



STEPHEN B. BAYLIN, M.D.

VIEW OF THE CANCER EPIGENOME – IMPLICATIONS
FOR CANCER PREVENTION, INTERCEPTION AND THERAPY

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4:00 P.M.

208 LIGHT HALL



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VANDERBILT-INGRAM CANCER CENTER

Upcoming Discovery Lecture:
Vanderbilt Prize in Biomedical Science Lecture

LYNNE E. MAQUAT, Ph.D.

*J. Lowell Orbison Endowed Chair and Professor of Biochemistry & Biophysics
in the School of Medicine and Dentistry; Director of the Center for RNA Biology;
Chair of Graduate Women in Science, University of Rochester*

*November 29, 2018
208 Light Hall / 4:00 P.M.*

VANDERBILT  UNIVERSITY
MEDICAL CENTER

VIEW OF THE CANCER EPIGENOME – IMPLICATIONS FOR CANCER PREVENTION, INTERCEPTION AND THERAPY

The past two decades have seen an explosion in the understanding of epigenetics, with widespread epigenetic abnormalities now recognized as both fundamental hallmarks of cancer and opportunities for new therapy development. The broad range of functions affected by such epigenetic alterations span abnormal activation of oncogenes, inappropriate silencing of tumor suppressor gene expression, and an emerging series of connections to tumor immune attraction capacity. Deciphering epigenetic changes in cancer therefore has profound implications, both for understanding the origin and progression of tumors and for improving cancer management.

Dr. Baylin's laboratory helped define and continues to dissect the origins and translational implications of a cancer-specific abnormality: DNA hypermethylation and other chromatin transcriptional repression components in the gene promoter CpG "islands" and in enhancers. These processes correlate with abnormal gene silencing and/or blunting of normal gene induction. Dr. Baylin has developed evidence for how this more or less complete modulation of gene transcription associates with two of the leading (and linked) risk factors for cancer development: chronic inflammation and aging. His research has focused on a key molecular step for this link: the mechanism by which cells with neoplastic potential adapt to and survive chronic DNA damage, especially when associated with reactive oxygen species (ROS) exposure. These dynamics represent one pathway to epigenetic abnormalities, and Dr. Baylin's work elucidates the importance of genes targeted by this process, including how failure to induce certain genes during cancer initiation and progression can contribute to abnormal retention of cell self-renewal, blunting of differentiation capacity, and tumor cell "stemness." The abnormal repression of these targeted genes may contribute to the age risk for major cancers, which is associated with the susceptibility of cells to oncogenic addiction. Through observations made in colon organoids ("mini intestines") Dr. Baylin's laboratory has developed a system in which to study aging relationships, and moreover to actually change the "age" of colon epithelial cells and their response to key mutations. The results of studies will have clear translational implications for biomarker derivation and cancer therapy.



STEPHEN B. BAYLIN, M.D.

VIRGINIA AND D.K. LUDWIG PROFESSOR OF
ONCOLOGY AND MEDICINE, CO-DIRECTOR OF THE
CANCER BIOLOGY DIVISION AND ASSOCIATE DIRECTOR
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COMPREHENSIVE CANCER CENTER AT JOHNS HOPKINS

For over 30 years, Dr. Baylin has studied the role of epigenetic gene silencing in the initiation and progression of human cancer. He and his colleagues fostered the concept that DNA hypermethylation of gene promoters, and associated transcriptional silencing, can serve as an alternative to mutations for producing loss of tumor suppressor gene function. They have described some of the classic genes involved, invented approaches to randomly screen the cancer genome for such genes and to demonstrate their functional role in cancer progression, helped begin unravel the molecular mechanisms responsible for the initiation and maintenance of the gene silencing, and utilized all of their findings for translational purposes. For the latter activity, Dr. Baylin currently co-leads, with Peter Jones, the Van Andel Research Institute-Stand Up to Cancer (VARI-SU2C) Epigenetics Dream Team. Baylin has authored or co-authored over 425 full-length publications on the above and other areas of cancer biology.

Dr. Baylin is currently Co-Director of the Cancer Biology Program of The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins and is the Virginia and D.K. Ludwig Chair in Cancer Research. Representative honors include: the 2003 Jack Shultz Memorial Lecture in Genetics, Fox Chase Cancer Center; the 2004 National Investigator of the Year Award from the NCI SPORE program; the 2005 Shubitz Cancer Research Prize from the University of Chicago; the 2008 The David Workman Memorial Award (with Peter A. Jones, Ph.D.) from the Samuel Waxman Foundation; the 2009 Kirk A. Landon-AACR Prize for Basic Cancer Research, (with Peter A. Jones); the 14th NCI Alfred G. Knudson Award in Cancer Genetics; and the 2011 American Cancer Society's Medal of Honor. He has been elected as a Fellow of the AACR Academy and to the National Academy of Sciences in 2017.