WELCOME to the

Learning Together About COVID-19

Session will start in less than 15 minutes
Vaccines for Covid-19

What are prospects and time line
Conflict of Interest Disclosure Statement

No Conflicts of Interest.

Am leading a consortium at Dartmouth and DHMC to define the immune responses to COVID-19 infection that has internal and NIH funding.
History of Vaccines

• Lots of positive history in vaccines but what have we learned from trying to develop some of the tougher vaccines- AIDS or RSV?
• Understanding structure is critical
• Vaccines can cause enhanced disease
• Need to understand all aspects of the immune response
• Vector based vaccines and those based on genetic material have emerged as most promising
• Have prepared investigators, funding, and capacity for “Operation Warp Speed”
Steps in Vaccine development

• Concept
• Animal studies
• Phase 1 and 2 studies primarily for safety and immunogenicity
• Phase 3 studies Effectiveness
• Regulatory and Manufacturing considerations
• Distribution
Structure of the SARS-CoV-2 spike protein. This will be a very targeted vaccine.
What are the leading candidates

• Important to realize that none of the approaches of the leading candidates has yet led to a successful licensed vaccine.
• RNA based vaccines being developed in London and Bethesda
• Chimp adenovirus (non-replicating) being developed at Oxford
• In both cases the product is given intramuscularly and we don’t quite understand how enough cells can be “pierced” by the end of a needle or infected by the non-replicating vector to stimulate a vigorous response
Animal studies reported to show protection for Oxford vaccine
Is mucosal antibody important?
Type 2 polioviruses recovered after vaccination with mOPV2

FIDEC Trial

Type 2 polio shedding on challenge is inhibited by prior receipt of homologous OPV, but not by a single IPV dose.
The challenges of a Challenge Study

• I think we will come to this it may be more ethical to expose a small group of young adult highly informed and monitored volunteers to a challenge with a low dose of virus than perform a large trial in which the potential for harm to greater numbers exist.

• The other practical argument is time to vaccine development particularly if the virus quiets down this summer when efficacy trials might begin.

• However, we cannot yet predict what causes severe illness and death and we have had enhanced disease with vaccines – RSV, measles.
Development of Global Vaccines and the Profit Motive

- Academic Institutions
- Governmental Institutions - VRC at NIH
- Small biotech companies
- Large multinational drug companies
- UN organizations
- GAVI, CEPI and the like
- Bill Gates
How long will it take?

- If everything worked right (it hardly ever does) we could have a vaccine by the end of the year. Many of the downstream issues are being addressed.

- A failed trial or worse enhancement of disease would put us on a much, much longer timeline and force us to go back and fully dissect immunopathogenesis of the disease.

- Other risks include further antigenic change as this virus optimizes its growth in human tissue or emergence of mucosal immunity as critical for vaccine efficacy- I do not think current candidates will induce this.
References