Scaling the Evaluation and Adoption of Safer Chemicals and Technologies: Science and Policy Needs and Opportunities

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Are we really winning the “war of cancer”

All cancer, all children <20 years, U.S. SEER data
Overall Trends in Cancer Incidence

Prevention Works

U.S. SEER data
What do we know about carcinogens?

~500 chemicals/processes evaluated for carcinogenicity (IARC) are of concern

- Carcinogenic to humans: 117
- Probably carcinogenic to humans: 74
- Possibly carcinogenic to humans: 287
- Not classifiable: 503
- Probably not carcinogenic to humans: 1

*Note these do not include chemicals/agents that may affect individual “hallmarks” of cancer (i.e., not direct carcinogens)

Are we asking the wrong question?

- Much attention paid on a currently unanswerable question: "How much cancer is caused by the chemicals in the environment?"
  - Doll & Peto (1981)
  - State-level cancer prevention and control programs
  - “Cancer is just bad luck” articles

- What if we changed the question:
  “If incidence rates of childhood cancer and cancers associated with environmental exposures are rising, and there are chemicals that we know cause cancer, why not use safer substitutes?”
Transitioning to safer alternatives
A key cancer prevention strategy

Safer Alternatives: A 3-legged stool of strategies for and drivers of cancer prevention
Regulation: a key driver of the substitution of high hazard chemicals

**EU**

- Registration, Evaluation, Authorization (*and Restriction*) of Chemicals (REACH)
- Primary driver for substitution according to industry survey*
- Multiple regulatory signals to phase out *Substances of Very High Concern*
- Substitution is mandated in a number of EU OSH Directives and regulations and Member State legislation

**U.S.**

- TSCA reform (Lautenberg Act)
- 8 of the 10 chemicals EPA is currently conducting risk evaluations for are known/suspected carcinogens

*https://echa.europa.eu/view-article/-/journal_content/title/reach-is-the-dominant-driver-for-substitution-more-action-is-needed
States: major forces for change in the U.S.

States are leading the way

23 states are considering 83 policies to protect people from toxic chemicals. 169 state policies have been adopted in 35 states.

The states in green are those that have adopted or are considering positive policy changes in 2016. Select a state to learn more.

Source: Safer States
Filling the US gap – chemical regulation at the state level

- Chemical-specific laws
  - BPA
  - Flame retardants
  - Mercury
  - Phthalates

- Broader laws
  - Disclosure
  - Alternatives assessment
  - Comprehensive chemicals regulation of children’s products
  - Toxics use reduction
  - Green chemistry/safer alternative innovation

Image from: http://www.saferstates.com/
Key to regulatory effectiveness – minimizing “regrettable substitutions”

- Banning a chemical – what are we moving towards?
- All substitutes are not equal
- Without an *informed consideration* of the options, industry is often too quick to adopt the easiest “drop-in” substitute that is not being regulated often with regrettable consequences.
- Examples:
  - BPS/BPF for BPA
  - Chlorinated tris for PBDE
Advancing Safer Substitution: Alternatives Assessment

- A process for identifying and comparing potential chemical and non-chemical alternatives that could replace chemicals or technologies of priority concern on the basis of their hazards, performance, and economic viability*

- Goal: To facilitate an informed consideration of the advantages and disadvantages of alternatives to a chemical of concern in substitution decisions

Alternatives Assessment in Regulatory Policies

- **REACH**
  - Required of authorization applications and restriction proposals

- **California Safer Consumer Products**
  - Required of users/distributors/importers of priority product/chemical

- Also being used to guide “voluntary/programmatic efforts:”
  - Example gov’t agency models: EPA Design for Environment/Safer Choice program, MA, TURA Program; WA, Dept of Ecology
Example of Impact: MA

Toxics use reduction = carcinogen reduction = cancer prevention

- Since 1990, use of carcinogens by Massachusetts industries declined 32%
- Releases to the environment declined 93%
Market demand: Includes both Advocacy and Industry Efforts

Advocacy/Consumer Efforts

Industry/Supply Chain Efforts

Learning with Purpose
Hazard/Alternatives Resources and Tools

How to scale their use and impact?

HBN Pharos

EWG’s Skin Deep® Cosmetics Database

GREENSCREEN FOR SAFER CHEMICALS

Safer Choice

Preservatives and Antioxidants

HBN DataCommons (coming soon)

SSI’s Detox Me
Science: driver of safer alternatives

- **Science of public health harms/problems** is a driver of the need for elimination/substitution
  - Basis of regulatory action
  - Justifies consumer/market demands
- **Science of the solutions** is a driver of the R&D of safer, greener alternatives – the science to support preventative interventions

How can we better connect these fields of science to advance cancer prevention related to chemical toxicants in the environment?
Scientific Innovations for Cancer Prevention

“Benign by Design”

- Innovations are needed to engineer hazards out of the next generation chemicals
- The growing discipline of green chemistry is making this possible
- Current needs:
  - Promoting R&D on green chemistry solutions to priority toxics
  - Building stronger connections with toxicology/hazard assessment science
    - Predictive toxicology/Tox21
Summary thoughts

Advancing the transition to safer alternatives to carcinogens in our economy will require continued efforts on the 3 fronts of:
- policy, market demand, scientific discovery and innovation

Scaling this transition needs to involve:
- Consideration of alternatives in chemical policies
- Advancing the broader use of alternatives assessment
- Scaling the use of resources and tools to support the identification and adoption of safer chemicals and products
- Building deeper connections between the public health sciences and green chemistry