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Moross
Integrated Cancer Center (MICC)
המרכז הבינתחומי לחקר סרטן ע"ש מוחס

Dwek Institute for Cancer Therapy Research

Department of Biological Regulation and Dwek Institute for Cancer Therapy Research

ZOOM ON CANCER

ZOOM ONLY LECTURE

Prof. Andrew (Andy) Feinberg

Bloomberg Distinguished Professor
of Medicine, Biomedical Engineering,
and Mental Health,
Johns Hopkins University

Cancer is a disease of epigenetic stochasticity

27th January Thursday 2022

14:00 (ISRAEL TIME)

My colleagues and I proposed in 2006 that increased epigenetic stochasticity is a driving force of tumor progression from its origin to metastasis, and would allow rapid selection for tumor cell survival at the expense of the host. Since 2009, I have pursued an idea that natural selection will favor the emergence of genetic loci for epigenetic variance, not just mean, for loci in which the environment changes unpredictably but often enough, and these epigenetically variable loci are critical to normal embryonic development and injury response. The idea is also relevant to cancer, in that increased epigenetic stochasticity would allow rapid selection for tumor cell survival at the expense of the host. This model puts epigenetic instability at the heart of tumor progression and is the primary target of cancer mutations. Several recent observations from the laboratory point to a genome-scale disruption of the epigenome that involves large blocks of variable DNA methylation and chromatin affecting shores and islands, and increasing gene expression variability. We also find large-scale reprogramming of chromatin and DNA modifications during the natural evolution of distant metastasis, with dependence on the oxidative branch of the pentose phosphate pathway. We have also developed Gibbs-Boltzmann-style epigenetic landscapes incorporating stochasticity, and we have shown its relationship to entropy in information theory. Recent data shows that this approach identifies epigenetic and genetic drivers of cancer, using ALL as a model. Thus, viewing cancer as a disease of epigenetic stochasticity could accelerate cancer diagnostics and treatments.

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Host

Prof. Moshe Oren
The Andre Lwoff Chair in Molecular Biology
Director, the Moross Integrated Cancer Center
Department of Molecular Cell Biology

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