

## References for COVID-19 Vaccine and Breastfeeding Flyer (12.9.21)

### How am I (and my baby) protected?

“With curious babies comes inevitable germs. Milk from vaccinated mothers has antibodies that neutralize COVID-19 germs before (and after) your baby is exposed to them.”

- Gray KJ, Bordt EA, Atyeo C, et al. Coronavirus disease 2019 vaccine response in pregnant and lactating women: a cohort study. *Am J Obstet Gynecol.* Mar 26 2021;doi:10.1016/j.ajog.2021.03.023
- Kelly JC, Carter EB, Raghuraman N, et al. Anti-severe acute respiratory syndrome coronavirus 2 antibodies induced in breast milk after Pfizer-BioNTech/BNT162b2 vaccination. *Am J Obstet Gynecol.* 2021;225:101–3.
- Perl SH, Uzan-Yulzari A, Klainer H, et al. SARS-CoV-2-specific antibodies in breast milk after COVID-19 vaccination of breastfeeding women. *Jama.* 2021;325:2013–4.
- Collier AY, McMahan K, Yu J, et al. Immunogenicity of COVID-19 mRNA vaccines in pregnant and lactating women. *Jama.* 2021;325:2370–80.
- Atyeo C, DeRiso EA, Davis C, et al. COVID-19 mRNA vaccines drive differential antibody Fc-functional profiles in pregnant, lactating, and nonpregnant women. *Sci Transl Med.* 2021;13(617):eabi8631.

“It's not just about the baby - your health matters too! Antibody levels are higher in vaccination than when you have the illness...even in pregnancy and when breastfeeding.”

- Young BE, Seppo AE, Diaz N, et al. Association of Human Milk Antibody Induction, Persistence, and Neutralizing Capacity With SARS-CoV-2 Infection vs mRNA Vaccination. *JAMA Pediatr.* Published online November 10, 2021. doi:10.1001/jamapediatrics.2021.4897
- Gray KJ, Bordt EA, Atyeo C, et al. Coronavirus disease 2019 vaccine response in pregnant and lactating women: a cohort study. *Am J Obstet Gynecol.* Mar 26 2021;doi:10.1016/j.ajog.2021.03.023

“Vaccines work and can keep your family healthy. A recent study showed hospitalizations were 14 times higher for unvaccinated adults than for fully vaccinated adults.”

- <https://covid.cdc.gov/covid-data-tracker/#covidnet-hospitalizations-vaccination>
  - Comment: recent estimates have updated to 12 higher (14 was cited in the flyer)

### Vaccine Side Effects

“After vaccination, normal and expected side effects may be chills, headache, and body aches. Don't forget: you can take Advil or Tylenol while breastfeeding!”

“Plan on downtime. Most moms report that performing tasks at work, around the house, or with childcare were more difficult the day after vaccination.”

- Kerri Bertrand, Gordon Honerkamp-Smith, and Christina D. Chambers. *Breastfeeding Medicine.* Sep 2021.697-701. <http://doi.org/10.1089/bfm.2021.0169>
- Skyler McLaurin-Jiang, Christine D. Garner, Kaytlin Krutsch, and Thomas W. Hale. *Breastfeeding Medicine.* Sep 2021.702-709. <http://doi.org/10.1089/bfm.2021.0079>

“Babies may experience increased fussiness (~3%) or sleepiness (~3%).”

- Skyler McLaurin-Jiang, Christine D. Garner, Kaytlin Krutsch, and Thomas W. Hale. *Breastfeeding Medicine.* Sep 2021.702-709. <http://doi.org/10.1089/bfm.2021.0079>

“All symptoms should subside within 24-48 hours.”

- <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/expect/after.html>
- Bertrand K, Honerkamp-Smith G, Chambers CD. Maternal and child outcomes reported by breastfeeding women following messenger RNA COVID-19 vaccination. *Breastfeed Med.* 2021;16:697–701.
- Skyler McLaurin-Jiang, Christine D. Garner, Kaytlin Krutsch, and Thomas W. Hale. *Breastfeeding Medicine.* Sep 2021.702-709. <http://doi.org/10.1089/bfm.2021.0079>

“Few mothers reported an impact on milk supply or a temporary change in pumped breast milk color. These returned to normal within 72 hours, with no evidence of harm to the baby.”

- Bertrand K, Honerkamp-Smith G, Chambers CD. Maternal and child outcomes reported by breastfeeding women following messenger RNA COVID-19 vaccination. *Breastfeed Med.* 2021;16:697–701.
- Skyler McLaurin-Jiang, Christine D. Garner, Kaytlin Krutsch, and Thomas W. Hale. Breastfeeding Medicine. Sep 2021.702-709. <http://doi.org/10.1089/bfm.2021.0079>
- Golan Y, Prahl M, Cassidy AG, et al. COVID-19 mRNA vaccination in lactation: assessment of adverse events and vaccine related antibodies in mother-infant dyads. *Front Immunol.* 2021;12:777103. doi:10.3389/fimmu.2021.777103

## Facts vs. Myths

“The vaccine is still highly recommended. The duration of natural immunity is unknown and produces fewer antibodies”

- Young BE, Seppo AE, Diaz N, et al. Association of Human Milk Antibody Induction, Persistence, and Neutralizing Capacity With SARS-CoV-2 Infection vs mRNA Vaccination. *JAMA Pediatr.* Published online November 10, 2021. doi:10.1001/jamapediatrics.2021.4897
- Cavanaugh AM, Spicer KB, Thoroughman D, Glick C, Winter K. Reduced Risk of Reinfection with SARS-CoV-2 After COVID-19 Vaccination — Kentucky, May–June 2021. *MMWR Morb Mortal Wkly Rep* 2021;70:1081-1083. DOI: <http://dx.doi.org/10.15585/mmwr.mm7032e1>

“The COVID-19 vaccines do not contain the live virus and cannot cause infection”

- <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/facts.html>
- Burrell CJ, Howard CR, Murphy FA. Vaccines and Vaccination. *Fenner and White’s Medical Virology.* Published online 2017:155-167. doi:10.1016/b978-0-12-375156-0.00011-4
- Petrovsky N, Aguilar JC (October 2004). "Vaccine adjuvants: current state and future trends". *Immunology and Cell Biology.* 82 (5): 488–496.

“There is no evidence that vaccine ingredients cause any problems with future health or pregnancies”

- This is difficult to cite, as we are referring to the overwhelming absence of high-quality literature showing an association between the vaccine(s) and predictable harm.
- <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/planning-for-pregnancy.html>
- Orvieto R, Noach-Hirsh M, Segev-Zahav A, Haas J, Nahum R, Aizer A. Does mRNA SARS-CoV-2 vaccine influence patients' performance during IVF-ET cycle? *Reprod Biol Endocrinol.* 2021;19(1):69. doi:10.1186/s12958-021-00757-6
- Gonzalez DC, Nassau DE, Khodamoradi K, et al. Sperm parameters before and after COVID-19 mRNA vaccination. *JAMA.* 2021;326(3):273-274. doi:10.1001/jama.2021.9976
- Kharbanda EO, Haapala J, DeSilva M, et al. Spontaneous Abortion Following COVID-19 Vaccination During Pregnancy [published correction appears in *JAMA.* 2021 Sep 10;:null]. *JAMA.* 2021;326(16):1629-1631. doi:10.1001/jama.2021.15494

## Additional reading:

- Guida M, Terracciano D, Cennamo M, et al. COVID-19 Vaccine mRNA BNT162b2 elicits human antibody response in milk of breastfeeding women. *Vaccines (Basel).* 2021;9(7):785. doi:10.3390/vaccines9070785
- Goldshtein I, Nevo D, Steinberg DM, et al. Association between BNT162b2 vaccination and incidence of SARS-CoV-2 infection in pregnant women. *JAMA.* Published online July 12, 2021. doi:10.1001/jama.2021.11035.
- Esteve-Palau E, Gonzalez-Cuevas A, Guerrero ME, et al. Quantification of specific antibodies against SARS-CoV-2 in breast milk of lactating women vaccinated with an mRNA vaccine. *JAMA Netw Open.* 2021;4(8):e2120575. doi:10.1001/jamanetworkopen.2021.20575

- Golan Y, Prah M, Cassidy AG, et al. COVID-19 mRNA vaccination in lactation: assessment of adverse events and vaccine related antibodies in mother-infant dyads. *Front Immunol.* 2021;12:777103. doi:10.3389/fimmu.2021.777103
- Collier AY, McMahan K, Yu J, et al. Immunogenicity of COVID-19 mRNA vaccines in pregnant and lactating women. *JAMA.* 2021;325(23):2370-2380. doi:10.1001/jama.2021.7563
- Charepe N, Gonçalves J, Juliano AM, et al. COVID-19 mRNA vaccine and antibody response in lactating women: a prospective cohort study. *BMC Pregnancy Childbirth.* 2021;21(1):632. doi:10.1186/s12884-021-04051-6
- Atyeo C, DeRiso EA, Davis C, et al. COVID-19 mRNA vaccines drive differential antibody Fc-functional profiles in pregnant, lactating, and nonpregnant women. *Sci Transl Med.* 2021;13(617):eabi8631. doi:10.1126/scitranslmed.abi8631
- Juncker HG, Mulleners SJ, van Gils MJ, et al. The levels of SARS-CoV-2 specific antibodies in human milk following vaccination. *J Hum Lact.* Published online June 27, 2021a. doi:10.1177/08903344211027112
- Juncker HG, Romijn M, Loth VN, et al. Human milk antibodies against SARS-CoV-2: a longitudinal follow-up study. *J Hum Lact.* 2021b;37(3):485-491. doi:10.1177/08903344211030171
- Low JM, Gu Y, Ng MSF, et al. Codominant IgG and IgA expression with minimal vaccine mRNA in milk of BNT162b2 vaccinees. *NPJ Vaccines.* 2021;6(1):105. doi:10.1038/s41541-021-00370-z
- Romero Ramírez DS, Lara Pérez MM, Carretero Pérez M, et al. SARS-CoV-2 antibodies in breast milk after vaccination. *Pediatrics.* 2021:e2021052286. doi:10.1542/peds.2021-052286
- Shimabukuro TT, Kim SY, Myers TR, et al; CDC v-safe COVID-19 Pregnancy Registry Team. Preliminary findings of mRNA Covid-19 vaccine safety in pregnant persons. *N Engl J Med.* 2021b;384(24):2273-2282. doi:10.1056/NEJMoa2104983