

The 2016 George H. and Fay C. Sparks
Forum on Ethics and Engineering

KENNETH OYE

SOMATIC CELL GENE THERAPY,
GERMLINE GENE THERAPY, AND
GENE DRIVES

ETHICAL, LEGAL, AND ECONOMIC CHALLENGES



Thursday, March 3, 11 am
Petit Institute Room 1128
Reception Follows

The Forum is made possible by the Sparks Memorial Fund and organized by the Georgia Tech Center for Ethics and Technology, with additional support from the:

- Ivan Allen College
- School of Public Policy
- BBUGS
- Petit Institute

Efficient gene sequencing, enhanced analytic methods to identify targets, and accurate fast gene editing tools to make changes have contributed to a revolution in applied genomics. In the past year:

- Over 300 somatic cell gene therapies to cure thalassemia, cystic fibrosis, hemophilia, and other illnesses are now under development.
- The Zhang lab at Broad and the Joung lab at MGH developed what they have termed "high fidelity" CRISPR Cas9.
- The Huang lab at Sun Yat-sen University attempted human germline modification, editing the β -thalassaemia gene in 28 embryos.
- Labs at Harvard, UCSD and UCSB demonstrated the ability to edit the genes of sexually reproducing plants and animals in the wild.

While all of these applications are enabled by CRISPR Cas9, the ethical, legal and economic challenges posed vary widely, with serious economic challenges for somatic gene therapy, with thorny ethical issues for developers and consumers of human germline modification, and with fundamental problems defining the appropriate scope and extent of consultation for first generation gene drives.

Kenneth Oye is the Director of the MIT Program on Emerging Technologies, with a joint appointment in Political Science and Engineering Systems. Professor Oye serves as Director of Policy and Practices in NSF SynBERC, a faculty research lead at the MIT Center for Biomedical Innovation, a faculty affiliate of the MIT Synthetic Biology Center and a member of the Advisory Board of the International Risk Governance Council. His recent articles include pieces on gene drives in Science, on yeast based opiate production in Nature, on drug licensing in Clinical Pharmacology and Therapeutics, and on the environmental effects of synthetic biology in the Journal of Environmental Studies and Sciences. He holds a B.A. in Economics and Political Science with Highest Honors from Swarthmore College and a Ph.D. in Political Science with the Chase Dissertation Prize from Harvard University.



The George H. and Fay C. Sparks Forum is supported by the Sparks Endowment of the GT Foundation. The Forum provides an opportunity to examine the ethical dimensions of engineering practice, including the application of ethical principles to professional decision-making.