

# **COVID-10 vaccine safety**

Stanley Perlman, M.D., Ph.D.

Department of Microbiology and Immunology

Department of Pediatrics

University of Iowa

# Vaccine-associated enhanced respiratory disease.

- Other than feline virus-immunized mice, no evidence for ADE in CoV infection.
- Several studies demonstrate altered pattern of immune cell infiltration after vaccination and challenge with SARS-CoV
  - Vaccination-Venezuelan equine encephalitis replicon particles expressing N protein
  - Vaccination-Inactivated whole virus
  - Generally Th2 type infiltration, with eosinophilia (in mice).
  - Mice do not develop more severe disease, but in fact are generally protected to some extent.
  - Alum-adjuvanted contributes to this phenotype.

# Vaccine-associated enhanced respiratory disease

- Macaque study showed increased inflammatory infiltration into lungs after immunization with vaccinia virus construct expressing S protein or passive infusion of anti-S antibodies and infection with SARS-CoV.
- Study showed change from wound healing (M2) to pro-inflammatory (M1) macrophages, with increased expression of inflammatory mediators such as IL-8 and CCL2.
- Most notably, macaques remained asymptomatic.
- How this impacts human vaccination and disease is not certain.

# Moderna and Pfizer RNA vaccines

- Vast majority of adverse effects are local or systemic, but quickly resolve.
  - Local-soreness at site of injection
  - Systemic-flu-like symptoms, fever, chills
  - Arthralgia, myalgia.
- Other adverse events noted but occurred in single patients
  - One exception is Bell's palsy, which occurred in 4 patients in both trials; only 1 in placebo limb.

# **Adenovirus-based vaccines (AstroZeneca)**

## **Ad5, chimp adeno, Ad26.**

- Transverse myelitis and potentially other neurological effects may occur rarely.
- Reactogenicity observed but less than with mRNA vaccines.
  - Less common in older individuals.

# Will there be additional adverse events reported as COVID-19 vaccines are used?

- Several systems are in place for safety and adverse event monitoring.
  - Adverse event reporting is both solicited and unsolicited.
- Most adverse events occur within 6-8 weeks of vaccination.
- However some events can occur much later.
  - Examples: killed RSV and measles vaccines, in which vaccine related enhanced disease occurred as immune responses waned.
- Vaccine enhanced disease difficult to monitor unless eosinophilia or Th2 cytokines are present.
- Must be distinguished from vaccine failure.