# NIEHS spurs investigation into the health effects of e-waste recycling

*By Paula Whitacre*


Each new computer innovation or cell-phone upgrade brings progress, but also a problem — a discarded item that becomes part of an exponentially growing electronic waste (e-waste) stream bound for informal, unregulated recycling facilities throughout the world.

To address the issue on a global level, the World Health Organization (WHO) convened a working meeting on e-Waste and child health June 11-12 in Geneva, sponsored by NIEHS and the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety. Attendees included experts and other key stakeholders at WHO collaborating centers, other United Nations organizations, and research institutions.

"This work group is so important," said NIEHS and NTP Director Linda Birnbaum, Ph.D., in opening remarks to the participants via a prerecorded video. "It brings visibility to a tremendous worldwide problem. Having this group review the current situation of e-waste exposure in child health, identify research gaps and successful interventions and strategies will determine our next steps."

**Linked Video**

**Watch Birnbaum's recorded message to meeting participants (4:11).**

William Suk, Ph.D., director of the NIEHS Center for Risk and Integrated Sciences (CRIS), and staff, as well as NIEHS-supported researchers, were deeply involved in planning and participating in the sessions. In addition, NIEHS provided funds, so researchers from countries where unregulated e-waste recycling is most prevalent — including China, India, Vietnam, and countries in West Africa — could attend.

### Mining e-waste for valuable metals

E-waste is recycled in order to extract gold, copper, platinum, and other commercially attractive materials. While on one level, e-waste recycling sounds commendable economically and environmentally, small-scale sites often engage in hazardous burning, acid baths, and other processes to extract the materials of interest, dumping the rest as waste. Adults and children work and often live amidst the recycling facilities, in direct and indirect contact with a mix of chemicals, including lead and other metals, polybrominated diphenyl ethers (PBDEs), and polychlorinated biphenyls (PCBs).

According to a 2011 Environmental Health Perspectives article *(http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3080922/)* co-authored by NIEHS grantees Aimin Chen, M.D., Ph.D., and Shuk-mei Ho, Ph.D., pregnant women and children in these communities are at risk of possible changes in fetal and child neurodevelopment. Other health issues, including respiratory irritation and skin burning, have also been observed, leading WHO to develop an initiative *(http://www.who.int/ceh/risks/ewaste/en/index.html)* on e-waste and children's health.

"Children, from newborns through adolescents, represent 26 percent of the world's population, and their potential exposure from what comprises e-waste is a significant health and disease problem as children, and as adults," observed Suk, who served as co-chair of the first day's session with Maria Neira, M.D., director of the Department of Public Health and Environment at

**Research on e-waste and vulnerable populations**

An informal survey, conducted in preparation for the WHO working meeting on e-waste and child health, showed that research on the health effects of e-waste recycling is scant.

NIH is currently supporting two studies that focus on children and women.

NIEHS and NTP Director Linda Birnbaum, Ph.D., is part of a team conducting an exposure assessment of home-based, female recycling workers in rural Vietnam, funded by the National Cancer Institute. In 2012, using a control group of women not involved in recycling for comparison, they measured PBDE congeners, other persistent organic pollutants, metals, and other chemicals. Initial biological screening shows dioxins, some PBDEs, and certain metals may be elevated in the recycling workers, with additional analyses under way.

Aimin Chen, M.D., Ph.D., of the University of Cincinnati College of Medicine, is focusing on pregnant women and their infants in Guiyu, China, an area with a large, concentrated amount of e-waste recycling being conducted in thousands of small family-run workshops. Working with Xia Huo, M.D., Ph.D., of Shantuo University Medical College in China, he is looking at exposure levels in the women and in a control group, their fetuses, and infants.

The next NIEHS Global Environmental Health (GEH) newsletter will focus on Chen's research in Guiyu. For more information on the newsletter and other global environmental health activities supported by NIEHS, visit the GEH website.

WHO. “This meeting was very important for bringing scientists from diverse disciplines.”

**Moving the conversation forward**

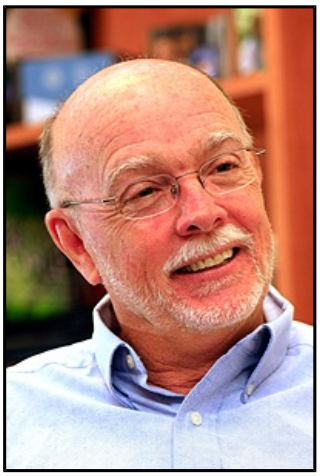
To review current knowledge and consider next steps, the approximately 30 participants divided into three groups to discuss exposures, health effects, and interventions. Later, the groups rejoined in a plenary, to recommend areas for research and consider future policies and interventions. According to NIEHS Health Specialist Michelle Heacock, Ph.D., of CRIS, the group agreed that more research is needed to better understand the impact of multiple exposures in an individual.

Next steps include creation of a network of researchers willing to share data and disseminate findings, dedicated sessions on children and e-waste at two major upcoming WHO meetings, and development of a training module for health care practitioners. Publications coming out of the workshop will include a comprehensive review of e-waste and child health, a collaborative paper by the entire workgroup, and an NIEHS-authored white paper describing the discussions and recommendations as they relate to the mission of the Institute.

*Citation:* Chen A, Dietrich KN, Huo X, Ho SM. *(http://www.ncbi.nlm.nih.gov/pubmed/21081302)* 2011. Developmental neurotoxicants in e-waste: an emerging health concern. Environ Health Perspect 119(4):431-438.

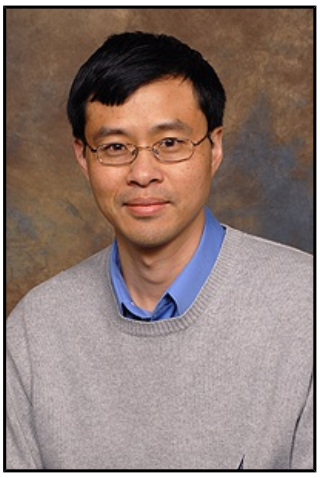
(Paula Whitacre is a contract writer with the NIEHS office in Bethesda, Md.)

*Birnbaum cited new restrictions on travel by federal employees when she limited the size of the NIEHS delegation. (Photo courtesy of Steve McCaw)*



*Suk also directs the NIEHS Superfund Research Program, which has a long history of global health collaboration. (Photo courtesy of Steve McCaw)*

*Heacock said she was moved by the individual narratives of people who lived and worked in the developing countries where e-waste is an increasing problem. (Photo courtesy of Steve McCaw)*



*The Environmental Factor featured Chen’s e-waste research in a January 2011 story . (Photo courtesy of Steve McCaw)*

*Piles of e-waste await processing by employees in a small workshop in Guiyu, China. (Photo courtesy of Xia Huo)*

*Participants at the WHO working meeting on e-waste and child health identified research gaps and called for greater awareness of the health impacts of e-waste recycling. (Photo courtesy of Xia Huo)*

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The Environmental Factor is produced monthly by the National Institute of Environmental Health Sciences (NIEHS) *(http://www.niehs.nih.gov/)*, Office of Communications and Public Liaison.  We welcome your comments and suggestions. *(bruskec@niehs.nih.gov)*