**Supplementary Table 1. Studies showing safety and efficacy of WHO-approved COVID-19 vaccines**

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| **Study** | **Research type** | **Country/ethnic group** | **Age, years** | **Male/female sex, *n*** | **Vaccine/placebo, *n*** | **Vaccine dosage and schedule** | **Efficacy data** | **Incidence of any adverse reactions** | **Incidence of serious adverse reactions** |
| **mRNA vaccines** | | | | | | | | | |
| BNT162b2 | | | | | | | | | |
| Polack et al. 2020 [11] | Phase 2/3 RCT | Multinational | ≥16 | 19,075 / 18,631 | 18,860 / 18,846 | Two-dose regimen (30 μg per dose, 21 days apart) | • COVID-19 occurrence at least 7 days after the second dose: 8 cases among vaccine recipients vs. 162 among placebo, corresponds to 95.0% vaccine efficacy (95% credible interval 90.3–97.6%), median follow-up of 2 months | 26.7% with vaccine vs. 12.2% with placebo | 0.6% with vaccine vs. 0.5% with placebo |
| Thomas *et al.* 2021 [12] | Phase 2/3 RCT | Multinational | ≥12 | 21,070 / 20,355 | 20,998 / 21,096 | Two-dose regimen (30 μg per dose, 21 days apart) | • COVID-19 occurrence at least 7 days after the second dose: 77 cases among vaccine recipients and 850 among placebo, corresponds to 91.3% vaccine efficacy (95% CI 89.0–93.2%)  • Vaccine efficacy was 96.2% from 7 days to < 2 months; 90.1% from 2 months to < 4 months); and 83.7% after 4 months | 30.2% with vaccine vs. 13.9% with placebo | 0.6% with vaccine vs. 0.5% with placebo |
| Moreira et al.2022 [13] | Phase 3 RCT | USA, South Africa, and Brazil | ≥16 | 4,975 / 5,150 | 5,081 / 5,044 | Three-dose regimen (30 μg per dose, 19–42 days apart, third dose ≥6 months after) | • COVID-19 occurrence at least 7 days after the third dose: 6 cases among vaccine recipients and 123 among placebo, corresponds to 95.3% vaccine efficacy (95% CI 89.5–98.3%), median follow-up of 2.5 months | 25% with vaccine vs. 6.5% with placebo | 0.3% with vaccine vs. 0.5% with placebo |
| mRNA-1273 | | | | | | | | | |
| Baden et al. 2020 [16] | Phase 3 RCT | USA | ≥18 | 15,985 / 14,366 | 15,181 / 15,170 | Two-dose regimen (100 μg per dose, 28 days apart) | • Symptomatic COVID-19 illness was confirmed in 185 participants in the placebo group and in 11 in the mRNA-1273 group; vaccine efficacy was 94.1% (95% CI 89.3–96.8%), median follow-up of 63 days | Solicited systemic AEs after second injection: 79.4% with vaccine vs. 36.5% with placebo | 1.0% with vaccine vs. 1.0% with placebo |
| **Adenoviral vector vaccines** | | | | | | | | | |
| AZD 1222 (ChAdOx1 nCoV-19) | | | | | | | | | |
| Voysey et al. 2021 [56] | Phase 1/2/3 RCT | UK, Brazil, and South Africa | ≥18 | 5807 / 5829 | 4591 / 7047 | Two doses regime  • standard dose: 5×10¹⁰ viral particles  • low dose: 2.2×10¹⁰ viral particles | •Vaccine efficacy against symptomatic COVID-19 infections was 62·1% (95% CI 41.0–75.7%) after 2 standard doses, 90.0% (95% CI 67.4–97%) in participants who received a low dose followed by a standard dose, and 70.4% (95.8% CI 54.8–80.6) across both groups | AEs of special interest in 0.8% with vaccine vs. 1.1% of control group | 0.7% with vaccine vs. 0.8% in control group |
| Falsey et al. 2021 [57] | Phase 3 RCT | USA, Chile, and Peru | ≥18 | 18,015 / 14,364 | 21,587 / 10,792 | Two-dose regimen (5×10¹⁰ viral particles, 28 days apart) | • 73 symptomatic COVID-19 events (0.4%) in the vaccine group vs. 130 (1.5%) in the placebo group, overall vaccine efficacy estimate of 74.0% (95% CI 65.3–80.5) | 40.6% with vaccine vs. 29.7% with placebo | 0.5% with vaccine vs. 0.5% with placebo |
| Ad26.COV2.S | | | | | | | | | |
| Sadoff et al. 2021 [68] | Phase 3 RCT | Argentina, Brazil, Chile, Colombia, Mexico, Peru, South Africa, and USA | ≥18 | 24,053 / 19,722 | 21,895 / 21,888 | A single intramuscular injection (0.5 mL) dose of 5×1010 viral particles | • Efficacy against moderate-to-severe critical COVID-19: 66.9% (adjusted 95% CI 59.0–73.4%) for disease with onset ≥14 days after administration and 66.1% (adjusted 95% CI 55.0–74.8%) for disease with onset ≥28 days after administration  • Vaccine efficacy against severe critical COVID-19 was 76.7% (adjusted 95% CI, 54.6 to 89.1) for onset at ≥14 days and 85.4% (adjusted 95% CI, 54.2 to 96.9) for onset at ≥28 days | Any unsolicited AEs during 28-days post-vaccination in 13.1% with vaccine vs. 12.0% with placebo | 0.4% with vaccine vs. 0.4% with placebo |
| **Inactivated vaccines** | | | | | | | | | |
| Sinovac-CoronaVac, Sinopharm, BBV152 | | | | | | | | | |
| Tanriover et al. 2022 [70] | Phase 3 RCT | Turkey | 18–59 | 6646 / 3568 | 5,907 / 4,307 | Two-dose regimen (3 μg of SARS-CoV-2 virion in a 0·5 mL aqueous suspension, 14 days apart) | • 9 cases of PCR-confirmed symptomatic COVID-19 in the vaccine group (31.7 cases per 1000 person-years) vs. 32 cases in the placebo group (192.3 cases per 1000 person-years); vaccine efficacy was 83.5% | 18.9% with vaccine vs. 16.9% with placebo (*p* = 0.0108) | • No grade 4 AEs or deaths  • Grade 3 AEs 0.3% of vaccine recipients and 0.2% of placebo recipients |
| Ella et al. 2021 [71] | Phase 3 RCT | India | ≥18 | 12221 / 12198 | 17,285 / 8,468 | Two-dose regimen (6 µg Algel-IMDG doses, 4 weeks apart) | • Symptomatic COVID-19 in 24/8471 (0.3%) vaccine recipients and 106/8502 (1.2%) placebo recipients; overall estimated vaccine efficacy of 77.8% (95% CI 65.2–86.4%) | 12.4% with vaccine vs. 12.4% with placebo | 0.3% with vaccine vs. 0.5% with placebo |
| Al Kaabi et al. 2021 [72] | Phase 3 RCT | United Arab Emirates and Bahrain | ≥ 18 | 25,469 / 13,458 | 32,261 / 5,945 | Two-dose of either SARS-CoV-2 WIV04 (5 μg/dose) or HB02 (4 μg/dose) strains, 3 weeks apart | • Symptomatic COVID-19 rate per 1000 person-years was 12.1 (95% CI 8.3–17.8) in the WIV04 group, 9.8 (95% CI 6.4–15.0) in the HB02 group, and 44.7 (95%CI 36.6–54.6) in the alum-only group  • Vaccine efficacy, compared with alum-only, of 72.8% (95% CI, 58.1–82.4%) for WIV04 and 78.1% (95% CI 64.8–86.3%) for HB02 | 44.2% with the WIV04 vaccine, 41.7% with the HB02 vaccine, and 46.5% with alum-only | 0.5% with WIV04, 0.4% with HB02, and 0.6% with alum-only |
| Bueno et al. 2021 [73] | Phase 3 RCT | Chile | ≥18 | 166 / 268 | 270 / 164 | Two-dose regimen (CoronaVac 3 μg/dose, two weeks apart) | Seroconversion rate for specific anti-S1-RBD IgG:  • In people age 18–59 years: 47.8% at 14 days post immunization and 95.6% at 28 and 42 days post immunization  • In people aged ≥60 years: 18.1% at 14 days, 100.0% at 28 days, and 87.5% at 42 days post immunization | 88.5% with vaccine vs. 48.8% with placebo | No serious AEs in either arm |
| **Protein subunit vaccine** | | | | | | | | | |
| NVX-CoV2373 | | | | | | | | | |
| Heath et al. 2021 [90] | Phase 3 RCT | UK | 18–84 | 7,238 / 6,801 | 7,020 / 7.019 | Two-dose regimen (5 μg per dose, 21 days apart) | • COVID-19 infections were reported in 10/7328 in the vaccine group (no hospitalizations or deaths) and 96/6801 in the placebo group (5 severe cases); vaccine efficacy was 89.7% (95% CI 80.2–94.6%).  • Post hoc analysis showed efficacy of 86.3% (95% CI 71.3–93.5%) against the B.1.1.7 variant and 96.4% (95% CI 73.8–99.5%) against non-B.1.1.7 variants | Systemic AEs in 64.0% with vaccine vs. 30.0% with placebo | Grade 4 systemic AEs in three vaccine recipients |
| Dunkle et al. 2022 [91] | Phase 3 RCT | USA and Mexico | ≥18 | 13,181 / 12,271 | 19,714 / 9,868 | Two-dose regimen (5 μg of recombinant spike protein and 50 μg of Matrix-M adjuvant), 21 days apart | • Over 3 months, 14 COVID-19 infections occurred in vaccine group (all mild) vs. 63 in placebo group (including 10 moderate and four severe); vaccine efficacy against any Covid-19 was 90.4% (95% CI 82.9–94.6%) and against moderate-to-severe disease was 100% (95% CI 87.0 to 100%) | Any solicited systemic AEs after second dose in 69.5% with vaccine vs. 35.9% with placebo | Severe systemic AEs after second dose in 12.1% with NVX-CoV2373 vs. 2.1% with placebo |
| Shinde et al. 2021 [92] | Phase 2a–b RCT | South Africa | 18–84 without HIV or 18–64 with stable HIV | 2,518 / 1,869 | 2,199 / 2,188 | Two-dose regimen, (5 μg of recombinant spike protein and 50 μg of Matrix-M adjuvant), 21 days apart | Symptomatic COVID-19 after day 28 in 15 participants in the vaccine group and 29 participants in the placebo group; vaccine efficacy was 49.4% (95% CI 6.1–72.8%) | Solicited systemic AEs after second dose in 34.4% with vaccine vs. 27.9% with placebo | Severe systemic AEs after second dose in 4.5% with vaccine vs. 4.5% with placebo |

AE, adverse event; CI, confidence interval; HIV, human immunodeficiency virus; Ig, immunoglobulin; RCT, randomized controlled trial; S-RBD, spike protein receptor-binding domain.