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PANACEA broad-spectrum antiviral therapeutics

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Although there is great concern over emerging viruses and viruses on the category A-C priority pathogen lists, there are relatively few prophylactics or therapeutics for these viruses, and most which do exist are highly pathogen-specific or have undesirable side effects or other disadvantages. We have developed a radically new and very broad-spectrum antiviral therapeutic/prophylactic that has the potential to revolutionize the treatment of viral infections, including those due to emerging, category A-C, and common clinical pathogens. Our Double-stranded RNA (dsRNA) Activated Caspase Oligomerizer (DRACO) approach selectively induces apoptosis in cells containing any viral dsRNA, rapidly killing infected cells without harming uninfected cells. We have demonstrated that DRACOs are nontoxic in all 11 cell types tested thus far, and effective against at least 15 different viruses, including DNA and RNA viruses, enveloped and nonenveloped viruses, and viruses that use a variety of receptors. Among the viruses against which DRACOs have proven effective in vitro are dengue hemorrhagic fever virus, multiple arenaviruses, and multiple bunyaviruses. In mice, we have demonstrated that DRACOs rapidly penetrate into all organs tested, persist for over 24 hours after each dose, and are nontoxic. We have shown that DRACOs rescue mice from lethal H1N1 influenza and Amapari arenavirus challenges. We hope to optimize our DRACO designs and demonstrate them against additional viruses and in additional animal models. This work should greatly advance DRACOs toward ultimate utility as safe, broad-spectrum therapeutics/prophylactics for priority and emerging viral pathogens, filling a large gap in existing therapeutics.

Biography

Todd Rider received his Ph.D. from MIT in 1995, and since 1997 he has worked at MIT's Lincoln Laboratory, where he is Senior Staff Scientist in the Bioengineering Systems and Technologies Group. He also conducts animal trials at MIT's Division of Comparative Medicine. In addition to inventing DRACO and other PANACEA broad-spectrum therapeutics, he invented the CANARY biosensor, which uses genetically engineered bioluminescent B lymphocyte cell lines to identify a wide range of pathogens in a very rapid, sensitive, and specific manner.

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