

The Boston Stem Cell Science Education Symposium

Tuesday November 11th, 2008

7:30 am - 5:30 pm

Whitehead Institute & Broad Institute
7 & 9 Cambridge Center
Kendall Square
Cambridge, MA

Sponsored by:



The Boston Stem Cell Science Education Symposium

Agenda

All events will be held in the Whitehead Auditorium except where noted.

- 7:30** - 8:00 a.m. Breakfast & Registration (*at Broad Institute*)
- 8:00** - 8:15 a.m. Welcome & Opening Remarks
- 8:15** - 8:45 a.m. Teacher Panel, Session I
- 8:45** - 11:00 a.m. Science Block
- An Overview of Stem Cells and Cellular Reprogramming**
Rick Young, *Professor, Whitehead Institute & MIT*
- Title TBD**
Debra Auguste, *Assistant Professor, Harvard University*
- Break
- Blood-Forming Stem Cells: Expanding Them in Culture for Clinical Use**
Harvey Lodish, *Professor, Whitehead Institute & MIT*
- 11:00** - 11:30 a.m. Teacher Panel, Session II
- 11:30** - 11:45 a.m. Break
- 11:45** - 12:15 p.m. Lab Tours of Broad & Whitehead, Session I
- 12:15** - 1:15 p.m. Lunch (*at Broad Institute*)
- 1:15** - 1:45 p.m. Lab Tours of Broad & Whitehead, Session II
- 1:45** - 2:45 p.m. Roundtable Discussion: Myths & Misconceptions of Stem Cell Science
- 2:45** - 3:15 p.m. Break
- 3:15** - 4:15 p.m. Teacher Presentation
- 4:15** - 4:45 p.m. Lesson Planning Session
- 4:45** - 5:00 p.m. Closing Remarks
- 5:00** - 5:30 p.m. Closing Reception (*at Broad Institute*)

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Speakers & Panelists

Welcome and Opening Remarks

Paul Hanle, *Biotechnology Institute*

Michael Werner, *The Werner Group*

Teacher Panel Participants

Kay Merseth (Moderator), *Harvard Graduate School of Education*

Shahira Badran, *Bunker Hill Community College*

David Barry, *Boston Latin Academy*

Betty Carvellas, *Teacher Advisory Council of the National Academies*

Willy Lensch, *Children's Hospital Boston*

Beth Shepley, *Avon Middle-High School*

Science Block Speakers

Rick Young, *Whitehead Institute*

Debra Auguste, *Harvard University*

Harvey Lodish, *Whitehead Institute*

Roundtable Discussion Participants

Michael Werner (Moderator), *The Werner Group*

Chad Cowan, *Harvard Stem Cell Institute*

John McNeish, *Pfizer*

Mildred Solomon, *Harvard Medical School and EDC*

Karen Weintraub, *The Boston Globe*

Teacher Presentation Participants

Linda McIntosh, *Swampscott High School*

Julie Snyder, *Hudson High School*

Closing Remarks

Paul Hanle, *Biotechnology Institute*

Michael Werner, *The Werner Group*

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Speaker & Panelist Bios

Teacher Panel Participants

Kay Merseth is a Senior Lecturer on Education and the Director of the Teacher Education Program at the Harvard Graduate School of Education. Katherine Merseth's work concentrates on charter schools, teacher education, mathematics education and the case-method of instruction. She has been a member of the education faculty since 1985. At the university level, she was the founding executive director of the Harvard Children's Initiative, a university-wide program focusing on the needs of children. At HGSE, Merseth was the founding director of the School Leadership Program and the Teacher Education Program. She was the principal investigator of the Mathematics Case Development Project funded by the National Science Foundation (NSF), and co-principal investigator of the Teacher Education Addressing Mathematics and Science in Boston and Cambridge Project, also funded by the NSF. She recently concluded a three year grant leading a Massachusetts Math and Science Partnership working with middle school mathematics teachers using an innovative approach of classroom based cases. Currently she serves as PI on the NSF funded Noyce Scholars in math and science program and just recently launched a two year study to examine best practices in high performing charter schools that focus on students at risk. She has served as a math curriculum developer, teacher, and administrator in K-12 schools. In addition to her Harvard doctorate, Merseth holds a bachelor's in mathematics from Cornell University, a master's in mathematics from Boston College, and a master of arts in teaching

from Harvard in secondary mathematics education.

Shahira Badran is an Associate Professor and the Biotechnology Program Coordinator at Bunker Hill Community College. Shahira developed and launched a new biotechnology program as part of a two year Associate Degree in Biological Science at BHCC with two concentrations: a biotechnology option that prepares students for employment in entry-level research/lab assistant positions available in private industries, research institutions, and hospitals and a biology transfer option that prepares students for transfer to four-year universities with junior status as biology majors. Prior to that, Shahira taught Advanced Placement Biology at Somerville High School. Shahira received her BS degree in Biology from Ain Shams University, Egypt, and her Master's degree in molecular biology/genetics from the University of Basel, Switzerland. She also holds a Master's of Education.

David Barry is the chair of the Science Department at Boston Latin Academy, where he also teaches biology. David graduated with his bachelors of science and masters of science degrees from MIT in 1973, and he spent the next 22 years managing local food coops. He then taught biology and chemistry at Chelsea High School for ten years, after which he moved to Boston Latin Academy. Now that his children are grown, he specializes at home in Jamaica Plain in gardening, sports, and home repair.

Teacher Panel Participants

Betty Carvellas retired in 2007 after teaching science for 39 years at the middle and high school levels. Her professional service includes work at the local, state and national levels. She served as co-chair of the education committee and was a member of the executive board of the Council of Scientific Society Presidents and is a past president of the National Association of Biology Teachers. Included among her awards are the Outstanding Science Teacher-Vermont (1981), Presidential Award for Excellence in Mathematics and Science Teaching (1984), and a Christa McAuliffe fellowship. She was a charter member and chair of the Vermont Standards Board for Professional Educators, and served on the board of Directors for the Biological Science Curriculum Study. Throughout her career, she traveled extensively on her own (science trips to the Arctic, Costa Rica, and the Canary Islands) and with students (Andros Island, Bahamas, Costa Rica, and Belize). Carvellas was a charter member of the Teacher Advisory Council of the National Academies and currently serves as the Teacher Leader for the Council.

M. William Lensch is an Instructor in Pediatrics at the Harvard Medical School, Affiliate Faculty of the Harvard Stem Cell Institute, and Senior Scientist in the laboratory of George Q. Daley, M.D., Ph.D. at the Howard Hughes Medical Institute/Children's Hospital Boston. His current research revolves around the use of human pluripotent stem cells as platforms for understanding the blood-forming system. Lensch has co-authored over 30 research articles, reviews/book chapters, and policy recommendations in addition to delivering more than 100 invited lectures, interviews, or panel discussions; the majority on the history, utility, and appli-

cation of stem cells. He is the recipient of a Governor's Distinguished Service Award (Connecticut), a past Fellow of the Aspen Institute's Inaugural Health Forum, and the recipient of both a Harvard Stem Cell Institute Seed Grant and Service Award. He is a past gubernatorial appointee to the Stem Cell Research Advisory Committee for the State of Connecticut, the Ad Hoc Committee to Establish a Public Umbilical Cord Blood Bank for Connecticut, and is a founding member of the Interstate Alliance for Stem Cell Research. He currently sits on the Public Education Committee of the International Society for Stem Cell Research. Willy has lectured internationally in scientific, medical, government, religious, and general public forums on the science, conduct, and policy of stem cell research across an incredibly diverse set of forums ranging from the New York Times to The Salt Lake City Tribune, Forbes Magazine to Soap Opera Digest and Sports Illustrated, the Chambers of the United States Senate to local town-hall meetings, and the Pontifical University Regina Apostolorum (Rome) to the Temple Ohabei Shalom (Massachusetts).

Beth Shepley is a biology instructor at Avon Middle-High School. Beth completed her undergraduate work in Biology at Kalamazoo College in Michigan and received her Masters of Science in Teaching from Boston College. Before becoming a teacher, she worked as a research assistant in the department of Molecular Immunology at the Dana-Farber Cancer Institute. As a recipient of a French Government Teaching Assistantship, she taught English to French middle-school students. She has, however, been teaching high school Biology in the Avon Public Schools in Avon, MA for the past 20 years.

Science Block Speakers

Richard Young is a member of the Whitehead Institute and a Professor of Biology at MIT. Young is a pioneer in gene transcription, the process by which cells read and interpret the genetic instructions embedded in DNA. The Young lab also uses DNA arrays and other state-of-the-art genomic tools to map the genome-wide circuitry of living cells and to study infectious diseases. Achievements include novel AIDS vaccine candidates and new approaches to drug-resistant tuberculosis. Young received his PhD from Yale University in 1975, and became a Whitehead Member in 1984. *Scientific American* recognized him as one of the top 50 leaders in science, technology and business in 2006 and his awards include a Burroughs Wellcome Scholarship, the Chiron Corporation Biotechnology Research Award, and Yale's Wilbur Cross Medal. Young has served as an advisor to *Science* magazine, the National Institutes of Health and the World Health Organization.

Debra Auguste is an Assistant Professor at Harvard University, prior to which, she was a Post-Doctoral Associate at the Massachusetts Institute of Technology. She received her S.B. in Chemical Engineering from Massachusetts Institute of Technology in 1999 and her Ph.D. in Chemical Engineering from Princeton University in 2005. Her interests include drug delivery, polymer synthesis, gene delivery, targeted delivery, stimuli sensitive polymers, tissue engineering, differentiation of stem cells (including human embryonic stem cells), and

preparation of matrices for stem cell development. She is the principal investigator on grants from the Office of Naval Research and the Juvenile Diabetes Research Foundation. Her research interests are in demonstrating unique release kinetics and biodistribution of molecules and stem cell differentiation via chemical and matrix cues. She is a recipient of various awards including; the ONR Young Investigator Award-2007, JDRF Innovation Award-2007, 1930 Wallace Memorial Honorific Fellowship-2003, NJ Biomaterials Research Award-2004, and several fellowships. She has consulted for start-up companies and large corporations.

Harvey Lodish is a member of the Whitehead Institute and a Professor of Biology and Bioengineering at MIT. Lodish is a leader in the field of membrane biology, has isolated and cloned numerous proteins that reside on the surface of cells and play a role in cell growth, glucose transport, and fatty acid transport. His results have important implications for the treatment of cancer, diabetes, heart disease, and obesity. A Founding Member of the Whitehead Institute, Lodish joined the MIT faculty in 1968 and has been a professor of biology since 1976 and professor of bioengineering since 1999. He earned his PhD at Rockefeller University in 1966. He was elected a fellow of the American Association for the Advancement of Science in 1986, a member of the National Academy of Sciences in 1987, and a fellow of the American Academy of Arts and Sciences in 1999.

Roundtable Discussion Participants

Michael J. Werner is President of The Werner Group, a Washington DC-based firm that provides legislative, regulatory, and bioethics consulting services for life sciences companies, health care providers, health plans, investors, and broad-based coalitions. Michael has over 23 years of health care law, policy development and legislative/regulatory advocacy experience in Washington and is a leader in the biotechnology industry. Prior to founding The Werner Group, Michael was Chief of Policy for the Biotechnology Industry Organization (BIO), representing over 1000 biotechnology companies in the US and other countries. In that role, he was responsible for virtually all major issues affecting biotech companies including: drug evaluation and review by FDA; CMS policies and reimbursement, Medicare, intellectual property, stem cell research and other sensitive bioethics issues. Michael is also a founding member of the Board of Directors of the Coalition for the Advancement of Medical Research (CAMR), an organization of almost 100 nationally-recognized patient organizations, universities, scientific societies, foundations, and individuals that advocates for the advancement of breakthrough research and technologies in stem cell research and related fields. Michael is a heavily sought-after speaker for meetings and conferences, and the author of over 40 published articles.

Chad Cowan is a Principal Faculty member of the Harvard Stem Cell Institute, an Assistant Professor at the Harvard Medical School, and an Assistant Investigator of the Stowers Medical Institute. After receiving his Ph.D. in Cellular Regulation from the University of Texas Southwestern Medical Center in 2002, Dr. Cowan joined Dr. Doug Melton's lab at Harvard for postdoctoral studies. In 2006, Dr. Cowan was appointed Principal Investigator, Center for

Regenerative Medicine, Massachusetts General Hospital and Assistant Investigator, Stowers Institute for Medical Research. In 2008, he was named Assistant Professor in Medicine, Harvard Medical School and Assistant Professor, Department of Stem Cell and Regenerative Biology, Harvard University. Dr. Cowan's lab is focused on understanding the contribution of environmental and genetic factors in the development of disease.

John McNeish is an Executive Director in Pfizer Global Research and Development in Cambridge, Massachusetts. In 2008, John transitioned to a new role as Executive Director of Regenerative Medicine that builds on his research interests in stem cell based regenerative medicine targets and therapeutics. For 16 years, he served as the Head of the Center of Excellence for Genetically Modified Models that included global responsibilities for research and application in genetically engineered animals and stem cell technologies. Prior to joining Pfizer in 1992, he did post-doctoral research focusing in stem cell technology with the Nobel laureate Dr. Oliver Smithies at the University of North Carolina. John received his PhD from the University of Cincinnati in Developmental Biology with Dr. S. Steven Potter where he applied transgenic mouse technologies to the identification of a chromosomal locus involved in several critical mammalian developmental pathways. He has co-authored more than 50 articles and book chapters on the use of genetically modified mice and stem cells. John serves on the editorial board for Regenerative Medicine and holds an adjunct faculty position at Connecticut College. In 2007, John was the recipient of the W.E. Upjohn award, Pfizer's highest award in recognition for innovation, for his research in novel applications of stem cells in drug discovery.

Roundtable Discussion Participants

Mildred Solomon is Vice President of Education Development Center, Inc. (EDC), and Associate Clinical Professor of Social Medicine, Medical Ethics, and Anaesthesia at Harvard Medical School. At EDC, Dr. Solomon directs its Center for Applied Ethics. At Harvard, she directs the medical school's Fellowship in Medical Ethics. An expert in ethics education and behavioral change, Dr. Solomon has more than 30 years' experience researching, designing, and evaluating a wide variety of education and quality improvement programs for health professionals, health care organizations, and the public. She has served as principal investigator on numerous grants from federal agencies, including the Agency for Health Research and Quality, the National Cancer Institute, the Centers for Disease Control and Prevention, and the Health Resources and Services Administration. She frequently consults to government agencies, foundations and universities. Currently, for the NIH, she is leading an effort to educate U.S. high school students about the ethical issues raised by advances in the life sciences, and advising the Open Society Institute about ways to enhance patients' rights in the health care systems of the former countries of the Soviet Union and southern and eastern Africa. As

an elected Fellow of The Hastings Center, Dr. Solomon's bioethics scholarship has focused most on the ethics of adult and pediatric end-of-life care and on the ethics of organ donation. She also sits on the U.S. Secretary of Health and Human Services' Advisory Committee on Organ Transplantation. In the mid-1990s, Dr. Solomon was honored by the Association of Academic Health Centers for a "distinguished career in educational research." She received her BA degree from Smith College, and her doctorate from Harvard University.

Karen Weintraub is the deputy health and science editor of The Boston Globe, managing three reporters and overseeing the weekly section. She has been at the Globe since 2001, serving in the early years as Boston city hall editor and obituary editor. Weintraub has worked in daily journalism since 1989. She has an undergraduate degree in urban studies and art history from the University of Pennsylvania and a masters degree in political science from the University of Houston. Weintraub is currently a Fellow in the Knight Science Journalism Fellowship program at MIT. As a Fellow, she plans to study evolution, new media technologies, epidemiology, and statistics.

Teacher Presentation Participants

Linda McIntosh is a biology teacher at Swampscott High School. Prior to teaching in Swampscott, she taught at the Dana Hall School in Wellesley.

Julie Snyder teaches AP Biology, honors biology and honors genetics at Hudson High School. She is currently starting her 24th year in teaching. She has had two HHMI research fellowships, one for her work in Dr. Eldridge's lab at Boston University with transcriptional factors in the turtle retina, and another for her work in Dr. Hunter's lab at Harvard

University working with temperature sensitive *C. elegans* mutants. Julie keeps herself current by participating in the Whitehead and Harvard's MCB Teacher Workshops. Julie recently received an HHMI fellowship for her work this past summer at MIT on developing labs for high schools using aquatic phages, planaria and fruit flies. She and her husband have two teenage daughters and 23 acres in Harvard, which keep them both busy. She enjoys cooking, running, walking and sustainable gardening.

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