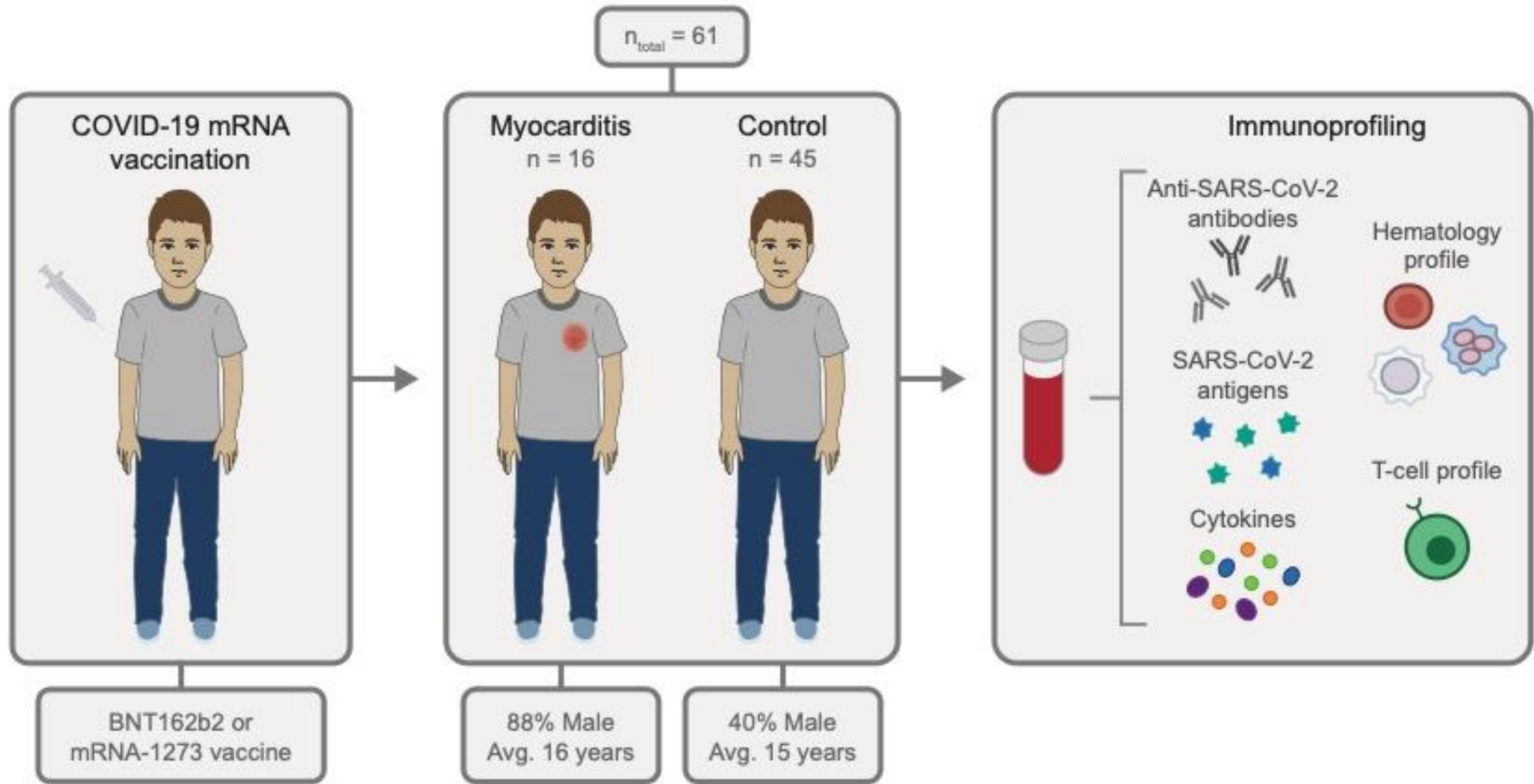


Circulating Spike protein detected in post-COVID-19 mRNA vaccine myocarditis

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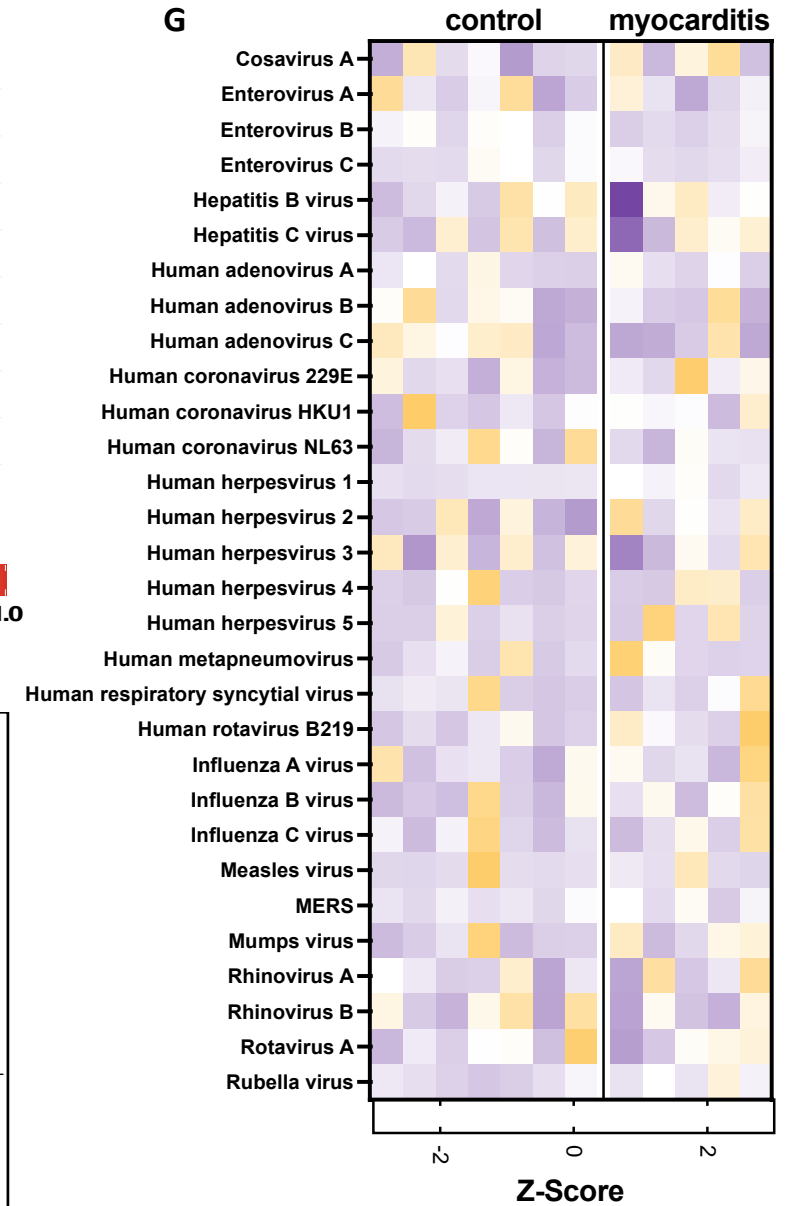
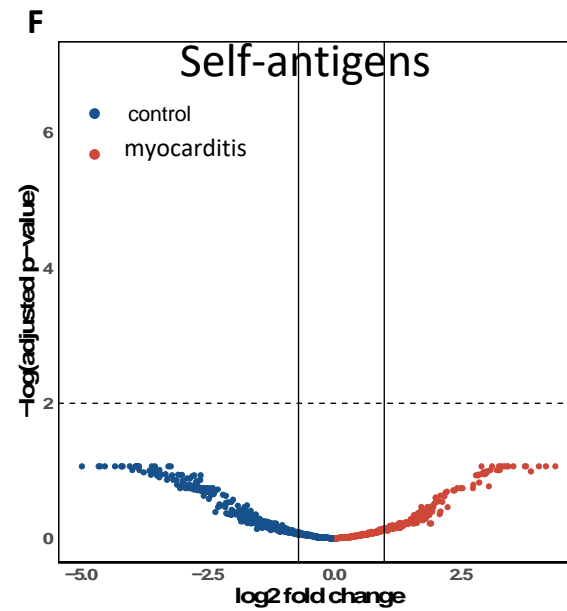
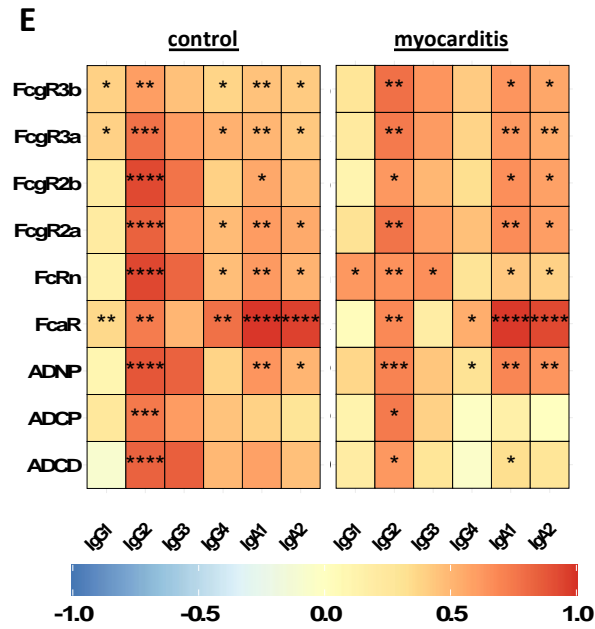
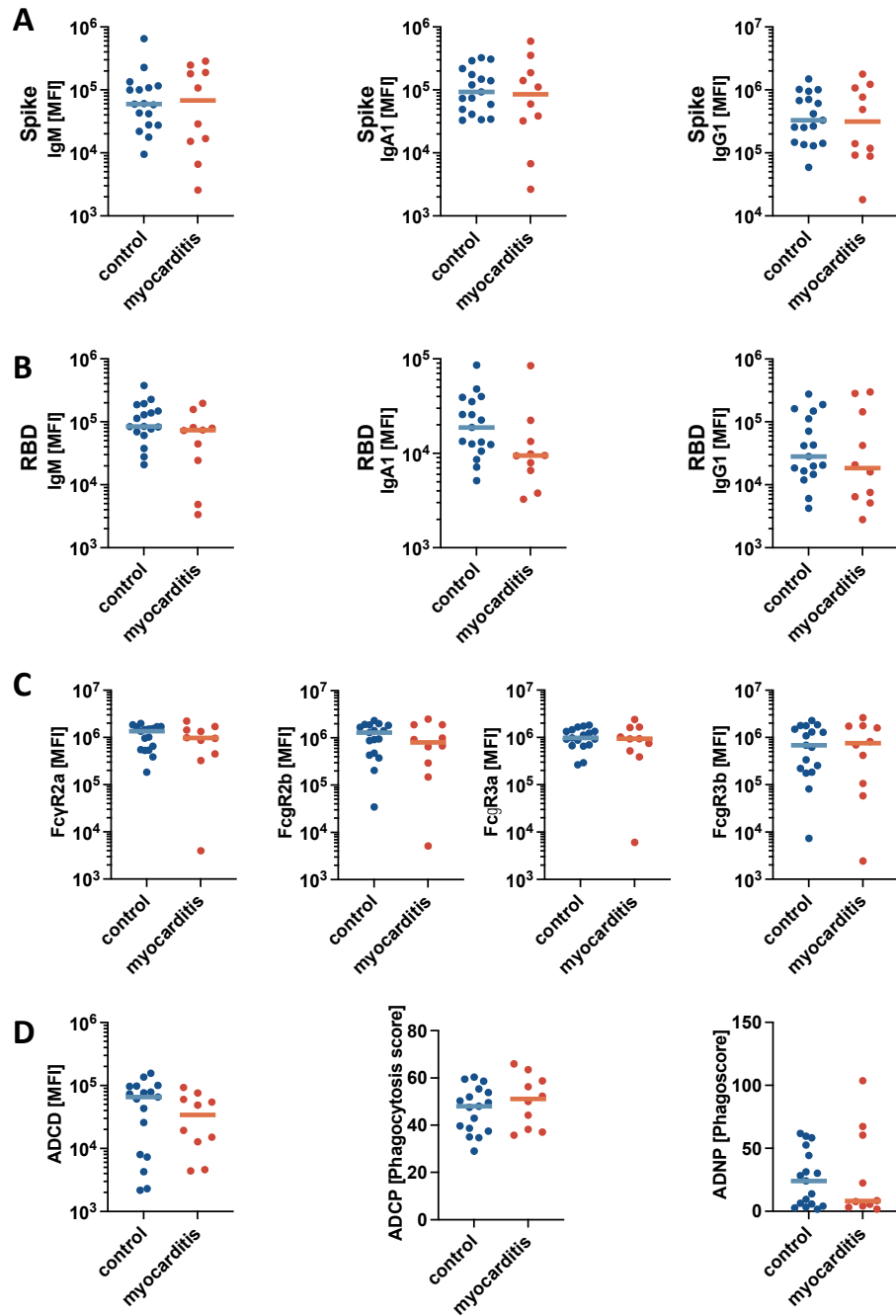


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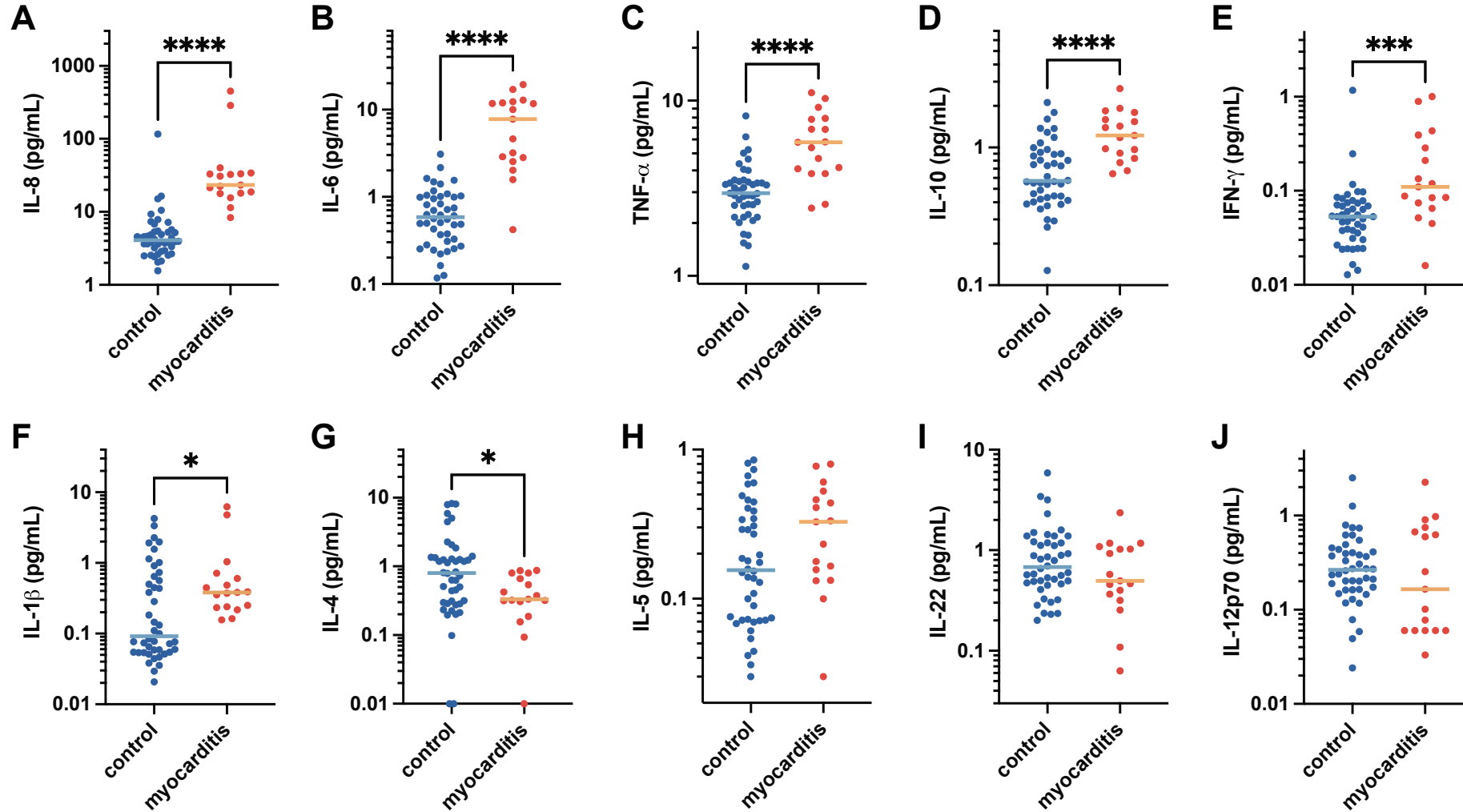
Patient Characteristics	Post-Vaccine Myocarditis (n = 16)	Vaccinated Controls (n = 45)
Age at Enrollment, average (min, max)	16 (12, 21)	15 (12, 20)
Male Sex, number (%)	13 (81)	18 (40)
Race, number (%)		
Asian	2 (13)	4 (9)
Black	0 (0)	1 (2)
White	11 (69)	23 (51)
Other	2 (13)	10 (22)
Unknown	1 (6)	7 (16)
Hispanic, number (%)	5 (31)	9 (20)
Days Between Vaccination and Sample Collection, median (min, max)	4 (1, 19)	14 (4, 21)

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Patient	Vaccine Type	Doses Received	Time between Vaccination and Symptom Onset (days)	Symptoms at Presentation	Highest Level of Hospital Care	Duration of Hospital Stay (days)	Peak Troponin (ng/L)	Peak CRP (mg/L)
1	BNT162b2	1	3	Chest pain	Ward	3	210	52.4
2	BNT162b2	1	19	Chest pain, shortness of breath, right arm numbness, lightheadedness	Pediatric ICU	5	2005	41.8
3	BNT162b2	2	9	Chest pain, burning and tightness, fever, headache, myalgias, skin rash/ulcers, sleep disturbance	Ward	3	1340	75.2
4	BNT162b2	2	2	Chest pain, burning and tightness, shortness of breath, chills/rigors, fatigue and weakness	Ward	3	90	76.1
5	BNT162b2	2	2	Chest pain, burning and tightness, fever, headache, cough, sore throat, rhiorrhea, congestion, abdominal pain, nausea/vomiting, diarrhea, loss of appetite, myalgias, fatigue and weakness, altered awareness/confusion, delerium, loss of sense of smell, swollen and cracked lips, lymphadenopathy	Pediatric ICU	6	190	45.1
6	BNT162b2	2	2	Chest pain, burning and tightness, chills/rigors, headache, myalgias, fatigue/weakness	Ward	3	910	20.7
7	BNT162b2	2	3	Chest pain, burning and tightness, shortness of breath, fever, chills/rigors, headache, myalgias, arthralgias, abdominal pain, nausea, loss of appetite, fatigue and weakness	Ward	2	250	15.4
8	BNT162b2	2	1	Chest pain, shortness of breath	Ward	2	184	9.3
9	BNT162b2	2	3	Chest pain, burning and tightness, shortness of breath, headache	Ward	3	230	30
10	BNT162b2	2	3	Chest pain	Ward	4	270	74.3
11	BNT162b2	2	5	Chest pain, burning and tightness, chills/rigors, headache, productive cough, wheezing, sore throat, rhinorrhea/congestion, myalgias, lymphadenopathy, fatigue and weakness	Ward	3	250	27.4
12	BNT162b2	2	3	Chest pain, burning and tightness, fever, chills/rigors, headache, difficulty walking	Ward	4	240	15.9
13	mRNA-1273	2	4	Chest pain, shortness of breath, left upper arm pain	Pediatric ICU	4	1127	11.2
14	mRNA-1273	2	2	Chest pain, palpitations	Ward	3	1008	29.5
15	BNT162b2	3	2	Chest pain, left-sided neck pain	Ward	4	4040	32.4
16	mRNA-1273	3	4	Chest pain, nausea/vomiting, left arm numbness, sweating	Ward	3	1074	8

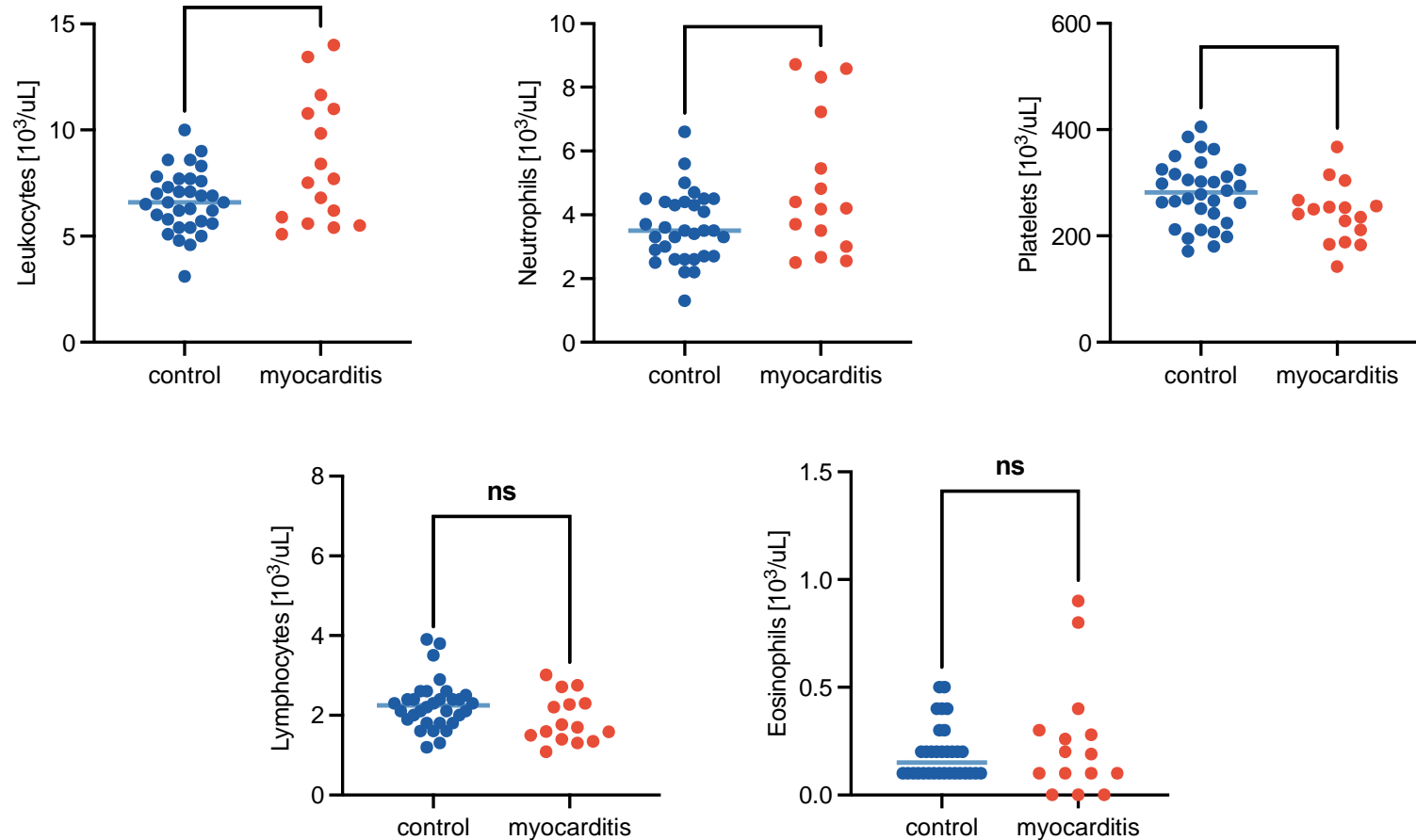


Cytokine profiles:



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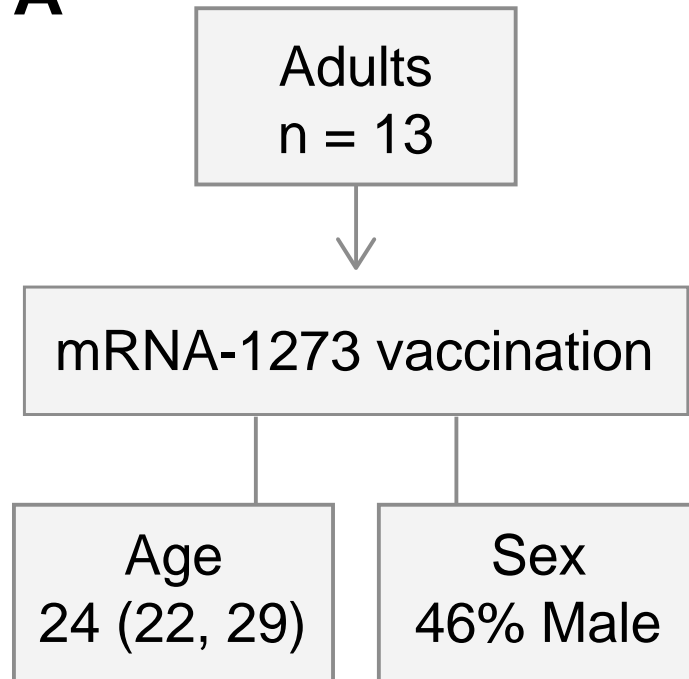
Complete blood cell counts:



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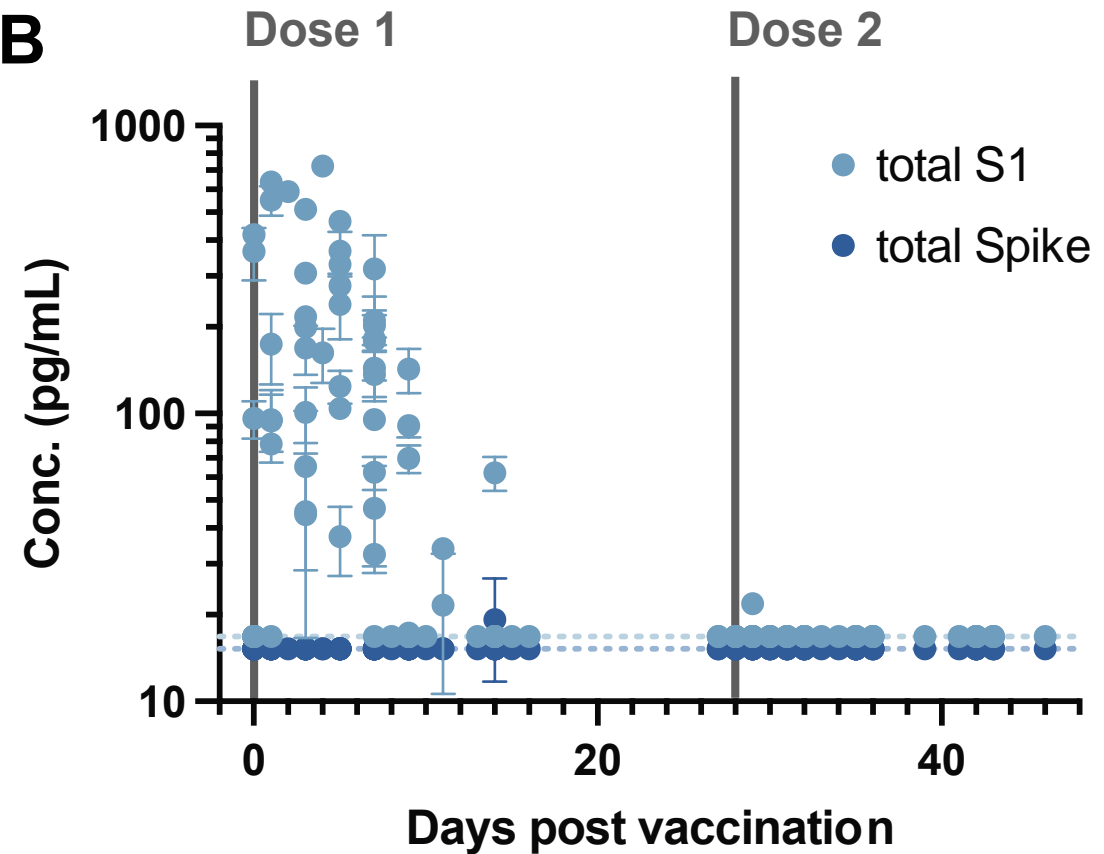
S1 antigen detected post-vaccination in healthy adults:

A



Ogata *et al.* 2021

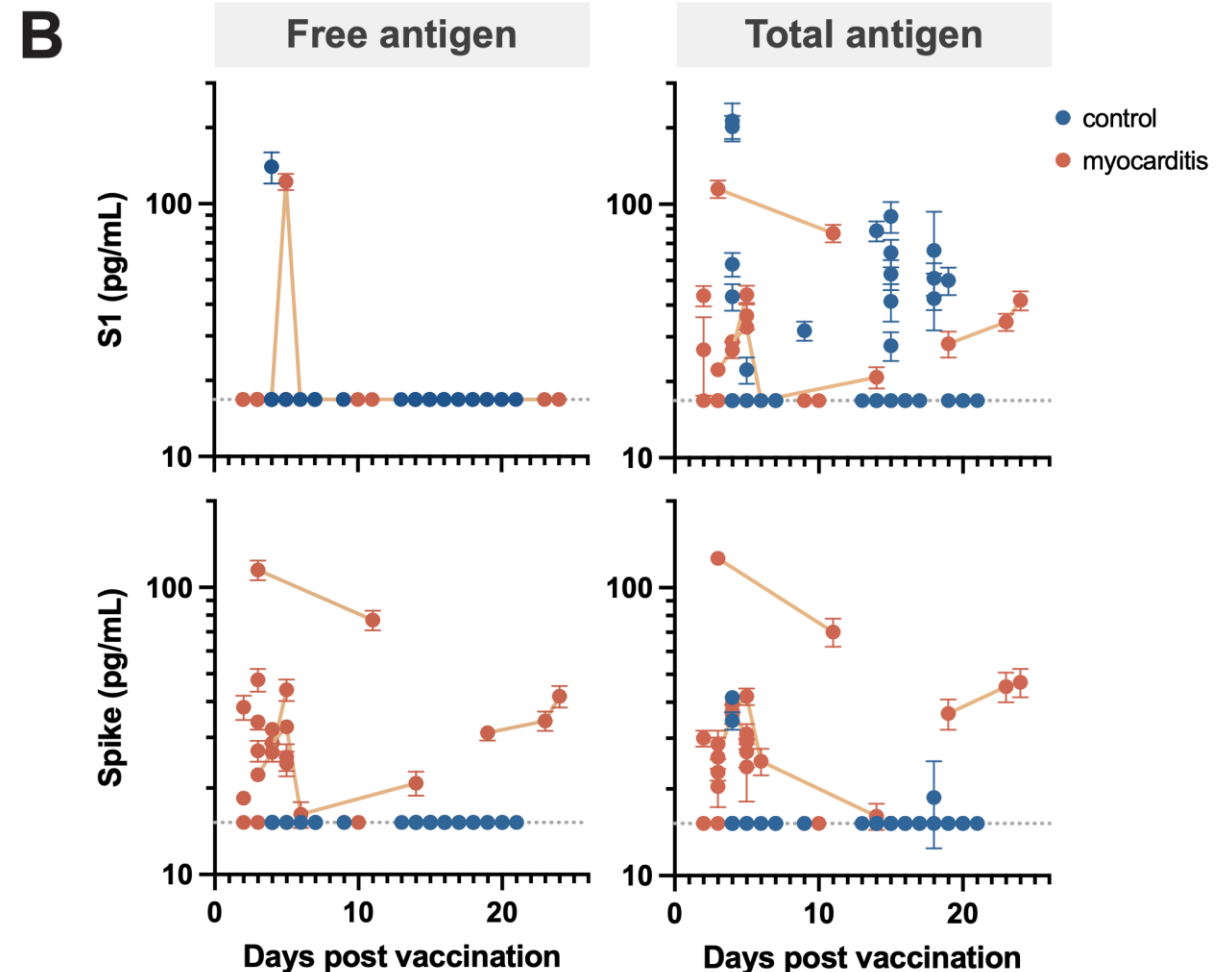
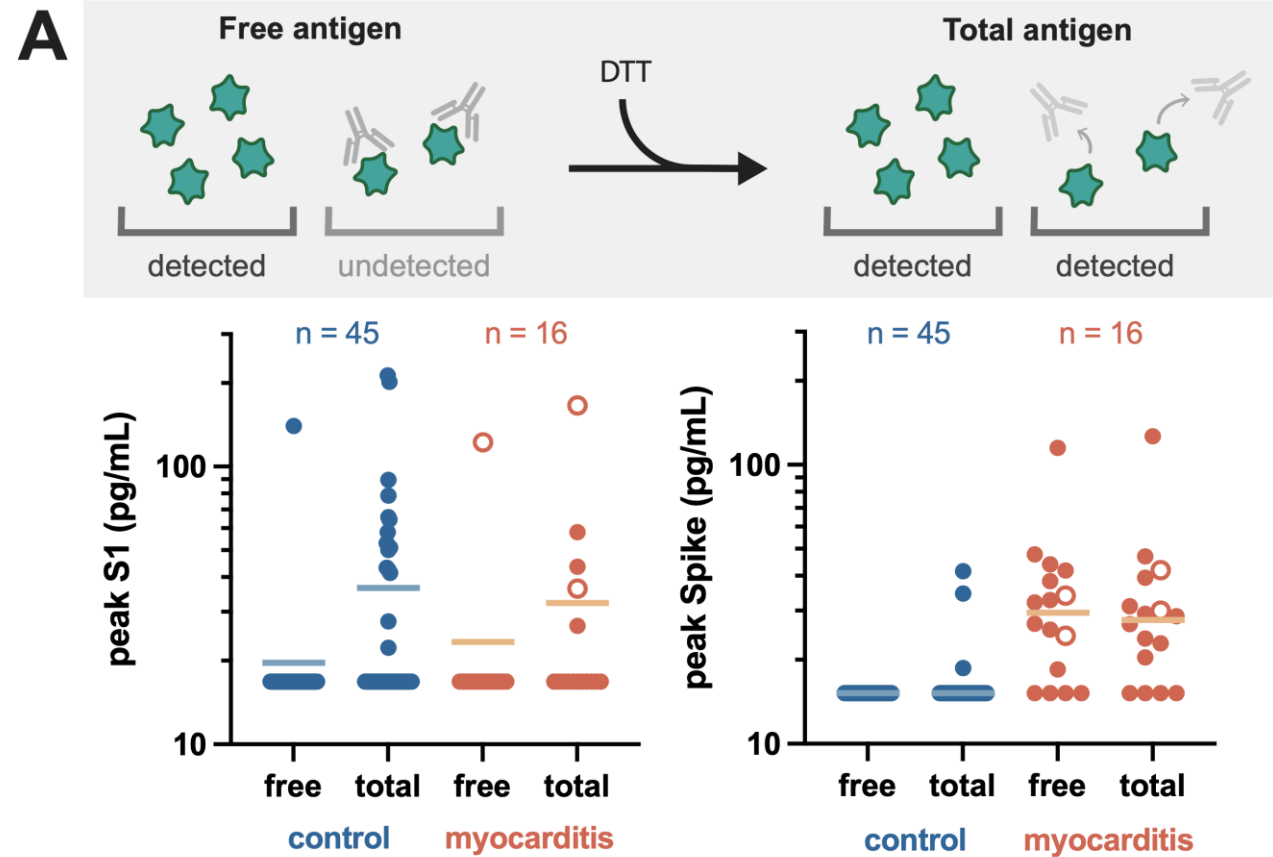
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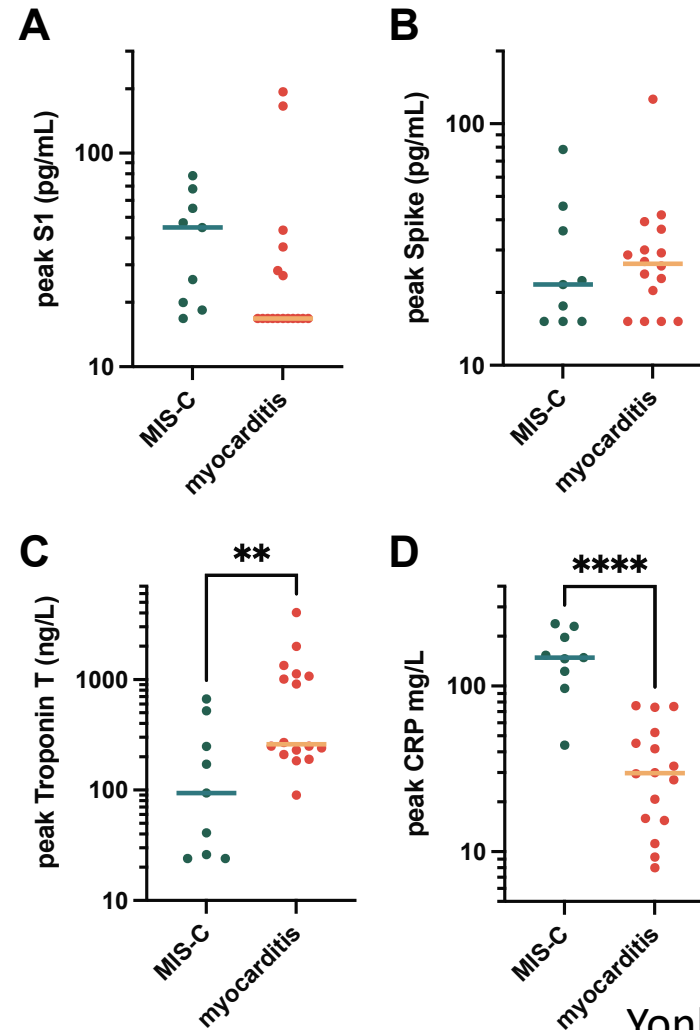
Full length Spike unbound by antibodies

Exclusively detected in post-vaccine myocarditis:



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How does MIS-C compare with post-vaccine myocarditis?

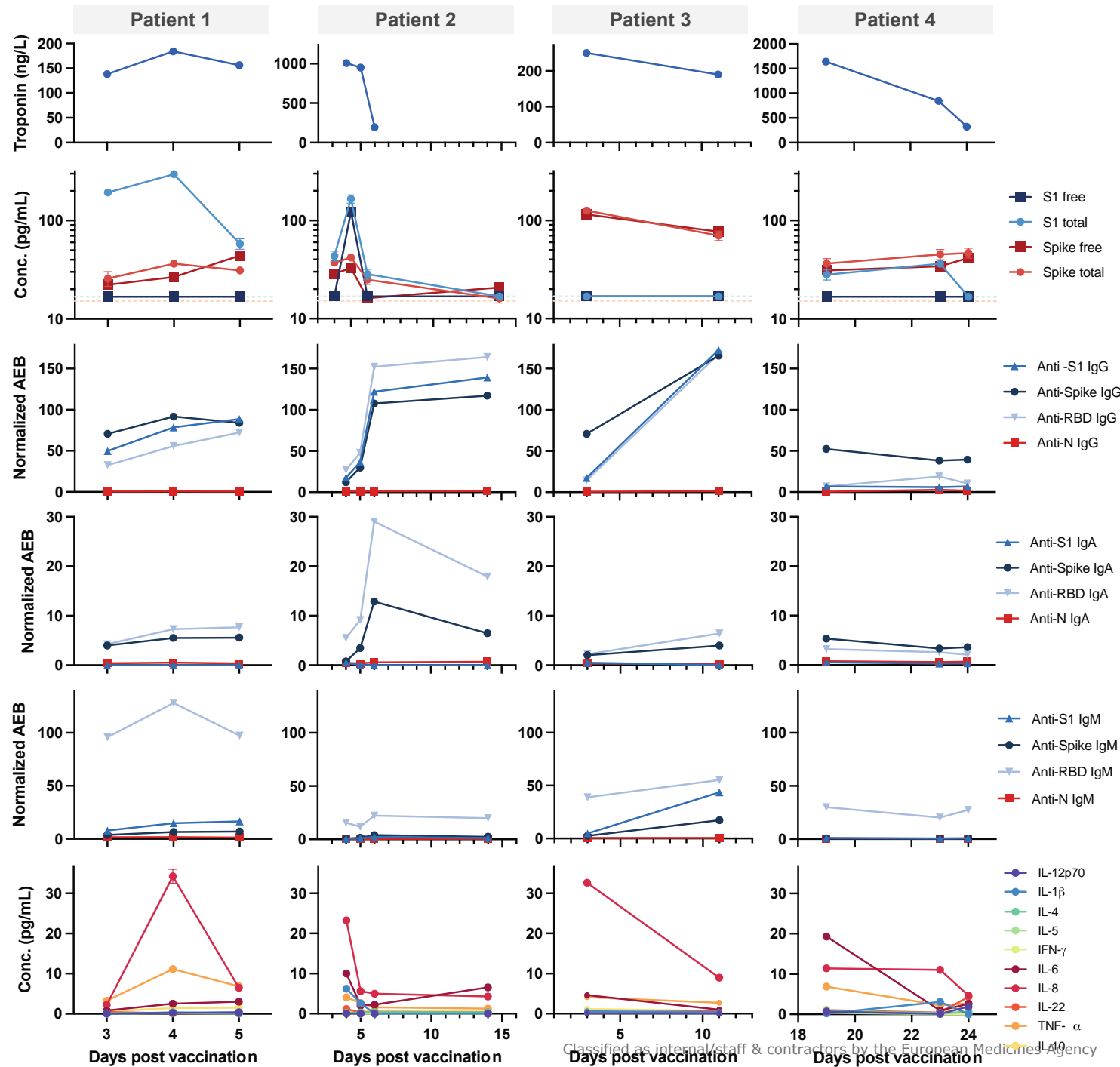


Yonker LM, Golboa T, Ogata AF... Walt DR, Fasano

A. J Clin Invest. 2021 Jul 15. PMID: 34032635 Classified as internal/staff & contractors by the European Medicines Agency

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Conclusions:

- Comparing post-vaccine myocarditis with vaccinated controls:
 - No differences in anti-SARS-CoV-2 antibody response
 - No differences in neutralization
 - No autoantibodies
 - No underlying/co-infection
 - No differences in SARS-CoV-2 specific T cell responses
- Differences detected:
 - Increased cytokines, increased innate cell response
 - Increased free Spike

Implications/Considerations:

- **Does not change risk/benefit ratio for COVID vaccines**
- Spike directly inflames endothelium and cardiac pericytes?
- Why is Spike not bound by antibodies?
- Implications for treatment or post-vaccine myocarditis? Monoclonal antibodies, IVIG?
- Is Spike seen in other complications post- mRNA vaccination?
- Differences in S1 clearance in adolescents vs adults? Is this important?