AI for Antibiotic Discovery

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Computers can be programmed for superhuman pattern recognition of images and text; however, their application in biology and medicine is still in its infancy. In this talk, I will discuss our advances over the past half-decade, which are accelerating discoveries in the crucial and underinvested area of antibiotic discovery. We pioneered the development of an antibiotic designed by a computer with proven efficacy in preclinical animal models, demonstrating that machines and artificial intelligence (AI) could be used to design therapeutic peptide molecules. Our algorithms have accelerated antibiotic discovery, and for the first time, we successfully mined the human proteome for antibiotics. Recently, we expanded our proteome-mining efforts to explore the proteomes of extinct species. Using AI, my lab discovered the first therapeutic molecules in extinct organisms, launching the field of molecular de-extinction. Collectively, our efforts have dramatically reduced the time needed to discover preclinical antibiotic candidates, from years to hours. I believe we are on the cusp of a new era in science where advances enabled by AI will help control antibiotic resistance, infectious disease outbreaks, and pandemics.