Ocular and Dermal Irritation Implementation Plan

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Implementation Plan Outline

• Coordinate activities via ICCVAM Workgroups

• Draft a scoping document to identify U.S. agency requirements, needs, and decision contexts

• Coordinate efforts with stakeholders

• Identify, acquire, and curate high quality data from reference test methods

• Identify and evaluate non-animal alternative approaches

• Gain regulatory acceptance and facilitate use of non-animal approaches
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Current Ocular and Dermal Irritation Workgroup Roster

- Adrienne Layton (CPSC)
- Joanna Matheson (CPSC)
- David Mattie (DOD)
- Timothy Varney (DOD)
- Evisabel Craig (EPA, OPP)
- Krystle Yozzo (EPA, OPP)
- Jenny Tao (EPA, OPP)
- Todd Stedeford (EPA, OPPT)
- Jill Merrill (FDA, CDER, WG Chair)
- Andrew J. McDougal (FDA, CDER)
- Donnie Lowther (FDA, CFSAN)
- Warren Casey (NIEHS)
- Elizabeth Maull (NIEHS)

ICATM Liaison Members
- João Barroso (EURL ECVAM)
- Yavinder Bhuller (Health Canada)
- Brenda Linke (Health Canada)

NICEATM Support Staff (ILS)
- Amber Daniel
- Neepa Choksi
- David Allen
Validation Study: OptiSafe Method

- Manufactured kit for ocular irritant/non-irritant classification

- Irritation prediction based on measured molecular damage

- 2-Phase Validation Study
  - Bottom-up approach (non-irritants vs all irritant classes)
  - Phase I: Initial qualification of naïve labs and protocol refinement
  - Phase II: Testing of 30 chemicals by all 3 labs, additional 60 tested by main lab

- Testing complete – finalizing report

- ICCVAM ODIWG members make up the VMT
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# Eye/Skin Irritation and Corrosion: U.S. Statutes and Regulations

<table>
<thead>
<tr>
<th>US Statute/Regulations</th>
<th>Agency</th>
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<tbody>
<tr>
<td>Federal Hazardous Substances Act (FHSA) (1960): 16 CFR 1500.3: <strong>Consumer Products</strong></td>
<td>CPSC</td>
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<td><strong>Transported Substances</strong></td>
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<td>156, 40 CFR 158.500, 40 CFR 158.2140, 40 CFR 158.2230, 40 CFR 159.165: <strong>Pesticides</strong></td>
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<tr>
<td>Toxic Substances Control Act (TSCA; 1976): 40 CFR 720.50: <strong>New or Imported Chemicals</strong></td>
<td>EPA</td>
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<td>Federal Food, Drug, and Cosmetic Act (1938): <strong>All routes of administration for small molecule drugs, protein therapeutics, and monoclonal antibodies</strong></td>
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Agencies that Use Ocular and Dermal Data
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Eye Irritation: Private-Public Partnership

• Crop Life America-EPA-NICEATM
  – BASF, Dow, Bayer, Syngenta, Dupont

• Paired data for approximately 200 pesticides

• Rabbit eye test data + in vitro data in one or more assays:
  – Bovine corneal opacity and permeability (BCOP, OECD TG 437)
  – Isolated chicken eye (ICE, OECD TG 438)
  – EpiOcular (EO, OECD TG 492 and ET40 protocol)
  – Neutral red release (NRR)
  – Chorioallantoic membrane vascular assay (CAMVA)
Outcome

• A tiered approach using EO and NRR is promising, but not sufficient to identify all hazard categories

• BCOP did not appear to be useful for testing agrochemical formulations

• ICE and CAMVA datasets were too small for definitive assessments

• Overall, there is a need to conduct prospective *in vitro* testing
  – Protocol optimization
  – Data generation for specific formulation types
Skin Irritation: Private-Public Partnership

• Optimization of 3D skin model for testing antimicrobial cleaning products (AMCPs)

• Companies donated AMCPs

• Optimization/testing ongoing at IIVS

• Regular stakeholder teleconferences to discuss updates, data needs, etc.
  – PISC, PCRM
  – EPA and NTP
  – Industry
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Ongoing Ocular and Dermal Irritation Data Collection/Curation

• EPA FIFRA
• CropLife America (paired in vivo and in vitro ocular)
• Other stakeholders (EPA-led stakeholder discussions)
• Developing and evaluating QSAR models and where feasible to use in defined approaches
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Prospective Testing of Agrochemical Formulations

- Phase 1: small number (n=6) tested in all assays to demonstrate proof-of-concept

- Phase 2: comprehensive assessment of applicability with a larger set
  - Phase 2 study design and assays to be included contingent on Phase 1 results

- Coded formulations donated by companies

- Careful consideration of in vivo data

- Co-organized by NICEATM and PISC, with VMT members from ICCVAM and ODIWG, EURL ECVAM, PMRA, and industry
Eye Methods to be Evaluated

- BCOP
- ICE
- NRR
- EpiOcular (time to toxicity and TG 492 protocols)
- PorCORA (to evaluate reversibility of effects)
- Phase 1 testing ongoing
Additional Efforts

• Investigate the feasibility of developing new approaches, particularly for classes of substances that are poorly predicted by the existing models
  – Reflect on published work and OECD
  – Interrogate in vivo variability; build on Luechtefeld et al. 2016 and others

• Investigate incorporation of other data inputs

• Consider machine learning and other computational approaches, where feasible
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IATA for Eye Irritation: An International Effort

- OECD Guidance Document 263 (US and EU co-led project)

- Three parts:
  1. Existing and available information (physchem properties QSAR, read across, bridging)
  2. Weight of evidence
  3. New testing (in vitro and/or in vivo)
Scientific and Non-scientific Challenges

- Animal methods currently provide the reference data for evaluating alternatives
  - Results are variable
  - Need to identify summary metric & characterize uncertainty

- Data requirements vary across U.S. and global regulatory authorities and are often ambiguous

- Overcoming institutional inertia
  - Education and training, communication with method/model developers