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## Using synthetic biology to develop new cancer treatments

Jonathan Lewis  
ZIOPHARM Oncology, USA

The completion of the human genome project and high throughput sequencing coupled with the advancements in cancer biology and mechanistic understanding of the disease process has revolutionized our understanding of gene informed biology. In addition, computer-based modeling and design principles, as well as advances in genome synthesis technology has created a new era for synthetic biology and disruptive gene therapy strategies, that will likely revolutionize the entire drug discovery process. These strategies are cost and time-effective. They can reintroduce missing or depressed genes or gene products, or factors to rewire cancer cells to self-destruct or attract mechanisms that can destroy them. Since 2011, ZIOPHARM Oncology in partnership with Intrexon Corporation (Blacksburg, VA) is utilizing a regulatable synthetic biology platform with modular transgene design and assembly providing unique strategies for gene therapy in oncology. One of our key advantages is the ability to use synthetic DNA to express mRNA and proteins and control many cell types. With our enormous computational power, library of DNA and large data and learning, we are able to design, test and build DNA-based therapeutics with an engineering philosophy and guiding principles. We are developing systems that, like technology has done with computing, will lead to faster, better, cheaper translation and development.

### Biography

Jonathan Lewis, MD, PhD is the Chief Executive Officer and a Director of ZIOPHARM Oncology. He served as Professor of Surgery and Medicine at Memorial Sloan-Kettering Cancer Center. He has been actively involved in leading translational and clinical research in cancer. He has helped develop several drugs in cancer. He has received numerous honors and awards in medicine and science, including the ASCO Young Investigator Award, the Kristen Carr Fellowship, the Yale University Ohse Award, the Royal College of Surgeons Trubshaw Medal, and the Sarcoma Foundation of America Hope and Vision Award. He serves as a Director on the Board of POPPA (the Police Organization Providing Peer Assistance) of the New York Police Department (NYPD). He serves on the Board of Trustees for the Hope Funds for Cancer Research and as Board Trustee for the Kate McGarrigle Foundation. He is on the Medical Advisory Board of the Sarcoma Foundation of America and on the Scientific Advisory Board of the Combat Wound Initiative Program of the Henry Jackson Foundation for the Advancement of Military Medicine.

[JLewis@ziopharm.com](mailto:JLewis@ziopharm.com)