

Ihor R. Lemischka (1953–2017)

“Ihor loved science and life, and to him they were two sides of the same coin. As a graduate student, he cloned genes and was fascinated by pseudo-genes. As a mature scientist, he plumbed the depths of hematopoietic stem cells and development, producing papers with massive data and insights. He left us much too soon.” —Phillip Sharp, Ph.D., Nobel Laureate, MIT

On December 7, 2017, the stem cell community suffered a major loss. Professor Ihor Lemischka, a true pioneer in the fields of hematopoiesis and pluripotent cell biology, passed away unexpectedly. Ihor will be remembered for his enormous enthusiasm for science, sharp intellect, rigorous research principles, and a remarkable visionary capacity that enabled him to predict where the field was moving and to dive boldly into those new areas. Four decades of his work have translated into seminal contributions to stem cell biology, which have won the respect and admiration of his peers. He was also a great mentor and a role model to the dozens of young researchers who were fortunate to train and grow under his guidance.

Ihor was born and died in Trenton, New Jersey, a city whose motto is, “Trenton makes; the world takes.” He was the only son of his parents, Andrew and Lydia Lemischka, who came to America from Ukraine after the Second World War. His father, a physician, treated patients on the bottom floor of their townhouse and inspired Ihor to become a doctor. While in college at Johns Hopkins University, he started doing research in the lab of the developmental biologist Eric Weinberg. Fascinated by the biological sciences, Ihor abandoned his plans to become a physician and instead pursued a Ph.D.—much to the initial chagrin of his parents.

He earned his Ph.D. at the Massachusetts Institute of Technology, where he worked with Phillip Sharp. There, he studied pseudo-genes and was among the first to indicate that they originate through

RNA-mediated insertions (Lemischka and Sharp, 1982).

For his postdoctoral studies, Ihor joined Richard Mulligan’s lab at the Whitehead Institute and conducted groundbreaking research using retroviral-vector-mediated gene transfer to express genes in hematopoietic stem cells (HSCs). He leveraged this technology to elegantly prove that a single HSC is both necessary and sufficient to regenerate the entire hematopoietic system. Further, his research revealed several classes of HSCs, including cells that can repopulate all hematopoietic lineages as well as cells that contribute predominantly to certain lineages or specific anatomical locations (Lemischka et al., 1986). These landmark discoveries helped pave the way for modern gene therapy.

Upon completion of his postdoctoral training, Ihor joined the faculty at Princeton University, where he spent 21 years chaperoning research that shaped the stem cell field. He was the first to successfully isolate HSCs from fetal liver, and he painstakingly dissected the fetal liver microenvironment by generating stromal cell lines that could maintain transplantable HSCs *in vitro*. He then constructed the first molecular profiles of HSCs and their niche. To make these data available to the stem cell community, he established the Stem Cell and Stromal Cell Databases. Gene products from these studies have been analyzed by numerous laboratories. Ihor also became interested in pluripotent stem cell biology. With short hairpin RNAs, he identified novel molecules that are necessary for maintaining the pluripotent state in embryonic stem cells (ESCs) (Ivanova et al., 2006). His was the first such study in the field; it made genetic manipulation of ESCs rapid and robust, accelerating the pace of molecular discoveries. Ihor was also among the very first investigators to undertake a systems biology approach to determine how stem cells work (Lu et al., 2009). He believed in the power of computational biology and envisioned a future where computers rather than pipettes solve fundamental questions in biology.

Ihor’s broad expertise in stem cell biology led to his appointment as the Di-



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rector of the Black Family Stem Cell Institute at the Mount Sinai School of Medicine in 2007. He further dissected the pluripotency networks and he used induced pluripotent stem cells to develop robust models of human genetic diseases, such as LEOPARD and Li-Fraumeni syndromes. He also continued his studies of hematopoiesis; together with his lifelong collaborator and wife Kateri Moore, he identified a combination of factors that were sufficient for reprogramming mouse fibroblasts into hematopoietic progenitors (Pereira et al., 2013).

As much as he was a consummate scientist, Ihor was also an incredible mentor. Patient and generous with his time and resources, he took great care in fostering the careers of the next generation of researchers. Rather than imposing his vision of science upon his students, he encouraged us to discover our own paths. He was always available to look at the data, answer questions, and discuss ideas. He urged us to think precisely and concisely. At lab meetings he could look as though he were not listening and then, straight to the point, he would ask the “killer” question that no one else had thought of. He mentored more than 20 postdoctoral fellows and 15 graduate students, all of whom have gone on to biomedical careers. As an institute director, he also recruited and mentored many young faculty members.

Ihor dedicated much of his time to the wider stem cell community. He was a

stalwart member of the ISSCR, rising to the occasion as a brilliant program chair for the 2008 annual meeting and serving on the board of directors for many years. He served on numerous NIH review panels and was an editorial board member for the journals *Cell Stem Cell* and *Developmental Cell*. In addition, he was an advisory board member for the New York Stem Cell Foundation, Harvard Stem Cell Institute, and UCLA Program in Regenerative Medicine. His contributions to science were recognized by many awards, including the NIH Merit Award and the International Society of Experimental Hematology Donald Metcalf Award.

Beyond his roles as a scientist and mentor, Ihor will be remembered for his vibrant personality, which touched and elevated those around him. He was an avid reader, and on every Friday, piling on top of his desk was a stack of new books to read over the weekend. He had nuanced and well-informed opinions on a myriad of topics, including artificial intelligence, philosophy, politics, and society. He collected art and music, was a fan of

European football, and a connoisseur of food and wine. He had a great sense of humor, too—who else could sport a Hawaiian shirt in the middle of dress-up New York?

As we mourn Ihor's passing, let us also celebrate his life and the rich legacy he left in many areas of stem cell biology, where his contributions and ideas are set to move the field forward for years to come.

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