Immune responses to COVID-19 vaccines in Hong Kong

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COVID-19 vaccinations

- Immunity can be acquired by infection or vaccination. Infections tend to spread until population immunity reaches a high level, but surges in COVID-19 transmission would threaten to overwhelm our healthcare system and cause many thousands of local deaths (infection in unvaccinated individuals is 10-20 times more serious than influenza, and no pre-existing population immunity to COVID-19 prior to 2020)

- Increasing our population immunity through vaccines provides a pathway back to "normal life", eventually with no further need for face masks, social distancing policies, and other public health measures
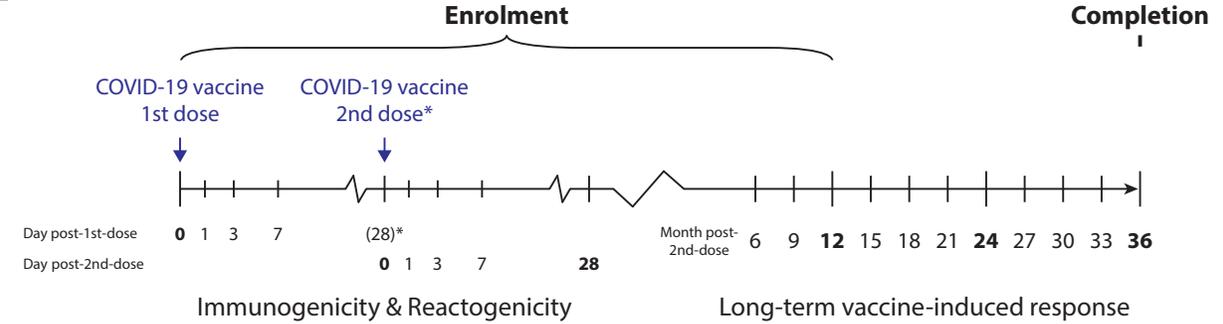
Overarching aims

- Our long-term aim is to improve our assessment of <u>population immunity</u> against COVID-19 and inform policy accordingly

- Short term aims:
    - Measure population immunity from natural SARS-CoV-2 infections (EPI-HK study and other studies, presented by Prof Peiris this afternoon)
    - Measure population immunity over time since receipt of COVID-19 vaccine doses
    - Identify "correlates of protection"[1] i.e. translate information on immune markers into actual immunity – only possible once infections are prevalent in community

- Same approaches could also be applied to influenza

1. Lim et al. 2020 Am J Epidemiol

COVAR study

3-year study of immunity in 1500 persons following vaccination, includes:

- Humoral and cellular immune responses to initial vaccine doses and subsequent boosters
- Waning over time between vaccinations
- Biological and epidemiological correlates of immune responses
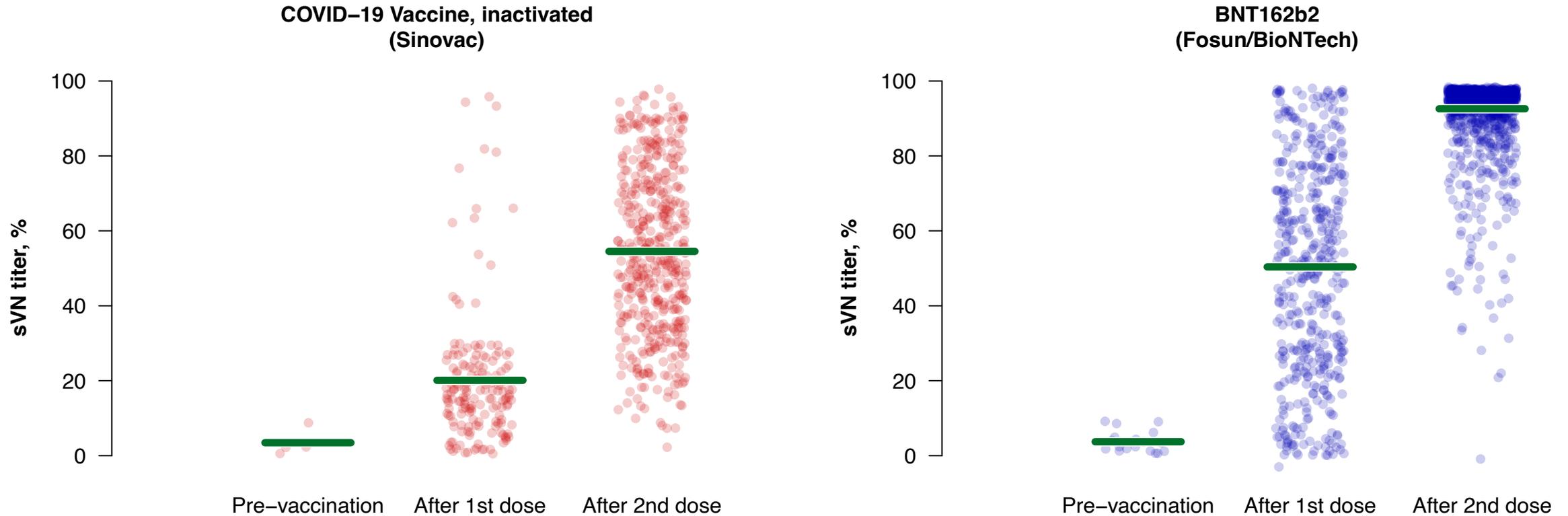

Longitudinal follow-up:

Immunogenicity & Reactogenicity — Long-term vaccine-induced response

*For individuals who do not plan to receive the second dose of COVID-19 vaccine, or plan to receive >35 days after the first dose, we will arrange blood collection 28 days after the first dose of vaccination. ^optional
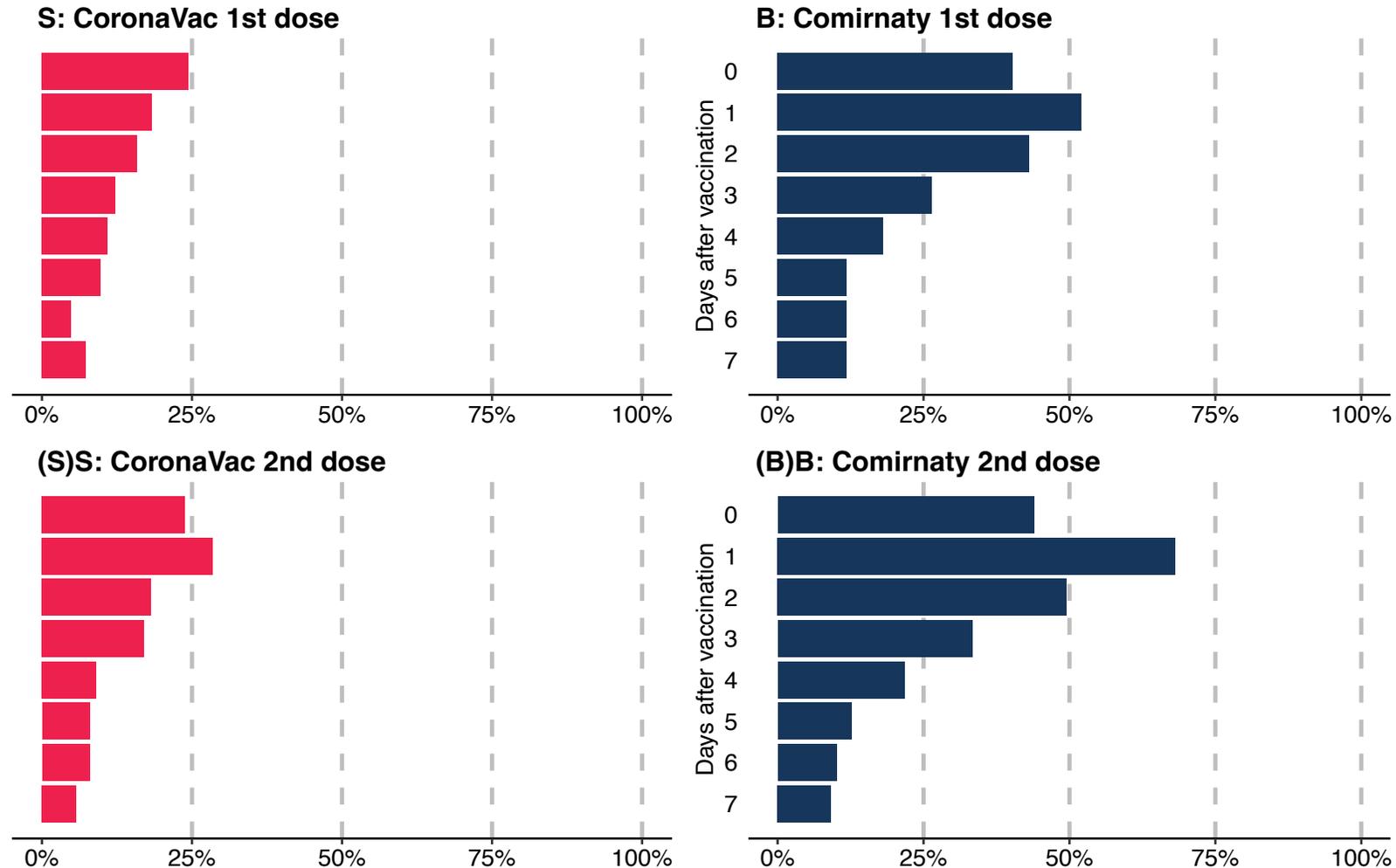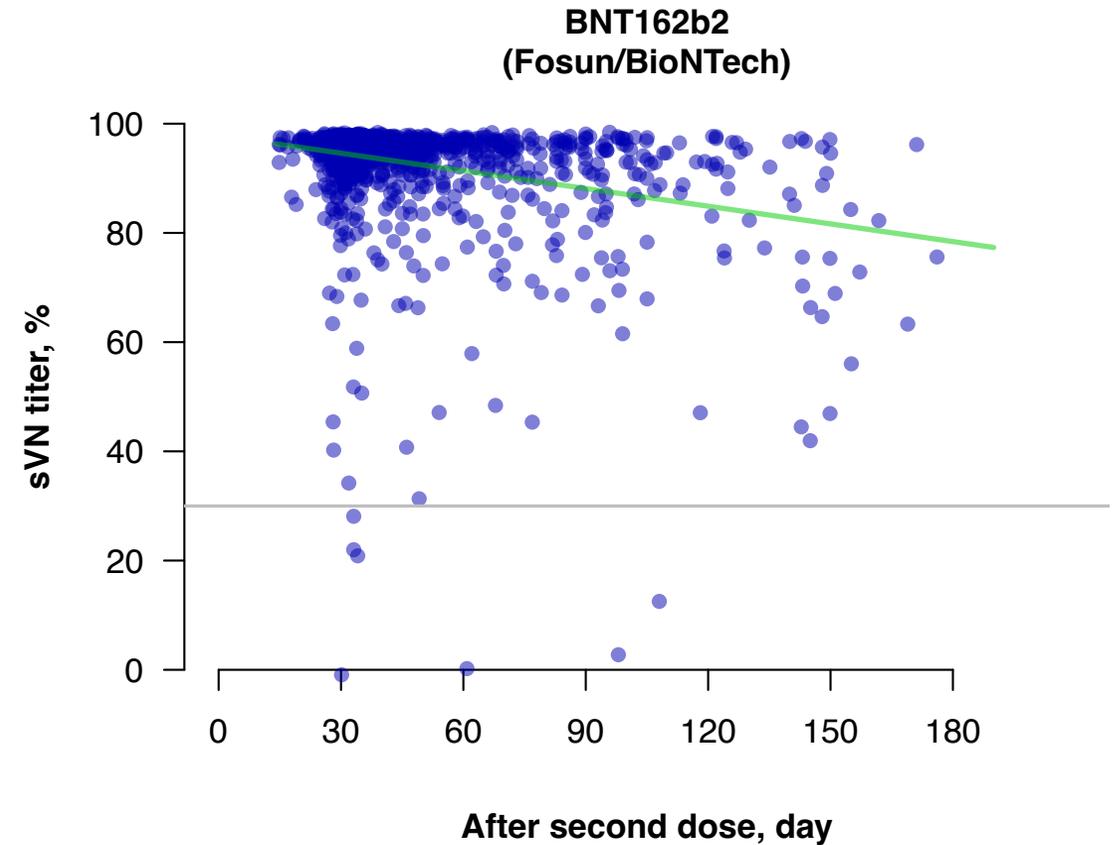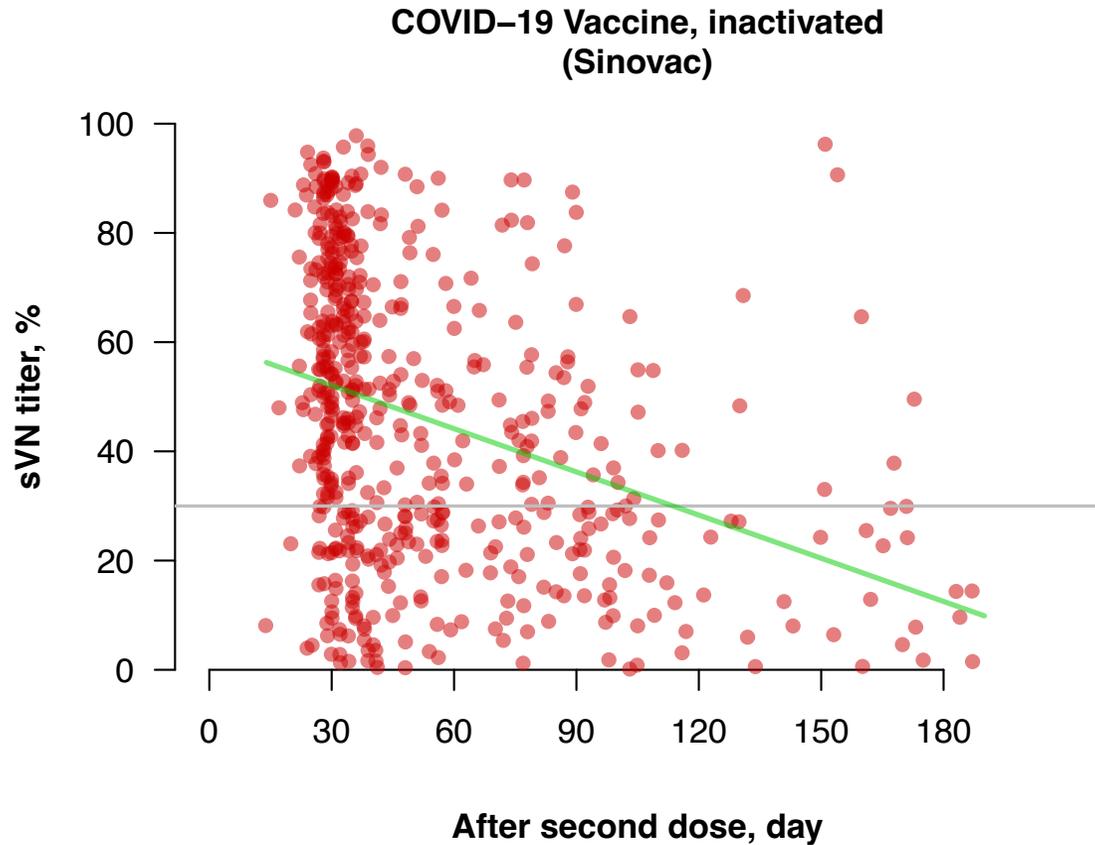
COVAR study – rises in antibody titers

Data from 929 participants (262 S + 667 B)

COVAR study – signs/symptoms after vaccination

Feeling unwell in the last 24 hours

COVAR study – declines in titers up to 6m after 2nd dose

COVID−19 Vaccine, inactivated
(Sinovac)

BNT162b2
(Fosun/BioNTech)

Potential need for third dose?

- Vaccines maintaining high level of protection against severe disease, although there is evidence of reductions in efficacy against symptomatic infections with Delta variant for two reasons – antigenic mismatch, and immune decay over time (waning)

- Third doses could boost antibody titers and improve protection
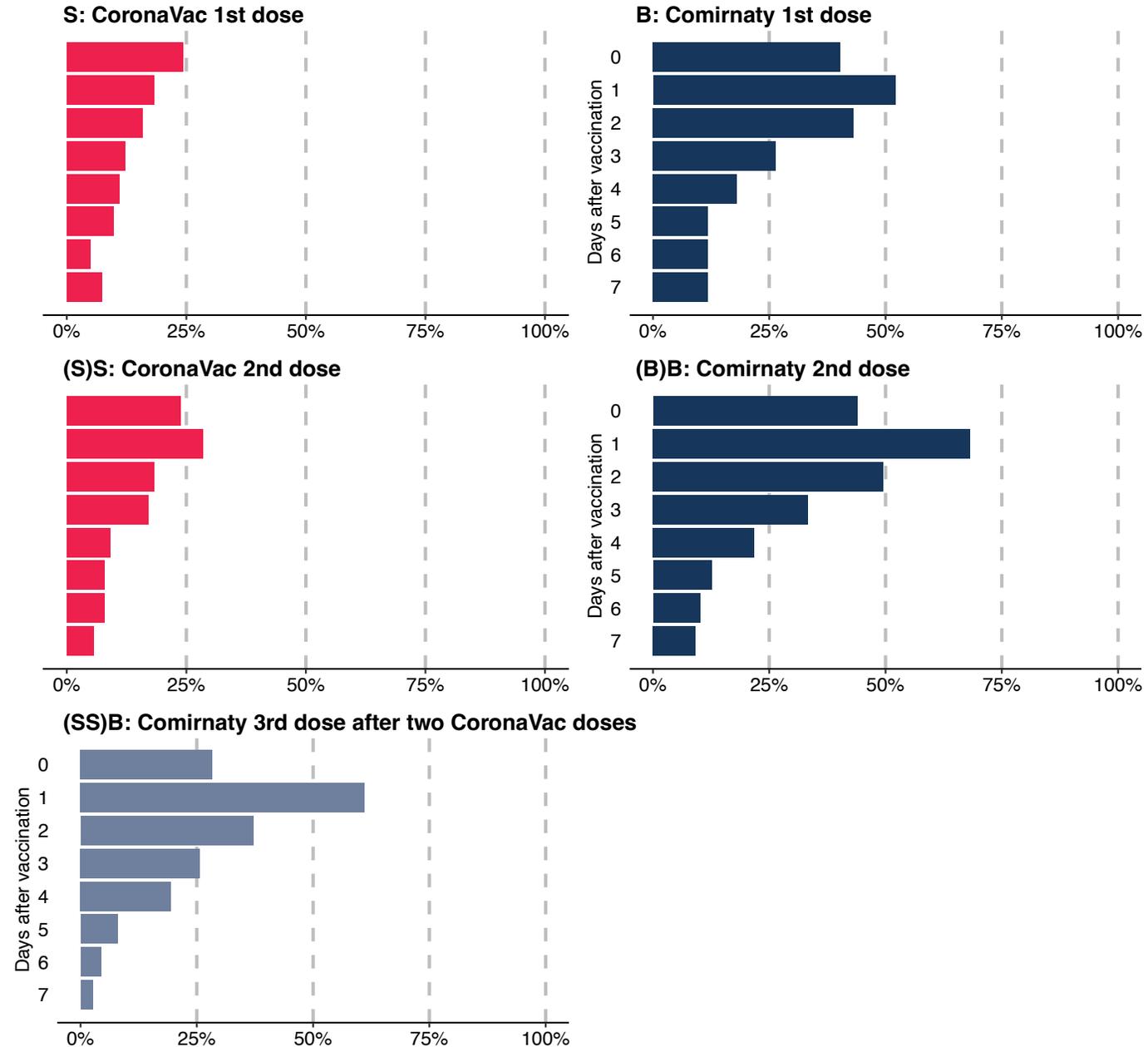
mBoost trial

(*not supported by HMRF)
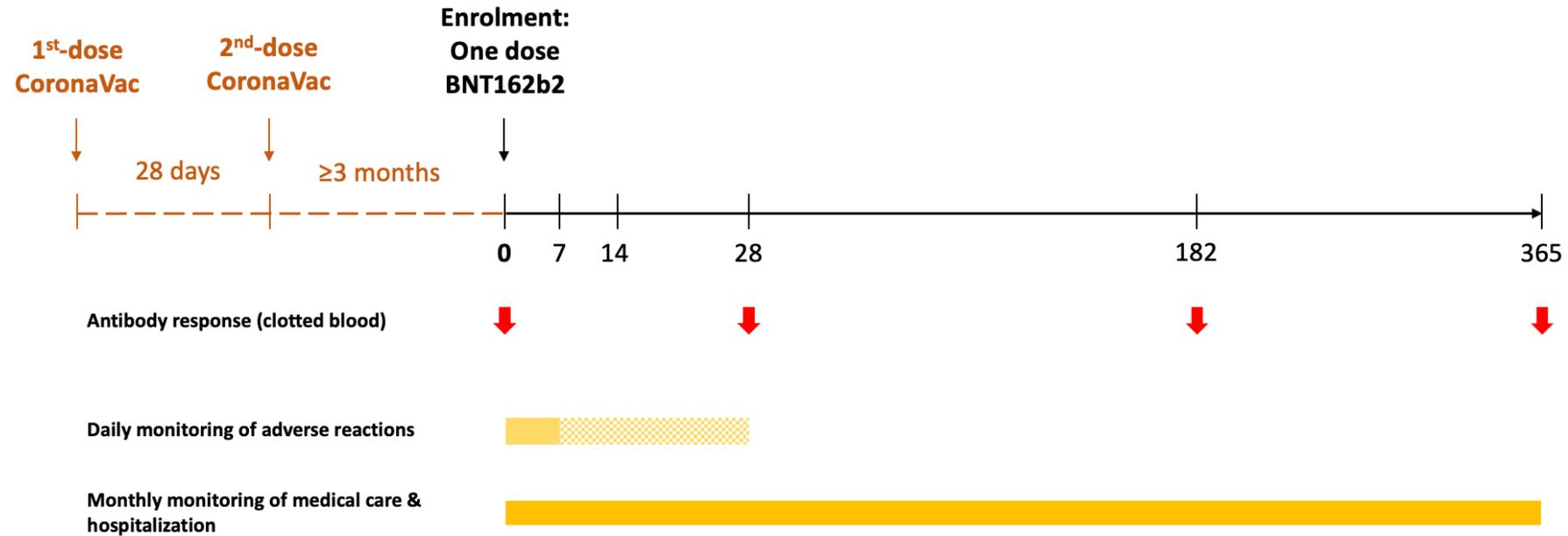
We have enrolled and vaccinated 350 adults age ≥30,
collection of day 28 samples is ongoing

https://clinicaltrials.gov/ct2/show/NCT05057182

mBoost vs COVAR

Immediate reactions after BioNTech 3rd dose in those who previously received two doses of CoronaVac are quite comparable to the reactions after first BioNTech dose
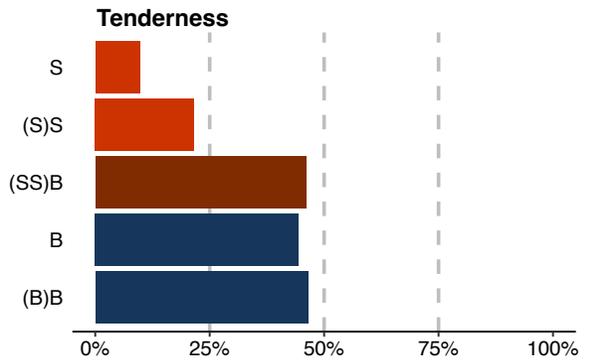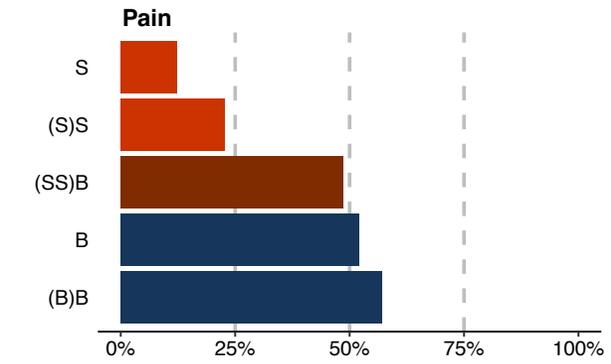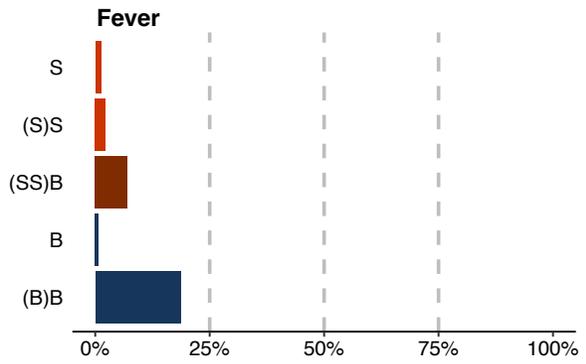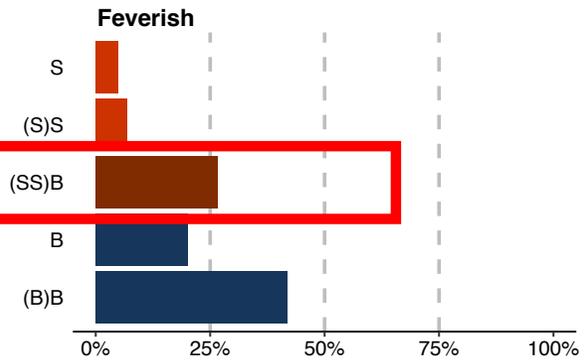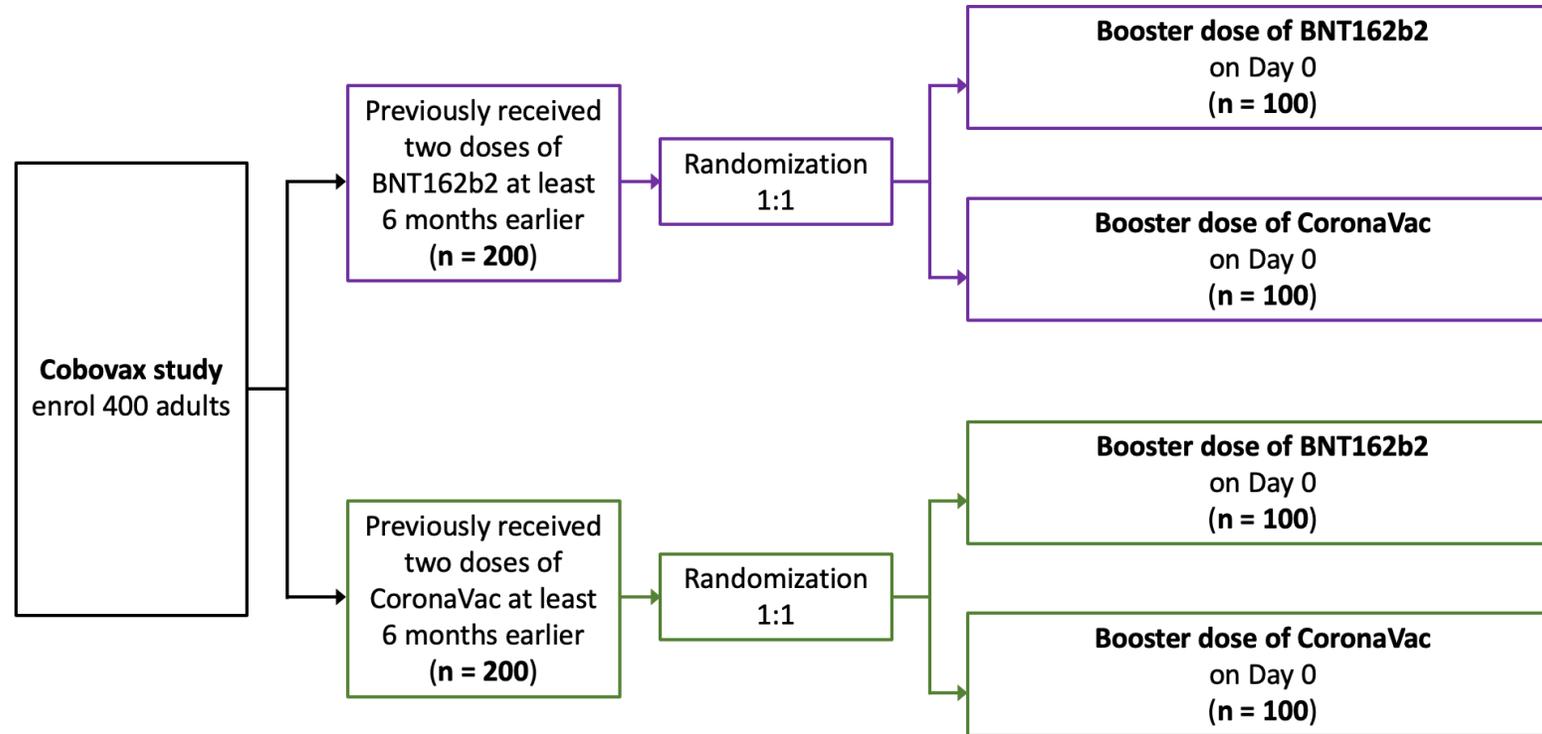
Relevant systemic symptoms up to 7 days after vaccination by vaccine type and dose

Local reactions up to 7 days after vaccination by vaccine type and dose
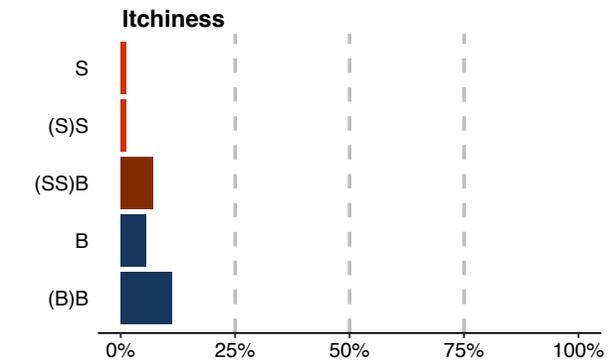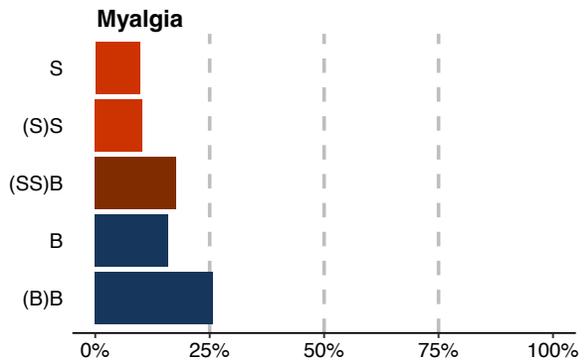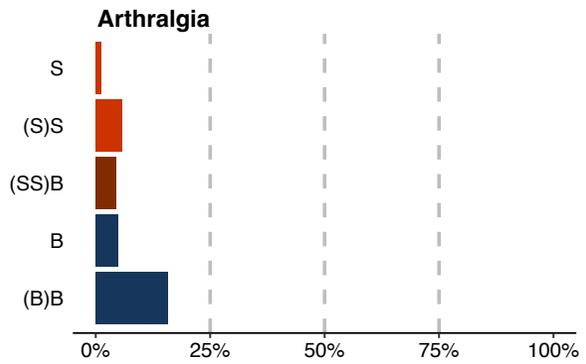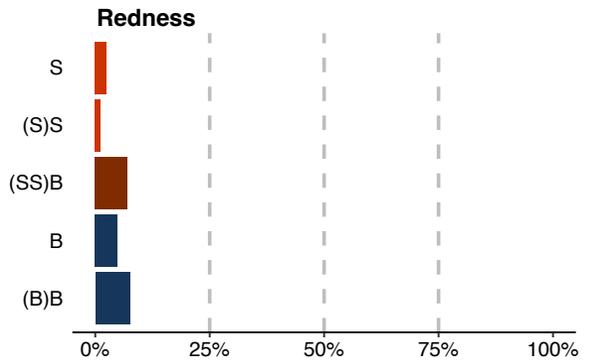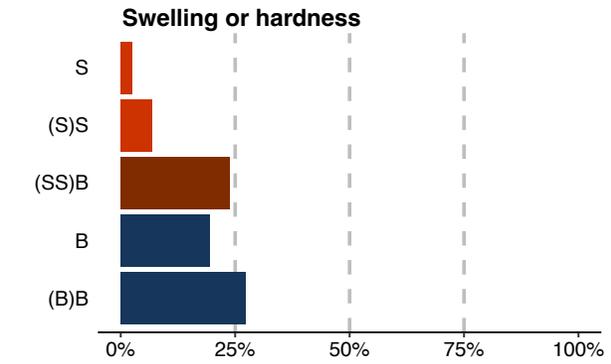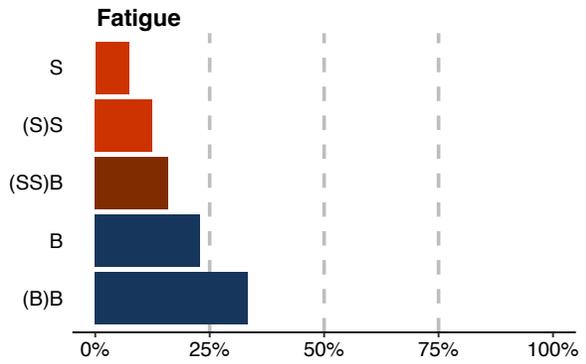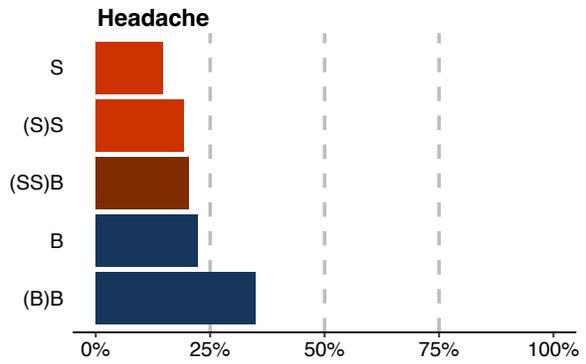
Cobovax trial

Currently enrolling 400 adults age ≥18

Similar timing of blood draws as the mBoost study (previous slide), plus CMI analysis

PIVOTe cohort study

- We complement the data from the COVAR study with an elderly cohort

- This spring we collected 1290 blood samples from 1299 cohort participants all ≥69 years of age
  - Only 153 reported receipt of a COVID-19 vaccine between February and the date of the spring draw up to June 2021 (49 BioNTech, 104 Sinovac). Among the remaining participants, only 40 planned to get COVID-19 vaccination.

- Now collecting autumn blood draws and updating information on receipt of COVID-19 vaccine doses, will have laboratory results from spring and autumn draws soon

Final comments

- Stronger antibody responses to BioNTech vaccine compared to Sinovac vaccine, but similar T cell responses (not shown today)

- mBoost trial will provide data specifically on 3rd doses of BioNTech following two CoronaVac

- Cobovax trial will soon provide data on immune responses to third doses with the same or different platform from the first two doses

- COVAR and PIVOTe studies will provide continuous observational data on immunity through time

Acknowledgments