Why and What and How
of various emerging approaches
IATA, NAMs, AOPs, QSARs

Peter Hoet

KU Leuven, Environment & Health

peter.hoet@kuleuven.be

KU LEUVEN

What? (definition → how)

- IATA Integrated assessment and testing approaches
  are flexible **approaches** for chemical **safety assessment** based on the **integration** and translation of the **data derived from multiple methods** and **sources**.

What? (definition → how)

- IATA Integrated assessment and testing approaches
  are flexible **approaches** for chemical **safety assessment** based on the **integration** and translation of the **data derived from multiple methods** and **sources**.
- NAMs New approach methodologies
  a reference to any *non-animal-based* **approaches** that can be used to provide information in the context **of chemical hazard and risk assessment**.
  NAMs for e.g. *read-across*, screening and prioritisation.

What? (definition → how)

- IATA Integrated assessment and testing approaches
  are flexible **approaches** for chemical **safety assessment** based on the **integration** and translation of the **data derived from multiple methods** and **sources**.
- NAMs New approach methodologies
  a reference to any *non-animal-based* **approaches** that can be used to provide information in the context **of chemical hazard and risk assessment**.
  NAMs for e.g. *read-across*, screening and prioritisation.
- AOP Adverse outcome pathway
  model that identifies the sequence of **molecular and cellular events** required to **produce a toxic effect** when an organism is exposed to a substance

What? (definition → how)

- IATA Integrated assessment and testing approaches
  are flexible **approaches** for chemical **safety assessment** based on the **integration** and translation of the **data derived from multiple methods** and **sources**.
- NAMs New approach methodologies
  a reference to any *non-animal-based* **approaches** that can be used to provide information in the context **of chemical hazard and risk assessment**.
  NAMs for e.g. *read-across*, screening and prioritisation.
- AOP Adverse outcome pathway
  model that identifies the sequence of **molecular and cellular events** required to **produce a toxic effect** when an organism is exposed to a substance
- (Q)SAR (Quantitative) structure–activity relationship
  are mathematical **models** used to **predict** the physicochemical, **biological** and environmental fate **properties** of compounds from the knowledge of their **chemical *structure***.

Why (& how)

- Biological / Toxic effect - Hazard assessment *(IATA, NAMs, AOPs, QSAR)*
  - Test data driven *(IATA, NAMs)*
  - Key events → predict potential (adverse) outcome *(AOPs)*
    - Specific compound (initiating event) – to generic context (?)
  - Chemical characteristics (moieties) → biological effects *(QSAR)*
    - From compound specific towards broader context

Why (& how)

- Biological / Toxic effect - Hazard assessment *(IATA, NAMs, AOPs, QSAR)*
  - Test data driven *(IATA, NAMs)*
  - Key events → predict potential (adverse) outcome *(AOPs)*
    - Specific compound (initiating event) – to generic context (?)
  - Chemical characteristics (moieties) → biological effects *(QSAR)*
    - From compound specific towards broader context
- 3R's *(NAMs - all)*
  - In vitro, in silico, in chemico, … no lab-animals → towards safety assessment

Why (& how)

- Biological / Toxic effect - Hazard assessment *(IATA, NAMs, AOPs, QSAR)*
  - Test data driven *(IATA, NAMs)*
  - Key events → predict potential (adverse) outcome *(AOPs)*
    - Specific compound (initiating event) – to generic context (?)
  - Chemical characteristics (moieties) → biological effects *(QSAR)*
    - From compound specific towards broader context
- 3R's *(NAMs - all)*
  - In vitro, in silico, in chemico, … no lab-animals → towards safety assessment
- Risk assessment *(IATA, NAMs, AOPs, QSAR)*

Why (& how)

- Biological / Toxic effect - Hazard assessment *(IATA, NAMs, AOPs, QSAR)*
  - Test data driven *(IATA, NAMs)*
  - Key events → predict potential (adverse) outcome *(AOPs)*
    - Specific compound (initiating event) – to generic context (?)
  - Chemical characteristics (moieties) → biological effects *(QSAR)*
    - From compound specific towards broader context
- 3R's *(NAMs - all)*
  - In vitro, in silico, in chemico, … no lab-animals → towards safety assessment
- Risk assessment *(IATA, NAMs, AOPs, QSAR)*

→Mechanistic understanding – less animals – better safety *(IATA, NAMs, AOPs, QSAR)*

You can find more: Tuesday November 17, 2020

Paper Id	Title/Author
Room 3	Session A1L-03
1141	Development of an **Adverse Outcome Pathway** for Chronic and Multi-Generational Impacts of Nanomaterials in the Environmental Indicator Species Daphnia Magna *Iseult Lynch, Katie Reilly, Mihaela Roxana Cimpan, Anne-Marthe Drønen, Ivan Rios-Mondragon Rios-Mondragon, Sebastien...*
1125	Nanomaterial-Relevant **Adverse Outcome Pathways** Developed With Support From SmartNanoTox and PATROLs *Sabina Halappanavar, Sybille van Den Brule, Penny Nymark, Laurent Gaté, Carole Seidel, Sarah Valentino, Vadim Zherno.*
Room 4	Session A1L-04
1146	Advancing the Development of **Adverse Outcome Pathways** of Relevance to Nanomaterials: The Opportunities and Limitations of the Present Nanotoxicology Literature *Sabina Halappanavar, James D. Ede, Harald F. Krug, Indrani Mahapatra, Eileen D. Kuempel, Rob J. Vandebriel, Iseult Ly...*
1137	Translating Scientific Advances in **the AOP Framework** to Decision Making for Nanomaterials *James D. Ede, Vladimir Lobaskin, Ulla Vogel, Iseult Lynch, Sabina Halappanavar, Shareen Doak, Megan Roberts, Jo Anne ...*
1130	Generation of Testable **Adverse Outcome Pathways** (AOPs) for Nanomaterial Human Hazard Assessment *Sivakumar Murugadoss, Ivana Vinković Vrček, Mihaela Roxana Cimpan, Marvin Martens, Maciej Gromelski, Tomasz Puzyn, ...*
1075	**Decision Support System** for Risk Assessment and Management of Nano-Biomaterials Used in Medical Devices and Advanced Therapy Medicinal Products *Alex Zabeo, Virginia Cazzagon, Elisa Giubilato, Lisa Pizzol, Danail Hristozov*
1057	**The Risk Management Framework** for Nano-Biomaterials Used in Medical Devices and Advanced Therapy Medicinal Products *Elisa Giubilato, Virginia Cazzagon, Antonio Marcomini, Lisa Pizzol, Leagh Powell, Alex Zabeo, Danail Hristozov*
1074	Characterisation and Human Health **Risk Assessments** of Nanomaterials: Are We Ready for the Next (Active) Generation? *Petra Krystek, Neeraj Shandilya, Wouter Fransman*

How? -- in the following presentations

New developments in human hazard assessment

"The Why and What and How of AOPs and various emerging approaches – QSAR, NAMs, IATA" -- Peter Hoet, KU Leuven

- 9:15-9:30 h
  "Beyond chemocentric models: from toxicogenomics to integrated approaches for IATA development" by **Dario Greco**, Uni Tampere

How? -- in the following presentations

New developments in human hazard assessment

"The Why and What and How of AOPs and various emerging approaches – QSAR, NAMs, IATA" -- Peter Hoet, KU Leuven

- 9:15-9:30 h
  "Beyond chemocentric models: from toxicogenomics to integrated approaches for IATA development" by **Dario Greco**, Uni Tampere
- 9:30-9:45 h
  "AOPs and data integration within Nanosafety"
  by **Penny Nymark**, Karolisnka Institutet

How? -- in the following presentations

New developments in human hazard assessment

"The Why and What and How of AOPs and various emerging approaches – QSAR, NAMs, IATA" -- Peter Hoet, KU Leuven

- 9:15-9:30 h
  "Beyond chemocentric models: from toxicogenomics to integrated approaches for IATA development" by **Dario Greco**, Uni Tampere
- 9:30-9:45 h
  "AOPs and data integration within Nanosafety"
  by **Penny Nymark**, Karolisnka Institutet
- 9:45-10:00 h
  "Showcasing the AOP-Wiki Resource Description Framework – why nano-AOPs do not exist" by **Marvin Martens**, Uni Maastricht

Thank You