The BNT162b2 (BioNTech/Pfizer) vaccine had 95% efficacy against COVID-19 ≥7 days after the 2nd dose


Question: In persons aged ≥16 years, what are the efficacy and safety of a modified RNA (mRNA) vaccine, BNT162b2, for preventing coronavirus disease 2019 (COVID-19)?

Design: Randomized placebo-controlled trial.

Blinding: Treatment allocation concealed; blinded (participants, investigators, investigator staff, and safety outcome assessors).*

Setting: 152 centers in Argentina, Brazil, Germany, South Africa, Turkey, and the USA.

Participants: 43,548 persons aged ≥16 years (median age, 52 y; and 51% men among 37,706 participants with safety data for a median 2 mo after the second dose) who were healthy or had stable chronic medical conditions, which could include HIV or hepatitis B or C virus infection. Key exclusions: medical history of COVID-19, immunocompromising conditions, or use of immunosuppressive therapy.

Interventions: Lipid nanoparticle-formulated, nucleoside-modified RNA vaccine, BNT162b2 (BioNTech/Pfizer), given intramuscularly in two 30-μg doses 21 days apart (n = 21,720 received vaccine), or saline placebo (n = 21,728).

Funding: BioNTech and Pfizer.

Results: BNT162b2 vaccine vs. placebo for preventing COVID-19† in persons aged ≥16 y

<table>
<thead>
<tr>
<th>Outcomes (n in analysis)</th>
<th>Events (events/1000 person-y)</th>
<th>Vaccine efficacy (95% CI/CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19 ≥7 d after second dose in persons without previous infection§ (34,922)</td>
<td>8 (3.6)</td>
<td>162 (73) 95% (CI, 90 to 98)</td>
</tr>
<tr>
<td>COVID-19 ≥7 d after second dose in persons with or without previous infection§ (37,267)</td>
<td>9 (3.9)</td>
<td>169 (72) 95% (CI, 90 to 97)</td>
</tr>
<tr>
<td>COVID-19 after first dose (42,572)</td>
<td>50 (12)</td>
<td>275 (69) 82% (CI, 76 to 87)</td>
</tr>
<tr>
<td>Severe COVID-19 ≥7 d after second dose (42,573)</td>
<td>1 (0.25)</td>
<td>4 (1.0) 75% (CI, –153 to 99.5)</td>
</tr>
<tr>
<td>Severe COVID-19 after first dose (42,573)</td>
<td>1 (0.25)</td>
<td>9 (2.2) 89% (CI, 20 to 99.7)</td>
</tr>
</tbody>
</table>

In 43,232 participants with varied follow-up after first dose, 27% in the vaccine group had AEs vs. 12% in the placebo group and 0.6% vs. 0.3% had serious AEs; 2 vs. 4 participants died. In the subgroup of 8183 participants assessed for local and systemic reactions ≥7 d after vaccination, 66% to 83% vs. 9% to 14% had injection site pain, 34% to 59% vs. 17% to 33% had fatigue, 25% to 52% vs. 14% to 34% had headache, 14% to 37% vs. 5% to 11% had muscle pain, 9% to 22% vs. 4% to 6% had joint pain, and 6% to 35% vs. 3% to 6% had chills.

AE = adverse event, COVID-19 = coronavirus disease 2019; CI = credible interval; CI defined in Glossary. Primary efficacy outcomes indicated by boldface.
†Confirmed COVID-19 based on U.S. Food and Drug Administration criteria: presence of ≥1 symptom (fever, chills; new or increased cough, shortness of breath, or muscle pain; new loss of taste or smell; sore throat; diarrhea; or vomiting) and positive nucleic acid amplification-based test for severe acute respiratory syndrome coronavirus-2 infection during or ≤4 d before or after the symptomatic period. Severe COVID-19 met confirmed COVID-19 criteria and had ≥1 additional feature (clinical signs at rest of severe systemic illness; respiratory failure; shock; significant, acute renal, hepatic, or neurologic dysfunction; intensive care unit admission; or death).
§Previous infection = infection up to 7 d after second dose.
||Previous probability >0.9999 for vaccine efficacy ≥30%.

Commentary: The development of a COVID-19 vaccine, based on an experimental mRNA platform, in less than 1 year after sequencing of severe acute respiratory syndrome coronavirus-2 is one of the biggest scientific advances of the decade. Polack and colleagues found that recipients of the BioNTech/Pfizer vaccine had a 95% reduction in symptomatic COVID-19 from 7 days after the second dose. Although study data did not determine whether participants had sterilizing immunity or were asymptomatic but shedding, data from other vaccinations suggest the former (1).

Vaccine efficacy between the first and second dose was 52% (95% CI, 30% to 68%), suggesting there was some benefit after the first dose. As we discuss long-term strategies for vaccine administration, we could consider a single dose for mass administration. However, we must balance this against the potential for blunted efficacy. For example, follow-up data from the closely related mRNA-based test for severe acute respiratory syndrome coronavirus-2 infection during or ≤4 d before or after the symptomatic period. Severe COVID-19 met confirmed COVID-19 criteria and had ≥1 additional feature (clinical signs at rest of severe systemic illness; respiratory failure; shock; significant, acute renal, hepatic, or neurologic dysfunction; intensive care unit admission; or death).

In Hutterite communities: a randomized trial. JAMA. 2010;303:943-50.


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Disclosure: The commentator has disclosed no conflicts of interest. The form can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M20-7313.

References

