UNC
GILLINGS SCHOOL OF
GLOBAL PUBLIC HEALTH

Gillings Innovation Labs

Staying One Step Ahead of Deadly Viruses

Combating childhood diarrhea by designing "super antigens"

Noroviruses are responsible for approximately 90% of all epidemic outbreaks of diarrhea around the world, causing millions of deaths per year, mostly in young children. Although the human immune system is highly efficient at seeking out and destroying viruses that cause disease, noroviruses are particularly good at rapidly changing their exterior surface to evade the human immune response. This Gillings Innovation Lab will use computational models to find common elements of the viruses' structures and then use these elements to design a vaccine effective against nearly 95% of the norovirus strains that infect humans.

Taking Aim at a Moving Target

Traditionally, the development of norovirus vaccines has been complicated by the viruses' ability to constantly adapt to the antigens developed to combat the diseases they cause. Complications, such as selecting the wrong viral strains to include in a reformulated vaccine, or reactivity across different strains have resulted in reducing the overall efficacy in vaccine development.

Observing the adaptability of the norovirus has inspired a new platform for creating vaccines to treat rapidly mutating viruses.

High Risk, Potentially Higher Reward

Current vaccine development paradigms have established traditional approaches to vaccine design that are based on live viruses and experimental evidence. This innovation lab will use computational models to identify portions of the viruses' surface that might not be changing as rapidly, and target these in vaccine development, creating "super antigens" to aid the body's immune system. While the risk that this approach might not yield highly effective immune responses is high, if the technology proves effective, it can be used to develop vaccines for a multitude of viruses.

Leadership

Eric Donaldson, PhD, research assistant professor, epidemiology, leads a team that includes computational biologists with the potential to tackle a problem that has been insolvable using conventional technology. These experts will work with virologists who possess the necessary expertise to fully test these new vaccine models.

GOAL
To computationally design a "super antigen"-based norovirus vaccine for the prevention of childhood diarrhea

PARTNERS
This team is a collaboration of computational biologists and molecular virologists

IMPACT!
Vaccines that Save Lives

Childhood diarrhea caused by norovirus infection is a major cause of morbidity and mortality both in the United States and in the developing world. Preventing viral infections will improve public health worldwide.