclassified — ENV/JM/MONO(2014)23

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

11-Jul-2014

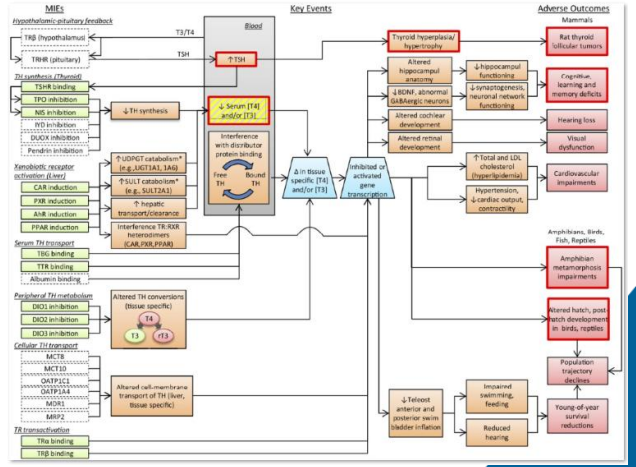
English - Or. English

ENVIRONMENT DIRECTORATE
JOINT MEETING OF THE CHEMICALS COMMITTEE AND
THE WORKING PARTY ON CHEMICALS, PESTICIDES AND BIOTECHNOLOGY

NEW SCOPING DOCUMENT ON IN VITRO AND EX VIVO ASSAYS FOR THE IDENTIFICATION OF MODULATORS OF THYROID HORMONE SIGNALLING

Series on Testing and Assessment

No. 207

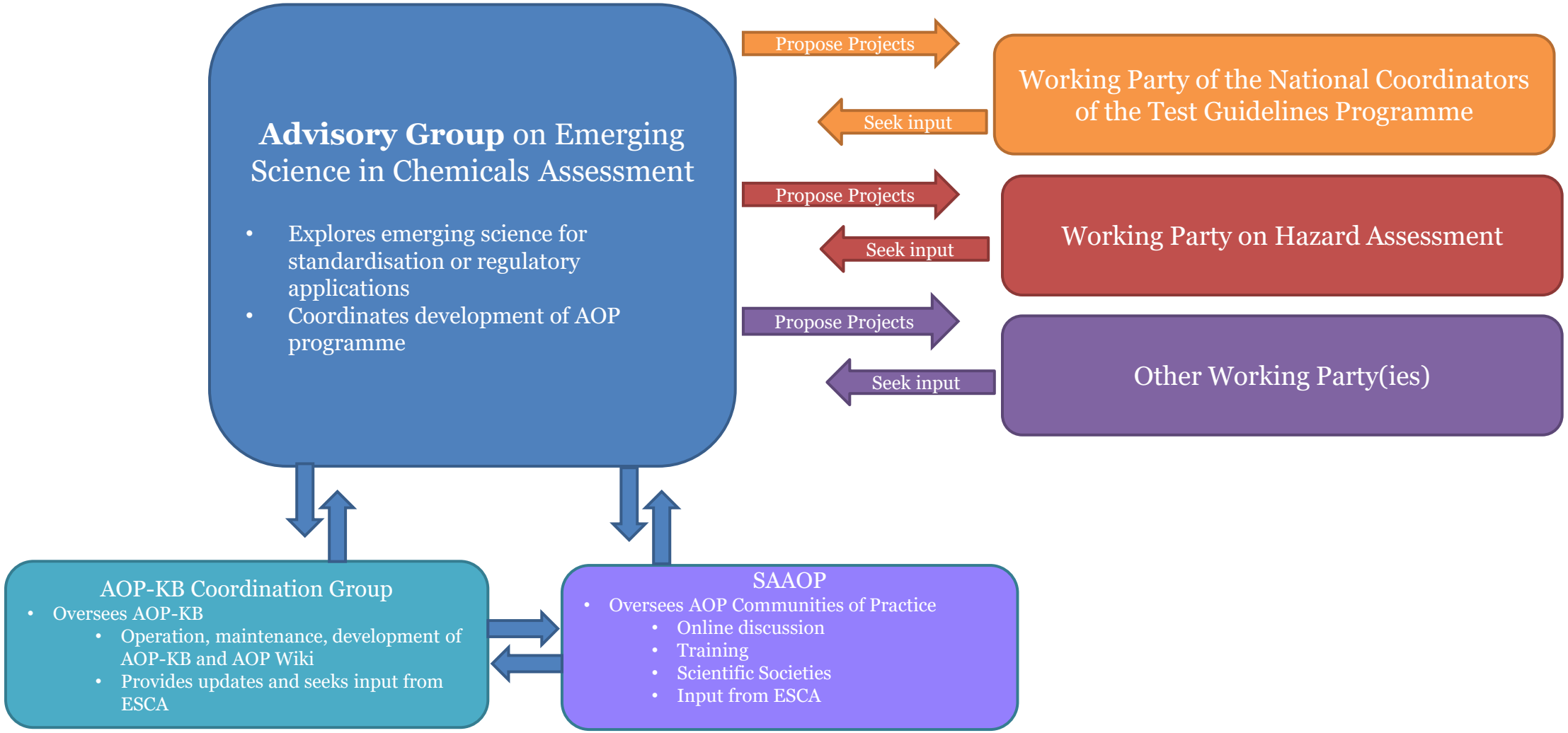


AOP DEVELOPMENT AND ENDORSEMENT AT THE OECD

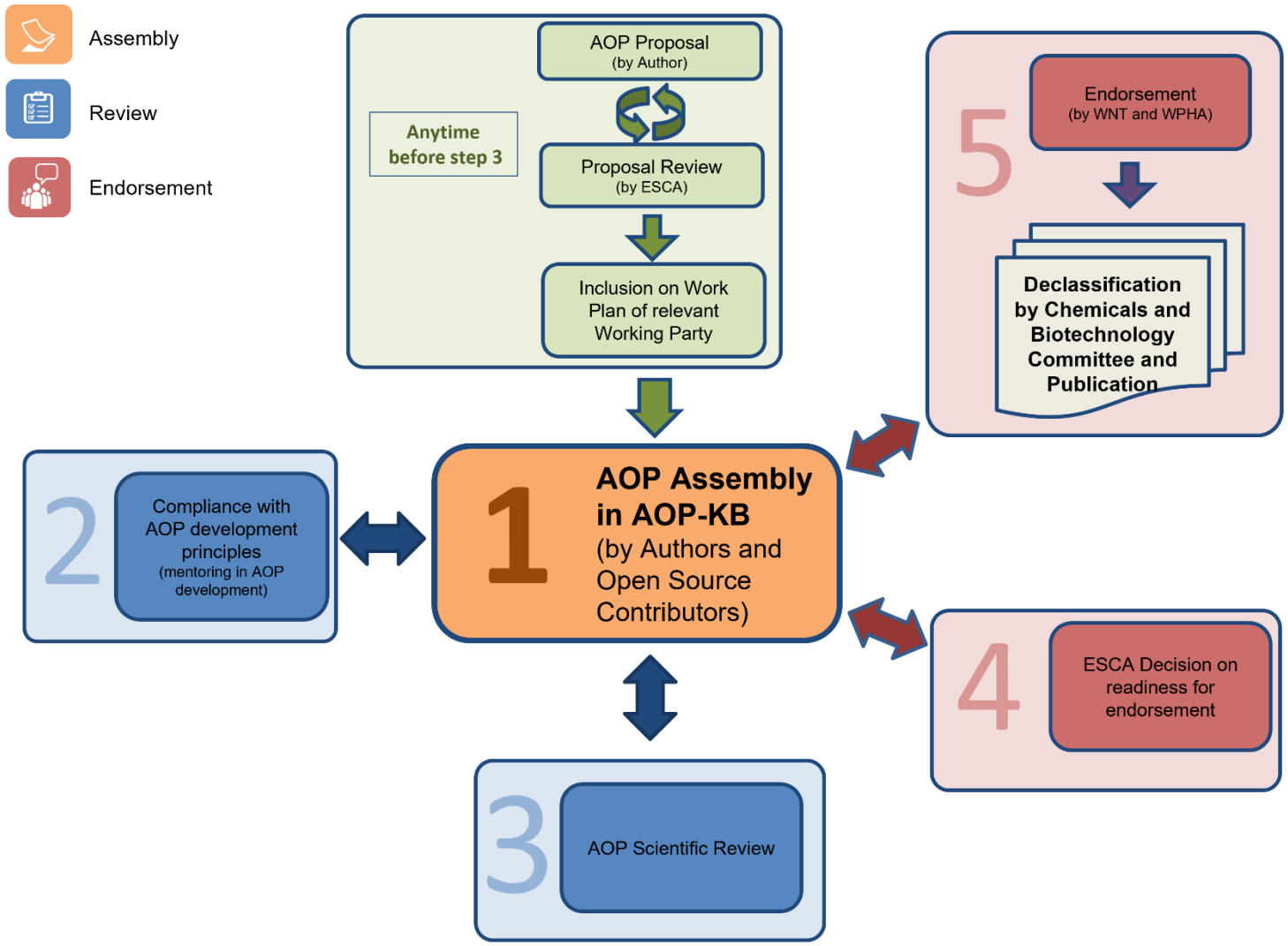
The OECD AOP Development Programme

- Overseen by the Advisory group on Emerging Science in Chemicals Assessment (ESCA)
  - Advises and develops guidance or recommendations on emerging scientific approaches to support next generation chemical assessment
  - Oversees the essential elements of the AOP Programme

Emerging Science in Chemicals Assessment



Detailed description of the AOP development process

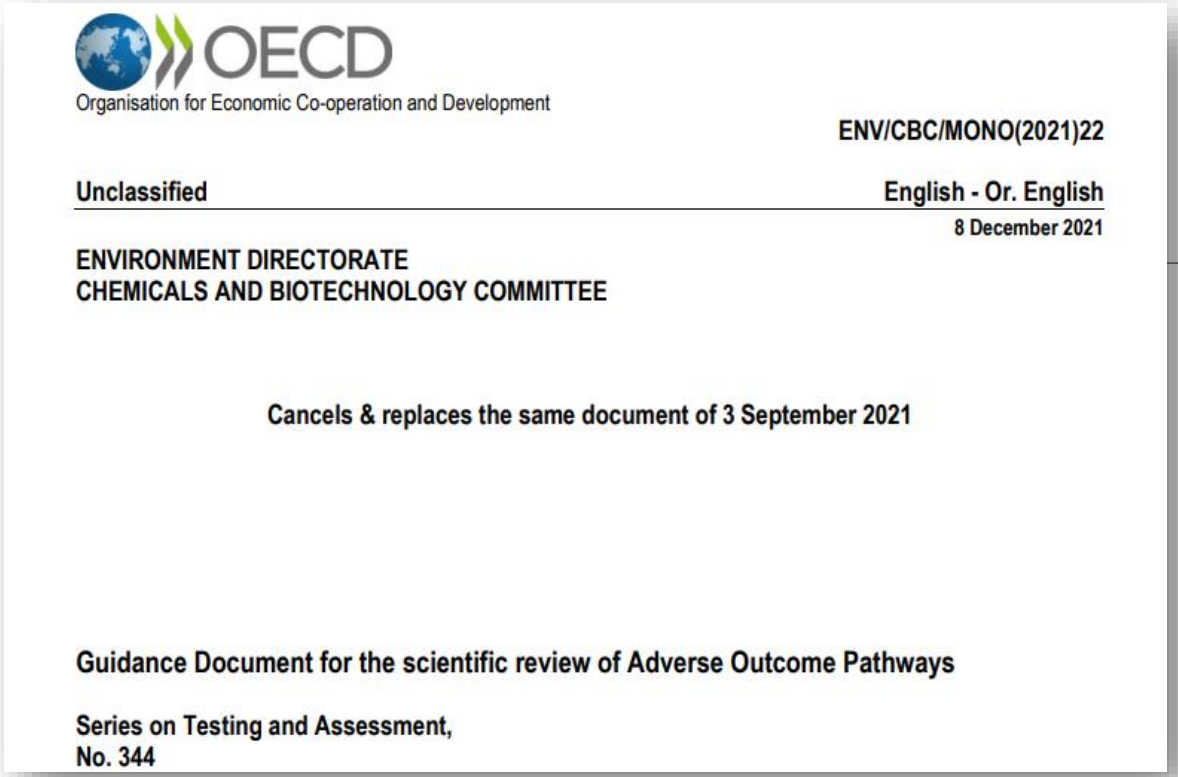


OECD Series on Adverse Outcome Pathways

AOPs published in iLibrary in 2023

[OECD Series on Adverse Outcome Pathways | OECD iLibrary (oecd-ilibrary.org)]

No. 35	12 Dec 2023	Adverse Outcome Pathway on Androgen receptor agonism leading to male-biased sex ratio **Kelvin J. Santana Rodriguez, Daniel L. Villeneuve, Kathleen M. Jensen, Gerald T. Ankley and David H. Miller**
No. 34	12 Dec 2023	Adverse Outcome Pathway on Aromatase inhibition leading to male-biased sex ratio via impacts on gonad differentiation **Kelvin J. Santana Rodriguez, Daniel L. Villeneuve, Kathleen M. Jensen, Gerald T. Ankley and David H. Miller**
No. 33	12 Dec 2023	Substance interaction with the pulmonary resident cell membrane components leading to pulmonary fibrosis **Sabina Halappanavar, Monita Sharma, Silvia Solorio-Rodriguez, Hakan Wallin, Ulla Vogel, Kristie Sullivan and Amy J. Clippinger**
No. 32	23 Oct 2023	Adverse Outcome Pathway on deposition of energy leading to lung cancer **Samantha Sherman, Zakara Said, Baki Sadi, Carole Yauk, Danielle Beaton, Ruth Wilkins, Robert Stainforth, Nadine Adam and Vinita Chauhan**
No. 31	23 Oct 2023	Disruption of VEGFR signaling leading to developmental defects **Thomas B. Knudsen, Katerine Saili, Jill Franzosa, Nancy Baker, Richard Spencer, Tamara Tal, Nicole Kleinstreuer, Tuula Heinonen, Rob Ellis-Hutchings, Neil Vargesson and Maria Bondesson**
No. 30	23 Oct 2023	Adverse Outcome Pathway on impaired interleukin-1 receptor type I (IL-1R1) signaling leading to impaired T-cell dependent antibody response **Yutaka Kimura, Setsuya Aiba, Takao Ashikaga, Takumi Ohishi and Kiyoshi Kushima**
No. 29	11 Jul 2023	Oxidative DNA damage leading to chromosomal aberrations and mutations **Eunnara Cho, Ashley Allemang, Marc Audebert, Vinita Chauhan, Stephen Dertinger, Giel Hendriks, Mirjam Luijten, Francesco Marchetti, Sheroy Minocherhomji, Stefan Pfuhler, Daniel J. Roberts, Kristina Trenz and Carole L. Yauk**



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English - Or. English

8 December 2021

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Cancels & replaces the same document of 3 September 2021

Guidance Document for the scientific review of Adverse Outcome Pathways

Series on Testing and Assessment,
No. 344

SETAC
SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY

Environmental and Molecular Mutagenesis

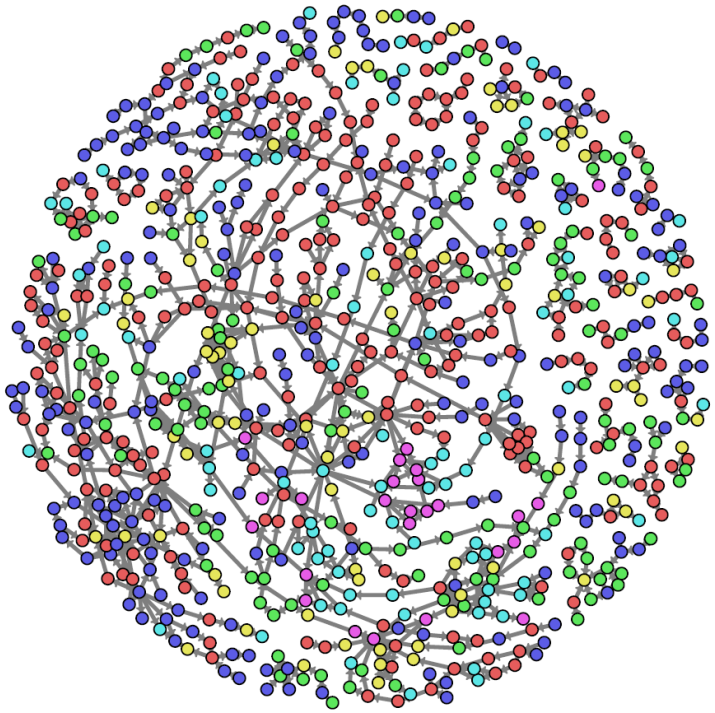
ALTEX
ALTERNATIVES TO ANIMAL EXPERIMENTATION

cancers

The following Journals have already signed an MOU with the OECD:

- Environmental Toxicology and Chemistry (ET&C), a journal published by the Society of Environmental Toxicology and Chemistry (SETAC - AOP Pathways and Predictions: Virtual issue
- Environmental and Molecular Mutagenesis (EMM), the journal of the Environmental Mutagenesis and Genomics Society
- Alternatives to Animal Experimentation (ALTEX)
- Cancers, a journal published by MDPI

Conclusion



- AOPs can support
  - Test method development
  - Chemical assessments through IATA
- AOPs proved to be
  - An efficient tool for communicating complex biology
- Increase the impact of AOPs by
  - Linking to OECD projects/activities
  - Supporting other regulatory initiatives
- Collaboration is key - All scientists and scientific societies are invited to contribute in their field of expertise to the development of AOP networks

Thank you for your attention!

For more information

– OECD public website on Adverse Outcome Pathways:
[Adverse Outcome Pathways - OECD]

– Wiki platform:
https://aopwiki.org

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