

GEMS meeting focuses on genomics data and risk assessment

By Ernie Hood

The Genetics and Environmental Mutagenesis Society (GEMS) held its 32nd annual fall meeting Oct. 22 at the North Carolina Biotechnology Center in Research Triangle Park, North Carolina.

The theme for this year's meeting, which was supported in part by grants from NIEHS, was "Innovations and Integration of Genomics Data to Advance Risk Assessment."

Channa Keshava, Ph.D., [GEMS](http://www.gems-nc.org/)

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president-elect and senior scientist at the U.S. Environmental Protection Agency (EPA), organized the conference and moderated the presentations. "Science is advancing so fast and we have so much more to explore to understand the whole genome. It's really exciting to hear about the latest advances and the latest technology," he said. "With EPA, NIEHS, and all of the industries here in the Triangle, this is a great place to organize a local meeting to share this knowledge and the latest information in the field."

Keshava emphasized that, in addition to serving as a resource for local professionals, the society designs the meeting to provide an opportunity for young, aspiring scientists — graduate students, undergraduates, and high school students — to present to, and interact with, more seasoned scientists.

Speak locally, think globally

The four talks from senior scientists, featured at the meeting, illustrated the world-class research being conducted in genomics and risk assessment in the Triangle area.

Scott Auerbach, Ph.D., a molecular toxicologist in the National Toxicology Program (NTP) Molecular Toxicology and Informatics Group, led off the day's proceedings with a presentation, "The Application of Toxicogenomic Compendium Data to Forecasting Chemical Effects in Biological Systems." He described the data, resources, and methods being used in omics-based hazard characterization, and provided several examples of applications of the approach.



EPA postdoctoral fellow Natalia VanDuyn, Ph.D., center, won a \$500 cash prize and a \$500 Environmental Mutagenesis and Genomics Society travel award for her oral presentation, "Building Gene Expression Signatures Indicative of Transcription Factor Activation to Predict AOP Modulation." Keshava, left, and current GEMS president William Kaufmann, Ph.D., right, presented the award to VanDuyn. (Photo courtesy of Steve McCaw)



As is customary at the fall GEMS meeting, outgoing president Kaufmann symbolically passed the baton to president-elect Keshava. (Photo courtesy of Steve McCaw)

NIEHS grantee Rebecca Fry, Ph.D., associate professor of environmental sciences and engineering at the University of North Carolina at Chapel Hill, presented results of research suggesting that blocking epigenetic modifications, due to environmental contaminant exposures, may be useful in preventing diseases and birth defects. Her lab concentrates on mechanisms of disease associated with toxic metal exposure early in life, particularly arsenic exposure.

Fred Wright, Ph.D., director of the Bioinformatics Research Center at North Carolina State University (NCSU), spoke about [NexGen risk assessment](http://www.epa.gov/risk/nexgen/) (<http://www.epa.gov/risk/nexgen/>) and the prospects for assessing population genetic variation using rapid automated *in vitro* testing, or assays. Using cytotoxicity studies involving hundreds of cell lines and approximately 180 chemicals, these assays are providing important data for chemical prioritization and establishing benchmarks for average risk due to exposure.

U.S. Environmental Protection Agency (EPA) systems biologist Stephen Edwards, Ph.D., discussed how the adverse outcome pathway concept provides an ideal framework for bridging the gap between high-throughput screening toxicity testing, such as [Tox21](http://ntp.niehs.nih.gov/results/hts/index.html) (<http://ntp.niehs.nih.gov/results/hts/index.html>) and the adverse outcomes that are typically used in regulatory decision-making.

Attendees also enjoyed four short talks by graduate students and postdoctoral fellows, and 11 poster presentations. Authors of the best short talk and three best posters received awards.

(Ernie Hood is a contract writer with the NIEHS Office of Communications and Public Liaison.)



"There are three basic pieces of information that we need to give to the EPA or the FDA [U.S. Food and Drug Administration], in order to do risk assessment," Auerbach told the GEMS attendees. "Number one, what the hazard is. Number two, mode of action, and number three is the dose at which the hazard is nonoccurring." He described how NTP is using genomics and other high-dimensional data to acquire the information. (Photo courtesy of Steve McCaw)



Fry emphasized the need to characterize pathways, in order to get a better sense of how environmental contaminants are associated with disease etiology. "Also, we have to be thinking about the regulators of the pathway in terms of disease prevention," she told the GEMS audience. (Photo courtesy of Steve McCaw)



Kin Chan, Ph.D., an Intramural Research Training Award fellow in the NIEHS Mechanisms of Genome Dynamics Group, spoke about molecular genetic analysis of mutation clusters formed in single-strand DNA. (Photo courtesy of Steve McCaw)



The GEMS judges thought so much of the posters that they awarded \$100 cash prizes to three scientists, instead of the intended two — EPA trainees Noffisat Oki, Ph.D., and Jenna Currier, Ph.D., and Kimberly Herman of NCSU. Pictured above, from left, are Keshava, Oki, Kaufmann, and Currier. (Photo courtesy of Steve McCaw)



There was ample time during the meeting to review and discuss the posters that were presented in the lobby at the North Carolina Biotechnology Center. (Photo courtesy of Steve McCaw)



Wright, left, offered feedback to poster presenter Arjun Keshava, a student at Wake Early College of Health and Sciences in Raleigh, North Carolina. (Photo courtesy of Steve McCaw)



As is always the case at GEMS meetings, NIEHS and NTP were well represented. From left, Gloria Jahnke, D.V.M., of the NTP Office of the Report on Carcinogens, and Kristine Witt, of the NTP Biomolecular Screening Branch, found one of the posters especially interesting. (Photo courtesy of Steve McCaw)

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