

Birnbaum leads delegation to Dioxin 2014

By Eddy Ball

NIEHS and National Toxicology Program (NTP) Director Linda Birnbaum, Ph.D., led a delegation of 7 scientists to [Dioxin 2014](http://www.dioxin2014.org/) (<http://www.dioxin2014.org/>)

Aug. 31-Sept. 5 in Madrid. The event marked the 34th anniversary of this major international symposia series highlighting research into scientific and public health aspects of exposure to halogenated persistent organic pollutants in the environment.

“Dioxin 2014 will continue in the tradition of previous symposia as the leading international conference for scientists, regulators, and exhibitors presenting recent advances in all areas of halogenated persistent organic pollutants,” wrote symposium chair Begona Jimenez, Ph.D., of the Spanish National Research Council. “We are very fortunate to have received more than 650 short papers, from 41 countries, that will be presented at this meeting.”

At the start of her week in Madrid, Birnbaum made a presentation on the toxicology of tetrabromobisphenol A (TBBPA) during the symposium’s daylong Flame Retardant Science and Policy side meeting Aug. 31, where Green Science Policy Institute representatives unveiled [The Madrid Statement on Poly- and Perfluoroalkyl Substances](http://greensciencepolicy.org/madrid-statement/) (<http://greensciencepolicy.org/madrid-statement/>)

. That evening, along with five other senior scientific experts, she was a panelist at the popular Science With Tapas forum for students — one of several events reflecting the Dioxin 2014 theme, “Our Students, Our Future.”

In the course of the symposium, which formally opened Sept. 1, Birnbaum participated in three themed sessions and two poster sessions, presenting NIEHS and NTP research on chemicals used in fire retardants and plastics, as well as research from her own National Cancer Institute-funded laboratory (see [text box](#)). On the final full day of the meeting, she presented a thought-provoking re-examination of dose response in risk assessment, along with a novel integrated approach to hazard identification.

In keeping with its student-centered motto, Dioxin 2014 wrapped up Sept. 5 with the presentation of Otto Hutzinger Student Awards and a look ahead to Dioxin 2015, scheduled for Aug. 23-28 in Sao Paulo.

Next generation risk assessment

As the meeting neared its finale, several discussions highlighted theoretical, policy, and regulatory themes. In the Sept. 4 session on Integrating Toxicology and Epidemiology for Risk Assessment, Birnbaum looked forward to an emerging paradigm of integrated toxicology that recognizes complex dose response, as she examined the implications of “Environmental Exposures, Endocrine-disrupting Chemicals, and New Approaches to the Science of Risk Assessment.”

In her presentation, Birnbaum outlined evidence supporting the concept of nonmonotonic dose response of organisms to hormones and hormone-like chemical exposures, where the shape of the dose response curve reverses as the level of contamination goes up. To help support her proposal for an integrated risk assessment, she cited several authorities, including the Endocrine Society, U.S. Environmental Protection Agency, and European Commission.

This pattern in dose response means that low levels of exposure to endocrine-disrupting compounds can have disproportionate effects on human health. In contrast, for chemicals that exhibit the more traditional monotonic dose response, toxicity steadily increases with dose. According to Birnbaum, the traditional risk assessment framework, based on monotonic dose response, needs to be expanded to accommodate newer research findings about the specific mechanisms at work in the endocrine system.

“The question is no longer whether nonmonotonic dose responses are real,” she maintained. “Instead, the question is which dose-response shapes should be expected for specific environmental chemicals and under what specific circumstances.”

Birnbaum concluded her talk with an additional proposal for advancing hazard identification, with the adoption of systematic review to address the breadth of relevant data from human, animal, and mechanistic studies. She presented a four-step approach to hazard evaluation, based on a model now used by NTP, that quantifies confidence levels for the body of evidence of adverse health effects resulting from environmental exposures.



Birnbaum, right, was joined by her husband David, who travelled to Madrid at his own expense, at the Dioxin 2014 banquet Sept. 4. (Photo courtesy of Linda Birnbaum)

Showing research from NIEHS and NTP

Birnbaum and members of her lab at NIEHS — the Toxicology and Toxicokinetics Group — presented “Biological Effects of Tetrabromobisphenol A (TBBA) in Female Wistar Han Rats,” during the Is TBPA Safe? session Sept. 1, which she also co-chaired. She was joined by NTP toxicologist Michael Sanders, Ph.D.; postdoctoral fellow Gabriel Knudsen, Ph.D.; and laboratory technician Sherry Coulter.

The TBPA session also included a presentation by a team of NTP scientists, reporting on findings that “Uterine Tumors are Induced in Rats After Exposure to Tetrabromobisphenol A, a Commonly Used Flame Retardant.” The team included toxicologist June Dunnick, Sanders, and pathologist Susan Elmore, D.V.M.

During a Sept. 2 session on Industrial, Occupational and Accidental Exposure, Birnbaum joined an international group of colleagues to discuss “Biomonitoring of Selected Halogenated Organics and Metals in Vietnamese Women Electronic Waste Incinerator Workers.”

During a poster session on Food and Feed: Evaluation of Dietary Intake later that day, she and her co-authors communicated their findings on “Exposure to Bisphenol A (BPA) From Fresh, Frozen, and Canned Food from Dallas, Texas, U.S.A.” Birnbaum’s lab group also participated in the Toxicology and Mechanisms: Dioxins and Dioxin-like Chemicals poster session, with a study tracing “Biological Fate of the Emerging Brominated Flame Retardants, 2-Ethylhexyl Tetrabromobenzoate (TBB) and Bis(2-ethylhexyl) Tetrabromophthalate (TBPH) in Female Sprague Dawley Rats.”

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