

“The genomic and epigenomic evolution of cancer”

by Olivier Elemento, PhD

Abstract:

I will start by describing work performed in my lab on using next generation sequencing to uncover fundamental principles of tumor evolution, with a focus on B cell malignancies. I will describe additional new insights we have gained on the epigenomic evolution of tumors and the contribution of the epigenome to tumor progression. In the second part of the talk, I will present systems biology approaches for increasing actionability of cancer genomes. I will describe ongoing work on the development and experimental validation of virtual cancer cells designed to enable in silico testing of hundreds of thousands of drug combinations and select patient-specific optimal anticancer therapies. I will also present a new computational drug repositioning framework for identifying molecules that target frequently mutated and disease-driving transcriptional regulators. I will specifically describe how we identified and experimentally validated candidate inhibitors of ERG, an oncogenic transcription factor mutated and overexpressed in over 50% of prostate cancer patients.

Bio:

Dr Elemento initially trained as a mechanical engineer at INSA Toulouse in France. He then obtained a master in Intelligent Systems from University of Paris, and a PhD in Computational Biology from the CNRS. He was then a postdoctoral fellow and lecturer at Princeton University, working on unravelling and characterizing transcriptional and posttranscriptional networks using computational genomic approaches. In 2009, he joined Weill Cornell Medical College as Assistant Professor. At Weill Cornell, Dr Elemento directs the Laboratory of Cancer Systems Biology. The Elemento lab at Weill Cornell uses ultrafast genome and DNA sequencing, high-performance computing, mathematical modeling, Big Data and machine learning techniques to develop entirely new ways to help prevent, diagnose, treat and ultimately cure cancer. In addition, Dr Elemento oversees the development of analytic pipelines for clinical sequencing at Weill Cornell's Institute for Precision Medicine. Dr Elemento is the recipient of several awards including the NSF CAREER award, the Hirschl trust Career Scientist Award and the Starr Cancer Consortium award and organizes several educational activities such as the NIH-funded Summer Course on Statistical Methods for Functional Genomics at the Cold Spring Harbor Laboratories.