

Comparing COVID-19 infection vs mRNA vaccination in 5-11 year old children

	<u>Infection</u>	<u>mRNA vaccination</u>
<u>General</u>	<p>How likely is it that a non-vaccinated or not previously infected 5-11 yo child will be infected with SARS-CoV-2?</p> <p>Given the contagiousness of the currently circulating variants, it is quite possible that the child gets infected, but >99% of children will have mild disease.</p>	<p>Will mRNA vaccination completely prevent SARS-CoV-2 infection in 5-11 yo children?</p> <p>The vaccine in analogy to young adults is probably less or not effective against omicron then against delta at preventing infection[1-4]. However, the vaccine seems effective in preventing the very rare severe infection in children.</p>
<u>Safety</u>		
	<p>How severe is COVID-19 in 5-11 yo children?</p> <p>Most cases are asymptomatic, mild or moderate. Approximately 0.01-0.1% of infected children require hospital admission for infection with Delta and even less with the Omicron variant[5-7]. Most of these admissions are short and do not require ICU admission. Moreover, admissions also include children admitted with COVID-19 rather than because of COVID-19, likely overestimating admission rate. With Omicron, the risk of admission seems even lower as shown for children <5 yo [8]</p>	<p>How well are mRNA vaccines tolerated in 5-11 yo children?</p> <p>mRNA vaccines are very well tolerated in 5-11 yo children[9]. Most side-effects only last a few days. In the USA, after approximately 8 million doses were administered in 5-11 yo, 100 serious adverse events have been reported, the most frequent being fever and vomiting[10]. It is unclear how many of those events were related to the vaccine.</p>
<i>Myocarditis</i>	<p>How frequent is myocarditis following COVID-19 in 5-11 yo children?</p> <p>It is very rare, but the exact frequency is currently unknown.</p> <p><i>Myocarditis in general is more frequent in adolescents and young adults than in 5-11 yo children, thus the incidence of post-COVID-19 and post-mRNA vaccine myocarditis in 5-11 yo children is expected to be lower than in young adults. In addition to myocarditis, many children with MIS-C (see below) show myocardial involvement.</i></p>	<p>How frequent is myocarditis following mRNA vaccine in 5-11 yo children?</p> <p>It is very rare but the exact frequency is currently unknown. In the USA, after more than 8 million doses were administered in 5-11 yo, only 12 cases of myocarditis have been reported[11]. All 12 patients had recovered or were recovering at time of publication[11].</p> <p><i>See comment on the left panel</i></p>
<i>Other serious adverse events</i>	<p>How frequent is MIS-C (multisystem inflammatory syndrome in children)?</p> <p>MIS-C is very rare, occurring in 0.05% of infected children 6-10 yo in initial estimates[12]. The risk of MIS-C during Delta dominance seemed slightly lower around 0.02-0.05%[13]. For Omicron, the risk is unknown (no data yet).</p>	<p>How frequent is MIS-V (multisystem inflammatory syndrome associated with vaccine)?</p> <p>Very rare. No MIS-V has been reported in children so far. Few cases of MIS-V have been reported after vaccination in adults and teenagers [17-20].</p>

	The risk of MIS-C seems to be reduced in immunized children [14-16].	
Long-COVID	<p>How frequent is long-COVID in 5-11 yo children?</p> <p>Long-COVID likely affects up to 0.5-2% of infected children in this age group[21]. There is not sufficient evidence at this stage to be able to provide precise estimates[22]. The majority of children fully recover from Long-COVID within one to five months[23].</p>	<p>Does mRNA vaccination protect against long-COVID in 5-11 yo children?</p> <p>There is not enough data to confirm whether vaccination protects against long-COVID in children. However, since mRNA vaccination reduces the likelihood of infection and its severity in children, it is expected that mRNA vaccination may also reduce the risk of long-COVID in this age group to the same extent.</p> <p><i>In adults, vaccination significantly decreases the likelihood of long-COVID[24].</i></p>
Other long-term effects	<p>What are other long-term effects of COVID-19 in 5-11 yo children?</p> <p>They are currently unknown.</p>	<p>What are other long-term effects of mRNA vaccination in 5-11 yo children?</p> <p>Despite several millions of doses used so far and very vigilant reporting systems in place no delayed adverse events have been reported within the observation period of about 6 months.</p>

Immunity

Protection against reinfection	<p>What is the likelihood to be reinfected if a 5-11 yo children had COVID-19?</p> <p>Children more than adults develop robust and sustained cross-reactive spike-specific immune responses to SARS-CoV-2 infection.[25]</p> <p>Re-infections with SARS-CoV-2 are likely to occur since local immunity in the upper respiratory tract against respiratory viruses is usually short lived. Moreover, protection is dependent on the antigenic overlap between previous and subsequent viral variants. With Omicron, this overlap is poor leading to very low levels of protection against mild re-infection. However, every exposure to SARS-CoV-2 will likely broaden and strengthen systemic immunity. Thus, protection against severe disease after re-infection is generally high in immunocompetent children. Re-infection is expected to be milder than primary infection.</p>	<p>What is the likelihood of a 5-11 yo child to be infected after vaccination?</p> <p>Breakthrough infections with SARS-CoV-2 are likely to occur since local immunity in the upper respiratory tract against respiratory viruses is usually short lived after intramuscular immunization. Moreover, protection is dependent on the antigenic overlap between vaccine and circulating viral variants. In 5-11 yo children, the mRNA-vaccine BNT162b2 demonstrated 91% protection for 3 months against infection with antigenetically closely related viral variants[9]. Vaccine efficacy against mild or asymptomatic infection is expected to be substantially inferior and short lived against the Omicron variant also in this age group. Vaccine efficacy against severe infection is likely to be much more robust and long-lived and will be boosted with every additional antigenic encounter by vaccination or infection. Infection despite vaccination is expected to be milder than in non-immunized.</p>
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<p>Contagiousness if infected</p>	<p>What is the likelihood of 5-11 yo unvaccinated children being contagious if infected with SARS-CoV-2?</p> <p>With the currently circulating variants, the likelihood of infected children to infect their contacts (family, peers) is very high.</p>	<p>What is the likelihood of 5-11 yo children, vaccinated with two doses of an mRNA vaccine, being contagious if infected with SARS-CoV-2?</p> <p>Even though there are no paediatric data with the currently circulating variants, children infected despite vaccination can possibly infect their contacts (family, peers) to some extent.</p> <p><i>However, adult data show that in persons infected despite vaccination, the risk of transmission is lower than if the persons were not vaccinated, especially in the first few months after vaccination. Early data suggest that this is still valid for Omicron although somewhat reduced[26].</i></p>
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Text in italics refers to data in groups other than 5-11yo.

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