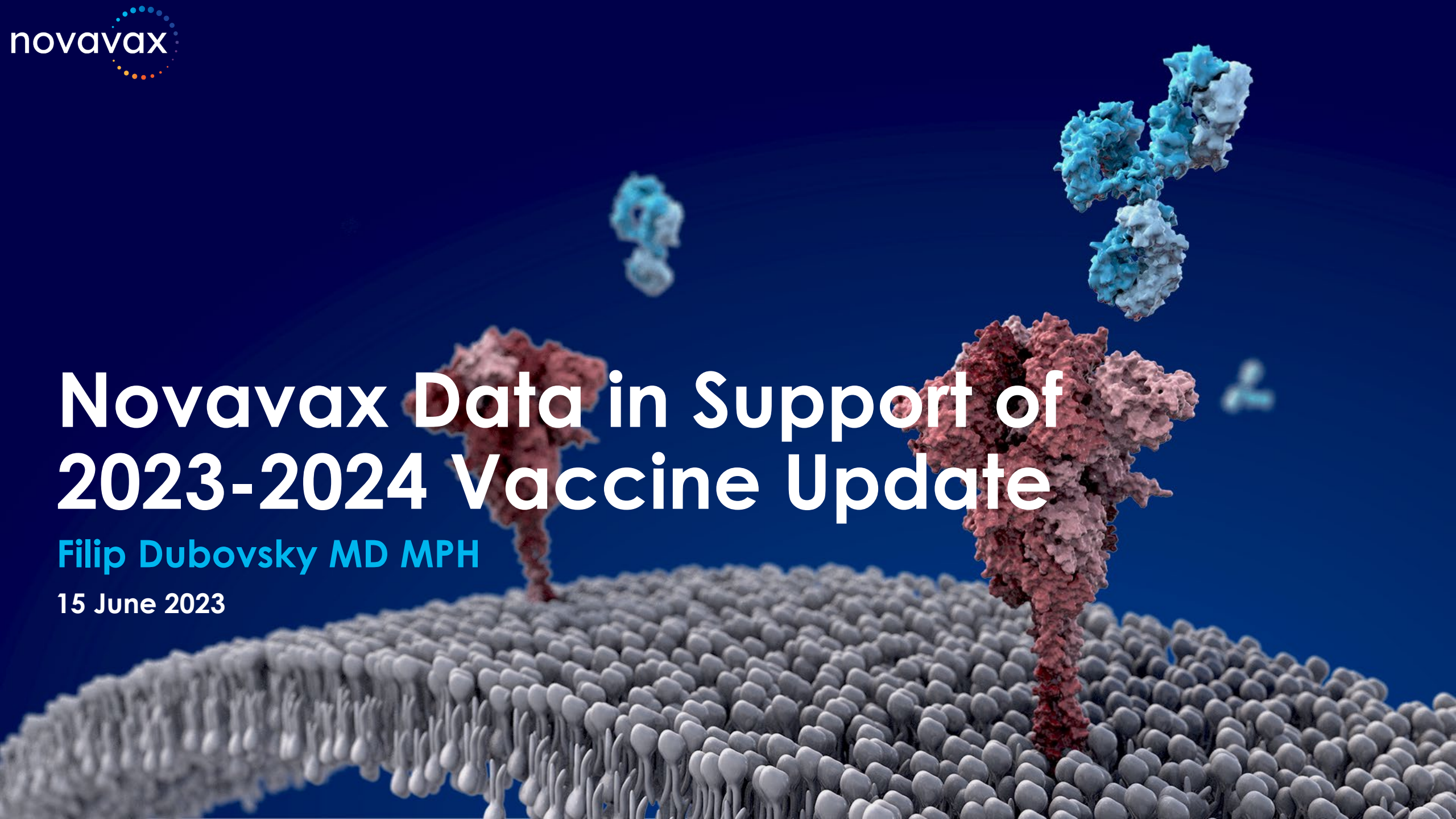
Individuals using assistive technology may not be able to fully access the information contained in this file. For assistance, please call 800-835-4709 or 240-402-8010, extension 1. CBER Consumer Affairs Branch or send an e-mail to: ocod@fda.hhs.gov and include 508 Accommodation and the title of the document in the subject line of your e-mail.



Novavax Data in Support of 2023-2024 Vaccine Update

Filip Dubovsky MD MPH

15 June 2023

Overview

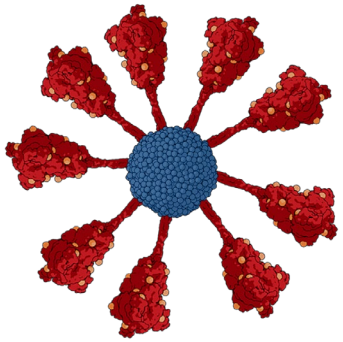
- Authorized vaccines induce low neutralizing immune responses against XBB sub-variants
- Primary vaccination in mice with XBB.1.5 & XBB.1.16 induces cross-neutralizing responses
  - Monovalent vaccine induces higher responses compared to bivalent vaccine
- Boosting primed animals with XBB.1.5 and XBB.1.16 induces cross-neutralizing responses
  - Non-human primate neutralization responses similar for XBB.1.5 and XBB.1.16
  - XBB.1.5 induces robust receptor binding inhibition to XBB.2.3 variant
- XBB.1.5 boosting induces comparable cellular responses for XBB.1.5 and XBB.1.16
- Novavax data supports use of a monovalent XBB.1.5 vaccine for the 2023-2024 season

Novavax Vaccine Platform

Recombinant protein particle plus Matrix-M™ adjuvant

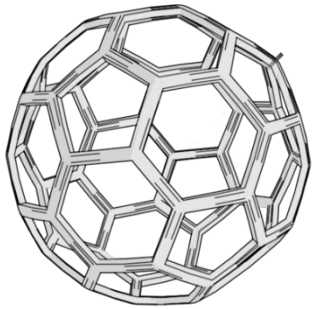
Recombinant protein particle

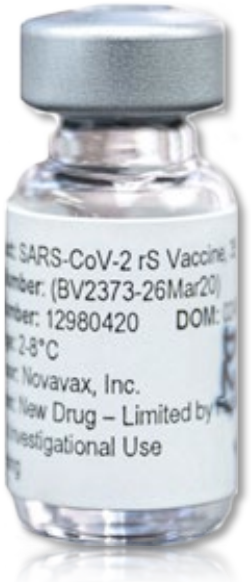
- Native 3-dimensional conformation
- Truncated *S. frugiperda* glycans
- Particulate structure facilitates antigen presentation and processing



Matrix-M adjuvant

- Induces robust neutralizing antibodies
- Induces polyfunctional CD4+ Th1

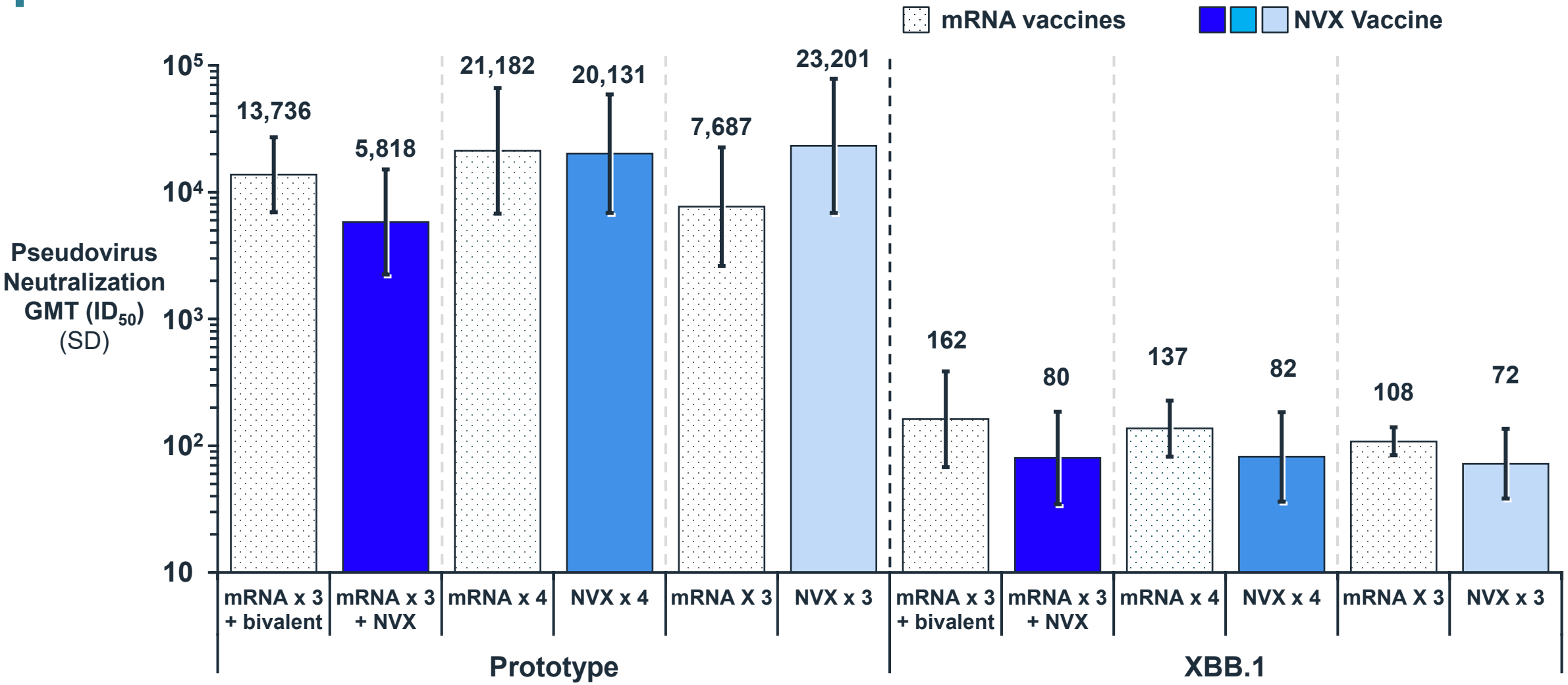




Novavax vaccine platform

Prototype and XBB.1 Pseudovirus Neutralization Responses Following Various Vaccination Regimens

GMT levels similar across all boosting regimens

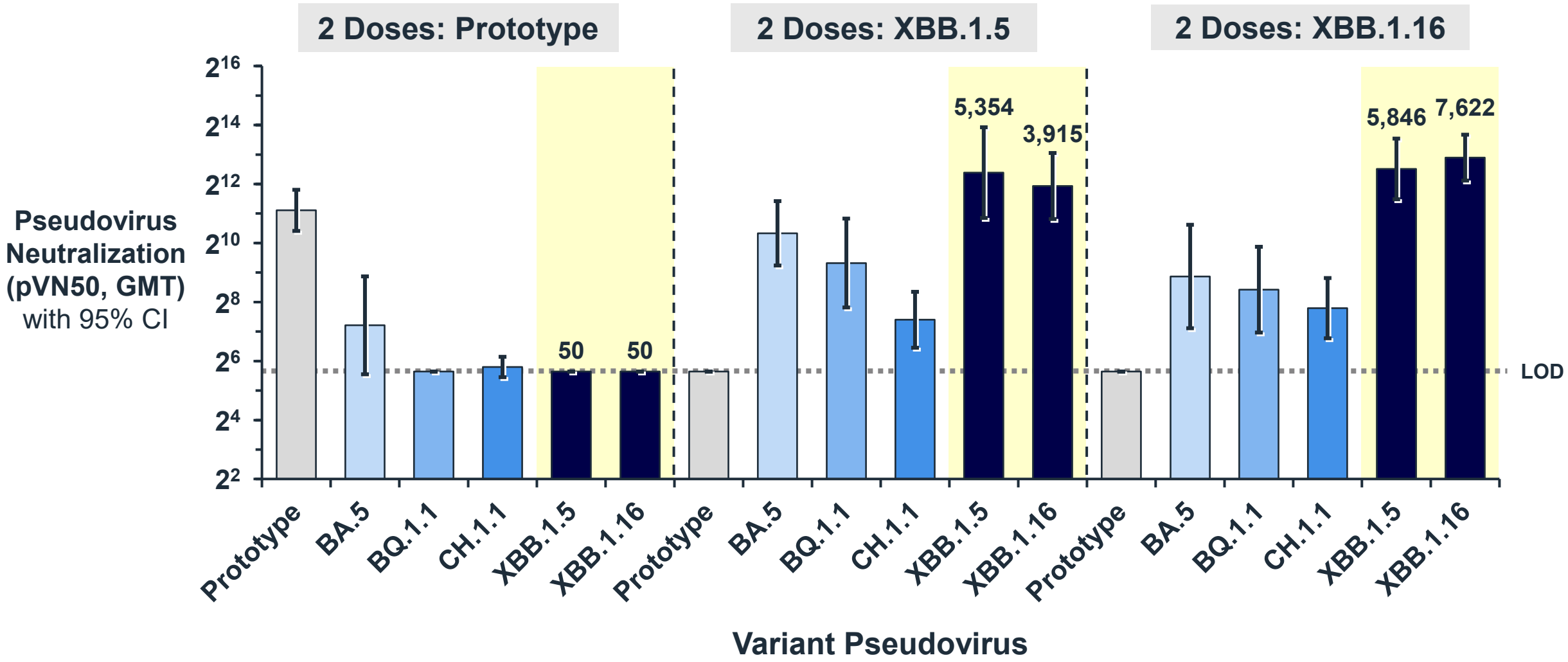


Data from Wang et al., 2022 and unpublished
Seronegative participants: defined as anti-N negative as per testing in Dr. Ho's lab

Primary Two Dose Series in Mice

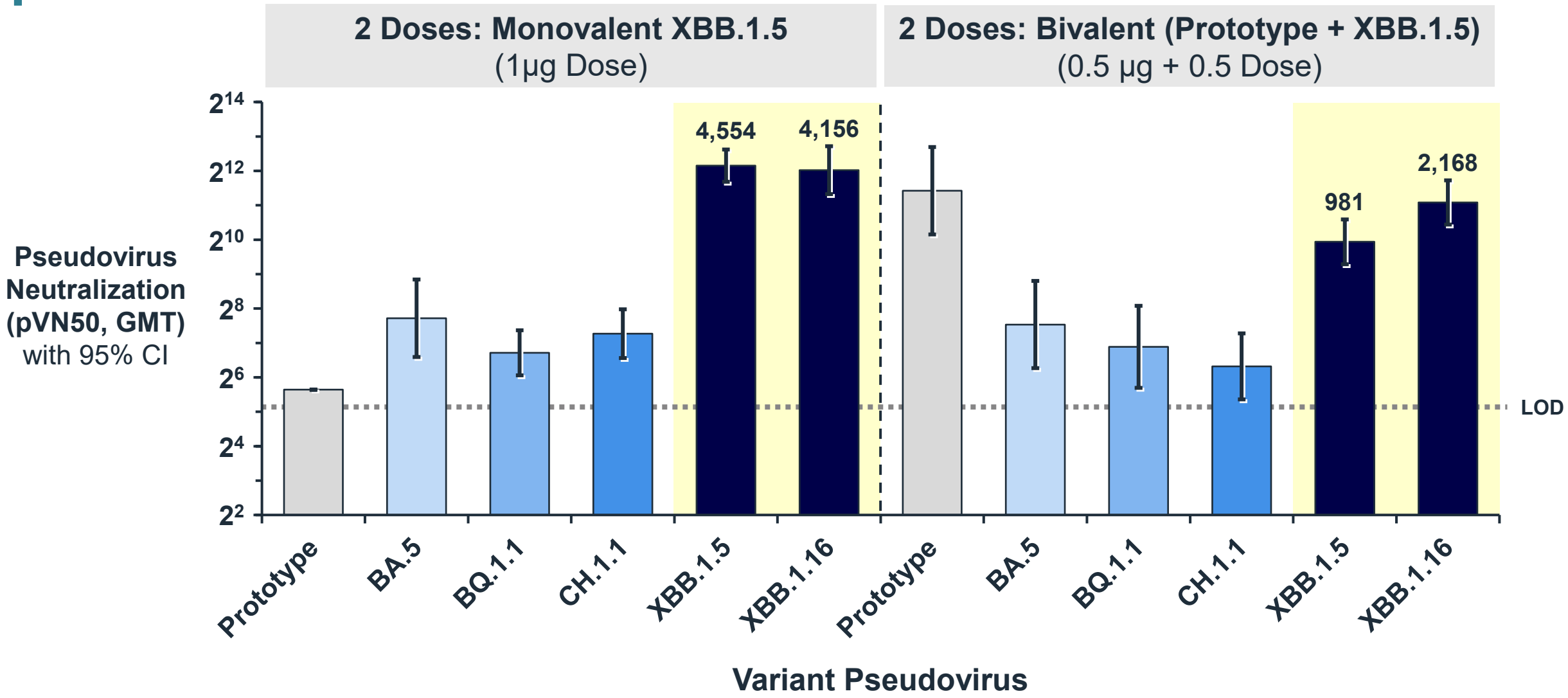
Neutralization in Mice: Primary Vaccination with Two Doses of Monovalent Prototype, XBB.1.5 or XBB.1.16

Primary vaccination with monovalent XBB.1.5 or XBB.1.16 induces comparable XBB.1.5 and XBB.1.16 neutralizing responses



Neutralization in Mice: Primary Vaccination with Two Doses of Monovalent XBB.1.5 or Bivalent (Prototype + XBB.1.5)

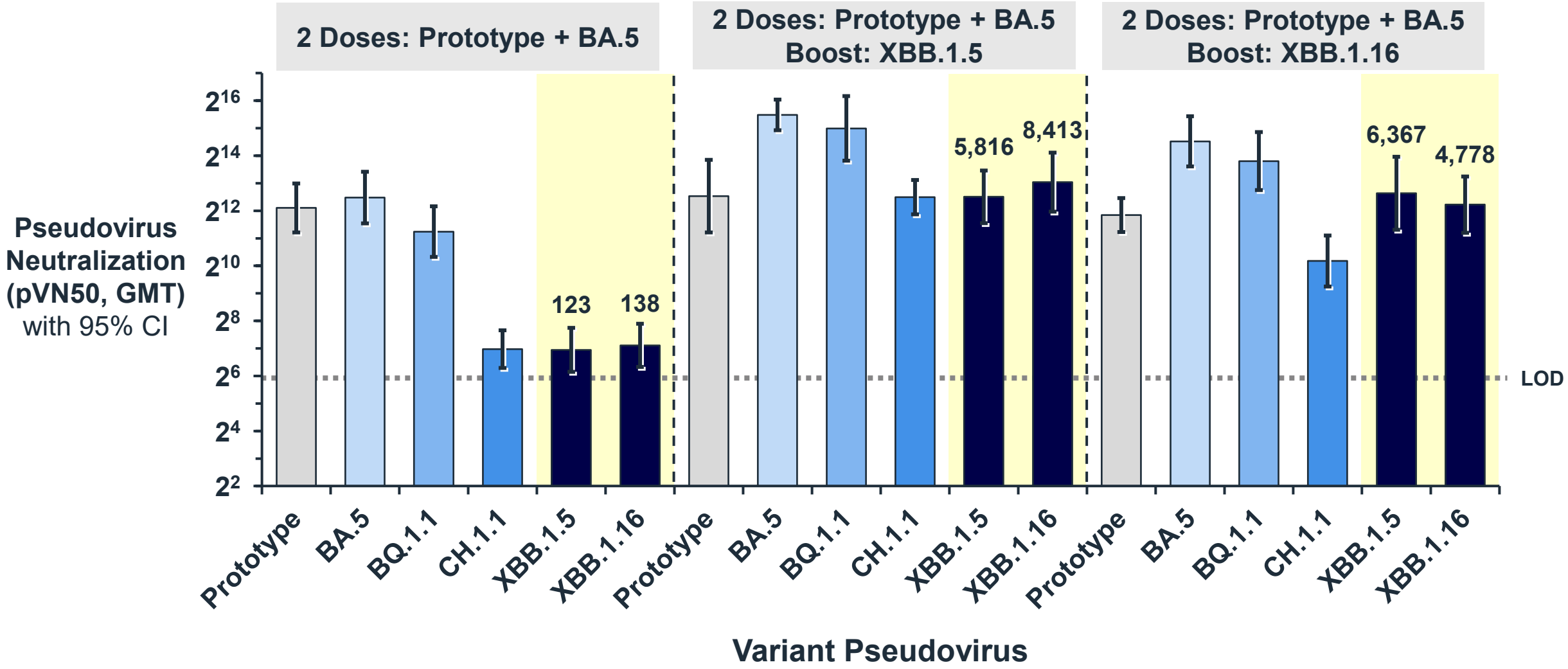
Monovalent vaccine induces higher responses



Booster Dose Data in Mice and Macaques

Neutralization in Mice: Primary Vaccination with Bivalent (Prototype + BA.5) and Boosted with XBB.1.5 or XBB.1.16

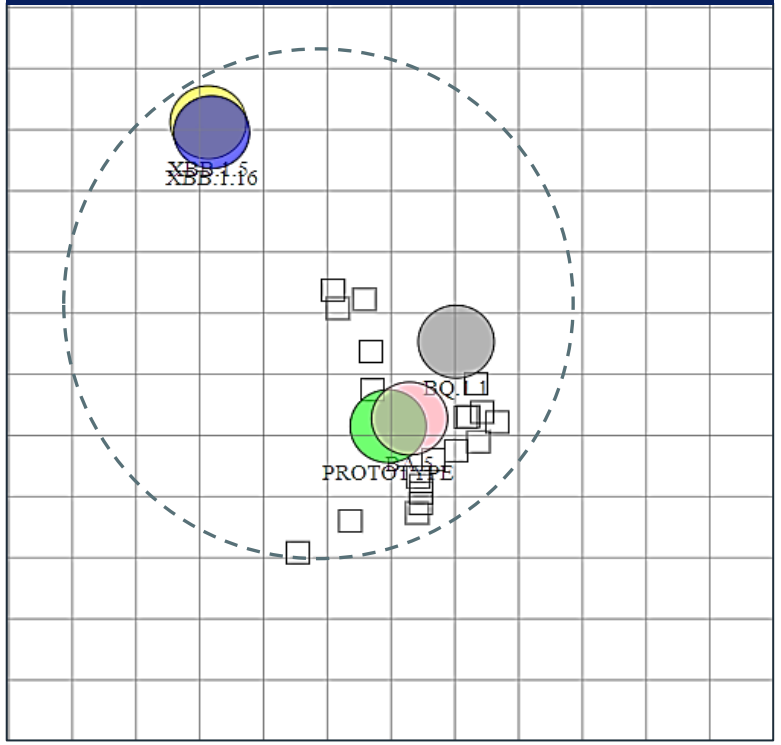
Responses are comparable for XBB.1.5 and XBB.1.16



Neutralization in Mice: Primed with 2 Doses of Bivalent (Prototype + BA.5) and Boosted with XBB.1.5 or XBB.1.16

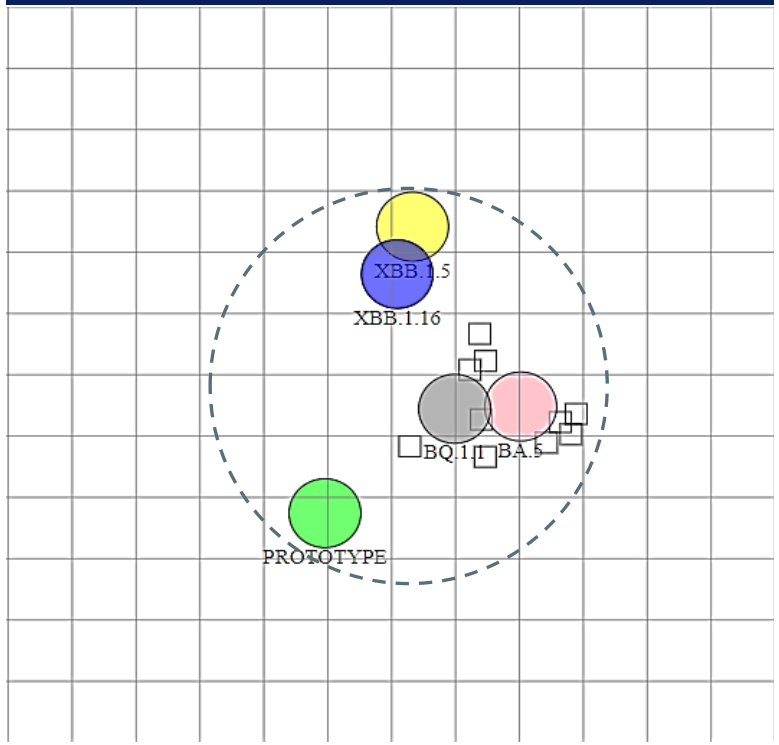
Boosted neutralizing responses are comparable for XBB.1.5 and XBB.1.16

Two Doses – Prototype + BA.5



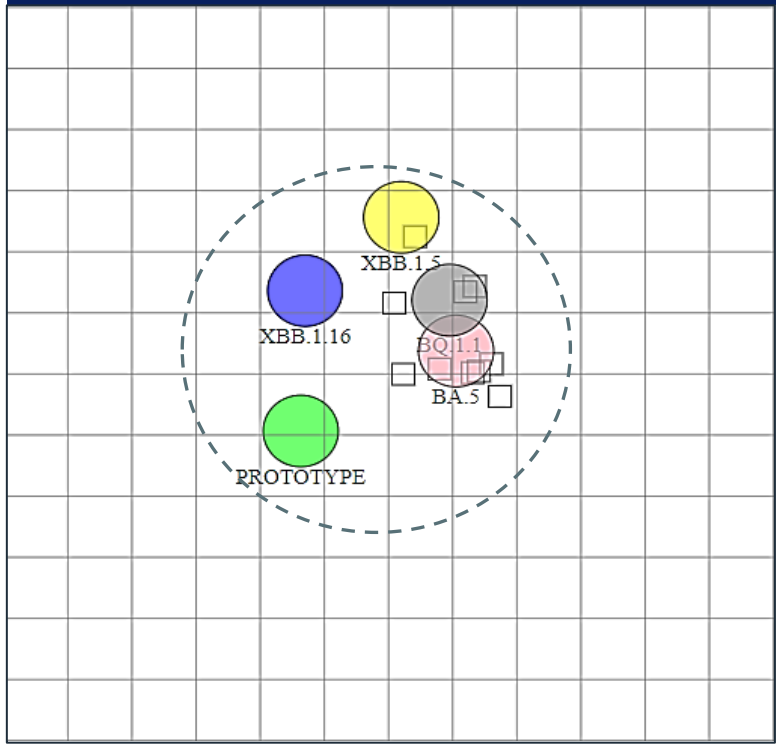
Fold Difference:
Prototype → XBB.1.5 = 35.7
Prototype → XBB.1.16 = 31.8

Boost – XBB.1.5



Fold Difference:
XBB.1.5 → XBB.1.16 = 0.691

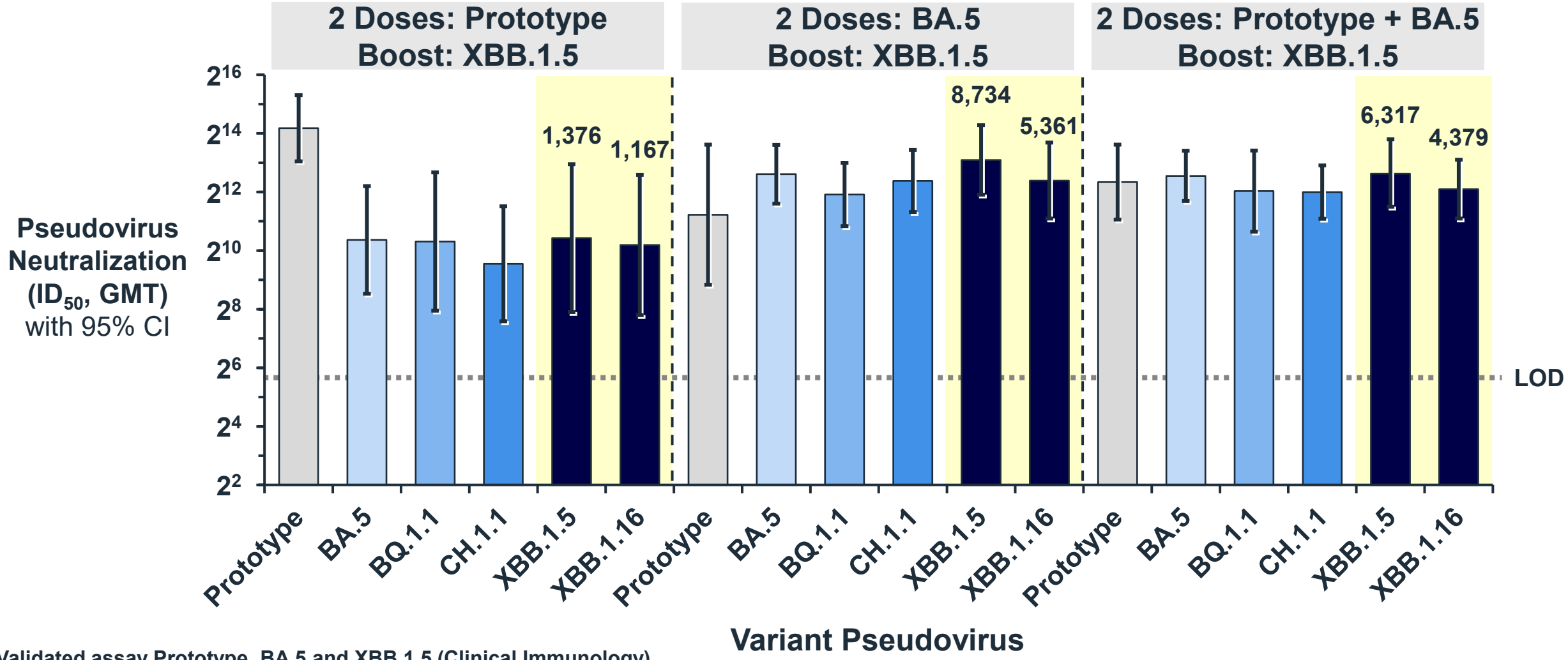
Boost – XBB.1.16



Fold Difference:
XBB.1.16 → XBB.1.5 = 0.750

Neutralization in Rhesus Macaques: Various Priming Regimens Followed by Boosting with XBB.1.5

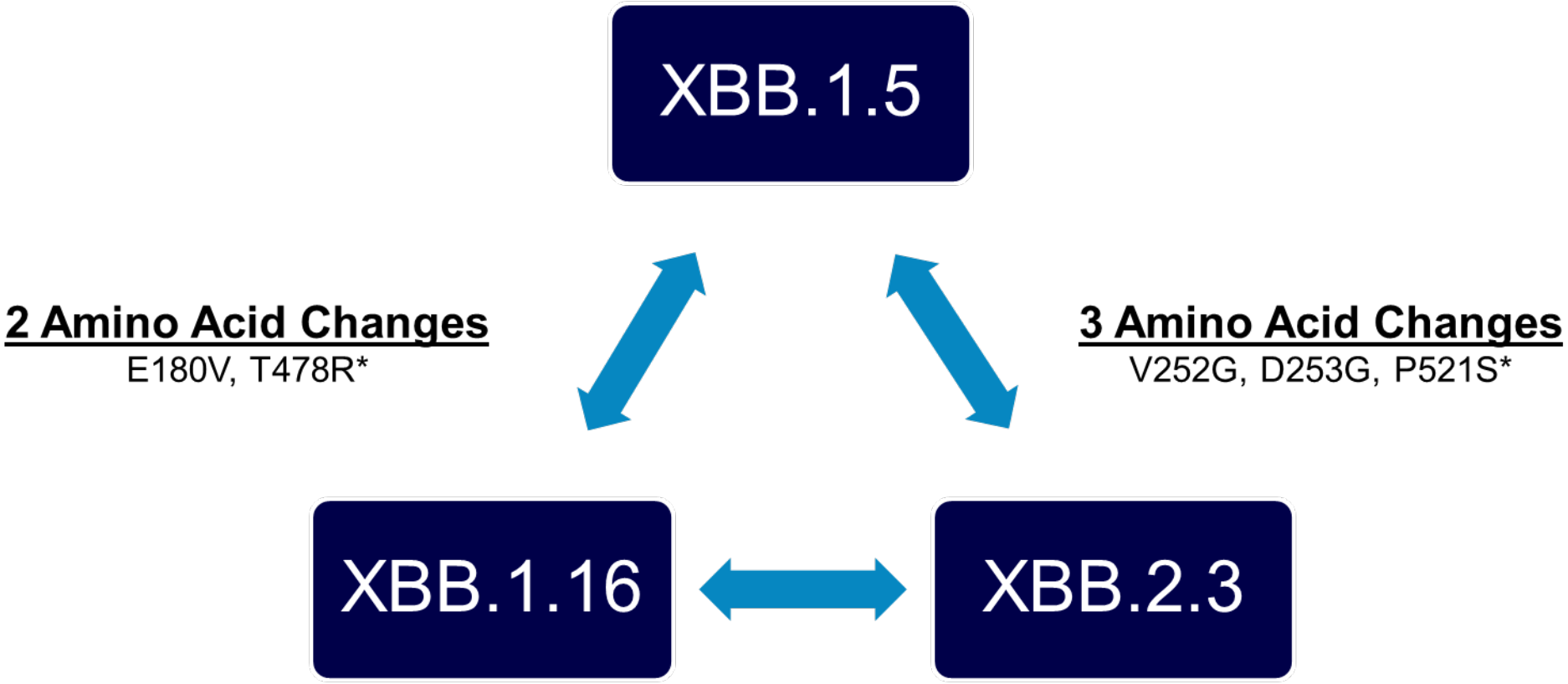
Boosting with XBB.1.5 induces comparable neutralizing responses to XBB.1.5 and XBB.1.16
BA.5 priming results in higher titers for XBB variants compared to protype priming



Validated assay Prototype, BA.5 and XBB.1.5 (Clinical Immunology)

Spike Protein Mutations: XBB.1.5, XBB.1.16 & XBB.2.3

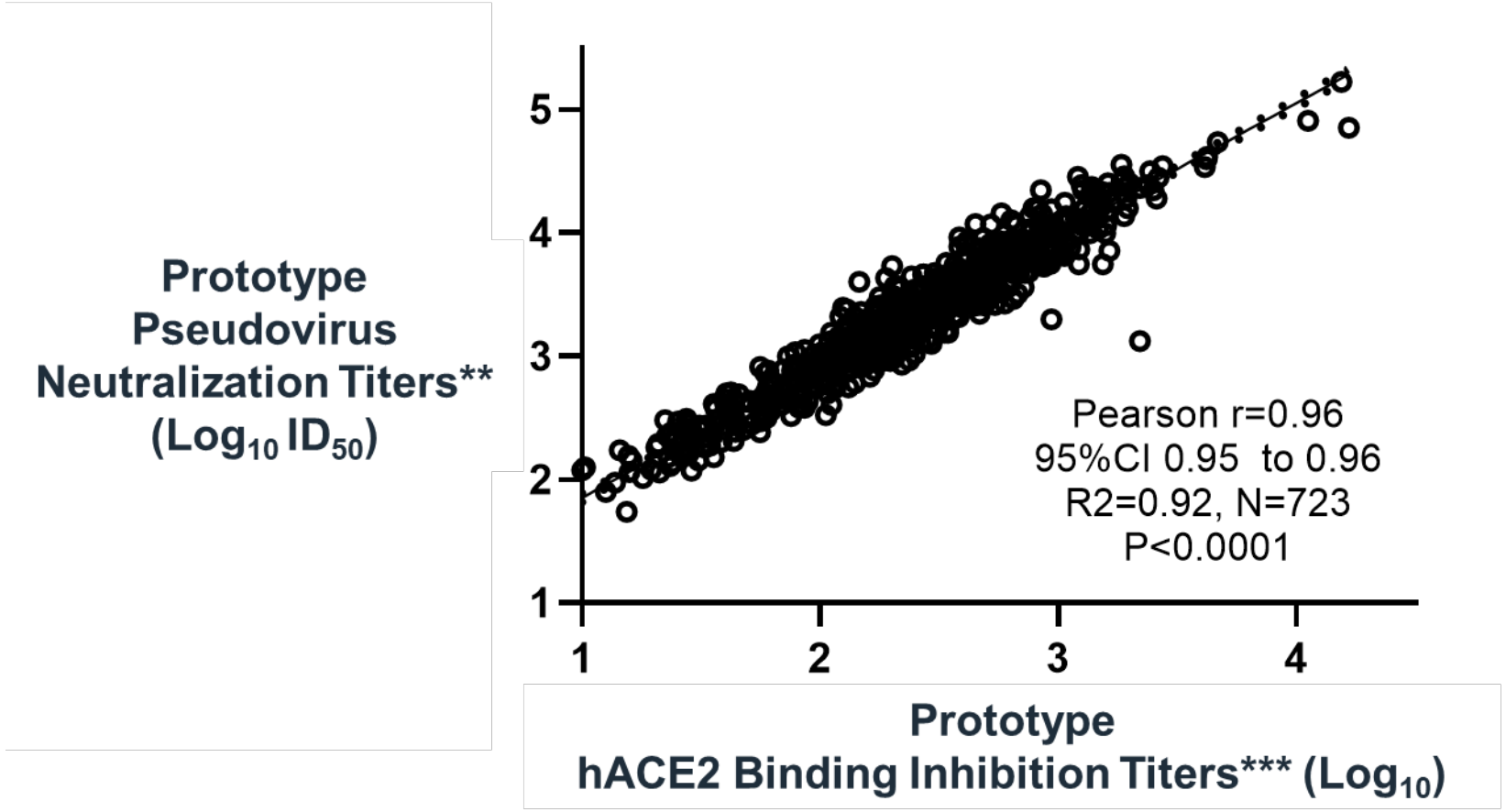
Sequence comparison suggests XBB.1.5 vaccine preferred for currently emerging XBB variants



* Denote differences in Receptor Binding Domain

hACE2 Receptor Binding Inhibition Assay

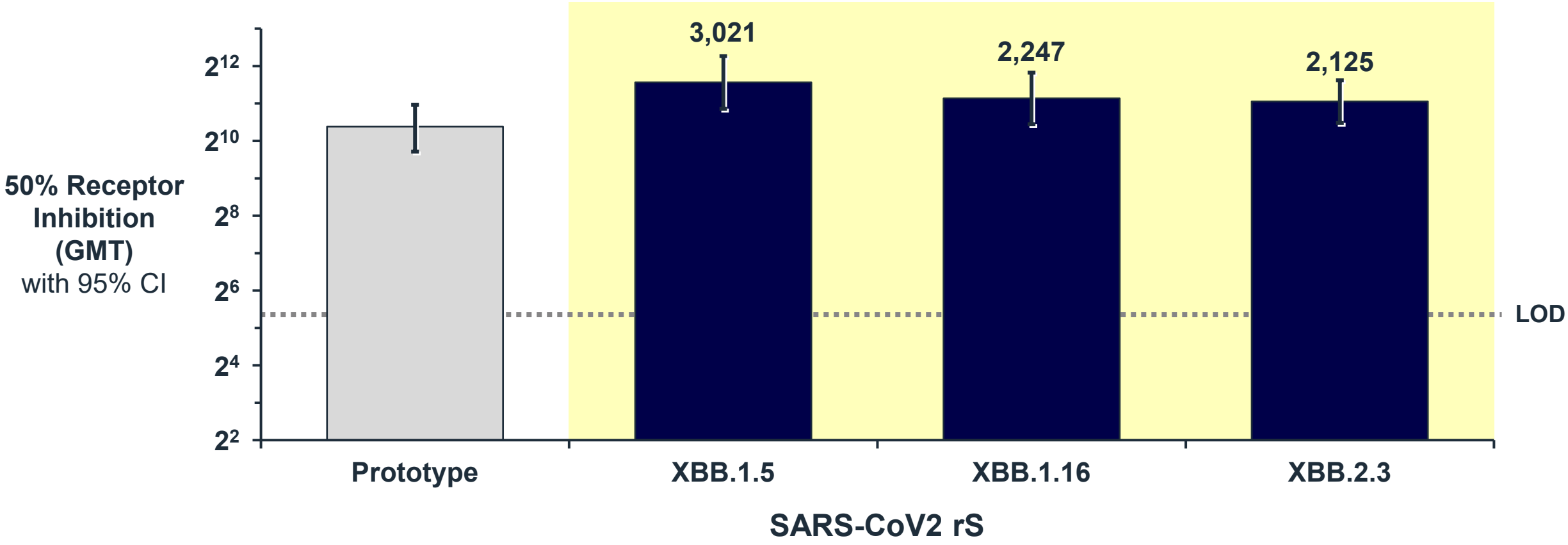
Strong correlation between human ACE2 binding inhibition titers and neutralization responses*



* All participant data from 2019-nCoV 311 study
** Validated Assay (Monogram Biosciences)
*** Validated Assay (Clinical Immunology, Novavax)

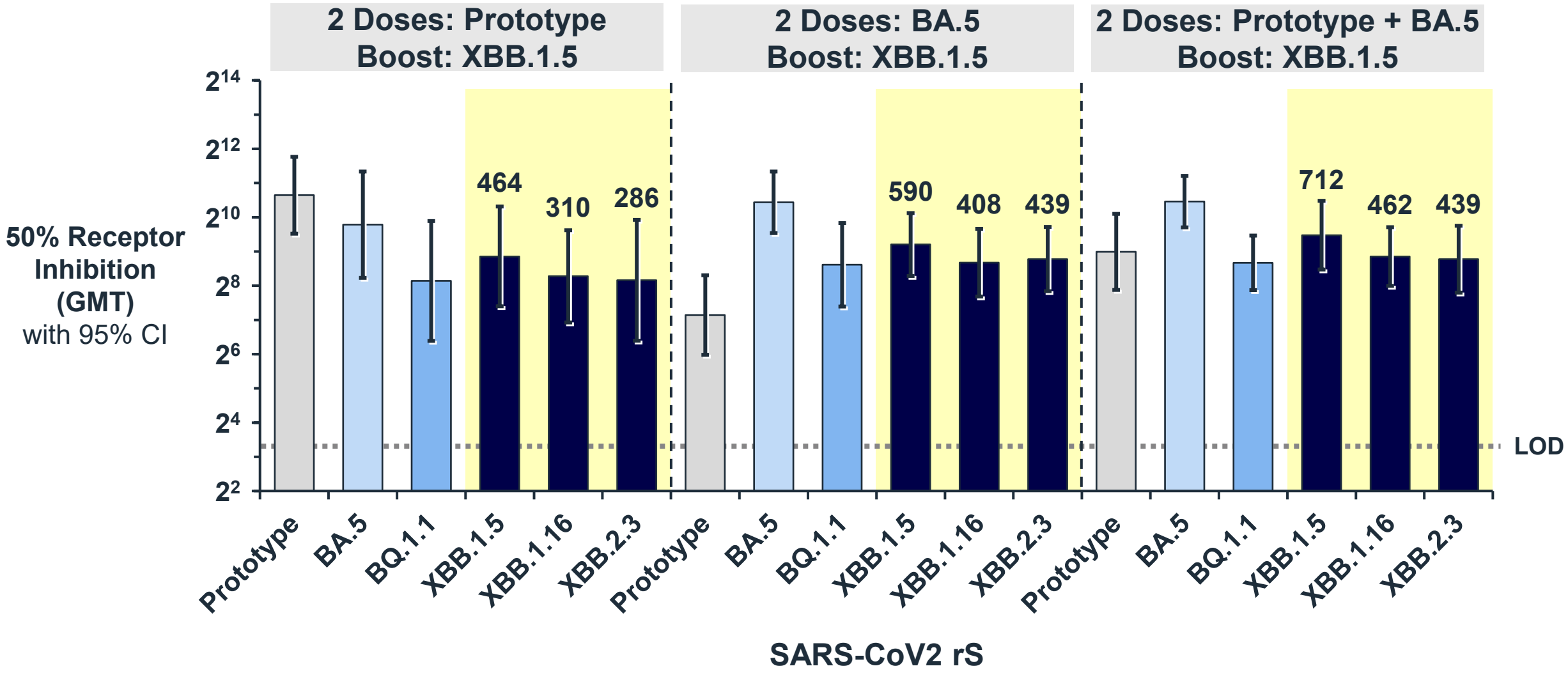
Receptor Binding Inhibition Responses in Mice: Primed with 2 Doses of Bivalent (Prototype + BA.5) and Boosted with XBB.1.5

Boosting with XBB.1.5 induces robust receptor binding Inhibition responses to XBB.1.5, XBB.1.16 & XBB.2.3



Receptor Inhibition Responses in Rhesus Macaques: Various Priming Regimens and Boosting with XBB.1.5

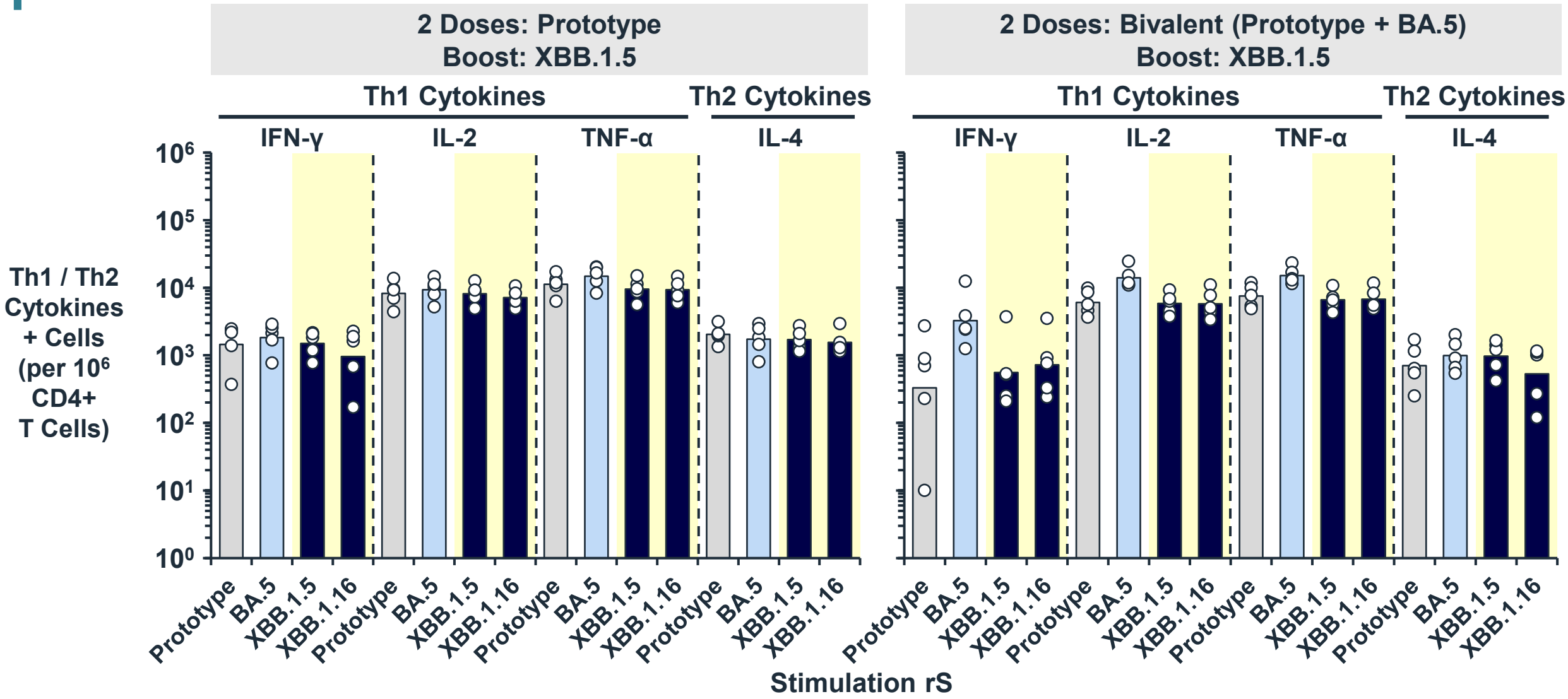
Boosting with XBB.1.5 induces comparable receptor binding Inhibition to XBB.1.5, XBB.1.16, and XBB.2.3



T Cell Responses

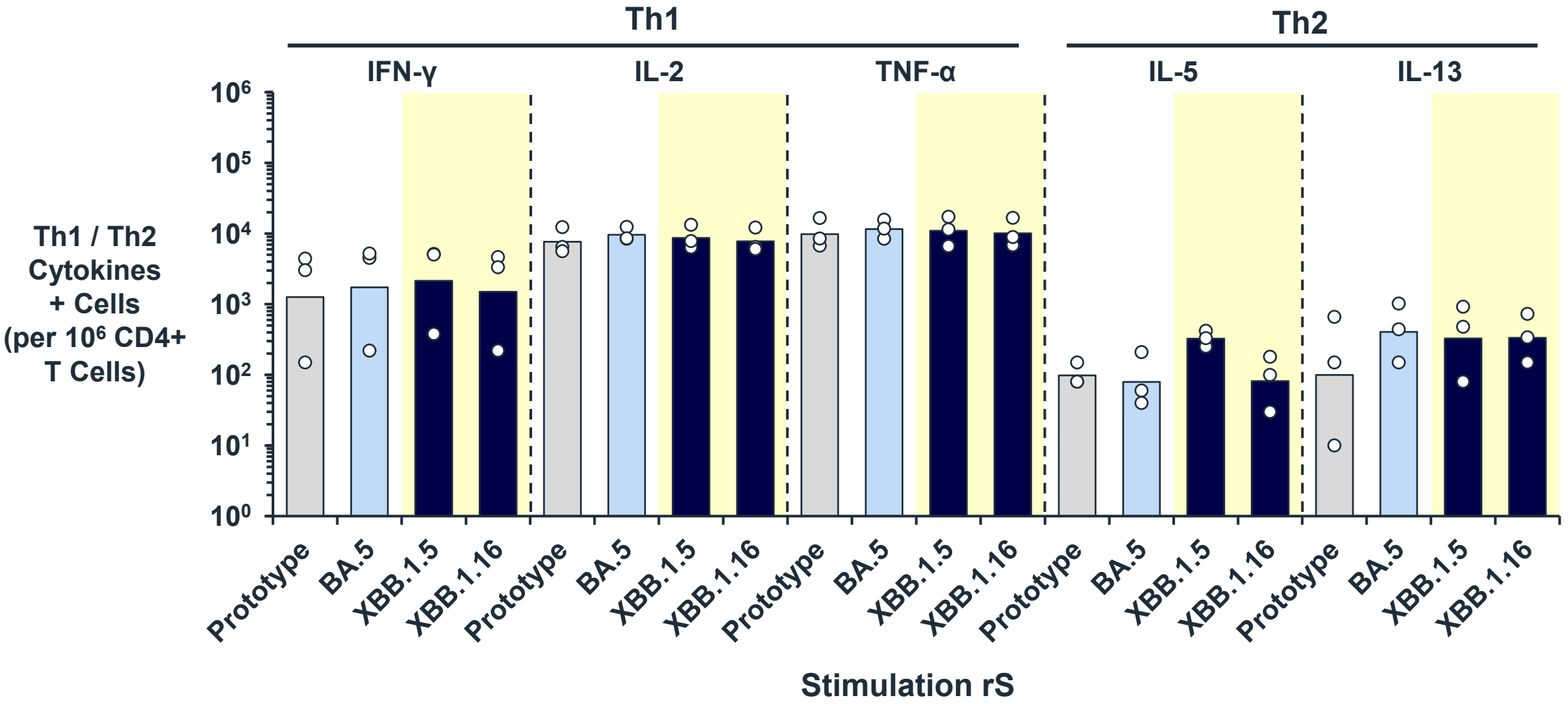
CD4+ T Cell Responses in Mice: Primed with Prototype or Bivalent BA.5 Vaccine and Boosted with XBB.1.5

Boosted cellular responses are similar irrespective of priming vaccine



CD4+ T Cell Responses in Rhesus Macaques: Primed with Bivalent BA.5 Vaccine and Boosted with XBB.1.5

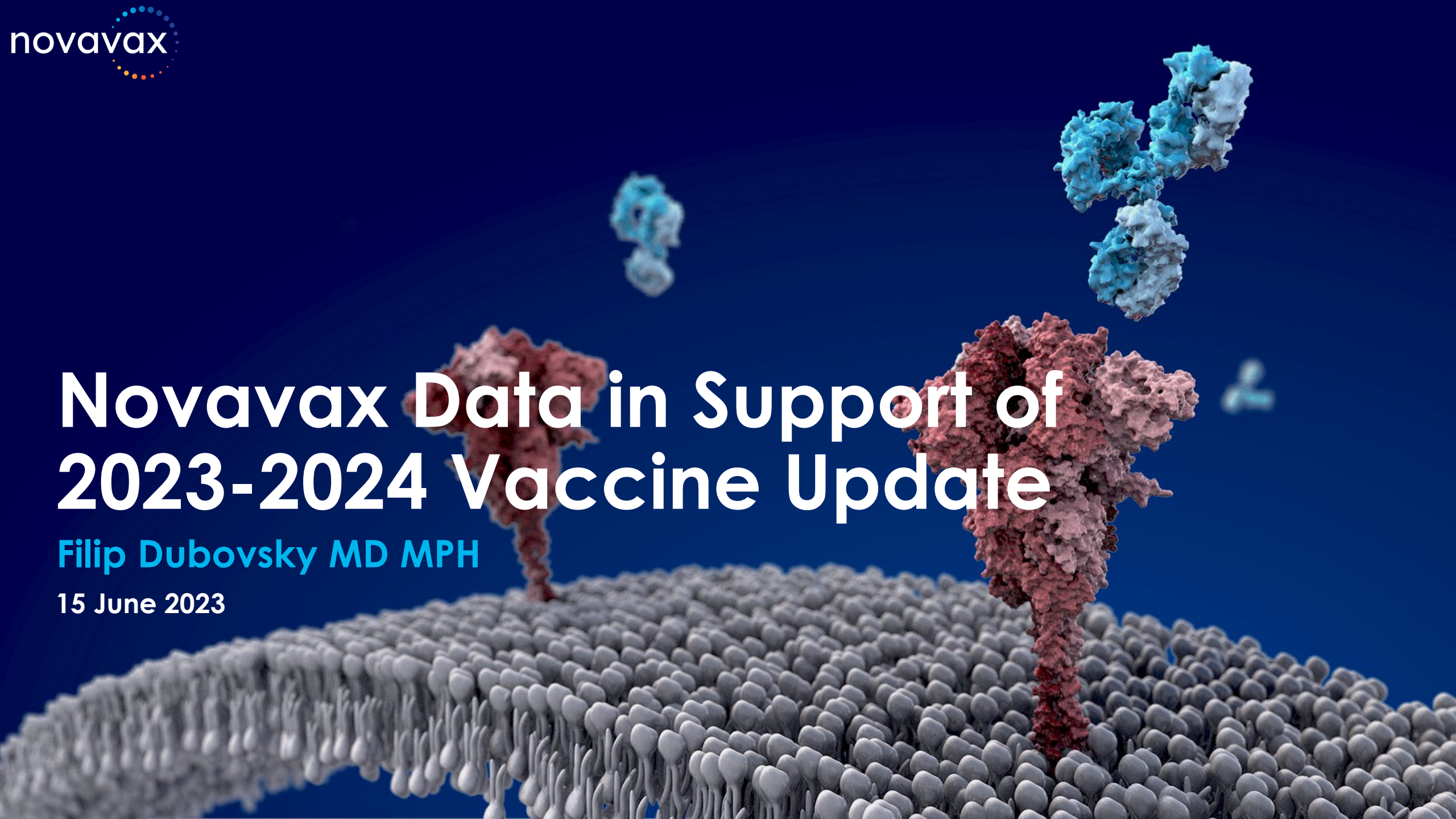
Boosted XBB.1.5 cellular responses are similar for all variants



Novavax Data Supports a Monovalent XBB.1.5 Vaccine for 2023-2024 Season

- XBB.1.5 monovalent vaccine
  - Induces robust neutralizing responses against XBB.1.5 and XBB.1.16 variants
  - Generates greater neutralizing responses compared to bivalent vaccine
  - Boosts well on a variety of immunologic backgrounds with similar neutralizing responses against XBB.1.5 and XBB.1.16
  - Induces functional antibodies that block XBB.2.3 spike protein binding to human ACE-2 receptor
  - Generates a polyfunctional Th1-biased CD4+ cellular immune response against XBB sub-variants

- Commercial manufacture of a monovalent XBB.1.5 vaccine is ongoing to support Fall 2023 availability



Novavax Data in Support of 2023-2024 Vaccine Update

Filip Dubovsky MD MPH

15 June 2023