

February 17, 2021

Dear Colleagues,

Each February, we celebrate the legacies of Black trailblazers in every walk of life. There are several virtual events in February to recognize and celebrate **Black History Month** at the UA and these remind us all of the work together to eliminate anti-Black structural racism in the U.S.

You can participate in these live events or watch recordings when available:

- Africana Studies Program's series of forums, showcases, guest DJ sessions and lectures
- A Feb. 18 seminar on African-American/Black Authors' Perspectives on Publishing in Medical Education Journals
- Office of Diversity and Inclusion Feb. 26 webinar Moving Forward, Looking Black
- In addition: resources from the ALVSCE Diversity and Inclusion Council

UA has a special wildcat logo in honor of Black History Month and here are the stories behind the iconography selected by students, faculty, staff, campus cultural groups and alumni.

This Friday, academic unit heads, academic unit business officers, other appointed administrators and business officers, faculty and staff shared governance representatives, and the Executive Council will meet for the ALVSCE Spring Budget and Planning Retreat. This is one of two annual indispensable shared governance ALVSCE business events. This is recorded and will be posted for you to view soon after the retreat has ended.

I've heard from some of you who are trepidatious about taking the next steps in teaching next Monday; others have told me how excited you are to be able to interact with your students in-person again; for many of you, it is both. Our students are feeling the same way, and a lot are entering UA classrooms for the very first time. I want to thank all our faculty and teaching assistants who have carried such a massive, stressful load for almost a year now and continue to serve and fulfill our promise to Arizona students by teaching from every setting.

I want to now focus on YOU: In my last letter I said that I believed we are at the end of the beginning of the pandemic. I think we will enter the beginning of the end of this pandemic as soon we can get enough people vaccinated to be ahead of the disease caused by the more infectious SARS COV2 variants that are becoming predominant in the U.S. If you are following the news, you will know the good news that more vaccine manufacturers should have FDA emergency use authorization within weeks and vaccine production is increasing now.

In addition, the University of Arizona was just designated a high-capacity state COVID-19 vaccination site serving southern Arizona. To register for your vaccines go to the [State of Arizona webpage](#) to make **an appointment** at the UA point of distribution (POD). **You must make an appointment. Do not just show up.**

If you have received a Pfizer primer vaccination via the Pima County Health Dept. registration, you will be able to receive your booster Pfizer dose at the UA POD. Otherwise, the UA POD will be using the Moderna vaccine.

Many of you already have an appointment for your primer vaccine, many of you are preparing for your booster vaccine, and a very few have had both. To help inform you on the process and what you can anticipate when you get your booster, I want to share the following table from the College of Medicine-Tucson.

The Process	Possible Side Effects	Reaction Info
Bring your vaccine card with you so your second dose can be documented	Pain/soreness at the injection site	If you had a reaction to your first dose requiring medical treatment (e.g. epinephrine or Benadryl), you may be required to see an allergist-immunologist for evaluation and recommendations.
	Fatigue	
	Headache	
If you are able, try to <u>schedule the day after off</u> – some people experience more side effects with the second dose than the first, so it is best to plan ahead.	Body aches	
	Low-grade fever	
	Chills	

If you are like me and know you have been infected with SARS COV2 (whether you were symptomatic or not), I recommend that you discuss how best you should be vaccinated with your medical provider. I found the attached paper useful. I will be vaccinated consistent with my own optimal immune status, continued non-SARS COV2 shedding and my best chance of not having *major* vaccine side effects—and when I am not taking a vaccine from others who need it much more than I do right now.

Make no mistake, I am pro-vaccination in general and very pro-vaccination against COVID. I know very well the science that shows vaccination is critical to most quickly and effectively getting our economy back up and running, stopping the devastating non-COVID health effects of this pandemic, decreasing risks of “long COVID” morbidity, getting our health care system operating as normal, and saving lives.

We still have a lot of work to do together before our population immunity is such that SARS COV2 is “under control” like we say of measles and influenza. So please remember that even as vaccination is continuing as well as it is at the UA, we must keep doing all we can to control this pandemic by masking up and social distancing as if our most susceptible loved ones’ lives depend on it, *because they do*.

Hang in there for this last hard haul together.



Shane C. Burgess

1 **Robust spike antibody responses and increased reactivity in seropositive individuals after a**  
2 **single dose of SARS-CoV-2 mRNA vaccine**

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## 28 **Abstract**

29 An important question is arising as COVID-19 vaccines are getting rolled out: Should individuals  
30 who already had a SARS-CoV-2 infection receive one or two shots of the currently authorized mRNA  
31 vaccines. In this short report, we show that the antibody response to the first vaccine dose in individuals  
32 with pre-existing immunity is equal to or even exceeds the titers found in naïve individuals after the second  
33 dose. We also show that the reactogenicity is significantly higher in individuals who have been infected  
34 with SARS-CoV-2 in the past. Changing the policy to give these individuals only one dose of vaccine  
35 would not negatively impact on their antibody titers, spare them from unnecessary pain and free up many  
36 urgently needed vaccine doses.

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## 38 **Manuscript**

39 Two SARS-CoV-2 spike mRNA vaccines received emergency use authorization by the FDA in  
40 December 2020 (BNT162b2/Pfizer; mRNA-1273/Moderna).<sup>1</sup> Both Phase 3 trials reported high efficacy in  
41 preventing symptomatic SARS-CoV-2 infections after two doses of the vaccine administered three to four  
42 weeks apart (BNT162b2: 21 days; mRNA-1273: 28 days) in participants without previous COVID-19.<sup>2,3</sup> For  
43 individuals with pre-existing immunity to SARS-CoV-2 the first vaccine dose likely immunologically  
44 resembles the booster dose in naïve individuals. Anecdotally, individuals with pre-existing immunity also  
45 experience more severe reactogenicity after the first doses compared to naïve individuals. This begs the  
46 question if individuals with pre-existing immunity should even receive a second dose of vaccine.

47

48 Here we describe the antibody responses in 109 individuals with and without documented pre-  
49 existing SARS-CoV-2 immunity (seronegative: 68, seropositive: 41) who received their first vaccine dose  
50 in 2020. Repeated sampling after the first dose indicates that the majority of seronegative individuals  
51 mount variable and relatively low SARS-CoV-2 IgG responses within 9-12 days after vaccination (median  
52 AUC pre-vaccination: 1 [N=68]; 9-12 days: 439 [N=13]; 13-16 days: 1037 [N=15], 17-20 days: 1,037  
53 [N=15], 21-24 days: 1,075 [N=11], and post 2<sup>nd</sup> dose 1,399 [N= 21]; Fig. 1A). In contrast, individuals with  
54 pre-existing SARS-CoV-2 immune responses (as evidenced by SARS-CoV-2 antibodies) rapidly develop  
55 uniform, high antibody titers within days of vaccination (median AUC pre vaccination: 91 [N=41]; 5-8 days:  
56 14,208 [N=15], 9-12 days: 20,783 [N=8]; 13-16 days: 25,927 [N=20], 17-20 days: 12,661 [N=5], 21-24  
57 days: 16,263 [N=4] and post 2<sup>nd</sup> dose: 22,509 [N=7], Fig. 1A). The antibody titers of vaccinees with pre-  
58 existing immunity are not only 10-20 times higher than those of naïve vaccines at the same time points ( $p$   
59  $<0.0001$ , two tailed Mann Whitney test), but also exceed the median antibody titers measured in naïve  
60 individuals after the second vaccine dose by more than 10-fold. Ongoing follow-up studies will show  
61 whether these early differences in immune responses are maintained over time.

62 In addition, we compared frequency of local, injection side-related as well as systemic reactions  
63 after the first dose of vaccination in 231 individuals (148 seronegative and 83 seropositive; Fig. 1B).  
64 Overall both vaccines are well tolerated without any side effects requiring additional medical attention.  
65 159/231 of the participants completing the survey after the first dose experienced any kind of side effect  
66 (66% seronegative and 73% seropositive). Most common were localized injection site symptoms (e.g.,  
67 pain, swelling and erythema), which occurred with equal frequency independent of the serostatus at the  
68 time of vaccination and resolved spontaneously within days of vaccination. Vaccine recipients with pre-  
69 existing immunity experience systemic side effects with a significantly higher frequency than antibody  
70 naïve vaccines (e.g., fatigue, headache, chills, fever, muscle or joint pains, in order of decreasing  
71 frequency,  $P < 0.001$  for all listed symptoms, Fisher's exact test, two-sided). Most of the participants for  
72 whom antibody results are presented above also completed the vaccine side-effect survey.

73

74 These findings suggest that a single dose of mRNA vaccine elicits very rapid immune responses in  
75 seropositive individuals with post-vaccine antibody titers that are comparable to or exceed titers found in  
76 naïve individuals who received two vaccinations. We also noted that vaccine reactogenicity after the first  
77 dose is substantially more pronounced in individuals with pre-existing immunity akin to side-effects  
78 reported for the second dose in the phase III vaccine trials<sup>2,3</sup>. These observations are in line with the first  
79 vaccine dose serving as boost in naturally infected individuals providing a rationale for updating vaccine  
80 recommendations to considering a single vaccine dose to be sufficient to reach immunity. Using  
81 quantitative serological assays that measure antibodies to the spike protein could be used to screen  
82 individuals prior to vaccination if the infection history is unknown.<sup>4,5</sup> Such policies would allow not only  
83 expanding limited vaccine supply but also limit the reactogenicity experienced by COVID-19 survivors.

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#### 85 **Acknowledgment**

86 We thank the study participants for their generosity and continued support of COVID19 research.

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#### 88 **Ethics statement**

89 The study protocols for the collection of clinical specimens from individuals with and without SARS-CoV-2  
90 infection by the Personalized Virology Initiative were reviewed and approved by the Mount Sinai Hospital  
91 Institutional Review Board (IRB-16-00791; IRB-20-03374). All participants provided informed consent prior  
92 to collection of specimen and clinical information. All specimens were coded prior to processing.

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#### 94 **Conflict of interest statement**

95 The Icahn School of Medicine at Mount Sinai has filed patent applications relating to SARS-CoV-2  
96 serological assays and NDV-based SARS-CoV-2 vaccines which list Florian Krammer as co-inventor.

97 Daniel Stadlbauer and Viviana Simon are also listed on the serological assay patent application as co-  
98 inventors. Mount Sinai has spun out a company, Kantaro, to market serological tests for SARS-CoV-2.  
99 Florian Krammer has consulted for Merck and Pfizer (before 2020), and is currently consulting for Seqirus  
100 and Avimex. The Krammer laboratory is also collaborating with Pfizer on animal models of SARS-CoV-2.

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## 102 **Funding statement**

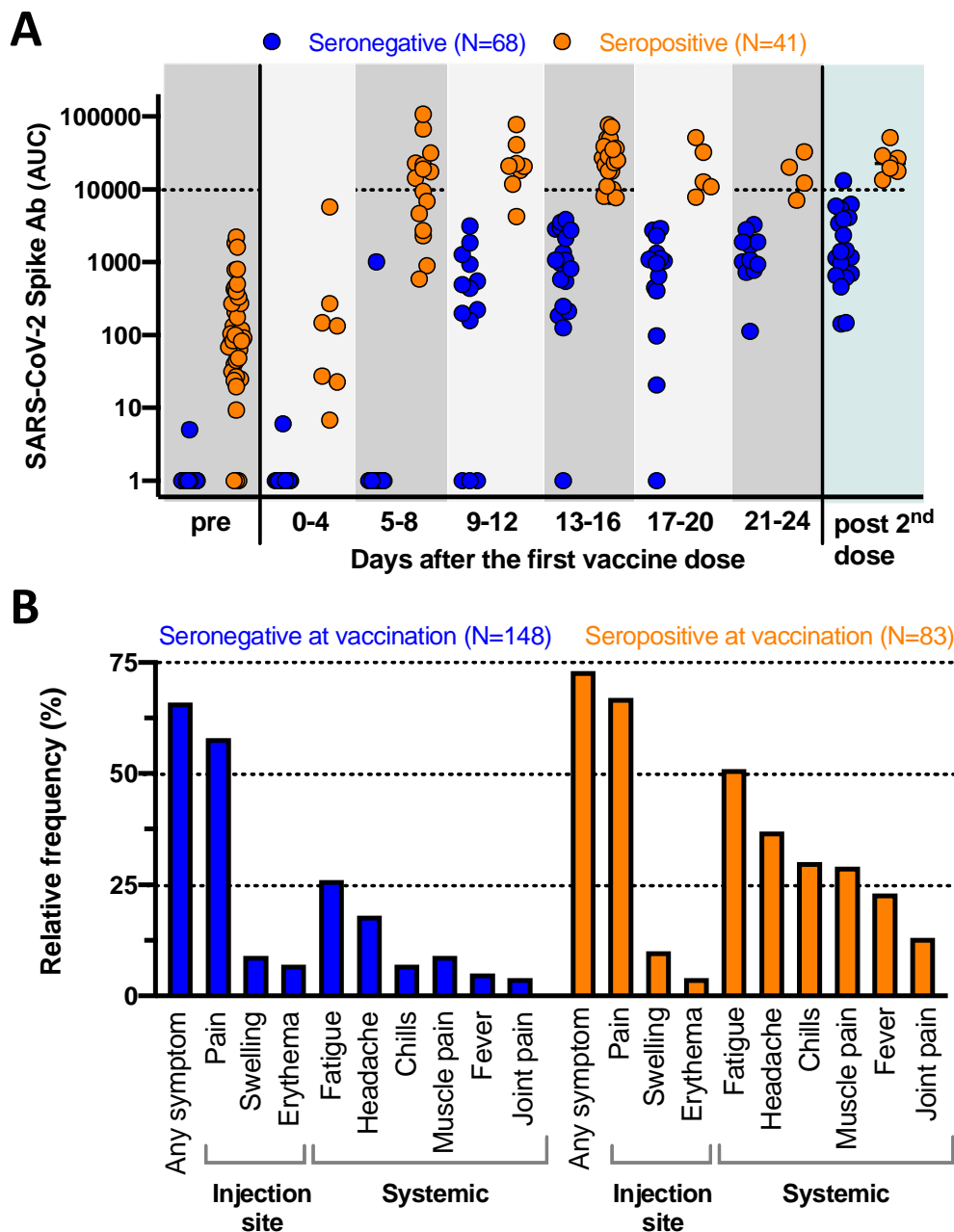
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**Fig. 1:** Immunogenicity and reactogenicity of SARS-CoV-2 RNA vaccines. A: Quantitative SARS-CoV-2 spike antibody titers (ELISA, expressed as area under the curve, AUC) for 109 individuals. “Pre” represents the antibody response prior to vaccination while “post 2<sup>nd</sup> dose” indicates the immune responses mounted after the second vaccine dose. Note that some of the individuals with pre-existing immunity had antibody titers below detection (AUC of 1) at the time point prior to vaccination. B: Vaccine associated side effects experienced after the first dose (N= 231 individuals). The local side effects occur with comparable frequency while the systemic symptoms are significantly more common in the individuals with pre-existing immunity.