

COVID-19 Vaccination Among Reproductive Age Patients: An Opportunity Knocks

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COVID-19 vaccination pre-conception, during pregnancy or in the postpartum state of reproductive-aged patients will significantly reduce the morbidity and mortality for them and their newborn from COVID-19 infection. Over the last year and a half, the COVID-19 pandemic has taken a toll on many aspects of our country and specifically, South Dakota. From the stresses on our healthcare system to the collective mental health burden on our nation,^{1,2} millions of individuals have been directly affected by this virus. Currently, over 220,000 Americans have been hospitalized with COVID-19³ in South Dakota, approximately 242 out of every 100,000 people have died due to COVID-19.⁴ Fortunately, with the introduction of the COVID vaccinations, the number of positive cases due to COVID-19 have significantly decreased⁵ and those who received the vaccine and become infected in general have a reduced severity of disease. Additionally, as of September 2021, over 50 percent of the country's (and South Dakota's) population have been vaccinated,⁶ still below the number needed to reach 'herd immunity.' However, despite the overall vaccination rates, there is still an alarming gap in the vaccination rates among pregnant individuals, with vaccination rates of only 31 percent.⁷ Both the CDC and WHO consider pregnancy a high risk state for COVID infection with increased danger to the woman and unborn infant and the critical need to vaccinate this group. Among women who choose not to receive vaccination, uncertainty in the effects of the vaccine on fertility and the developing fetus were their main concerns.⁸

Around the same time the COVID-19 vaccines became available, unsubstantiated claims arose that COVID vaccination causes sterility among women attempting pregnancy. Specifically, reports postulated potential sterility based on possible cross-reactivity between syncytin-1, a protein essential to the proper formation of syncytiotrophoblast during embryo implantation, and the vaccine's spike protein.⁹ However, first from a structural perspective, there are no significant similarities between the amino acid chains of syncytin-1 and the COVID spike protein¹⁰.

Furthermore, a recent study by Morris R.S. published in

Fertility and Sterility Reports provides even more substantial evidence refuting previous claims of the sterility caused by the mRNA based COVID vaccine spike protein. In this prospective cohort study, women undergoing in vitro fertilization frozen embryo transfer (FET) were analyzed to determine the association between seropositivity for COVID-19 spike protein IgG (from either vaccination or natural infection) and hCG levels (indicating successful pregnancy).¹⁰ Over a three-month period, 143 frozen embryos transfers were analyzed. Of these 143 patients, 37.8 percent were reactive for the spike protein IgG on serum analysis, with 64.8 percent of those from vaccination. The rate of implantation, determined by serum hCG levels greater than 5mIU/mL eight days after embryo transfer in addition to continued rising levels of hormone, was found to be similar in spike protein IgG seronegative (73.9 percent) and seropositive individuals. In addition, there was no statistically significant difference in implantation rates between vaccine seropositive (80.0 percent) and infection seropositive (73.7 percent) individuals. It should also be noted that it is well-established that the mRNA vaccines do not contain any live viral particles, and therefore will not cause genetic changes.¹¹ Therefore, while this study does not explore the effects of COVID seropositivity on the various other factors affecting conception, including ovulation and fertilization, it can be used to conclude that seropositivity from the COVID vaccine spike protein is not associated with negative effects on embryo implantation.

Equally as important, there is also research exploring the robust vaccine-induced antibody response in pregnant and lactating individuals, which could confer protection to the fetus/neonate.

A recent prospective cohort study by Gray et al. published in the *American Journal of Obstetrics & Gynecology* provides substantial evidence that mRNA vaccination induces adequate amounts of antibody titer in pregnant and recently pregnant women.¹² The study enrolled a total of 131 vaccinated participants (84 pregnant, 31 lactating, 16 non-pregnant) as well as 37 participants naturally infected with COVID during their pregnancies. Using serum analysis,