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An organism's susceptibility to a virus depends on the virus's ability to hijack key cellular processes in order to evade the host immune system and replicate. Tarakhovsky's lab has found that pathogenic viruses can hijack critical epigenetic regulators of human cell function. The lab studies how viral mimics of the host's epigenetic regulators contribute to virus immune evasion and replication, and to long-lasting virus impact on cell homeostasis.

The virus-host interaction entails constant mutual adaption and the emergence of novel features of the interacting entities. During this interaction, the fitness gains of the virus are often offset by fitness gains of the host, and vice versa. The balance of relative virus-host fitness can be shifted toward the virus when viruses hijack essential host proteins.

Several years ago, the Tarakhovsky lab discovered that viruses can usurp host cell function by hijacking critical epigenetic regulators of the innate antiviral response. The lab found that viruses mimic histones and other epigenetic regulators to alter host gene expression in a fashion that benefits viral infection. These findings led the group to propose that viral proteins that mimic the host epigenome may serve as epigenetic surrogates: They take control of chromatin-based antiviral response pathways and allow viruses to utilize the cellular processes required for viral replication.

The concept of epigenome mimics led the Tarakhovsky lab to investigate small molecular-weight compounds that imitate virus histone mimics and regulate antiviral gene expression by interfering with epigenome function.

The lab continues to research and define the role of the epigenome in virus immune evasion, virus evolution, and virus species-specificity.

EDUCATION

M.D., 1978
Kiev Medical Institute

Ph.D., 1982
Institute for Oncology, Academy of Science, Kiev

POSTDOC

University of Cologne, 1990–1992

POSITIONS

Research Associate, 1992–1994
Group Leader, 1994–1996
Professor, 1996–2000
Institute for Genetics, University of Cologne

Associate Professor, 2000–2003
Professor, 2003–
The Rockefeller University

SELECTED PUBLICATIONS

von Schimmelmann, M. et al. Polycomb repressive complex 2 (PRC2) silences genes responsible for neurodegeneration. *Nat. Neurosci.* 19, 1321–1330 (2016).

Schaefer, U. et al. The "histone mimicry" by pathogens. *Cold Spring Harb. Symp. Quant. Biol.* 78, 81–90 (2014).

Marazzi, I. et al. Suppression of the antiviral response by an influenza histone mimic. *Nature* 483, 428–433 (2012).

Nicodeme, E. et al. Suppression of inflammation by a synthetic histone mimic. *Nature* 468, 1119–1123 (2010).

Su, I-H. et al. Polycomb group protein Ezh2 controls actin polymerization and cell signaling. *Cell* 121, 425–436 (2005).