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Shin Jie Yong Follow

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Yes, mRNA Vaccine Can Cause Blood Vessel Dysfunction and Inflammation, But It's Minor and Short-lived.

And it's not unique to mRNA vaccines.

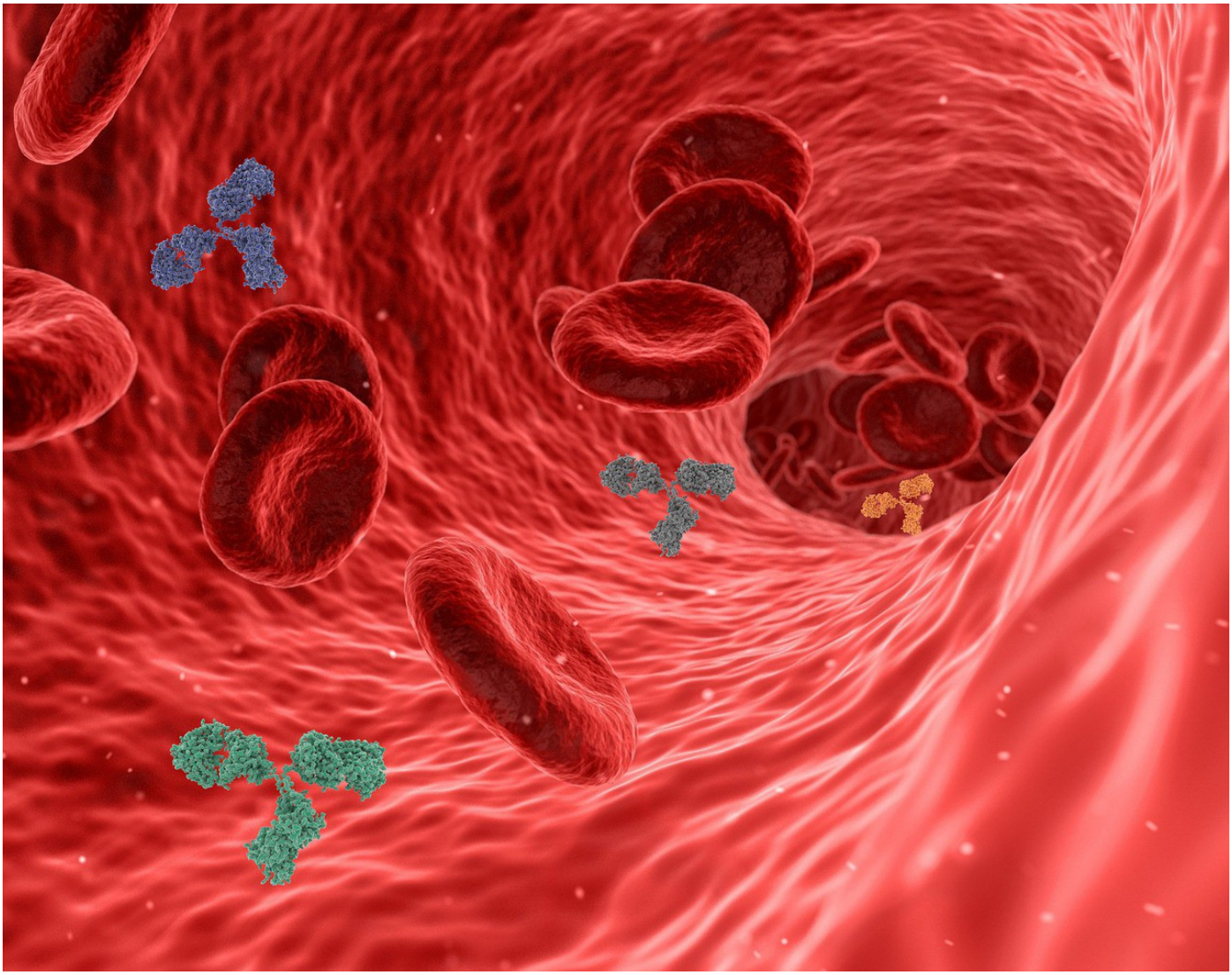


Image by swiftsciencewriting from Pixabay

Mixing in a bit of fact is a convincing way to tell a lie. Recently, a few studies on mRNA vaccine safety have been published, which anti-vaccine communities may easily exploit to push their narrative.

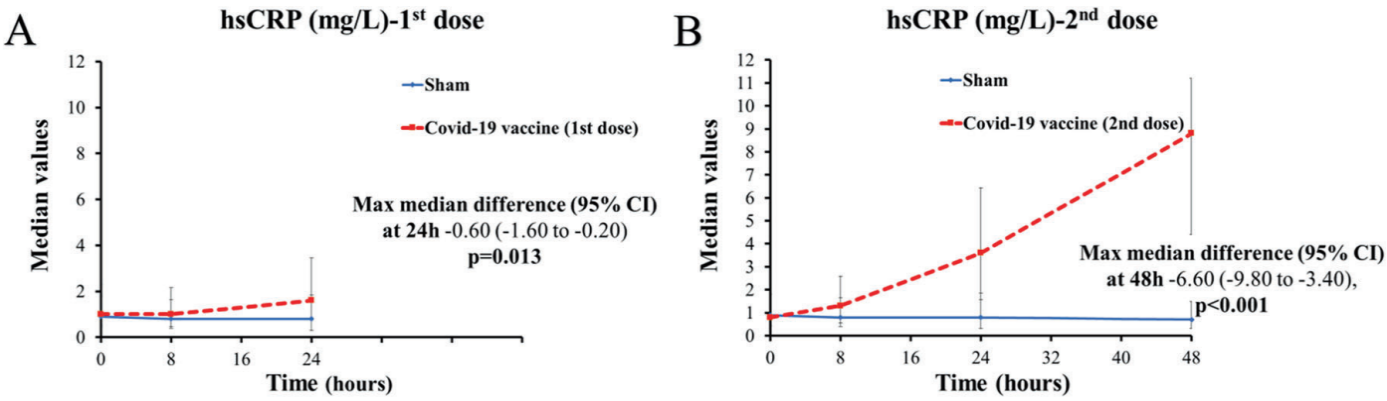
But let's first understand what those studies discovered and how they shape our understanding of Covid/SARS-CoV-2 mRNA vaccines. I find these studies through the PubMed biomedical literature database, using the relevant keywords to derive and filter through several papers.

How mRNA vaccines affect blood vessels

In a published paper, "*The effect of an mRNA vaccine against COVID-19 on endothelial function and arterial stiffness*," researchers from Greece recruited 32 healthy adults (mean age of 37 years; 65% males) with upcoming mRNA vaccination (Pfizer) or placebo injection.

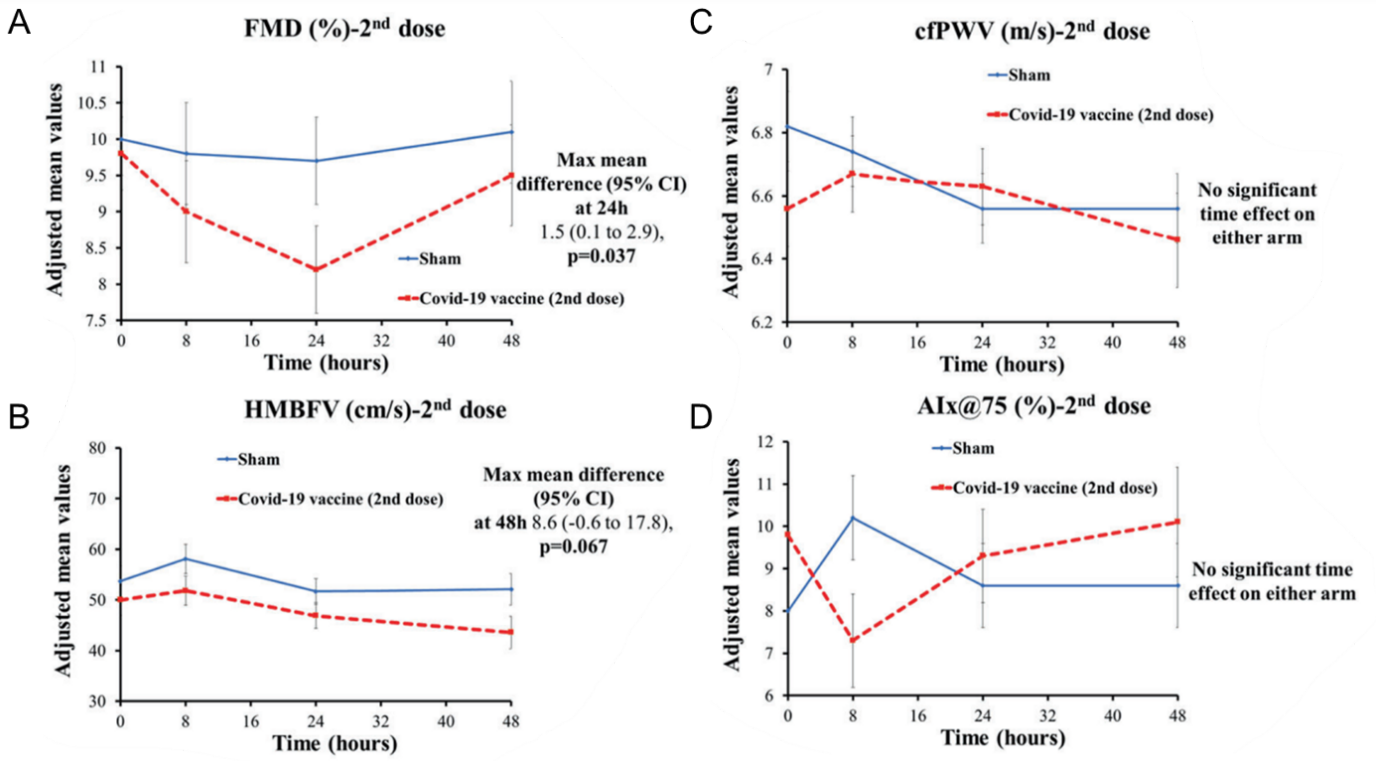
Their endothelial (blood vessel) function, aortic (main artery) stiffness, and C-reactive protein (biomarker for inflammation) were measured before and after vaccination/placebo injection.

Results were normal at baseline before any injection. But at 24-hour after the first mRNA vaccine dose, CRP rose a little by 0.6 mg/L compared to the placebo injection. At 24–48-hour after the second dose, however, CRP rose even more by up to 9.8 mg/L vs. placebo injection:



Source: Terentes-Printzios et al. (2022). Measurement of high-sensitivity C-reactive protein (hsCRP; an inflammatory biomarker) after the first (panel A) and second (panel B) dose of Pfizer mRNA vaccine.

Moving on, blood vessel function did not change after the first dose vs. placebo. But blood vessel function — measured by brachial artery flow-mediated dilatation (FMD) — dropped slightly by 15% at 24-hour, which returned to baseline at 48-hour after the second dose. And there were no significant differences in aortic stiffness after vaccination vs. placebo:



Source: Terentes-Printzios et al. (2022). Measurement of endothelial (blood vessel) function using brachial artery flow-mediated dilatation (FMD; panel A) and hyperemic mean blood flow velocity (HMBFV; panel B), as well as aortic stiffness using carotid-femoral pulse wave velocity (cfPWV; panel C) and aortic augmentation index (AIx@75 panel D). No significant differences in panels B-D ($p > 0.05$).

But thankfully, none of the participants had any major adverse events that adversely impact their health.

"This study shows, for the first time, that the [Pfizer] mRNA COVID-19 vaccine causes a prominent increase in inflammatory markers, especially after the 2nd dose, which is also associated with a moderate transient deterioration of endothelial function at 24 h [which recovered at 48h]," the study authors concluded. "These results confirm the short-term cardiovascular safety of the vaccine despite its potent inflammatory response."

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2. Data from Denmark

In another study, "*Inflammation and Platelet Activation After COVID-19 Vaccines — Possible Mechanisms Behind Vaccine-Induced Immune Thrombocytopenia and Thrombosis*," Denmark

Compared to unvaccinated controls, both the DNA and mRNA vaccine groups had about 10–50% higher levels of blood-clotting biomarkers (e.g., platelet count and aggregation, D-dimer, and fibrinogen) one week after vaccination:

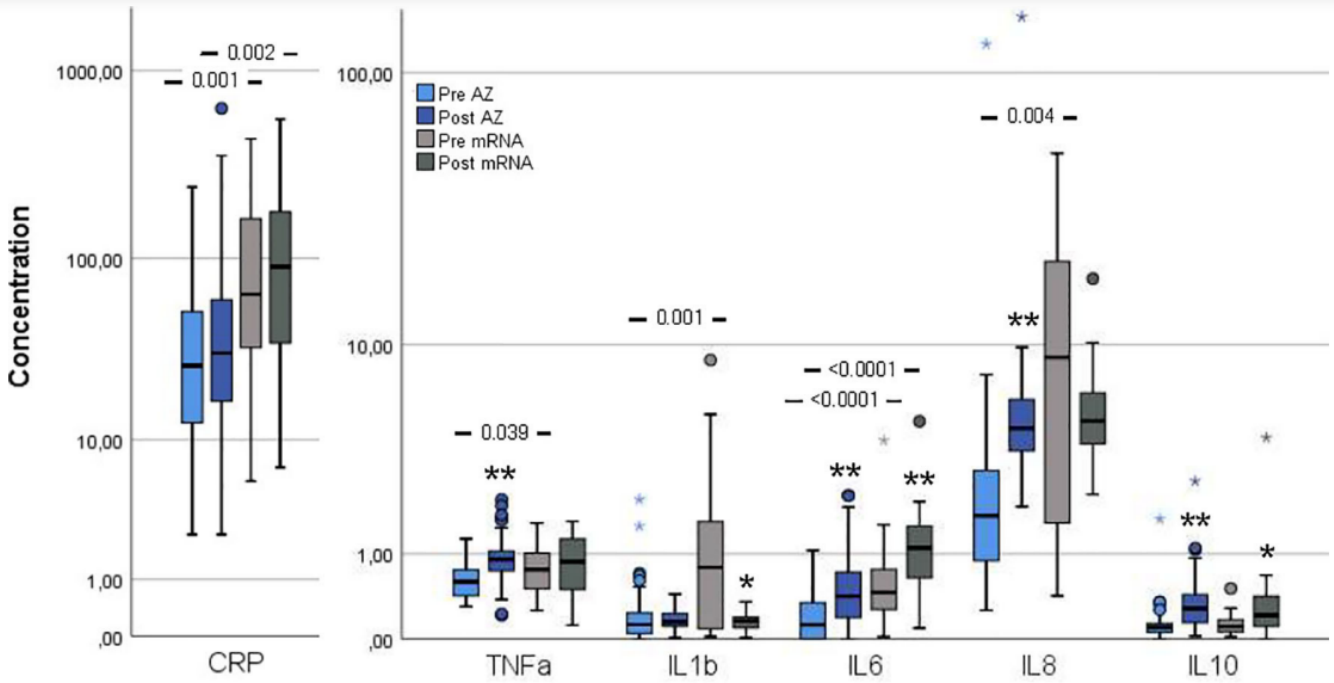
TABLE 1 | Coagulation, primary and secondary hemostasis and thrombin generation post-vaccination either AZ (n=55) or mRNA (n=25) vaccines and in non-vaccinated age and gender matched controls (n=55).

Group	Unit	AZ Median (IQR)	mRNA Median (IQR)	AZ *vs* mRNA p-value	Controls Median (IQR)	Con *vs* AZ	Con *vs* mRNA
Standard coagulation							
Platelet count	10^9/L	285 (251-329)	265 (217-279)	**0.013**	245 (215-281)	**<0.0001**	NS
D-dimer	FEU/L	0.30 (0.25-0.43)	0.26 (0.25-0.38)	NS	0.25 (0.25-0.32)	**0.004**	NS
Fibrinogen	µmol/L	8.78 (7.39-9.92)	10.59 (8.45-12.54)	**0.004**	8.29 (7.08-9.71)	NS	**0.001**
aPTT	Sec	23.3 (21.8-25)	22.6 (21.7-24.4)	NS	23.7 (22.7-24.7)	NS	**0.032**
INR	IU	1.00 (1.00-1.06)	1.00 (1.00-1.00)	NS	1.00 (1.00-1.05)	NS	**0.042**
Platelet aggregation (Multiplate)							
COLtest	AUC	688 (582-770)	695 (645-766)	NS	464 (367-611)	**<0.0001**	**<0.0001**
ADPtest	AUC	809 (690-984)	808 (677-964)	NS	810 (754-1,007)	NS	NS
ASPItest	AUC	1,060 (896-1,194)	1,066 (791-1,164)	NS	1,074 (962-1,164)	NS	NS
ASPItest*	AUC	1,065 (946-1,206)	1,066 (800-1,175)	NS	1,074 (962-1,164)	NS	NS
Thromboelastometry (ROTEM)							
EXTEM CT	Sec	62 (60-67)	64 (58-66)	NS	63 (56-67)	NS	NS
EXTEM MCF	mm	65 (62-67)	66 (62-68)	NS	63 (60-66)	**0.007**	**0.023**
EXTEM LI30	%	100 (100-100)	100 (100-100)	NS	100 (100-100)	NS	NS
INTEM CT	Sec	187 (178-198)	184 (175-212)	NS	181 (173-190)	**0.015**	NS
INTEM MCF	mm	63 (62-66)	64 (61-67)	NS	63 (60-65)	NS	NS
INTEM LI30	%	99 (98-100)	100 (99-100)	**0.007**	100 (99-100)	**0.007**	NS
FIBTEM MCF	mm	16 (13-19)	16 (14-20)	NS	15 (11-17)	**0.007**	**0.014**
Thrombin generation							
Lagtime	min	2.74 (2.40-3.40)	3.33 (3.00-3.33)	**0.011**	2.83 (2.67-3.00)	**NS**	**<0.0001**
Peak	nM	241 (198-279)	198 (174-253)	**0.030**	221 (190-254)	NS	NS
ttPeak	min	6.24 (5.41-7.24)	7.00 (6.50-7.71)	**0.003**	6.33 (6.00-7.00)	NS	**<0.0001**
ETP	nM*min	1,430 (1,346-1,673)	1,318 (1,195-1,612)	**0.050**	1,360 (1,270-1,492)	**0.015**	NS

*Platelet count normal range: Females: 165-400; Males: 145-350. D-dimer normal range: <50 years <0.5 FEU/L; >50 years <0.6 FEU/L. *Two individuals in each group received ASA, median (IQR) values are displayed without these individuals included. Post-vaccination values in AZ and mRNA vaccinated individuals are compared by Mann-Whitney U test. P-values <0.050 are displayed in bold. P-values >0.10 are displayed as NS (not significant). aPTT, activate partial thrombin time; INR, international normalized ratio; CT, clotting time. MCF, maximum clot firmness; LI30, lysis after 30 min; ttPeak, time to peak; ETP, endogenous thrombin potential.*

Source: Ostrowski et al. (2022). Red box shows the statistical comparison between (i) AstraZeneca's DNA vaccine with controls and (ii) Pfizer's mRNA vaccine with controls. A p-value of <0.05 indicates a statistically significant difference, as bolded in the table. NS means non-statistically significant.

Compared to baseline scores, several inflammatory biomarkers also increased at one-week post-vaccination. Namely, TNF-a, IL-6, IL-8, and IL-10 increased in the DNA vaccine group, whereas only IL-8 and IL-10 increased in the mRNA vaccine group, but the magnitude of change (although statistically significant) was not huge. And there were no significant changes in CRP:



Source: Ostrowski et al. (2022). AstraZeneca (AZ) DNA-vaccinated individuals are displayed by blue bars (light blue: pre-vaccine; dark blue: post-vaccine), and Pfizer/Moderna mRNA vaccinated individuals are displayed by gray bars (light gray: pre-vaccine; dark gray: post-vaccine). CRP: C-reactive protein; TNFa, tumor necrosis factor-alpha; IL, interleukin. * or ** indicate statistically significant differences.

So, this study showed both DNA and mRNA Covid-19 vaccines could induce some level of minor blood clotting and inflammation. It's minor because no major adverse events were reported in the study.

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3. Data from the U.S. (Massachusetts)

Another study, "*The Influence of Covid-19-Based mRNA Vaccines on Measures of Conduit Artery and Microvascular Endothelial Function*," from the U.S. has also performed similar research. They analyzed the inflammation and vascular activities of nine individuals (mean age of 35 years; 44% females) who got the mRNA vaccine.

Results revealed a 2-fold increase in CRP at 48-hour after vaccination. But there were no significant changes in any of the vascular functions tested, including measures of microvascular and macrovascular functions.

and micro-vascular endothelial function and [nitric oxide]-dependent dilation were preserved in healthy adults."

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4. Data from Singapore

Finally, one short study, "*BNT162b2 mRNA SARS_CoV_2 vaccination does not cause upregulation of endothelial activation markers or hypercoagulability: A prospective, single_arm, longitudinal study*", from Singapore analyzed the blood samples of 18 participants (median age of 35 years; 78% females) who were vaccinated with the mRNA vaccine.

No evidence of blood vessel dysfunction was found, as evaluated by biomarkers indicative endothelial dysfunction or hypercoagulability (e.g., ICAM-1, VCAM-1, fibronogen, or D-dimer).

It's not unique to the Covid-19 vaccines.

Overall, two studies from Greece and Denmark found evidence of mRNA vaccine inducing short-term blood vessel dysfunction. But two other studies from the U.S. and Singapore noted so such findings.

Nearly all studies (3 out of 3) showed that mRNA vaccine could inflame the body to some extent, which is expected given that vaccines serve to train the immune system. And an inflammatory state is often accompanied by a blood vessel dysfunction state, given that immune cells need to travel by the blood vessels quicker to get the immune reactions rolling.

As authors of the Denmark study stated, "Vaccines are designed and administered to inflict an immune response, and some degree of inflammation and platelet activation is to be expected post-vaccination [the latter due to the close link between innate immunity and platelet activation."

One research showed may Salmonella typhi vaccine-induced blood vessel dysfunction was preventable by taking aspirin before vaccination. But this move is not widely recommended. It's a general advice not to take any medications before vaccination to avoid any potentially harmful drug interactions unless otherwise instructed by a medical professional. Plus, anti-inflammatory or anti-coagulant drugs may dampen the immune responses from the vaccine, possibly resulting in weaker immunity. But it seems alright to take such medications after vaccination if needed.

Overall, we should expect some level of inflammation and blood vessel dysfunction for 1–2 days after getting the mRNA vaccine — or any other vaccine for that matter. But such issues are only temporary and not severe enough to cause an adverse event in the studies described above.

It's also very simple to exploit such studies to say that the proof behind the claim of mRNA vaccines killing people have finally been found. But after looking closely at the studies, the data is definitely incapable of supporting such an absurd claim.