

Assessing alternatives to substances that present exposure risk

By Kelly Lenox

When faced with evidence that environmental exposure to a certain substance can harm public health, decision makers typically concentrate on determining safe levels. They should also begin evaluating alternatives to these substances, said Joel Tickner, Sc.D., during his Feb. 3 talk at NIEHS, “Building a Research Agenda and Scientific Community of Practice for Chemical Alternatives Assessment.”

Alternatives assessment refers to analyzing candidate substances to determine whether they are truly safer than those they are meant to replace. Tickner is an associate professor of community health and sustainability at the University of Massachusetts Lowell. The university, along with NIEHS and EPA, is sponsoring an international symposium on alternatives assessment March 5-6 (see [sidebar](#)).

“I’ve always really liked his approach, which is to focus on the solutions and what we need to get there, rather than focusing on the problems,” said Linda Birnbaum, Ph.D., director of NIEHS and the National Toxicology Program, who hosted the talk.

Guidance for evaluations

The shift to focusing on solutions favors innovation rather than setting limits, said Tickner. Market forces now encourage retailers and manufacturers to search for safer alternatives, which drives the need for evaluation tools (see [text box](#)). “The goal is to use a considered process of alternatives evaluation so we avoid jumping out of the frying pan into the fire, as we have seen with bisphenol A [BPA] alternatives,” he said, referring to indications that BPA alternatives may also present health concerns.

Tickner highlighted a framework developed by the National Research Council (NRC) of The National Academies. In addition to exposure hazards, the framework considers the life cycle of a substance or product, the performance of alternatives, and economic factors. “We need a flexible, adaptable approach to alternatives assessment that doesn’t lock people into a specific way of doing things, but ensures a comprehensive look at the process, minimizes unintended consequences, and supports informed transition,” he explained.

Data gaps call for novel approaches

A National Academy of Sciences panel analyzed the literature on alternatives assessment and developed a framework to support assessment processes. Tickner and two colleagues from the Academy team published their conclusions in a Jan. 27 editorial in *Environmental Science and Technology*.

Important differences in approaches to handling data gaps led the editorial authors to call for increased use of novel data streams. For example, high throughput screening and computer models and simulations can help ensure that alternatives assessment is not sidetracked by lack of data, they said.

Research agenda

Tickner kept his talk focused on the practical. “How do we pull together all the data so there is information decision makers can act on?” he asked. By way of an answer, Tickner outlined an agenda for future research.

- Develop more core hazard data for key health endpoints.
- Work toward data-type integration and filling of data gaps, for efficient review of more chemicals.

International Symposium on Alternatives Assessment — Advancing Science and Practice

March 5-6, 2015
National Institutes of Health,
Bethesda, Maryland
Free, [registration](#)
(<http://www.saferalternatives.org/registration>)
required

The Lowell Center for Sustainable Production at the University of Massachusetts Lowell, in conjunction with NIEHS, and with financial sponsorship from the U.S. Environmental Protection Agency and ToxServices, have organized the symposium to build up the scientific field and create a community of practice. Birnbaum will give a keynote address.



Tickner stressed that when an organization identifies a chemical as problematic, it should look at alternatives to avoid regrettable substitutions. (Photo courtesy of Steve McCaw)

- Improve tools for analyzing exposure tradeoffs.
- Develop tools that incorporate life cycle thinking, for example, manufacturing and use, byproducts, and end products.
- Create tools for integrating all these attributes into the decision-making process.

In closing, Tickner emphasized the need to incorporate what he called alternative thinking into all scientific endeavors, particularly in the fields of toxicology, ecological toxicology, and risk assessment. It is important to examine health threats, as well as evaluate what approaches are safer.

Citation: Tickner JA, Dorman DC, Shelton-Davenport M.

(<http://www.ncbi.nlm.nih.gov/pubmed/25625882>)

2015. Answering the Call for Improved Chemical Alternatives Assessments (CAA). *Environ Sci Technol* 49(4):1995-1996.



Mark Miller, Ph.D., left, Birnbaum's chief of staff, listens along with Andy Rooney, Ph.D., deputy director of the NTP Office of Health Assessment and Translation.

In response to Rooney's question about the timing of life cycle analysis, Tickner suggested one might look at toxicity first and then complete a life cycle analysis on substances that appear safer, if needed, to distinguish between using alternatives or reducing impacts. (Photo courtesy of Steve McCaw)

Resources

Listed below are some of the alternatives assessment approaches and resources Tickner shared.

- [A Framework to Guide Selection of Chemical Alternatives](http://dels.nas.edu/Report/Framework-Guide-Selection/18872)
(<http://dels.nas.edu/Report/Framework-Guide-Selection/18872>)
— NRC comprehensive approach to alternatives assessment that addresses the life cycle of a substance or product, performance of alternatives, and economic factors.
- [Organisation for Economic Co-operation and Development Substitution and Alternatives Assessment Toolbox](http://www.oecsaatoolbox.org/Home/Index)
(<http://www.oecsaatoolbox.org/Home/Index>)
— one-stop shop for alternatives assessment tools.
- [GreenScreen For Safer Chemicals](http://greenscreenchemicals.org)
(<http://greenscreenchemicals.org>)
— publicly available and transparent chemical hazard screening method to help move toward the use of safer chemicals.
- [Commons Principles for Alternatives Assessment](http://www.bizngo.org/resources/entry/commons-principles-for-alternatives-assessment)
(<http://www.bizngo.org/resources/entry/commons-principles-for-alternatives-assessment>)
— Chemical Commons group principles to guide alternatives assessments when making substitutions for hazardous products.
- [Occupational Safety and Health Administration toolkit](https://www.osha.gov/dsg/safer_chemicals/)
(https://www.osha.gov/dsg/safer_chemicals/)
— framework to help small and medium size businesses transition to safer chemicals.
- [Interstate Chemicals Clearinghouse](http://www.theic2.org)
(<http://www.theic2.org>)
— guide to a multistep framework for evaluating alternatives.
- [European Chemicals Agency REACH](http://echa.europa.eu/regulations/reach)
(<http://echa.europa.eu/regulations/reach>)
— authorization procedure for substances of very high concern establishes procedures for alternatives assessment for continued use of such substances.
- [California Safer Consumer Products program](https://www.dtsc.ca.gov/SCP/index.cfm)
(<https://www.dtsc.ca.gov/SCP/index.cfm>)
— requires alternatives assessment report for manufacturers and others.

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