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Inadvertent Exposure to Pharmacologically Designed Lipid Nanoparticles Via Bodily Fluids: Biologic Plausibility and Potential Consequences

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Abstract

Exposure to lipid nanoparticles, modified mRNA, adenoviral DNA, and/or spike protein from a Covid-19 injectable product or through secondary exposure via blood transfusion, is a potential source of human physiological harm. Blood reactions are an acknowledged side-effect of Covid-19 product injection; not limited to haemolysis, paroxysmal nocturnal hemoglobinuria, chronic cold agglutinin disease, immune thrombocytopenia, haemophagocytosis, hemophagocytic lymphohistiocytosis, and many other blood-related conditions. Adverse event occurrence in these contexts has motivated investigation into the cardiovascular mechanisms of harm by Covid-19 injectable products, and their biodistribution properties and pharmacokinetics. Biodistribution may not be limited to the body of the product recipient, as a growing body of evidence demonstrates the possibility of secondary exposure to injection by-products. These can be via bodily fluids and include the following routes of exposure: blood transfusion, organ transplantation, breastfeeding, and possibly other means. As Covid-19 injectable products are associated with an increased risk of stroke, the persistence of product artifacts in the blood presents a possible threat to a recipient of a blood donation from an injected donor who suffered from Vaccine Induced Thrombosis or Thrombocytopenia (VITT). We assess the feasibility and significance of these risks with an overview of the case report literature of blood disorders in injected individuals, pharmacovigilance reports from the US Vaccine Adverse Events Reporting System (VAERS), and a meta-analysis of the available literature on organ transplants from injected organ donors. Our analysis establishes biological mechanistic plausibility, a coherent safety signal in pharmacovigilance databases for secondary product content exposure (for the cases of blood transfusion and breastfeeding), and also an elevated level of adverse events in organ transplants from VITT-deceased donors, echoing increases in organ transplantation-related complications seen in national statistics for some countries. Secondary exposure to product artifacts is a potential explanation for some of the cases put forth, and requires a deeper investigation.

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Keywords

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Introduction

Since the introduction of Covid-19 injectable products, much attention has been given to the safety signal for myocarditis, as well as to the development of blood clots and hemolysis. SARS-CoV-2 exerts its pernicious impacts via the cardiovascular system [1–4], and most of the fatalities from Covid-19 were associated with cardiovascular inflammation and clotting [5–9]. Covid-19 injectable products developed during 2020 initially and superficially showed promising levels of protection in the clinical trials leading to their approval in many nations [10,11]. However, a strong cardiovascular safety signal emerged associated with the AstraZeneca product [12–14], leading to its suspension in several nations [15]. A thrombotic safety signal was also found in the Johnson and Johnson adenovirus-vectored product [16–18], also leading to its suspension in the USA [19].

Soon thereafter, a similar safety signal was observed for the Moderna and Pfizer modified mRNA injectable products [20], both modified messenger RNA (mRNA)-based products encapsulated in lipid nanoparticles (LNPs). Currently, several countries no longer promote the use of Covid-19 injectable products in younger populations, owing to the low likelihood of risk from Covid-19 and the increased risk of product-related injury, disability, and death for these populations. Cardiovascular events were much higher than any previously approved products in use, based on analyses of the various pharmacovigilance schemes. Several nations discontinued vaccination in younger people, notably Denmark [21].

Immune activation cascades occurring in the circulatory system, either in the blood through thrombosis or thrombocytopenia, or in the epithelial cells of the vasculature, can alter the normal flow of blood. In extreme cases, this can lead to a stroke. Given the fact that the Covid-19 injectable products reveal a safety signal consistent with alterations in blood properties, it is reasonable to examine the possibility for carry-over effects into blood transfusion.

Given the focus on cardiovascular risks associated with the Covid-19 injectable products and the apparent persistence of spike protein in blood, it may be possible that recipients of blood transfusions and organ transplants from vaccinated donors are exposed to artefacts from the Covid-19 injectable products. Limited literature exists on the comparisons between the blood of injected people and that of uninjected people [22,23]; nonetheless, despite the paucity of evidence, many blood banks claim that there are no significant differences [24–26].

Methods

We propose that the question of secondary exposure to injectable product particles is yet unresolved and requires further investigation. This is based on three classes of argument:

-Firstly, the persistence of modified mRNA/adenoviral DNA lipid nanoparticles and their by-products (ie spike protein) for extended periods of time following injection lends plausibility to this mechanism of harm. This review of the literature evidence establishes biological plausibility. As injectable product particles and altered blood parameters can be found months after injection, these may potentially be passed onto a blood donation recipient.

-Secondly, the case report literature demonstrates many circulatory disorders manifesting in differed blood characteristics in cases of the primary

recipient of the injection, as well as adverse events following exposure to the bodily fluids of injectees. The modalities of transmission for which there is a pharmacovigilance signal are blood transfusion and breastfeeding. These establish a pharmacovigilance signal from exposure to injectee blood (in the case of blood donation) and breastmilk, in the case of breastfeeding.
-Lastly, recipients of organ transplant from donors deceased due to Vaccine Induced Thrombosis and Thrombocytopenia (VITT), encountered blood clotting and thrombotic events, suggesting a possible danger for organ donation, as well as blood transfusion. National monitoring for adverse events following organ transplantation also showed an increased rate of adverse events in temporal relationship to mass injection, but others show no increase.

Results

Mechanisms of Harm

The conditions of natural infection and vaccination are similar and distinct in several important ways. They are similar in that both conditions involve the expression of the spike protein in the cells via the injected or viral RNA. The spike protein is identified as the etiological agent for a significant portion of the cardiovascular damage of both SARS-CoV-2 infection [1,27] and in the context of the Covid-19 injectable products [28,29].

The first Covid-19 injectable product to be investigated for cardiovascular damage was the AstraZeneca product, which was determined to cause clotting disorders in several recipients [30] leading to its restriction in several countries [31]. Afterwards, the Johnson and Johnson injectable products [32], as well as the Moderna modified mRNA COVID-19 injectable products [33] demonstrated cardiovascular safety signals, leading to their suspensions in the USA [34] and in Scandinavian nations (for young people) [35] respectively.

The proposed mechanism for cardiovascular injury from Covid-19 injectable products has been advanced in recent reviews [36,37]. Spike protein-induced clotting, being an unanticipated side effect of the products, warrants attention and caution when transfusing blood from one person to the other, depending on the time since injection, as there may still be LNP particles, aberrant proteins or spike protein present in the blood. It was previously assumed that the LNPs would remain at the site of injection [38] and break down rapidly [39]. However, both vaccine spike antigen and mRNA have been found in vaccine recipients 60 days [40] post-vaccination and spike protein antigen has been found 120 days post-vaccination [41]. The Red Cross claimed in a wishful public statement that vaccine particles do not enter the bloodstream [42], which has been contradicted by biodistribution studies [43]. It is possible that some of the Covid-19 product modified mRNA could be reverse-transcribed via LINE-1 to stably transfect the cell which would result in the observed continued production of spike protein [44].

One potential cause for concern is the observation that anti-platelet factor 4 antibodies have been measured and are elevated 7 months post injection in a subset of recipients [44]. Other studies show a small percentage of injected individuals maintain elevated levels long term [45,46]. Most patients have a transient response [47–49], but approximately 1% of patients maintain elevated anti-PF4 levels [45], which can lead to clotting [50]. This remains cause for concern, as the triggering of this immune response can well lead to a clotting cascade [51].

Pharmacovigilance

The large-scale administration of Covid-19 injectable products requires post-marketing surveillance to monitor any safety signal emerging from adverse event reports. Pharmacovigilance databases have observed an unprecedented number of adverse event (AE) reports since the rollout of the Covid-19 injectable products. These include the USA Vaccine Adverse Events Reporting System (VAERS) [52], the US-based V-safe database [53], the UK based yellow card scheme [54], the European EudraVigilance system [55] and the World Health Organization's (WHO's) VigiBase [56]. These resources were developed for the purpose of monitoring the safety profile of biological products following FDA approval. Despite a disproportionately high number of AE reports for the Covid-19 injectable products [57], these products are still approved for use and recommended in the USA and other countries as of July 3, 2024.

Case Reports of Blood Manifestations

Recent reviews cover cardiovascular adverse events, finding an increased rate compared to previous vaccines [58–62]. In addition to these monitoring systems, there are also hundreds of case reports in the medical literature which have been linked to the vaccine by the medical provider (Table 1). These can broadly fall into the categories of VITT [12,14,30,37,44,45,61,63–358], Stroke [36,78,79,88,98,101,108,146,359–388], Hemolysis [92,389–403], vasculitis [4,360,404–540], anemia [541–564], cold agglutin disease [565,566], and hepatitis [135,567].

Postmortem data also supports a causative role for the Covid-19 injectable products regarding patient death. Autopsies can include immunohistochemical staining of both spike (S) protein and nucleocapsid (N) protein, and can thus be used to distinguish a Covid-19 injectable product-related death, and a SARS-CoV-2 infection-related death [568]. As the Covid-19 injectable products only result in the production of spike proteins, whereas natural infection results in the production of both S and N proteins, observing S in the absence of N protein using immunohistochemical staining highly suggests that the proteins came from the injectable products, and not SARS-CoV-2 infection [569].

Condition	Case Reports
VITT	[12,14,30,37,44,45,61,63–358]
Stroke	[36,78,79,88,98,101,108,146,359–388]
Hemolysis	[92,389–403]
Vasculitis	[4,360,404–540]
Anemia	[541–564]
Cold agglutinin disease	[565,566]
Hepatitis	[135,567]

Table 1. An overview of case reports for blood conditions related to Covid-19 injectable products.

Blood Transfusions

Since Covid-19 injectable product and their downstream manifestations (e.g. microclots) remain in the bloodstream for long periods of time [41], blood transfusion is a potential (secondary) route of exposure to injection by-products.

There are 1352 transfusion reports in VAERS as of May 15, 2023 (Figure 1). As of May 25, 2023, according to the Worldometer [570], the population in the United States is 336,688,028. And according to Our World in Data, the number of Americans who have received at least one dose of the Covid-19 injectable products is 270,230,000, or 80% of the US population [571]. Considering the time course of injection, from the period of 1st March, 2021 to May 25, 2023, the time-averaged injection percentage is 70% [571]. A 2019 statistic puts the number of blood transfusions occurring yearly in the USA at 10,852,000 [572], putting the approximate number of blood transfusions during the above period at 24.2 million. Of the 24.2 million, approximately 17 million would have received a Covid-19 vaccine. Using the number of individuals who had received both an injection and a transfusion, and the number of reports of adverse events in VAERS of transfusions, we get a rate of 1/12,570 and with an under--reporting of 31, this becomes 1/405.

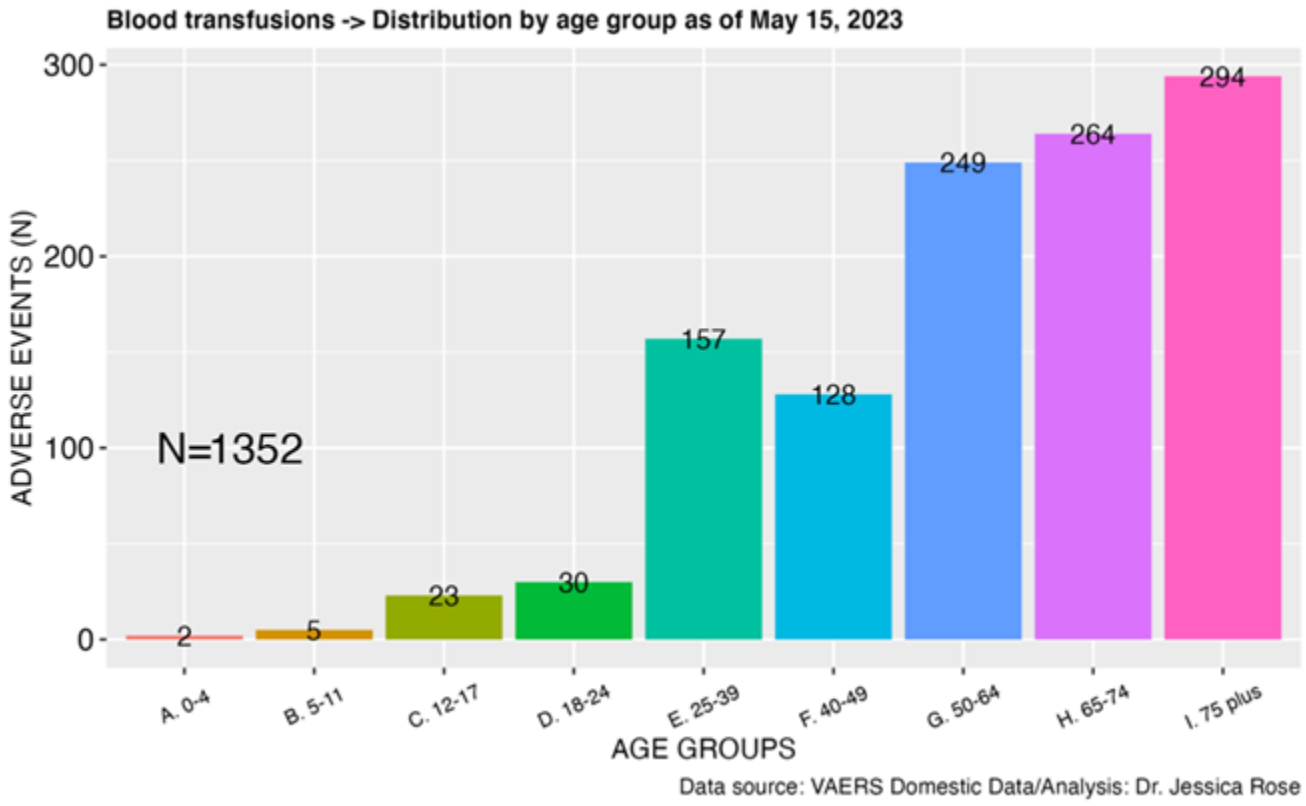

Figure 1. VAERS domestic and foreign reports as of May 15, 2023 queried using keyword "transfusions." Original figure with data source (https://vaers.hhs.gov).

Breastfeeding and other routes of exposure

Given that Covid-19 injectable product contents have been observed in breast milk [573], breastfeeding presents a possible, albeit likely transient, route of

secondary exposure for nursing babies. In VAERS as of May 15, 2023, the search terms ("Breast feeding," "Breast milk discoloration," "Exposure via breast milk," "Maternal exposure during breast feeding") return N = 1,835 total reports of adverse events (Figure 2).

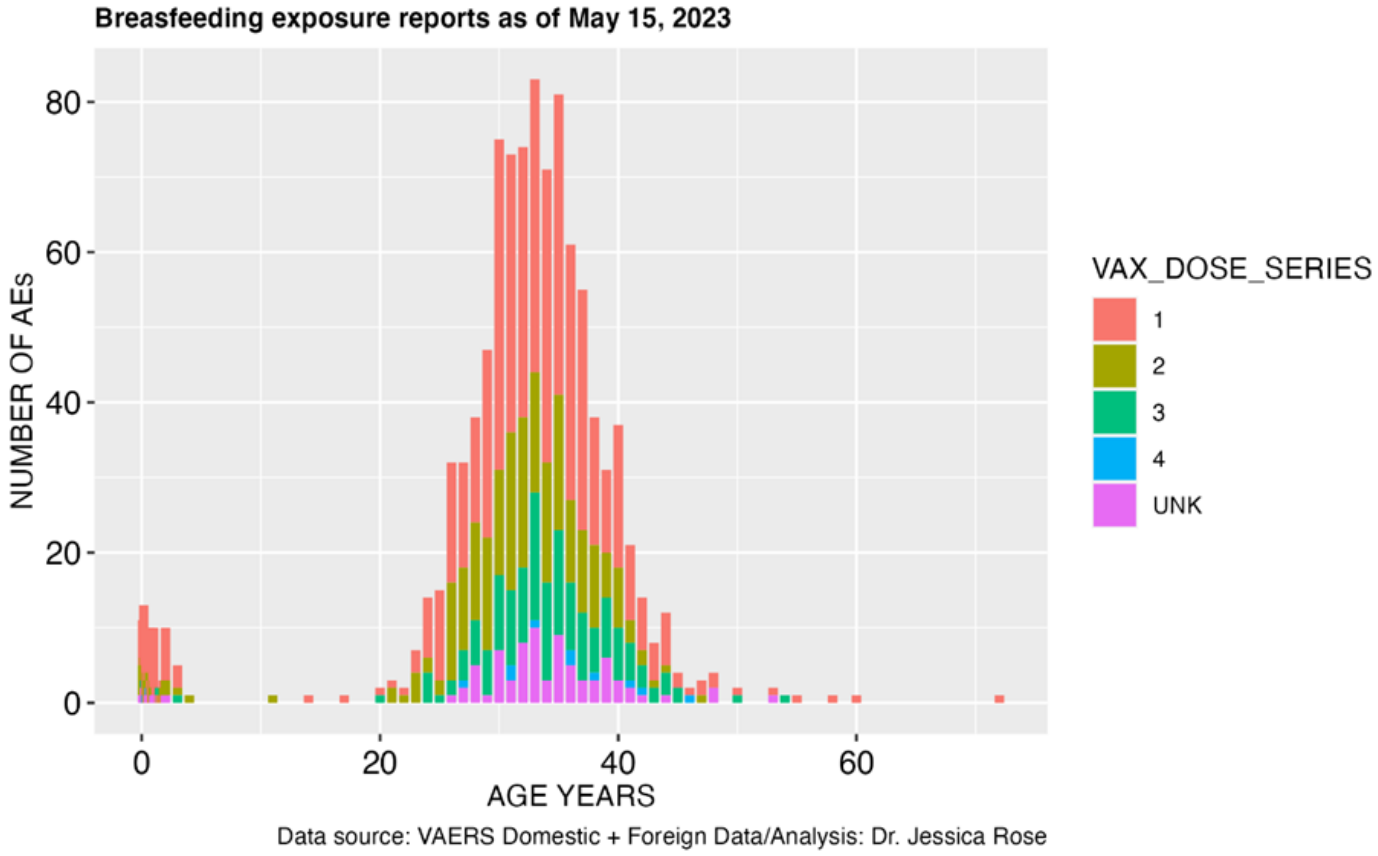

Figure 2. Possible routes of secondary exposure to vaccine artifacts.

To estimate the denominator of total number of (injected) mother-baby pairs, between December 14, 2020 and May 10, 2023, 60,615,370 women between the ages of 18 and 49 were reported to have been injected with at least one dose of the COVID products [574]. The age groups 18-24 and 25-49, as per the CDC grouping, span the child-bearing years appropriately.

The estimated fertility rate for women of childbearing age [15-44 years) in the United States in 2021 was 56.3 births per thousand women per year [575], therefore we can estimate that the number of women who gave birth (in the window of December 14, 2020 to May 10, 2023) of the number injected was 8,326,855. We can also estimate the number of women breastfeeding of those births since ~83% of infants are breastfed immediately, according to the CDC breastfeeding report card released in 2022 (based off 2019 data) [576]. Therefore, by these rates, there were approximately 6,911,289 women breastfeeding at the time of injection with COVID products. This is a rough estimate, but based on recent data provided by the CDC. Using this number to compare it with the number of reports in VAERS, we get 1,835 reports of adverse events out of approximately 7 million mother-infant pairs (with the mother having received a Covid-19 injectable biological product), or

approximately 1/3800. While seemingly low, this estimate does not account for underreporting, where the underreporting factor is estimated to be 31 [577].

Mechanistically, adverse events through breastfeeding exposure are plausible given that breast milk of recently injected mothers may contain SARS-CoV-2 antibody proteins [578,579] and traces of the injection materials [573].

While dosage would likely be minimal, it is possible that others may be exposed to injection particles via other routes. Shedding is observed in adenovirus vectored products [581], which would apply to Johnson & Johnson and AstraZeneca [581]. One important distinction is that while viral shedding can be ruled out with modified mRNA injectable products, because they lack a viral vector, exposure to the injection particles and their artifacts can occur, albeit in smaller quantities than the original injection.

In households where one person was injected, other family members developed spike protein antibodies [582]. While the cited article explained this in terms of the transfer of antibodies themselves, this would likely not be persistent. In cases where the antigen (spike protein) is transferred, this may possibly explain the presence of anti-spike antibodies in the serum of uninjected and unexposed (to SARS-CoV-2) individuals.

Sexual intercourse is a possible mode of transmission as spike protein RNA has been observed in semen during SARS-CoV-2 infection [583]. Inactivated viral vector Covid-19 injectable products have been observed to impair sperm morphology [584], motility [585], and increase DNA fragmentation [584]. Conflicting information exists on the impact of mRNA injections on semen parameters, with a study showing impaired semen concentration and sperm counts [586], and two studies seeing no impact [587,588]. It may be of interest that sperm motility decreased 22% at a sperm bank in Denmark from 2019 to 2022 [589], and the drop in quality may be due to Covid-19, Covid-19 biological products, or it may be spurious.

Transfer through either exhalation or skin-to-skin contact has anecdotal accounts supporting it, but limited published evidence exists. Mechanistically, the lipid nanoparticles of the mRNA injections are very similar to endogenous exosomes, which can be transmitted trans-dermally, via inhalation, via breast milk, and across the placenta (Figure 2) [590].

Spike protein can importantly be packaged into exosomes [591], and precedent exists for the presence of RNA-containing exosomes in breath [592–594]. A recent review has summarized the persistence of Covid-19 injection components in different bodily fluids [595], finding evidence for persistence of spike protein in lymph nodes [40], on skin [596] and in blood [40,597], and persistent spike protein mRNA in lymph nodes [40], and in blood plasma [598].

Organ Transplant Safety

Another source of information on the safety of blood transfusions is the organ transplant literature. Blood type matching is necessary for organ transplantation, in addition to other criteria, such as organ size. Current approaches are lowering the risk of transplant rejection by matching donor and recipient human leukocyte antigen (HLA) [599–601].

There are several case reports of transplants from Covid-19 injected donors. This literature focuses mostly on donors who died due to VITT. In the case of organ transplantation, with few exceptions, such as the kidney, the donor must be deceased. Considering these donors were classified as having

died from VITT by a medical professional, these donations are more likely to present safety issues than blood donation, where the donor does not have manifested VITT, as this would deem them ineligible or at the very least reluctant to donate.

Vaccination mandates with respect to transplantation, especially for recipients, have been a source of controversy during the Covid-19 pandemic [602–607]. Several centers have refused to provide transplants to uninjected prospective recipients.

Our search returns 8 articles focusing on transplants from donors deemed deceased from VITT [608–616] (Table 2).

Several people, having died from likely VITT, have donated their organs for medical transplantation. While the blood used during a transplant operation is typically given by a separate donor, still, this high rate of complications in recipients is cause for concern. Transplantation of organs from those suffering stroke is a common occurrence and has a low failure rate. In a Canadian study of kidney transplant recipients, where the donor died of stroke, only 5% of recipients were on dialysis after 1 year and there were no deaths in hospital [617], so the vast majority of the kidney transplants worked.

A study calculated the rate of microthrombi formation in recipients where the donor dies from a cardiac death (DCD) as 3.3% [618]. This was not significantly different from the rate of microthrombi formation in recipients where the donor dies due to brain death (DBD), which is 11.3% [618]. The rate of microthrombi and thrombotic complications is much higher in recipients of donors deceased due to VITT, at 30% of recipients (Table 2). Another study observed rates of vascular complications in the recipients of liver transplants from donors deceased due to cardiovascular events in 7% to 14% of transplant recipients [619]. The uncertainty is due to there being two categories of vascular complications, “hepatic artery thrombosis” and “other,” and it is not specified what the degree of overlap (recipients experiencing both types of complications) there is. Another study of liver transplant recipients from DCD cases showed a rejection rate due to thrombotic complications of 2%, comparable with 3% of recipients of DBD [620]. Another Swedish study reported rates of hepatic artery thrombosis in 8 of 24 liver graft recipients from DCD donors, or 33% [621]. A large meta-analysis found vascular thrombosis of 3% in DCD liver graft recipients, and 2% in DBD liver graft recipients [622]. The same meta-analysis observed rates of vascular stenosis of 4% in DCD and 2% in DBD liver graft recipients.

These operations have mixed successes, as many of these transplantations are successful, still, there remain several cases where the recipient experienced thrombotic events which persisted over long term. All considered, the risks of organ transplantation may be outweighed by the definite dangers of not going through with a transplant.

Data monitoring for increases in transfusion reactions is limited. Several national hemovigilance systems do not observe a significant increase in adverse event rates in 2021 compared to previous years [623,624]. Other systems have not yet published hemovigilance for 2021 [625], though Austria reported a 49% increase in transfusion reactions from 49 in 2020 to 73 in 2021 [626], Denmark saw a significant increase in adverse reactions between 2020 and 2021 [627] and UK hemovigilance data shows an increase in blood component issues from 2020 to 2021 [628]. Additionally, transplantation AE rates in Canada rose significantly, from less than 3 transfusion adverse events per year to 12 between 2020 and 2021 [629]. In Japan there was a slight increase of 7% from 2020

to 2021 [630].

Study	Donor	Organ	Recipient	Outcome	Thrombotic AE rate (AE rate including microthrombi, organ/graft rejection and Positive anti-PF4)
[608]	50-year female with VITT	Heart	Unknown	No thrombosis or thrombocytopenia Anti-PF4 antibodies negative 3 weeks after transplantation	0/1 (0/1)
[615]	18-year-old brain-dead female who dies from VITT-related intracranial hemorrhage	Liver	58-year-old female	Rapid drop in platelet counts from $104x10^9$/liter to $30x10^9$/liter Anti-PF4 IgG strongly positive Grade 3 (severe) thrombocytopenia	1/1 (1/1)
[609]	($n = 8$, aged between 22 and 55 years) Died of catastrophic intracerebral hemorrhage or thrombosis, had received the first dose of ChAdOx1 nCOV-19 vaccine 9 to 19 days before hospital admission, and had detectable anti-PF4, low fibrinogen and elevated D-Dimers	Liver	($n = 9$, aged 2–43 years)	Four recipients with positive anti-PF4 antibodies without bleeding or thrombotic complications Two recipients with severe thrombotic events, requiring emergency retransplantation. Anti-PF4 antibodies negative.	2/9 (6/9)
[610]	N=16 Median age 44 75% female	Kidney Microthrombi observed in 4/11 biopsies	N=30 Median age 48 47% female	2 recipients with anti-PF4 antibodies but no clinical disease Major hemorrhagic complications in 3 recipients w/ independent risk factors	3/30 (5/30)
[612]	Male, 41 Female, 69 Male, 67 All deceased from VITT	Heart Kidney Liver Lungs	N=9 Median age 58 (40-70) 44% female	Glomerular microthrombi in 2 kidney recipients Pulmonary embolism in lung recipient No anti-PF4 antibodies observed	1/9 (3/9)
[613]	N=6 Aged 37-72 years 50% female	Liver Kidney Lung Heart	N=17 Aged <1 to 77 years 42% female	Liver cell necrosis and re-transplantation in one recipient Microangiopathy in one kidney recipient Two recipients (11.8%) developed thrombosis-related complications	2/17 (4/17)
[614]	32-year-old female deceased from VITT-induced stroke	Liver	69-year-old female	No adverse events, operation successful	0/1 (0/1)
[611]	N=13 Median age 34 (21 to 63) 85% female	Kidney Liver Heart Lung Pancreas	N=26 Median age 40 (2 to 63)	Thrombosis Thromboembolism in 7/26 recipients (3 liver recipients and 4 Kidney/SPK/islet recipients) Graft dysfunction in 4/26 recipients Anti-PF4 antibodies positive in 3/13 (23%) tests with results	7/26 (10/26)
[616]	Female aged 60-69	Liver & Heart Lungs Right Kidney Left Kidney	63-year-old male 58-year-old woman 70-year-old man 52-year-old man	No AEs No AEs Thrombi is pre-implantation biopsy, uneventful transplantation Glomerular inflammation and hemorrhagic suffusion	0/4 (2/4)
Summary					16/98, 16% (29/98, 30%)

Table 2. A summary of transplantation trials from donors deceased from VITT.

Discussion

In total, we found evidence to support Covid-19 injectable product by-product transfer between injected and uninjected recipients, and this calls into question the safety of blood donation from injected individuals, especially in temporal proximity to actual injection date. Questions remain over the safety of associated blood products and secondary exposure to injection by-products. Circulatory AEs associated with Covid-19 injection far outnumber those for any vaccine historically monitored, and may be cause for concern, as clotting can exist at a subclinical level and evade detection for many years, unless explicitly tested for, through measurements of D-dimer or troponin, for example.

It has been brought to attention that with regard to the injectable Covid-19 biological products, these may be better classified as gene therapies as opposed to vaccines [631]. Additional testing for the shedding of the gene therapy product is required by both the US Food and Drug Administration [632] and the European Medicines Agency [633].

One open question is if the waiting period to donate blood post injection is sufficient to ensure the safety for the recipient, and if there is a definitive safe waiting period at all. Most countries have limited or nonexistent waiting periods for donations post-Covid-19 injection, though some ask their donors to refrain from donating blood for a few weeks afterwards. Given that injection by-products are, in principle, non-replicating, we expect them to decay once in the body, where their concentration gradually drops. The time curve of injection by-product decay still requires more investigation in the context of the LNPs, the modified mRNA, potential DNA, aberrant proteins produced to frameshifting, and the spike protein, as studies observe both circulating spike protein at least two months after injection [41].

One recommendation of this report is the development of hemovigilance systems to provide summary statistics on blood properties during donor intake. Additionally, the passive monitoring for transfusion related AEs from injected donors should be addressed in a passive monitoring study whereby donors voluntarily provide their Covid-19 injection status on an intake form. Comparisons of injected and uninjected blood should be made at two levels: both the properties of the blood itself, and its interaction with recipient blood/physiology. Summary statistics on both types of measurements can be calculated to determine if any statistically significant differences between blood products from injected and uninjected donors exists. Reporting of donor's Covid-19 injection status can be done on a voluntary basis, out of respect for medical privacy.

Questions remain as to the safety of transfusions and transplants from Covid-19 injected donors, and this question carries significant implications for national health systems, blood banks, and organ transplant pools. A survey of blood parameters, as well as recipient adverse events would require only recording the donor injection status, and analysis of such data is straightforward from a statistical perspective. The low cost of such a study, combined with the importance of the questions that it would address is significant motivation to perform such a study. We ask the relevant authorities (blood donation clinics and transplant clinics) to consider adding an optional questionnaire for donors, on whether they have been vaccinated, and the dose schedule, and type of vaccination. This presents a completely non-invasive way to address questions of significant public health importance.

Conclusion

Concerns remain over not only primary exposure to injection by-products, but also of secondary exposure through bodily fluids. Several lines of

evidence, including mechanistic understanding, pharmacovigilance, case reports of blood manifestations in product recipients, and case reports of autopsies from Covid-19-injected donors suggest that it may be a possibility. Persistence of injection by-products have been observed in blood [40,41] and breast milk [573]. Additionally, there are AE reports that support bodily fluid exposure (via blood transfusion or breastfeeding) as an aetiological factor.

Further evidence is notable by the comparatively high rate of thrombotic complications in organ donation recipients from donors deceased due to VITT, which appears higher than rates of thrombotic complications in people dying of comparable cause, only not injection-related. The rate of thrombotic complications for the case of Covid-19 injectable product donors deceased due to VITT is 30% (Table 2), whereas a pre-Covid-19 vaccine study observed a rate of thrombotic complications of 3% in recipients of liver grafts from donors deceased due to cardiovascular complications, including stroke [618]. While different studies have found a variety of rates for thrombotic complications, the rates of thrombotic complications in recipients of organ transplants from VITT donors (30%, Table 2) are higher than most comparable historical rates of thrombotic complications in recipients of organ transplants from DCD donors [618,620,622]. One study's reported rates [621] (33%) were similar to our reported rates of thrombotic complication (30%, Table 2).

Future monitoring is important for maintaining transfusion safety, as well as the safety of breastfeeding. At this point, harms cannot be definitively ruled out and the question deserves more attention. Given these concerns, blood donors should consider refraining from donation until more information is published on the safety of blood from donors who received the Covid-19 injectable products.

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References

1. Lei Y, Zhang J, Schiavon CR, He M, Chen L, Shen H, et al. SARS-CoV-2 Spike Protein Impairs Endothelial Function via Downregulation of ACE 2. Circulation Research. 2021 Apr 30;128(9):1323–6.

2. Stenmark KR, Frid MG, Gerasimovskaya E, Zhang H, McCarthy MK, Thurman JM, et al. Mechanisms of SARS-CoV-2-induced lung vascular disease: potential role of complement. Pulm Circ. 2021;11(2):20458940211015799.

3. Aid M, Busman-Sahay K, Vidal SJ, Maliga Z, Bondoc S, Starke C, et al. Vascular Disease and Thrombosis in SARS-CoV-2-Infected Rhesus Macaques. Cell. 2020 Nov 25;183(5):1354-1366.e13.

4. Teuwen LA, Geldhof V, Pasut A, Carmeliet P. COVID-19: the vasculature unleashed. Nat Rev Immunol. 2020 Jul;20(7):389–91.

5. Elsoukkary SS, Mostyka M, Dillard A, Berman DR, Ma LX, Chadburn A, et al. Autopsy Findings in 32

Patients with COVID-19: A Single-Institution Experience. Pathobiology. 2021;88(1):56–68.

6. Yao XH, Luo T, Shi Y, He ZC, Tang R, Zhang PP, et al. A cohort autopsy study defines COVID-19 systemic pathogenesis. Cell Res. 2021 Aug;31(8):836–46.

7. Hanley B, Lucas SB, Youd E, Swift B, Osborn M. Autopsy in suspected COVID-19 cases. Journal of Clinical Pathology. 2020 May 1;73(5):239–42.

8. Stillfried S von, Bülow RD, Röhrig R, Boor P, Böcker J, Schmidt J, et al. First report from the German COVID-19 autopsy registry. The Lancet Regional Health – Europe [Internet]. 2022 Apr 1 [cited 2022 Dec 7];15. Available from: https://www.thelancet.com/journals/lanepe/article/PIIS2666-7762(22)00023-0/fulltext

9. Ducloyer M, Gaborit B, Toquet C, Castain L, Bal A, Arrigoni PP, et al. Complete post-mortem data in a fatal case of COVID-19: clinical, radiological and pathological correlations. Int J Legal Med. 2020 Nov;134(6):2209–14.

10. Ghasemiyeh P, Mohammadi-Samani S, Firouzabadi N, Dehshahri A, Vazin A. A focused review on technologies, mechanisms, safety, and efficacy of available COVID-19 vaccines. International Immunopharmacology. 2021 Nov 1;100:108162.

11. Francis AI, Ghany S, Gilkes T, Umakanthan S. Review of COVID-19 vaccine subtypes, efficacy and geographical distributions. Postgraduate Medical Journal. 2022 May 1;98(1159):389–94.

12. Tobaiqy M, Elkout H, MacLure K. Analysis of Thrombotic Adverse Reactions of COVID-19 AstraZeneca Vaccine Reported to EudraVigilance Database. Vaccines. 2021 Apr;9(4):393.

13. Wise J. Covid-19: Rare immune response may cause clots after AstraZeneca vaccine, say researchers. BMJ. 2021 Apr 12;373:n954.

14. Geeraerts T, Montastruc F, Bonneville F, Mémier V, Raposo N. Oxford-AstraZeneca COVID-19 vaccine-induced cerebral venous thrombosis and thrombocytopaenia: A missed opportunity for a rapid return of experience. Anaesth Crit Care Pain Med. 2021 Aug;40(4):100889.

15. WHO statement on AstraZeneca COVID-19 vaccine safety signals [Internet]. [cited 2022 Dec 7]. Available from: https://www.who.int/news/item/17-03-2021-who-statement-on-astrazeneca-covid-19-vaccine-safety-signals

16. Shay DK. Safety Monitoring of the Janssen (Johnson & Johnson) COVID-19 Vaccine — United States, March–April 2021. MMWR Morb Mortal Wkly Rep [Internet]. 2021 [cited 2022 Dec 7];70. Available from: https://www.cdc.gov/mmwr/volumes/70/wr/mm7018e2.htm

17. Mahase E. Covid-19: Unusual blood clots are “very rare side effect” of Janssen vaccine, says EMA. BMJ. 2021 Apr 21;373:n1046.

18. Malik B, Kalantary A, Rikabi K, Kunadi A. Pulmonary embolism, transient ischaemic attack and thrombocytopenia after the Johnson & Johnson COVID-19 vaccine. BMJ Case Reports CP. 2021 Jul 1;14(7):e243975.

19. Mahase E. Covid-19: US suspends Johnson and Johnson vaccine rollout over blood clots. BMJ. 2021 Apr 13;373:n970.

20. Tobaiqy M, MacLure K, Elkout H, Stewart D. Thrombotic Adverse Events Reported for Moderna, Pfizer and Oxford-AstraZeneca COVID-19 Vaccines: Comparison of Occurrence and Clinical Outcomes in the EudraVigilance Database. Vaccines. 2021 Nov;9(11):1326.

21. Vaccination against covid-19 [Internet]. [cited 2022 Oct 1]. Available from:

https://www.sst.dk/en/english/corona-eng/vaccination-against-covid-19

22. Alawed AA. Evaluation of Platelet and D.dimer among covid-19 Vaccinated Individuals in Shandi Town [Internet] [Thesis]. Elfatih Mohammed Abdallah; 2022 [cited 2022 Dec 4]. Available from: http://localhost:8080/xmlui/handle/123456789/1306

23. Mahmoud MAK, Khudhair N. Comparison of Complete Blood Counts between four Groups: a COVID-19 Patient, a Healthy and Healthy Vaccine Recipient, and Patient Vaccinated Recipients in Anbar Province. HIV Nursing. 2022 Oct 30;22(2):1988–94.

24. Ltd TIS. JPAC - Transfusion Guidelines [Internet]. [cited 2022 Dec 7]. Available from: https://transfusionguidelines.org.uk/

25. Info about COVID-19 vaccines and blood donation [Internet]. [cited 2022 Dec 7]. Available from: https://www.blood.ca/en/covid19/vaccines-and-blood-donation

26. EBMT COVID Vaccine Information [Internet]. 2022 Jan. Report No.: COVID-19 vaccines. Version 8, January 3, 2022. Available from: https://www.ebmt.org/sites/default/files/2022-01/COVID%20vaccines%20version%208.3%20-%202022-01-03.pdf

27. Avolio E, Carrabba M, Milligan R, Kavanagh Williamson M, Beltrami AP, Gupta K, et al. The SARS-CoV-2 Spike protein disrupts human cardiac pericytes function through CD147 receptor-mediated signalling: a potential non-infective mechanism of COVID-19 microvascular disease. Clin Sci (Lond). 2021 Dec 22;135(24):2667–89.

28. Trougakos IP, Terpos E, Alexopoulos H, Politou M, Paraskevis D, Scorilas A, et al. Adverse effects of COVID-19 mRNA vaccines: the spike hypothesis. Trends Mol Med. 2022 Jul;28(7):542–54.

29. Cosentino M, Marino F. Understanding the Pharmacology of COVID-19 mRNA Vaccines: Playing Dice with the Spike? International Journal of Molecular Sciences. 2022 Jan;23(18):10881.

30. Muir KL, Kallam A, Koepsell SA, Gundabolu K. Thrombotic Thrombocytopenia after Ad26.COV2.S Vaccination. New England Journal of Medicine. 2021 May 20;384(20):1964–5.

31. Vogel G, Kupferschmidt K. New problems erode confidence in AstraZeneca's vaccine. Science. 2021 Mar 26;371(6536):1294–5.

32. See I, Su JR, Lale A, Woo EJ, Guh AY, Shimabukuro TT, et al. US Case Reports of Cerebral Venous Sinus Thrombosis With Thrombocytopenia After Ad26.COV2.S Vaccination, March 2 to April 21, 2021. JAMA. 2021 Jun 22;325(24):2448–56.

33. Karlstad Ø, Hovi P, Husby A, Härkänen T, Selmer RM, Pihlström N, et al. SARS-CoV-2 Vaccination and Myocarditis in a Nordic Cohort Study of 23 Million Residents. JAMA Cardiology. 2022 Jun 1;7(6):600–12.

34. Hsieh YL, Rak S, SteelFisher GK, Bauhoff S. Effect of the suspension of the J&J COVID-19 vaccine on vaccine hesitancy in the United States. Vaccine. 2022 Jan 24;40(3):424–7.

35. Paterlini M. Covid-19: Sweden, Norway, and Finland suspend use of Moderna vaccine in young people "as a precaution". BMJ. 2021 Oct 11;375:n2477.

36. De Michele M, Kahan J, Berto I, Schiavo OG, Iacobucci M, Toni D, et al. Cerebrovascular Complications of COVID-19 and COVID-19 Vaccination. Circ Res. 2022 Apr 15;130(8):1187–203.

37. McGonagle D, De Marco G, Bridgewood C. Mechanisms of Immunothrombosis in Vaccine-Induced Thrombotic Thrombocytopenia (VITT) Compared to Natural SARS-CoV-2 Infection. Journal of Autoimmunity. 2021 Jul 1;121:102662.

38. Lindsay KE, Bhosle SM, Zurla C, Beyersdorf J, Rogers KA, Vanover D, et al. Visualization of early events in mRNA vaccine delivery in non-human primates via PET–CT and near-infrared imaging. Nat Biomed Eng. 2019 May;3(5):371–80.

39. Spike Protein Behavior [Internet]. [cited 2022 Oct 1]. Available from: https://www.science.org/content/blog-post/spike-protein-behavior

40. Röltgen K, Nielsen SCA, Silva O, Younes SF, Zaslavsky M, Costales C, et al. Immune imprinting, breadth of variant recognition, and germinal center response in human SARS-CoV-2 infection and vaccination. Cell. 2022 Mar 17;185(6):1025-1040.e14.

41. Bansal S, Perincheri S, Fleming T, Poulson C, Tiffany B, Bremner RM, et al. Cutting Edge: Circulating Exosomes with COVID Spike Protein Are Induced by BNT162b2 (Pfizer–BioNTech) Vaccination prior to Development of Antibodies: A Novel Mechanism for Immune Activation by mRNA Vaccines. The Journal of Immunology. 2021 Nov 15;207(10):2405–10.

42. Jaramillo C. Red Cross Accepts Blood Donations From People Vaccinated Against COVID-19 [Internet]. FactCheck.org. 2022 [cited 2022 Dec 11]. Available from: https://www.factcheck.org/2022/04/scicheck-red-cross-accepts-and-uses-blood-donations-from-people-vaccinated-against-covid-19/

43. Ogata AF, Cheng CA, Desjardins M, Senussi Y, Sherman AC, Powell M, et al. Circulating Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Vaccine Antigen Detected in the Plasma of mRNA-1273 Vaccine Recipients. Clinical Infectious Diseases. 2022 Feb 15;74(4):715–8.

44. Aldén M, Olofsson Falla F, Yang D, Barghouth M, Luan C, Rasmussen M, et al. Intracellular Reverse Transcription of Pfizer BioNTech COVID-19 mRNA Vaccine BNT162b2 In Vitro in Human Liver Cell Line. Curr Issues Mol Biol. 2022 Feb 25;44(3):1115–26.

45. Montague SJ, Smith CW, Lodwick CS, Stoneley C, Roberts M, Lowe GC, et al. Anti-platelet factor 4 immunoglobulin G levels in vaccine-induced immune thrombocytopenia and thrombosis: Persistent positivity through 7 months. Res Pract Thromb Haemost. 2022 Mar;6(3):e12707.

46. Sørvoll IH, Horvei KD, Ernstsen SL, Laegreid IJ, Lund S, Grønli RH, et al. An observational study to identify the prevalence of thrombocytopenia and anti-PF4/polyanion antibodies in Norwegian health care workers after COVID-19 vaccination. J Thromb Haemost. 2021 Jul;19(7):1813–8.

47. Panagiota V, Dobbelstein C, Werwitzke S, Ganser A, Cooper N, Sachs UJ, et al. Long-Term Outcomes after Vaccine-Induced Thrombotic Thrombocytopenia. Viruses. 2022 Aug 1;14(8):1702.

48. Al-Samkari H, Leaf RK, Goodarzi K. Transient Thrombocytopenia With Glycoprotein-Specific Platelet Autoantibodies After Ad26.COV2.S Vaccination: A Case Report. Ann Intern Med. 2021 Nov 16;174(11):1632–3.

49. Vayne C, Rollin J, Gruel Y, Pouplard C, Galinat H, Huet O, et al. PF4 Immunoassays in Vaccine-Induced Thrombotic Thrombocytopenia. New England Journal of Medicine. 2021 Jul 22;385(4):376–8.

50. Schönborn L, Thiele T, Kaderali L, Günther A, Hoffmann T, Seck SE, et al. Most anti-PF4 antibodies in vaccine-induced immune thrombotic thrombocytopenia are transient. Blood. 2022 Mar 24;139(12):1903–7.

51. Gerotziafas GT, Elalamy I, Lecrubier C, Lebrazi J, Mirshahi M, Potevin F, et al. The role of platelet factor 4 in platelet aggregation induced by the antibodies implicated in heparin-induced

thrombocytopenia. Blood Coagul Fibrinolysis. 2001 Oct;12(7):511–20.

52. Warkentin TE. Platelet-activating anti-PF4 disorders: An overview. Semin Hematol. 2022 Apr;59(2):59–71.

53. Vaccine Adverse Event Reporting System (VAERS) [Internet]. [cited 2022 Dec 7]. Available from: https://vaers.hhs.gov/

54. CDC. Centers for Disease Control and Prevention. 2022 [cited 2022 Dec 7]. Enroll in v-safe after vaccination health checker. Available from: https://www.cdc.gov/vaccinesafety/ensuringsafety/monitoring/v-safe/index.html

55. GOV.UK [Internet]. [cited 2022 Dec 7]. Coronavirus vaccine - summary of Yellow Card reporting. Available from: https://www.gov.uk/government/publications/coronavirus-covid-19-vaccine-adverse-reactions/coronavirus-vaccine-summary-of-yellow-card-reporting

56. EMA. European Medicines Agency. 2018 [cited 2022 Dec 7]. EudraVigilance system overview. Available from: https://www.ema.europa.eu/en/human-regulatory/research-development/pharmacovigilance/eudravigilance/eudravigilance-system-overview

57. Centre UM. VigiBase Services [Internet]. [cited 2022 Dec 7]. Available from: https://who-umc.org/vigibase/vigibase-services/

58. Ceacareanu AC, Wintrob ZAP. Summary of COVID-19 Vaccine-Related Reports in the Vaccine Adverse Event Reporting System. J Res Pharm Pract. 2021 Dec 25;10(3):107–13.

59. Parmar K, Subramanyam S, Del Rio-Pertuz G, Sethi P, Argueta-Sosa E. Cardiac Adverse Events after Vaccination—A Systematic Review. Vaccines. 2022 May;10(5):700.

60. Jeet Kaur R, Dutta S, Charan J, Bhardwaj P, Tandon A, Yadav D, et al. Cardiovascular Adverse Events Reported from COVID-19 Vaccines: A Study Based on WHO Database. Int J Gen Med. 2021 Jul 27;14:3909–27.

61. Hajjo R, Sabbah DA, Bardaweel SK, Tropsha A. Shedding the Light on Post-Vaccine Myocarditis and Pericarditis in COVID-19 and Non-COVID-19 Vaccine Recipients. Vaccines. 2021 Oct;9(10):1186.

62. Welsh KJ, Baumblatt J, Chege W, Goud R, Nair N. Thrombocytopenia including immune thrombocytopenia after receipt of mRNA COVID-19 vaccines reported to the Vaccine Adverse Event Reporting System (VAERS). Vaccine. 2021 Jun 8;39(25):3329–32.

63. Yan MM, Zhao H, Li ZR, Chow JW, Zhang Q, Qi YP, et al. Serious adverse reaction associated with the COVID-19 vaccines of BNT162b2, Ad26.COV2.S, and mRNA-1273: Gaining insight through the VAERS. Front Pharmacol. 2022;13:921760.

64. Abrams CS, Barnes GD. SARS-CoV-2 Vaccination-Induced Thrombotic Thrombocytopenia: A Rare But Serious Immunologic Complication. Annual Review of Medicine. 2023;74(1):null.

65. Al-Maqbali JS, Rasbi SA, Kashoub MS, Hinaai AMA, Farhan H, Rawahi BA, et al. A 59-Year-Old Woman with Extensive Deep Vein Thrombosis and Pulmonary Thromboembolism 7 Days Following a First Dose of the Pfizer-BioNTech BNT162b2 mRNA COVID-19 Vaccine. Am J Case Rep. 2021 Jun 12;22:e932946-1-e932946-4.

66. Wiest NE, Johns GS, Edwards E. A Case of Acute Pulmonary Embolus after mRNA SARS-CoV-2 Immunization. Vaccines. 2021 Aug;9(8):903.

67. Fazio S, Vaccariello M, Affuso F. A Case of Adverse Reaction to Booster Dose of COVID-19 Vaccination: Could D-Dimer Elevation Suggest Increased Clotting Risk? Health. 2022 Jan

30;14(2):204–8.

68. Malayala SV, Papudesi BN, Sharma R, Vusqa UT, Raza A. A Case of Idiopathic Thrombocytopenic Purpura After Booster Dose of BNT162b2 (Pfizer-Biontech) COVID-19 Vaccine. Cureus [Internet]. 2021 Oct 23 [cited 2022 Dec 3];13(10). Available from: https://www.cureus.com/articles/73722-a-case-of-idiopathic-thrombocytopenic-purpura-after-booster-dose-of-bnt162b2-pfizer-biontech-covid-19-vaccine

69. van Dijk MMH, Veldman HD, Aarts F, Barten DG, van den Bergh JP, Dielis AWJH. A case of unusual mild clinical presentation of COVID-19 vaccine-induced immune thrombotic thrombocytopenia with splanchnic vein thrombosis. Ann Hepatol. 2022;27(1):100590.

70. Lee CSM, Liang HPH, Connor DE, Dey A, Tohidi-Esfahani I, Campbell H, et al. A novel flow cytometry procoagulant assay for diagnosis of vaccine-induced immune thrombotic thrombocytopenia. Blood Adv. 2022 Jun 14;6(11):3494–506.

71. Agbariah N, Bütler VA, Wieland A, Andina N, Hammann F, Kremer Hovinga JA. Acquired immune-mediated thrombotic thrombocytopenic pur-pura (iTTP) following mRNA-based COVID-19 vaccination (BNT162b2). Swiss Medical Weekly. 2021;20S-20S.

72. Ruhe J, Schnetzke U, Kentouche K, Prims F, Baier M, Herfurth K, et al. Acquired thrombotic thrombocytopenic purpura after first vaccination dose of BNT162b2 mRNA COVID-19 vaccine. Ann Hematol. 2022 Mar 1;101(3):717–9.

73. Yoshida K, Sakaki A, Matsuyama Y, Mushino T, Matsumoto M, Sonoki T, et al. Acquired Thrombotic Thrombocytopenic Purpura Following BNT162b2 mRNA Coronavirus Disease Vaccination in a Japanese Patient. Internal Medicine. 2022;61(3):407–12.

74. Ben Saida I, Maatouk I, Toumi R, Bouslama E, Ben Ismail H, Ben Salem C, et al. Acquired Thrombotic Thrombocytopenic Purpura Following Inactivated COVID-19 Vaccines: Two Case Reports and a Short Literature Review. Vaccines (Basel). 2022 Jun 24;10(7):1012.

75. McFadyen JD, Sharma P, Moon MJ, Noonan J, Goodall E, Tran HA, et al. Activation of circulating platelets in vaccine-induced thrombotic thrombocytopenia and its reversal by intravenous immunoglobulin. British Journal of Haematology. 2022;196(1):234–7.

76. Sung PS, Oh JS, Choi J. Acute Budd-Chiari syndrome with thrombotic thrombocytopenia after BNT162b2 mRNA vaccination. Liver Int. 2022 Jun;42(6):1447–8.

77. Tajstra M, Jaroszewicz J, Gąsior M. Acute Coronary Tree Thrombosis After Vaccination for COVID-19. JACC: Cardiovascular Interventions. 2021 May 10;14(9):e103–4.

78. Walter U, Fuchs M, Grossmann A, Walter M, Thiele T, Storch A, et al. Adenovirus-Vectored COVID-19 Vaccine–Induced Immune Thrombosis of Carotid Artery: A Case Report. Neurology. 2021 Oct 12;97(15):716–9.

79. Kolahchi Z, Khanmirzaei M, Mowla A. Acute ischemic stroke and vaccine-induced immune thrombotic thrombocytopenia post COVID-19 vaccination; a systematic review. J Neurol Sci. 2022 Aug 15;439:120327.

80. Costentin G, Ozkul-Wermester O, Triquenot A, Cam-Duchez VL, Massy N, Benhamou Y, et al. Acute Ischemic Stroke Revealing ChAdOx1 nCov-19 Vaccine-Induced Immune Thrombotic Thrombocytopenia: Impact on Recanalization Strategy. J Stroke Cerebrovasc Dis. 2021 Sep;30(9):105942.

81. Chen PW, Tsai ZY, Chao TH, Li YH, Hou CJY, Liu PY. Addressing Vaccine-Induced Immune Thrombotic

Thrombocytopenia (VITT) Following COVID-19 Vaccination: A Mini-Review of Practical Strategies. Acta Cardiol Sin. 2021 Jul;37(4):355–64.

82. Lioudaki S, Kontopodis N, Pontikoglou C, Gkalea V, Pappas T, Matsouka C, et al. Multiple Sites of Arterial Thrombosis in A 35-Year Old Patient after ChAdOx1 (AstraZeneca) Vaccination, Requiring Emergent Femoral and Carotid Surgical Thrombectomy. Annals of Vascular Surgery. 2022 Feb 1;79:438.e1-438.e4.

83. Islam A, Bashir MS, Joyce K, Rashid H, Laher I, Elshazly S. An Update on COVID-19 Vaccine Induced Thrombotic Thrombocytopenia Syndrome and Some Management Recommendations. Molecules. 2021 Aug 18;26(16):5004.

84. Ahmed SH, Shaikh TG, Waseem S, Qadir NA, Yousaf Z, Ullah I. Vaccine-induced thrombotic thrombocytopenia following coronavirus vaccine: A narrative review. Annals of Medicine and Surgery. 2022 Jan 1;73:102988.

85. Bourguignon A, Arnold DM, Warkentin TE, Smith JW, Pannu T, Shrum JM, et al. Adjunct Immune Globulin for Vaccine-Induced Immune Thrombotic Thrombocytopenia. New England Journal of Medicine. 2021 Aug 19;385(8):720–8.

86. Huynh A, Kelton JG, Arnold DM, Daka M, Nazy I. Antibody epitopes in vaccine-induced immune thrombotic thrombocytopaenia. Nature. 2021 Aug;596(7873):565–9.

87. Reilly-Stitt C, Kitchen S, Jennings I, Horner K, Jones R, Makris M, et al. Anti-PF4 testing for vaccine-induced immune thrombocytopenia and thrombosis and heparin induced thrombocytopenia: Results from a UK National External Quality Assessment Scheme exercise April 2021. Journal of Thrombosis and Haemostasis. 2021;19(9):2263–7.

88. Marcucci R, Marietta M. Vaccine-induced thrombotic thrombocytopenia: the elusive link between thrombosis and adenovirus-based SARS-CoV-2 vaccines. Intern Emerg Med. 2021 Aug 1;16(5):1113–9.

89. Mancuso M, Lauretti DL, Cecconi N, Santini M, Lami V, Orlandi G, et al. Arterial intracranial thrombosis as the first manifestation of vaccine-induced immune thrombotic thrombocytopenia (VITT): a case report. Neurol Sci. 2022 Mar;43(3):2085–9.

90. Sessa A, Gattamorta M, Punginelli M, Maggioni G. Arterial Thrombosis in an Unusual Site (Ulnar Artery) after COVID-19 Vaccination—A Case Report. Clinics and Practice. 2022 Jun;12(3):237–42.

91. Chen VM, Curnow JL, Tran HA, Choi PY. Australian and New Zealand approach to diagnosis and management of vaccine-induced immune thrombosis and thrombocytopenia. Medical Journal of Australia. 2021 Sep 20;215(6):245.

92. Rodríguez Y, Rojas M, Beltrán S, Polo F, Camacho-Domínguez L, Morales SD, et al. Autoimmune and autoinflammatory conditions after COVID-19 vaccination. New case reports and updated literature review. J Autoimmun. 2022 Oct;132:102898.

93. Gaignard ME, Lieberherr S, Schoenenberger A, Benz R. Autoimmune Hematologic Disorders in Two Patients After mRNA COVID-19 Vaccine. Hemasphere. 2021 Jul 13;5(8):e618.

94. Elrashdy F, Tambuwala MM, Hassan SkS, Adadi P, Seyran M, Abd El-Aziz TM, et al. Autoimmunity roots of the thrombotic events after COVID-19 vaccination. Autoimmunity Reviews. 2021 Nov 1;20(11):102941.

95. Ryan E, Benjamin D, McDonald I, Barrett A, McHugh J, Ryan K, et al. AZD1222 vaccine-related coagulopathy and thrombocytopenia without thrombosis in a young female. Br J Haematol. 2021 Aug;194(3):553–6.

96. Waqar U, Ahmed S, Gardezi SMHA, Tahir MS, Abidin ZU, Hussain A, et al. Thrombosis with Thrombocytopenia Syndrome After Administration of AZD1222 or Ad26.COV2.S Vaccine for COVID-19: A Systematic Review. Clin Appl Thromb Hemost. 2021;27:10760296211068487.

97. Cari L, Fiore P, Naghavi Alhosseini M, Sava G, Nocentini G. Blood clots and bleeding events following BNT162b2 and ChAdOx1 nCoV-19 vaccine: An analysis of European data. Journal of Autoimmunity. 2021 Aug 1;122:102685.

98. Ihnatko M, Truchla I, Ihnatková L, Prohászka Z, Lazúrová I. Case Report: A Case of COVID Vaccine-Induced Thrombotic Thrombocytopenia Manifested as Pulmonary Embolism and Hemorrhagia. A First Reported Case From Slovakia. Front Med (Lausanne). 2021;8:789972.

99. Braun T, Viard M, Juenemann M, Struffert T, Schwarm F, Huttner HB, et al. Case Report: Take a Second Look: Covid-19 Vaccination-Related Cerebral Venous Thrombosis and Thrombotic Thrombocytopenia Syndrome. Frontiers in Neurology [Internet]. 2021 [cited 2022 Dec 4];12. Available from: https://www.frontiersin.org/articles/10.3389/fneur.2021.763049

100. Su PH, Yu YC, Chen WH, Lin HC, Chen YT, Cheng MH, et al. Case Report: Vaccine-Induced Immune Thrombotic Thrombocytopenia in a Pancreatic Cancer Patient After Vaccination With Messenger RNA−1273. Front Med (Lausanne). 2021 Nov 1;8:772424.

101. See I, Lale A, Marquez P, Streiff MB, Wheeler AP, Tepper NK, et al. Case Series of Thrombosis With Thrombocytopenia Syndrome After COVID-19 Vaccination—United States, December 2020 to August 2021. Ann Intern Med. 2022 Apr 19;175(4):513–22.

102. Siegler JE, Klein P, Yaghi S, Vigilante N, Abdalkader M, Coutinho JM, et al. Cerebral Vein Thrombosis With Vaccine-Induced Immune Thrombotic Thrombocytopenia. Stroke. 2021 Sep;52(9):3045–53.

103. Adekoya A, Adelekan-Popoola F, Fabamwo A, Abayomi A, Ajibare A, Odugbemi B, et al. Chadox1 Ncov-19 Vaccination: A Clinico-Pathological Review of Coagulation Derangement in Four Cases. 2022 Oct 25;9:11–21.

104. Suresh P, Petchey W. ChAdOx1 nCOV-19 vaccine-induced immune thrombotic thrombocytopenia and cerebral venous sinus thrombosis (CVST). BMJ Case Reports CP. 2021 Jun 1;14(6):e243931.

105. Greinacher A, Schönborn L, Siegerist F, Steil L, Palankar R, Handtke S, et al. Pathogenesis of vaccine-induced immune thrombotic thrombocytopenia (VITT). Seminars in Hematology. 2022 Apr 1;59(2):97–107.

106. Sánchez van Kammen M, Aguiar de Sousa D, Poli S, Cordonnier C, Heldner MR, van de Munckhof A, et al. Characteristics and Outcomes of Patients With Cerebral Venous Sinus Thrombosis in SARS-CoV-2 Vaccine-Induced Immune Thrombotic Thrombocytopenia. JAMA Neurol. 2021 Nov 1;78(11):1314–23.

107. Lee AYY, Al Moosawi M, Peterson EA, McCracken RK, Wong SKW, Nicolson H, et al. Clinical care pathway for the evaluation of patients with suspected VITT after ChAdOx1 nCoV-19 vaccination. Blood Adv. 2022 Jun 14;6(11):3315–20.

108. Rizk JG, Gupta A, Sardar P, Henry BM, Lewin JC, Lippi G, et al. Clinical Characteristics and Pharmacological Management of COVID-19 Vaccine-Induced Immune Thrombotic Thrombocytopenia With Cerebral Venous Sinus Thrombosis: A Review. JAMA Cardiol. 2021 Dec 1;6(12):1451–60.

109. Mungmunpuntipantip R, Wiwanitkit V.

COVID-19, neurovascular thrombotic problem and short summary on blood coagulation disorder: a brief review. Egypt J Neurol Psychiatr Neurosurg. 2022;58(1):6.

110. Khan Z, Besis G, Candilio L. COVID-19 Vaccine-Induced Thrombotic Thrombocytopaenia With Venous and Arterial Thrombosis: A Case Report. Cureus. 2022 Aug;14(8):e28535.

111. Pishko AM, Bussel JB, Cines DB. COVID-19 vaccination and immune thrombocytopenia. Nat Med. 2021 Jul;27(7):1145–6.

112. Carli G, Nichele I, Ruggeri M, Barra S, Tosetto A. Deep vein thrombosis (DVT) occurring shortly after the second dose of mRNA SARS-CoV-2 vaccine. Intern Emerg Med. 2021 Apr 1;16(3):803–4.

113. Ledford H. COVID vaccines and blood clots: five key questions. Nature. 2021 Apr 22;592(7855):495–6.

114. Greinacher A. COVID vaccine-induced immune thrombotic thrombocytopenia: Rare but relevant. Eur J Intern Med. 2022 Nov;105:20–2.

115. Lai CC, Ko WC, Chen CJ, Chen PY, Huang YC, Lee PI, et al. COVID-19 vaccines and thrombosis with thrombocytopenia syndrome. Expert Rev Vaccines. 2021 Aug;20(8):1027–35.

116. Pavord S, Scully M, Hunt BJ, Lester W, Bagot C, Craven B, et al. Clinical Features of Vaccine-Induced Immune Thrombocytopenia and Thrombosis. New England Journal of Medicine. 2021 Oct 28;385(18):1680–9.

117. Alam W. COVID-19 vaccine-induced immune thrombotic thrombocytopenia: A review of the potential mechanisms and proposed management. Sci Prog. 2021;104(2):368504211025927.

118. Deucher W, Sukumar S, Cataland SR. Clinical relapse of immune-mediated thrombotic thrombocytopenic purpura following COVID-19 vaccination. Research and Practice in Thrombosis and Haemostasis. 2022;6(1):e12658.

119. Scully M, Singh D, Lown R, Poles A, Solomon T, Levi M, et al. Pathologic Antibodies to Platelet Factor 4 after ChAdOx1 nCoV-19 Vaccination. N Engl J Med. 2021 Jun 10;384(23):2202–11.

120. Hwang J, Han YJ, Yon DK, Lee SW, Kim BK, Lee SB, et al. Clinical significance of hepatosplenic thrombosis in vaccine-induced immune thrombotic thrombocytopenia after ChAdOx1 nCoV-19 vaccination. International Journal of Infectious Diseases. 2022 Mar 1;116:114–21.

121. Günther A, Brämer D, Pletz MW, Kamradt T, Baumgart S, Mayer TE, et al. Complicated Long Term Vaccine Induced Thrombotic Immune Thrombocytopenia-A Case Report. Vaccines (Basel). 2021 Nov 17;9(11):1344.

122. Mekheal EM, Millet C, Mekheal N, Ghrewati M, Mechineni A, Maroules M. Coincidental or causal? A case report of acquired thrombotic thrombocytopenic purpura following mRNA-1273 Covid-19 vaccination. Hematology, Transfusion and Cell Therapy [Internet]. 2022 Nov 28 [cited 2022 Dec 4]; Available from: https://www.sciencedirect.com/science/article/pii/S2531137922014560

123. Gan G, Liu H, Liang Z, Zhang G, Liu X, Ma L. Vaccine-associated thrombocytopenia. Thromb Res. 2022 Dec;220:12–20.

124. Alsmady MM, Al-Qaryouti RA, Sultan NG, Khrais OI, Khrais H. Upper Limb Ischemia Due to Arterial Thrombosis after COVID-19 Vaccination. Case Rep Med. 2022;2022:4819131.

125. Laroche A, Soulet D, Bazin M, Levesque T, Allaeys I, Vallières N, et al. Live imaging of platelets and neutrophils during antibody-mediated neurovascular thrombosis. Blood Advances. 2022 Jun 28;6(12):3697–702.

126. Bandapaati S, Bobba H, Navinan MR. Coeliac artery and splenic artery thrombosis complicated with splenic infarction 7 days following the first dose of Oxford vaccination, causal relationship or coincidence? BMJ Case Reports CP. 2021 Jul 1;14(7):e243799.

127. Chang JC, Hawley HB. Vaccine-Associated Thrombocytopenia and Thrombosis: Venous Endotheliopathy Leading to Venous Combined Micro-Macrothrombosis. Medicina. 2021 Nov;57(11):1163.

128. Pavord S, Hunt BJ, Horner D, Bewley S, Karpusheff J. Vaccine induced immune thrombocytopenia and thrombosis: summary of NICE guidance. BMJ. 2021 Oct 1;375:n2195.

129. Yamada S, Asakura H. Coagulopathy and Fibrinolytic Pathophysiology in COVID-19 and SARS-CoV-2 Vaccination. International Journal of Molecular Sciences. 2022 Jan;23(6):3338.

130. Abdel-Bakky MS, Amin E, Ewees MG, Mahmoud NI, Mohammed HA, Altowayan WM, et al. Coagulation System Activation for Targeting of COVID-19: Insights into Anticoagulants, Vaccine-Loaded Nanoparticles, and Hypercoagulability in COVID-19 Vaccines. Viruses. 2022 Feb;14(2):228.

131. Franchini M, Liumbruno GM, Pezzo M. COVID-19 vaccine-associated immune thrombosis and thrombocytopenia (VITT): Diagnostic and therapeutic recommendations for a new syndrome. European Journal of Haematology. 2021;107(2):173–80.

132. Thachil J. COVID-19 Vaccine-Induced Immune Thrombosis with Thrombocytopenia (VITT) and the Shades of Grey in Thrombus Formation. Semin Thromb Hemost. 2022 Feb;48(1):15–8.

133. Thaler J, Jilma P, Samadi N, Roitner F, Mikušková E, Kudrnovsky-Moser S, et al. Long-term follow-up after successful treatment of vaccine-induced prothrombotic immune thrombocytopenia. Thrombosis Research. 2021 Nov 1;207:126–30.

134. Abrignani MG, Murrone A, De Luca L, Roncon L, Di Lenarda A, Valente S, et al. COVID-19, Vaccines, and Thrombotic Events: A Narrative Review. J Clin Med. 2022 Feb 11;11(4):948.

135. Danish F i A, Rabani AE, Subhani F e R, Yasmin S, Koul SS. COVID-19: Vaccine-induced immune thrombotic thrombocytopenia. European Journal of Haematology. 2022;109(6):619–32.

136. Napoli R, Visonà E. Deep vein thrombosis and acute hepatitis after ChAdOx1 nCov-19 vaccination in a Charcot-Marie-Tooth patient: a case report. Clin Exp Vaccine Res. 2022 Sep;11(3):294–7.

137. Mouta Nunes de Oliveira P, Mendes-de-Almeida DP, Bertollo Gomes Porto V, Crespo Cordeiro C, Vitiello Teixeira G, Saraiva Pedro R, et al. Vaccine-induced immune thrombotic thrombocytopenia after COVID-19 vaccination: Description of a series of 39 cases in Brazil. Vaccine. 2022 Aug 5;40(33):4788–95.

138. Herrera-Comoglio R, Lane S. Vaccine-Induced Immune Thrombocytopenia and Thrombosis after the Sputnik V Vaccine. New England Journal of Medicine. 2022 Oct 13;387(15):1431–2.

139. Dotan A, Shoenfeld Y. Perspectives on vaccine induced thrombotic thrombocytopenia. Journal of Autoimmunity. 2021 Jul 1;121:102663.

140. Lavin M, Elder PT, O'Keeffe D, Enright H, Ryan E, Kelly A, et al. Vaccine-induced immune thrombotic thrombocytopenia (VITT) – a novel clinico-pathological entity with heterogeneous clinical presentations. British Journal of Haematology. 2021;195(1):76–84.

141. Hrastelj J, Robertson NP. Vaccine-induced immune thrombosis and thrombocytopaenia: incidence, mechanism and treatment. J Neurol. 2021 Nov 1;268(11):4396–7.

142. De Michele M, Iacobucci M, Chistolini A, Nicolini E, Pulcinelli F, Cerbelli B, et al. Malignant cerebral infarction after ChAdOx1 nCov-19 vaccination: a catastrophic variant of vaccine-induced immune thrombotic thrombocytopenia. Nat Commun. 2021 Aug 2;12(1):4663.

143. Smadja DM, Yue QY, Chocron R, Sanchez O, Louet ALL. Vaccination against COVID-19: insight from arterial and venous thrombosis occurrence using data from VigiBase. European Respiratory Journal [Internet]. 2021 Jul 1 [cited 2022 Dec 4];58(1). Available from: https://erj.ersjournals.com/content/58/1/2100956

144. Atoui A, Jarrah K, Al Mahmasani L, Bou-Fakhredin R, Taher AT. Deep venous thrombosis and pulmonary embolism after COVID-19 mRNA vaccination. Ann Hematol. 2022 May 1;101(5):1111–3.

145. Wiedmann M, Skattør T, Stray-Pedersen A, Romundstad L, Antal EA, Marthinsen PB, et al. Vaccine Induced Immune Thrombotic Thrombocytopenia Causing a Severe Form of Cerebral Venous Thrombosis With High Fatality Rate: A Case Series. Frontiers in Neurology [Internet]. 2021 [cited 2022 Dec 4];12. Available from: https://www.frontiersin.org/articles/10.3389/fneur.2021.721146

146. Bérezné A, Bougon D, Blanc-Jouvan F, Gendron N, Janssen C, Muller M, et al. Deterioration of vaccine-induced immune thrombotic thrombocytopenia treated by heparin and platelet transfusion: Insight from functional cytometry and serotonin release assay. Research and Practice in Thrombosis and Haemostasis. 2021;5(6):e12572.

147. Furie KL, Cushman M, Elkind MSV, Lyden PD, Saposnik G, null null. Diagnosis and Management of Cerebral Venous Sinus Thrombosis With Vaccine-Induced Immune Thrombotic Thrombocytopenia. Stroke. 2021 Jul;52(7):2478–82.

148. Pai M, Grill A, Ivers N, Maltsev A, Miller KJ, Razak F, et al. Vaccine Induced Prothrombotic Immune Thrombocytopenia (VIPIT) Following AstraZeneca COVID-19 Vaccination [Internet]. Ontario COVID-19 Science Advisory Table; 2021 Mar [cited 2022 Dec 4]. Available from: https://covid19-sciencetable.ca/sciencebrief/vaccine-induced-prothrombotic-immune-thrombocytopenia-vipit-following-astrazeneca-covid-19-vaccination

149. Oldenburg J, Klamroth R, Langer F, Albisetti M, Auer C von, Ay C, et al. Diagnosis and Management of Vaccine-Related Thrombosis following AstraZeneca COVID-19 Vaccination: Guidance Statement from the GTH. Hamostaseologie. 2021 Jun;41(3):184–9.

150. Long B, Bridwell R, Gottlieb M. Thrombosis with thrombocytopenia syndrome associated with COVID-19 vaccines. The American Journal of Emergency Medicine. 2021 Nov 1;49:58–61.

151. Ceschia N, Scheggi V, Gori AM, Rogolino AA, Cesari F, Giusti B, et al. Diffuse prothrombotic syndrome after ChAdOx1 nCoV-19 vaccine administration: a case report. J Med Case Reports. 2021 Oct 6;15(1):496.

152. Klok FA, Pai M, Huisman MV, Makris M. Vaccine-induced immune thrombotic thrombocytopenia. Lancet Haematol. 2022 Jan;9(1):e73–80.

153. Pai M. Epidemiology of VITT. Seminars in Hematology. 2022 Apr 1;59(2):72–5.

154. Brazete C, Aguiar A, Furtado I, Duarte R. Thrombotic events and COVID-19 vaccines. The International Journal of Tuberculosis and Lung Disease. 2021 Sep 1;25(9):701–7.

155. Berlot G, Tomasini A, La Fata C, Pintacuda S, Rigutti S, Falanga A. Widespread Arterial Thrombosis after ChAdOx1 nCov-19 Vaccination.

Case Reports in Critical Care. 2022 Feb 16;2022:e6804456.

156. Taylor P, Allen L, Shrikrishnapalasuriyar N, Stechman M, Rees A. Vaccine-induced thrombosis and thrombocytopenia with bilateral adrenal haemorrhage. Clin Endocrinol (Oxf). 2022 Jul;97(1):26–7.

157. Makris M, Pavord S, Lester W, Scully M, Hunt B. Vaccine-induced Immune Thrombocytopenia and Thrombosis (VITT). Res Pract Thromb Haemost. 2021 Jun 5;5(5):e12529.

158. Guditi S, Setty G, Verma M, Reddy R, Devraj R, Raju SB, et al. Vaccine-Induced Thrombotic Thrombocytopenia Due to Coronavirus Disease 2019 Vaccine From a Deceased Donor: A Case Report. Transplant Proc. 2022;54(6):1534–8.

159. Salih F, Schönborn L, Kohler S, Franke C, Möckel M, Dörner T, et al. Vaccine-Induced Thrombocytopenia with Severe Headache. New England Journal of Medicine. 2021 Nov 25;385(22):2103–5.

160. Lai CMB, Lee AYY, Parkin SBI. Vaccine-induced prothrombotic immune thrombocytopenia without thrombosis may not require immune modulatory therapy: A case report. Research and Practice in Thrombosis and Haemostasis. 2022;6(4):e12716.

161. Al Rawahi B, BaTaher H, Jaffer Z, Al-Balushi A, Al-Mazrouqi A, Al-Balushi N. Vaccine-induced immune thrombotic thrombocytopenia following AstraZeneca (ChAdOx1 nCOV19) vaccine–A case report. Research and Practice in Thrombosis and Haemostasis. 2021;5(6):e12578.

162. Dalan R, Boehm BO. Thrombosis post COVID-19 vaccinations: Potential link to ACE pathways. Thrombosis Research. 2021 Oct 1;206:137–8.

163. Sachs UJ, Cooper N, Czwalinna A, Müller J, Pötzsch B, Tiede A, et al. PF4-Dependent Immunoassays in Patients with Vaccine-Induced Immune Thrombotic Thrombocytopenia: Results of an Interlaboratory Comparison. Thromb Haemost. 2021 Dec;121(12):1622–7.

164. Curcio R, Gandolfo V, Alcidi R, Giacomino L, Campanella T, Casarola G, et al. Vaccine-induced massive pulmonary embolism and thrombocytopenia following a single dose of Janssen Ad26.COV2.S vaccination. International Journal of Infectious Diseases. 2022 Mar 1;116:154–6.

165. Aladdin Y, Algahtani H, Shirah B. Vaccine-Induced Immune Thrombotic Thrombocytopenia with Disseminated Intravascular Coagulation and Death following the ChAdOx1 nCoV-19 Vaccine. Journal of Stroke and Cerebrovascular Diseases. 2021 Sep 1;30(9):105938.

166. Charidimou A, Samudrala S, Cervantes-Arslanian AM, Sloan JM, Dasenbrock HH, Daneshmand A. Vaccine-Induced Immune Thrombotic Thrombocytopenia with Concurrent Arterial and Venous Thrombi Following Ad26.COV2.S Vaccination. Journal of Stroke and Cerebrovascular Diseases [Internet]. 2021 Dec 1 [cited 2022 Dec 4];30(12). Available from: https://www.strokejournal.org/article/S1052-3057(21)00518-8/fulltext

167. Connors JM, Iba T. Vaccine-induced immune thrombotic thrombocytopenia and patients with cancer. Thrombosis Research. 2022 May 1;213:S77–83.

168. Sharifian-Dorche M, Bahmanyar M, Sharifian-Dorche A, Mohammadi P, Nomovi M, Mowla A. Vaccine-induced immune thrombotic thrombocytopenia and cerebral venous sinus thrombosis post COVID-19 vaccination; a systematic review. Journal of the Neurological Sciences. 2021 Sep 15;428:117607.

169. Mohseni Afshar Z, Babazadeh A, Janbakhsh A, Afsharian M, Saleki K, Barary M, et al. Vaccine-

induced immune thrombotic thrombocytopenia after vaccination against Covid-19: A clinical dilemma for clinicians and patients. Reviews in Medical Virology. 2022;32(2):e2273.

170. Warkentin TE, Pai M. The Epidemiology of Thrombosis With Thrombocytopenia Syndrome: Analogies With Heparin-Induced Thrombocytopenia. Ann Intern Med. 2022 Apr 19;175(4):604–5.

171. Kuter DJ. Exacerbation of immune thrombocytopenia following COVID-19 vaccination. British Journal of Haematology. 2021;195(3):365–70.

172. Graça LL, Amaral MJ, Serôdio M, Costa B. Extensive thrombosis after COVID-19 vaccine: cause or coincidence? BMJ Case Reports CP. 2021 Aug 1;14(8):e244878.

173. Gresele P, Marietta M, Ageno W, Marcucci R, Contino L, Donadini MP, et al. Management of cerebral and splanchnic vein thrombosis associated with thrombocytopenia in subjects previously vaccinated with Vaxzevria (AstraZeneca): a position statement from the Italian Society for the Study of Haemostasis and Thrombosis (SISET). Blood Transfus. 2021 Jul;19(4):281–3.

174. Toom S, Wolf B, Avula A, Peeke S, Becker K. Familial thrombocytopenia flare-up following the first dose of mRNA-1273 Covid-19 vaccine. Am J Hematol. 2021 May;96(5):E134–5.

175. de Bruijn S, Maes MB, De Waele L, Vanhoorelbeke K, Gadisseur A. First report of a de novo iTTP episode associated with an mRNA-based anti-COVID-19 vaccination. Journal of Thrombosis and Haemostasis. 2021;19(8):2014–8.

176. Lee E, Cines DB, Gernsheimer T, Kessler C, Michel M, Tarantino MD, et al. Thrombocytopenia following Pfizer and Moderna SARS-CoV-2 vaccination. Am J Hematol. 2021 May;96(5):534–7.

177. Marietta M, Coluccio V, Luppi M. Potential mechanisms of vaccine-induced thrombosis. Eur J Intern Med. 2022 Nov;105:1–7.

178. Anderson A, Seddon M, Shahzad K, Lunevicius R. Post-COVID-19 vaccination occurrence of splenic infarction due to arterial thrombosis. BMJ Case Reports CP. 2021 Dec 1;14(12):e243846.

179. Sangli S, Virani A, Cheronis N, Vannatter B, Minich C, Noronha S, et al. Thrombosis With Thrombocytopenia After the Messenger RNA–1273 Vaccine. Ann Intern Med. 2021 Oct 19;174(10):1480–2.

180. Kenda J, Lovrič D, Škerget M, Milivojević N. Treatment of ChAdOx1 nCoV-19 Vaccine-Induced Immune Thrombotic Thrombocytopenia Related Acute Ischemic Stroke. J Stroke Cerebrovasc Dis. 2021 Nov;30(11):106072.

181. Othman M, Baker AT, Gupalo E, Elsebaie A, Bliss CM, Rondina MT, et al. To clot or not to clot? Ad is the question—Insights on mechanisms related to vaccine-induced thrombotic thrombocytopenia. Journal of Thrombosis and Haemostasis. 2021;19(11):2845–56.

182. Hosseinzadeh R, Barary M, Mehdinezhad H, Sio TT, Langer F, Khosravi S. Thrombotic thrombocytopenia After Sinopharm BBIBP-CorV COVID-19 vaccination. Research and Practice in Thrombosis and Haemostasis. 2022;6(4):e12750.

183. Gabarin N, Arnold DM, Nazy I, Warkentin TE. Treatment of vaccine-induced immune thrombotic thrombocytopenia (VITT). Semin Hematol. 2022 Apr;59(2):89–96.

184. Rzymski P, Perek B, Flisiak R. Thrombotic Thrombocytopenia after COVID-19 Vaccination: In Search of the Underlying Mechanism. Vaccines. 2021 Jun;9(6):559.

185. Stoll SE, Werner P, Wetsch WA, Dusse F, Bunck AC, Kochanek M, et al. Transjugular intrahepatic portosystemic shunt, local thrombaspiration, and lysis for management of

fulminant portomesenteric thrombosis and atraumatic splenic rupture due to vector-vaccine-induced thrombotic thrombocytopenia: a case report. Journal of Medical Case Reports. 2022 Jul 11;16(1):271.

186. Kim AY, Woo W, Yon DK, Lee SW, Yang JW, Kim JH, et al. Thrombosis patterns and clinical outcome of COVID-19 vaccine-induced immune thrombotic thrombocytopenia: A Systematic Review and Meta-Analysis. International Journal of Infectious Diseases. 2022 Jun 1;119:130–9.

187. Iba T, Levy JH. Thrombosis and thrombocytopenia in COVID-19 and after COVID-19 vaccination. Trends in Cardiovascular Medicine. 2022 Jul 1;32(5):249–56.

188. Schultz NH, Sørvoll IH, Michelsen AE, Munthe LA, Lund-Johansen F, Ahlen MT, et al. Thrombosis and Thrombocytopenia after ChAdOx1 nCoV-19 Vaccination. New England Journal of Medicine. 2021 Jun 3;384(22):2124–30.

189. Nicolai L, Leunig A, Pekayvaz K, Esefeld M, Anjum A, Rath J, et al. Thrombocytopenia and splenic platelet-directed immune responses after IV ChAdOx1 nCov-19 administration. Blood. 2022 Aug 4;140(5):478–90.

190. Wolf ME, Luz B, Niehaus L, Bhogal P, Bäzner H, Henkes H. Thrombocytopenia and Intracranial Venous Sinus Thrombosis after "COVID-19 Vaccine AstraZeneca" Exposure. Journal of Clinical Medicine. 2021 Jan;10(8):1599.

191. Patriquin CJ, Laroche V, Selby R, Pendergrast J, Barth D, Côté B, et al. Therapeutic Plasma Exchange in Vaccine-Induced Immune Thrombotic Thrombocytopenia. New England Journal of Medicine. 2021 Aug 26;385(9):857–9.

192. Thaler J, Ay C, Gleixner KV, Hauswirth AW, Cacioppo F, Grafeneder J, et al. Successful treatment of vaccine-induced prothrombotic immune thrombocytopenia (VIPIT). Journal of Thrombosis and Haemostasis. 2021;19(7):1819–22.

193. Helms JM, Ansteatt KT, Roberts JC, Kamatam S, Foong KS, Labayog J mel S, et al. Severe, Refractory Immune Thrombocytopenia Occurring After SARS-CoV-2 Vaccine. J Blood Med. 2021 Apr 6;12:221–4.

194. Ling VWT, Fan BE, Lau SL, Lee XH, Tan CW, Lee SY. Severe Thrombocytopenia, Thrombosis and Anti-PF4 Antibody after Pfizer-BioNTech COVID-19 mRNA Vaccine Booster—Is It Vaccine-Induced Immune Thrombotic Thrombocytopenia? Vaccines. 2022 Dec;10(12):2023.

195. Afshar ZM, Barary M, Babazadeh A, Hosseinzadeh R, Alijanpour A, Miri SR, et al. SARS-CoV-2-related and Covid-19 vaccine-induced thromboembolic events: A comparative review. Reviews in Medical Virology. 2022;32(4):e2327.

196. Hsiao PJ, Wu KL, Chen YC, Chen YL, Wang RL, Wu KA, et al. The role of anti-platelet factor 4 antibodies and platelet activation tests in patients with vaccine-induced immune thrombotic thrombocytopenia: Brief report on a comparison of the laboratory diagnosis and literature review. Clin Chim Acta. 2022 Apr 1;529:42–5.

197. Cines DB, Bussel JB. SARS-CoV-2 Vaccine–Induced Immune Thrombotic Thrombocytopenia. New England Journal of Medicine. 2021 Jun 10;384(23):2254–6.

198. Liu Y, Shao Z, Wang H. SARS-CoV-2 vaccine-induced immune thrombotic thrombocytopenia. Thrombosis Research. 2022 Jan 1;209:75–9.

199. Kashir J, Ambia AR, Shafqat A, Sajid MR, AlKattan K, Yaqinuddin A. Scientific premise for the involvement of neutrophil extracellular traps (NETs) in vaccine-induced thrombotic thrombocytopenia (VITT). Journal of Leukocyte Biology. 2022;111(3):725–34.

200. Kalaska B, Miklosz J, Swieton J, Jakimczuk A, Pawlak D, Mogielnicki A. The effect of ChAdOx1 nCov-19 vaccine on arterial thrombosis development and platelet aggregation in female rats. Vaccine. 2022 Mar 18;40(13):1996–2002.

201. Pavenski K. Relapse of Immune Thrombotic Thrombocytopenic Purpura Following Vaccination with COVID19 mRNA Vaccine. TH Open. 2021 Jul;05(3):e335–7.

202. Rock G, Weber V, Stegmayr B. Therapeutic plasma exchange (TPE) as a plausible rescue therapy in severe vaccine-induced immune thrombotic thrombocytopenia. Transfusion and Apheresis Science. 2021 Aug 1;60(4):103174.

203. Okada Y, Sakai R, Sato-Fitoussi M, Nodera M, Yoshinaga S, Shibata A, et al. Potential Triggers for Thrombocytopenia and/or Hemorrhage by the BNT162b2 Vaccine, Pfizer-BioNTech. Front Med (Lausanne). 2021 Sep 30;8:751598.

204. Chong KM, Yang CY, Lin CC, Lien WC. Severe immune thrombocytopenia following COVID-19 vaccination (Moderna) and immune checkpoint inhibitor. The American Journal of Emergency Medicine. 2022 Jun 1;56:395.e1-395.e3.

205. Schettle S, Frantz R, Stulak J, Villavicencio M, Rosenbaum A. HeartWare Thrombosis After mRNA COVID-19 Vaccination. Mayo Clinic Proceedings. 2022 Jul 1;97(7):1399–401.

206. Jacob C, Rani KA, Holton PJ, Boyce SR, Weir NU, Griffith CR, et al. Malignant middle cerebral artery syndrome with thrombotic thrombocytopenia following vaccination against SARS-CoV-2. Journal of the Intensive Care Society. 2022 Nov 1;23(4):479–84.

207. Cliff-Patel N, Moncrieff L, Ziauddin V. Renal Vein Thrombosis and Pulmonary Embolism Secondary to Vaccine-induced Thrombotic Thrombocytopenia (VITT). Eur J Case Rep Intern Med. 2021 Jun 30;8(6):002692.

208. Melas N. “Portal vein thrombosis occurring after the first dose of mRNA SARS-CoV-2 vaccine in a patient with antiphospholipid syndrome”. Thrombosis Update. 2021 Dec 1;5:100069.

209. Marchandot B, Carmona A, Trimaille A, Curtiaud A, Morel O. Procoagulant microparticles: a possible link between vaccine-induced immune thrombocytopenia (VITT) and cerebral sinus venous thrombosis. J Thromb Thrombolysis. 2021 Oct 1;52(3):689–91.

210. Favaloro EJ, Pasalic L, Lippi G. Review and evolution of guidelines for diagnosis of COVID-19 vaccine induced thrombotic thrombocytopenia (VITT). Clinical Chemistry and Laboratory Medicine (CCLM). 2022 Jan 1;60(1):7–17.

211. Franceschi AM, Petrover DR, McMahon TM, Libman RB, Giliberto L, Clouston SAP, et al. Retrospective review COVID-19 vaccine induced thrombotic thrombocytopenia and cerebral venous thrombosis-what can we learn from the immune response. Clin Imaging. 2022 Oct;90:63–70.

212. Lindhoff-Last E, Schoenborn L, Piorkowski M, Herold J, Greinacher A, Sheppard JA, et al. Heterogeneity of Vaccine-Induced Immune Thrombotic Thrombocytopenia after ChAdOx1 nCoV-19 Vaccination and Safety of Second Vaccination with BNT162b2. Thromb Haemost. 2022 Feb;122(2):304–7.

213. Sissa C, Al-Khaffaf A, Frattini F, Gaiardoni R, Mimiola E, Montorsi P, et al. Relapse of thrombotic thrombocytopenic purpura after COVID-19 vaccine. Transfusion and Apheresis Science [Internet]. 2021 Aug 1 [cited 2022 Dec 4];60(4). Available from: https://www.trasci.com/article/S1473-0502(21)00111-7/fulltext

214. Leung HHL, Perdomo J, Ahmadi Z, Zheng SS, Rashid FN, Enjeti A, et al. NETosis and thrombosis

in vaccine-induced immune thrombotic thrombocytopenia. Nat Commun. 2022 Sep 5;13(1):5206.

215. Wang CA, Yeh JS, Hong CY. Repeated Coronary Artery Thrombosis after mRNA-1273 COVID-19 Vaccination. Acta Cardiol Sin. 2022 Nov;38(6):793–5.

216. Iba T, Levy JH, Warkentin TE. Recognizing Vaccine-Induced Immune Thrombotic Thrombocytopenia. Crit Care Med. 2022 Jan;50(1):e80–6.

217. Julian JA, Mathern DR, Fernando D. Idiopathic Thrombocytopenic Purpura and the Moderna Covid-19 Vaccine. Annals of Emergency Medicine. 2021 Jun 1;77(6):654–6.

218. Paul M, Abraham L, Sophy M, Varghese D, Thomas J. Idiopathic Thrombotic Microangiopathy with ChAdOx1 nCov-19 Vaccination in a Middle Aged Male: A Clinical Challenge in the Covid Era. 2021 Jul 25;431.

219. Pasin F, Calabrese A, Pelagatti L. Immune thrombocytopenia following COVID-19 mRNA vaccine: casuality or causality? Intern Emerg Med. 2022 Jan 1;17(1):295–7.

220. Choi PYI, Hsu D, Tran HA, Tan CW, Enjeti A, Chen VMY, et al. Immune thrombocytopenia following vaccination during the COVID-19 pandemic. Haematologica. 2021 Aug 26;107(5):1193–6.

221. Tarawneh O, Tarawneh H. Immune thrombocytopenia in a 22-year-old post Covid-19 vaccine. Am J Hematol. 2021 May;96(5):E133–4.

222. Condorelli A, Markovic U, Sciortino R, Di Giorgio MA, Nicolosi D, Giuffrida G. Immune Thrombocytopenic Purpura Cases Following COVID-19 Vaccination. Mediterr J Hematol Infect Dis. 2021 Mar 1;13(1):e2021047.

223. Kelton JG, Arnold DM, Nazy I. Lessons from vaccine-induced immune thrombotic thrombocytopenia. Nat Rev Immunol. 2021 Dec;21(12):753–5.

224. Favaloro EJ. Laboratory testing for suspected COVID-19 vaccine–induced (immune) thrombotic thrombocytopenia. International Journal of Laboratory Hematology. 2021;43(4):559–70.

225. Thiele T, Weisser K, Schönborn L, Funk MB, Weber G, Greinacher A, et al. Laboratory confirmed vaccine-induced immune thrombotic thrombocytopenia: Retrospective analysis of reported cases after vaccination with ChAdOx-1 nCoV-19 in Germany. Lancet Reg Health Eur. 2022 Jan;12:100270.

226. Al-Ahmad M, Al Rasheed M, Altourah L, Rodriguez-Bouza T, Shalaby N. Isolated thrombosis after COVID-19 vaccination: case series. Int J Hematol. 2022 Feb 1;115(2):153–7.

227. Malayala SV, Mohan G, Vasireddy D, Atluri P. Purpuric Rash and Thrombocytopenia After the mRNA-1273 (Moderna) COVID-19 Vaccine. Cureus [Internet]. 2021 Mar 25 [cited 2022 Dec 4];13(3). Available from: https://www.cureus.com/articles/54984-purpuric-rash-and-thrombocytopenia-after-the-mrna-1273-moderna-covid-19-vaccine

228. Mendes-de-Almeida DP, Martins-Gonçalves R, Morato-Santos R, de Carvalho GAC, Martins SA, Palhinha L, et al. Intracerebral hemorrhage associated with vaccine-induced thrombotic thrombocytopenia following ChAdOx1 nCOVID-19 vaccine in a pregnant woman. Haematologica. 2021 Jul 15;106(11):3025–8.

229. Passariello M, Vetrei C, Amato F, De Lorenzo C. Interactions of Spike-RBD of SARS-CoV-2 and Platelet Factor 4: New Insights in the Etiopathogenesis of Thrombosis. Int J Mol Sci. 2021 Aug 9;22(16):8562.

230. Greinacher A, Selleng K, Palankar R, Wesche J, Handtke S, Wolff M, et al. Insights in ChAdOx1 nCoV-19 vaccine-induced immune thrombotic thrombocytopenia. Blood. 2021 Dec 2;138(22):2256–68.

231. Zheng X, Gao F, Wang L, Meng Y, Ageno W, Qi X. Incidence and outcomes of splanchnic vein thrombosis after diagnosis of COVID-19 or COVID-19 vaccination: a systematic review and meta-analysis. J Thromb Thrombolysis. 2022 Nov 19;1–14.

232. Dix C, McFadyen J, Huang A, Chunilal S, Chen V, Tran H. Understanding vaccine-induced thrombotic thrombocytopenia (VITT). Internal Medicine Journal. 2022 May 1;52(5):717–23.

233. Tsilingiris D, Vallianou NG, Karampela I, Dalamaga M. Vaccine induced thrombotic thrombocytopenia: The shady chapter of a success story. Metabolism Open. 2021 Sep 1;11:100101.

234. Chittal A, Rao S, Lakra P, Nacu N, Haas C. A Case of COVID-19 Vaccine-Induced Thrombotic Thrombocytopenia. Journal of Community Hospital Internal Medicine Perspectives. 2021 Nov 2;11(6):776–8.

235. Harrison H, Rezaei H, Dalal N. A Case of COVID-19 Vaccine-Induced Thrombotic Thrombocytopenia. Cureus. 2022 Jul;14(7):e27204.

236. Pini L, Malerba P, Giordani J, Stassaldi D, Aggiusti C, Martini G, et al. A case of Vaccine-Induced Thrombotic Thrombocytopenia (VITT) with thrombosis of the superior mesenteric artery after ChAdOx1 nCov-19 COVID-19 Vaccine. Emergency Care Journal [Internet]. 2021 Dec 20 [cited 2024 Jun 26];17(4). Available from: https://www.pagepressjournals.org/ecj/article/view/10032

237. Son YB, Kim TB, Min HJ, Lee J, Yang J, Kim MG, et al. A Case Report of Thrombotic Thrombocytopenia After ChAdOx1 nCov-19 Vaccination and Heparin Use During Hemodialysis. J Korean Med Sci. 2022 Mar 4;37(10):e75.

238. Lwin ZT. A Case Report: COVID Vaccine-Induced Immune Thrombocytopenia. Clin Surg. 2021;5(12):1–3.

239. Watts I, Smith D, Mounter S, Baker EH, Hitchings AW, Gill D. A case series of vaccine-induced thrombotic thrombocytopenia in a London teaching hospital. British Journal of Clinical Pharmacology. 2022;88(4):1935–41.

240. Goh Cy C, Teng Keat C, Su Kien C, Ai Sim G. A probable case of vaccine-induced immune thrombotic thrombocytopenia secondary to Pfizer Comirnaty COVID-19 vaccine. J R Coll Physicians Edinb. 2022 Jun;52(2):113–6.

241. Asmat H, Fayeye F, Alshakaty H, Patel J. A rare case of COVID-19 vaccine-induced thrombotic thrombocytopaenia (VITT) involving the veno-splanchnic and pulmonary arterial circulation, from a UK district general hospital. BMJ Case Reports CP. 2021 Sep 1;14(9):e244223.

242. Sobh O, AlSoofi N, Alatifi A, Alsulaim L, Dahhan H, Abuselmiya M, et al. A Rare Case of COVID-19 Vaccine-Induced Thrombotic Thrombocytopenia in a Young Patient. Cureus [Internet]. 2022 Apr 21 [cited 2024 Jun 26];14. Available from: https://www.cureus.com/articles/89048-a-rare-case-of-covid-19-vaccine-induced-thrombotic-thrombocytopenia-in-a-young-patient#!/

243. Kotal R, Jacob I, Rangappa P, Rao K, Hosurkar G, Anumula SK, et al. A rare case of vaccine-induced immune thrombosis and thrombocytopenia and approach to management. Surg Neurol Int. 2021 Aug 16;12:408.

244. Elberry MH, Abdelgawad HAH, Hamdallah A, Abdella WS, Ahmed AS, Ghaith HS, et al. A systematic review of vaccine-induced thrombotic

thrombocytopenia in individuals who received COVID-19 adenoviral-vector-based vaccines. J Thromb Thrombolysis. 2022 May 1;53(4):798–823.

245. Roncati L, Manenti A, Corsi L. A Three-Case Series of Thrombotic Deaths in Patients over 50 with Comorbidities Temporally after modRNA COVID-19 Vaccination. Pathogens. 2022 Apr;11(4):435.

246. Ken-Dror G, Sharma P, Group on behalf of the international BR to E the A of ST (BEAST) collaborators and CVSTWTSS. ABO blood group associated with cerebral venous thrombosis after Oxford-AstraZeneca COVID-19 vaccination: a case–control study. Journal of the Royal Society of Medicine [Internet]. 2023 Dec 12 [cited 2024 Jun 26]; Available from: https://journals.sagepub.com/doi/full/10.1177/01410768231214341

247. Palaiodimou L, Stefanou MI, Katsanos AH, Aguiar de Sousa D, Coutinho JM, Lagiou P, et al. Cerebral Venous Sinus Thrombosis and Thrombotic Events After Vector-Based COVID-19 Vaccines. Neurology. 2021 Nov 23;97(21):e2136–47.

248. Flower L, Bares Z, Santiapillai G, Harris S. Acute ST-segment elevation myocardial infarction secondary to vaccine-induced immune thrombosis with thrombocytopaenia (VITT). BMJ Case Reports CP. 2021 Sep 1;14(9):e245218.

249. Krzywicka K, van de Munckhof A, Sánchez van Kammen M, Heldner MR, Jood K, Lindgren E, et al. Age-Stratified Risk of Cerebral Venous Sinus Thrombosis After SARS-CoV-2 Vaccination. Neurology. 2022 Feb 15;98(7):e759–68.

250. Vierstraete M, Sabbe T. Aortic thrombosis and acute limb ischemia after ChAdOx1 nCov-19 (Oxford-AstraZeneca) vaccination: a case of vaccine-induced thrombocytopenia and thrombosis (VITT). Acta Chirurgica Belgica [Internet]. 2023 May 4 [cited 2024 Jun 26]; Available from: https://www.tandfonline.com/doi/abs/10.1080/00015458.2021.2017600

251. Giovane R, Campbell J, Giovane R, Campbell J. Bilateral Thalamic Stroke: A Case of COVID-19 Vaccine-Induced Immune Thrombotic Thrombocytopenia (VITT) or a Coincidence Due to Underlying Risk Factors? Cureus [Internet]. 2021 Oct 22 [cited 2024 Jun 26];13. Available from: https://www.cureus.com/articles/74167-bilateral-thalamic-stroke-a-case-of-covid-19-vaccine-induced-immune-thrombotic-thrombocytopenia-vitt-or-a-coincidence-due-to-underlying-risk-factors#!/

252. Paknahad MH, Yancheshmeh FB, Soleimani A. Cardiovascular complications of COVID-19 vaccines: A review of case-report and case-series studies. Heart & Lung. 2023 May 1;59:173–80.

253. Szypowski W, Dębiec A, Świstak J, Nowocień M, Rzepecki P, Możański M, et al. Case Report of Cerebral Sinus Thrombosis Related to Immune Thrombotic Thrombocytopenia Following Administration of ChAdOx1 nCoV-19 for Vaccination against COVID-19. Life. 2022 Feb;12(2):168.

254. Comer SP, Le Chevillier A, Szklanna PB, Kelliher S, Saeed K, Cullen S, et al. Case Report: Hypergranular Platelets in Vaccine-Induced Thrombotic Thrombocytopenia After ChAdOx1 nCov-19 Vaccination. Front Cardiovasc Med [Internet]. 2022 Feb 9 [cited 2024 Jun 26];9. Available from: https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2022.824601/full

255. Chen QT, Liu Y, Chen YC, Chou CH, Lin YP, Lin YQ, et al. Case report: Vaccine-induced immune thrombotic thrombocytopenia complicated by acute cerebral venous thrombosis and hemorrhage after AstraZeneca vaccines followed by Moderna COVID-19 vaccine booster and surgery. Front Neurol. 2022;13:989730.

256. Soltani M, Salimnia N, Nahayati MA, Payere M. Case Series of Cerebral Venous Sinus Thrombosis

After COVID-19 Vaccination. Caspian Journal of Neurological Sciences. 2023 Jul 10;9(3):193–9.

257. See I, Lale A, Marquez P, Streiff MB, Wheeler AP, Tepper NK, et al. Case Series of Thrombosis With Thrombocytopenia Syndrome After COVID-19 Vaccination—United States, December 2020 to August 2021. Ann Intern Med. 2022 Apr 19;175(4):513–22.

258. Saleh A, Collins J. Case study of thrombosis and thrombocytopenia syndrome following administration of the AstraZeneca COVID-19 vaccine. Aust J Gen Pract. 2021 Nov 12;50.

259. Pang E, Ghosh S, Chemmanam T, Grove C, Phillips T. Cerebral arterial and venous thrombosis due to COVID-19 vaccine-induced immune thrombotic thrombocytopenia. BMJ Case Reports CP. 2022 Jan 1;15(1):e245445.

260. Ali A, Dilibe A, Rai S, Awosika A, Omole AE, Ahmed M, et al. Cerebral Sinus Thrombosis and Immune Thrombocytopenia Post COVID-19 Vaccination: A Case Report and Narrative Review. Cureus. 2023 Feb;15(2):e34550.

261. Kawano H, Hashimoto Y, Hirano T. [Cerebral vein/venous sinus thrombosis with thrombocytopenia syndrome after COVID-19 vaccination]. Rinsho Shinkeigaku. 2021 Sep 28;61(9):594–601.

262. Mele F, Tafuri S, Stefanizzi P, D Amati A, Calvano M, Leonardelli M, et al. Cerebral venous sinus thrombosis after COVID-19 vaccination and congenital deficiency of coagulation factors: Is there a correlation? Hum Vaccin Immunother. 18(6):2095166.

263. Elfil M, Aladawi M, Balian D, Fahad I, Zhou DJ, Villafuerte-Trisolini B, et al. Cerebral venous sinus thrombosis after COVID-19 vaccination: a case report and literature review. Oxf Med Case Reports. 2023 Jan 18;2023(1):omac154.

264. Yagi Y, Asami Y, Kyoya M, Yokota T. Cerebral venous sinus thrombosis after mRNA-based COVID-19 vaccination. Neurol Sci. 2022;43(1):41–3.

265. Mehta PR, Apap Mangion S, Benger M, Stanton BR, Czuprynska J, Arya R, et al. Cerebral venous sinus thrombosis and thrombocytopenia after COVID-19 vaccination - A report of two UK cases. Brain Behav Immun. 2021 Jul;95:514–7.

266. Castelli GP, Pognani C, Sozzi C, Franchini M, Vivona L. Cerebral venous sinus thrombosis associated with thrombocytopenia post-vaccination for COVID-19. Critical Care. 2021 Apr 12;25(1):137.

267. Yahyavi-Firouz-Abadi N, Naik RP. Cerebral venous sinus thrombosis associated with vaccine-induced thrombotic thrombocytopenia. Neuroradiol J. 2022 Apr;35(2):247–9.

268. Frommeyer TC, Wu T, Gilbert MM, Brittain GV, Fuqua SP. Cerebral Venous Sinus Thrombosis Following an mRNA COVID-19 Vaccination and Recent Oral Contraceptive Use. Life. 2023 Feb;13(2):464.

269. Sharma SS, Gulli G, Sharma P. Cerebral venous sinus thrombosis following ChAdOx1 nCoV-19 AstraZeneca COVID-19 vaccine. JRSM Cardiovasc Dis. 2023 Apr 11;12:20480040231169464.

270. Jaiswal V, Nepal G, Dijamco P, Ishak A, Dagar M, Sarfraz Z, et al. Cerebral Venous Sinus Thrombosis Following COVID-19 Vaccination: A Systematic Review. J Prim Care Community Health. 2022 Feb 10;13:21501319221074450.

271. Lin W, Ko CA, Sung YF, Chen YC, Lee JT, Lin YQ, et al. Cerebral Venous Sinus Thrombosis, Pulmonary Embolism, and Thrombocytopenia After COVID-19 Vaccination in a Taiwanese Man: A Case Report and Literature Review. Front Neurol. 2021;12:738329.

272. Perry RJ, Tamborska A, Singh B, Craven B, Marigold R, Arthur-Farraj P, et al. Cerebral venous thrombosis after vaccination against COVID-19 in

the UK: a multicentre cohort study. The Lancet. 2021 Sep 25;398(10306):1147–56.

273. Lippi G, Favaloro EJ. Cerebral Venous Thrombosis Developing after COVID-19 Vaccination: VITT, VATT, TTS, and More. Semin Thromb Hemost. 2022 Feb;48(1):8–14.

274. Di Pietro M, Dono F, Consoli S, Evangelista G, Pozzilli V, Calisi D, et al. Cerebral venous thrombosis without thrombocytopenia after a single dose of COVID-19 (Ad26.COV2.S) vaccine injection: a case report. Neurol Sci. 2022 May 1;43(5):2951–6.

275. Faghihi H, Mottaghi-Dastjerdi N, Sharifzadeh M, Rahimi Kakavandi N. ChAdOx1 nCoV-19 Vaccine and Thrombosis with Thrombocytopenia Syndrome among Adults: A Systematic Review. Adv Pharm Bull. 2023 Nov;13(4):723–35.

276. Hong SY, Jun SS, Seo SW, Park JR, Im JI. Changes in thrombosis-related parameters after AstraZeneca COVID-19 vaccination in a male volunteer: a case report. J Med Case Reports. 2022 Aug 23;16(1):326.

277. Thakur KT, Tamborska A, Wood GK, McNeill E, Roh D, Akpan IJ, et al. Clinical review of cerebral venous thrombosis in the context of COVID-19 vaccinations: Evaluation, management, and scientific questions. Journal of the Neurological Sciences [Internet]. 2021 Aug 15 [cited 2024 Jun 26];427. Available from: https://www.jns-journal.com/article/S0022-510X(21)00226-4/fulltext

278. Tejaswi GM, Sriganesh K, Sriram V. COVID 19 vaccine induced thrombotic thrombocytopenia, cerebral venous thrombosis and neurogenic stunned myocardium. Indian J Anaesth. 2023 Feb;67(2):224–5.

279. Allas GDO, Arizala JDR, Manalo RVM. COVID-19 Adenoviral Vaccine-Induced Immune Thrombotic Thrombocytopenia (VITT), COVID-19-Related Thrombosis, and the Thrombotic Thrombocytopenic Syndromes. Hematology Reports. 2022 Dec;14(4):358–72.

280. Mahroum N, Lavine N, Ohayon A, Seida R, Alwani A, Alrais M, et al. COVID-19 Vaccination and the Rate of Immune and Autoimmune Adverse Events Following Immunization: Insights From a Narrative Literature Review. Front Immunol. 2022;13:872683.

281. Teo SP. COVID-19 vaccine safety surveillance and emerging concerns of vaccine-induced immune thrombotic thrombocytopenia. J Geriatr Cardiol. 2021 Nov 28;18(11):952–6.

282. Khan E, Bavishi S, Sharma AK, Sharma VK, Goyal V. COVID-19 Vaccine-Induced Immune Thrombotic Thrombocytopenia (VITT) and Cerebral Venous Sinus Thrombosis (CVST)- Lessons for India. Annals of Indian Academy of Neurology. 2022 Feb;25(1):15.

283. Sarkar M, Madabhavi IV, Quy PN, Govindagoudar MB. COVID-19 vaccine-induced immune thrombotic thrombocytopenia: A review. Annals of Thoracic Medicine. 2022 Mar;17(1):1.

284. Suhaimi SNAA, Zaki IAH, Noordin ZM, Hussin NSM, Ming LC, Zulkifly HH. COVID-19 vaccine-induced immune thrombotic thrombocytopenia: a review. Clin Exp Vaccine Res. 2023 Oct;12(4):265–90.

285. Porres-Aguilar M, Lazo-Langner A, Panduro A, Uribe M. COVID-19 vaccine-induced immune thrombotic thrombocytopenia: An emerging cause of splanchnic vein thrombosis. Ann Hepatol. 2021;23:100356.

286. Mishra K, Barki S, Pattanayak S, Shyam M, Sreen A, Kumar S, et al. COVID-19 Vaccine-Induced Thrombosis and Thrombocytopenia: First Confirmed Case from India. Indian J Hematol Blood Transfus. 2022 Jan 1;38(1):196–8.

287. Parums DV. Editorial: SARS-CoV-2 mRNA Vaccines and the Possible Mechanism of Vaccine-Induced Immune Thrombotic Thrombocytopenia (VITT). Med Sci Monit. 2021 Apr 26;27:e932899-1-e932899-2.

288. Alalwan AA, Abou Trabeh A, Premchandran D, Razeem M. COVID-19 Vaccine-Induced Thrombotic Thrombocytopenia: A Case Series. Cureus. 13(9):e17862.

289. Bilotta C, Perrone G, Adelfio V, Spatola GF, Uzzo ML, Argo A, et al. COVID-19 Vaccine-Related Thrombosis: A Systematic Review and Exploratory Analysis. Front Immunol. 2021;12:729251.

290. Scharf RE, Alberio L. COVID-19: SARS-CoV-2 Vaccine-Induced Immune Thrombotic Thrombocytopenia. Hämostaseologie. 2021 Jun 30;41:179–82.

291. Cleaver J, Ibitoye R, Morrison H, Flood R, Crewdson K, Marsh A, et al. Endovascular treatment for vaccine-induced cerebral venous sinus thrombosis and thrombocytopenia following ChAdOx1 nCoV-19 vaccination: a report of three cases. Journal of NeuroInterventional Surgery. 2022 Sep 1;14(9):853–8.

292. McMillan N, Rosenberg HJ, Anderson MP, Pal P, Stephenson K, Fehnel CR. Fatal Post COVID mRNA-Vaccine Associated Cerebral Ischemia. Neurohospitalist. 2023 Apr;13(2):156–8.

293. Rodriguez EVC, Bouazza FZ, Dauby N, Mullier F, d'Otreppe S, Jissendi Tchofo P, et al. Fatal vaccine-induced immune thrombotic thrombocytopenia (VITT) post Ad26.COV2.S: first documented case outside US. Infection. 2022 Apr 1;50(2):531–6.

294. Arachchillage DJ, Rajakaruna I, Makris M, Laffan M, Investigators on behalf of CC 19. Heparin-induced Thrombocytopenia with Thrombosis in COVID-19 versus Vaccine-induced Immune Thrombocytopenia and Thrombosis in the United Kingdom. Seminars in Thrombosis and Hemostasis [Internet]. 2024 Apr 9 [cited 2024 Jun 26]; Available from: https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0044-1785484?casa_token=GvhYdhrXXzgAAAAA:-moPHX-yOIuDn8QcTpeDpV7pddz44SaV7FiafMSDYu-x16WEJMPqEzA9K1z8vRXgQRlShDmgyudtTFRPrQ

295. Kataria S, Reza RR, Agboola AA, Mohamed KH, Mohamed AS, Zahid N, et al. Immune Thrombocytopenia and Cerebral Venous Sinus Thrombosis Following COVID-19 Vaccination: A Case Report. Cureus. 15(1):e34272.

296. Paulsen FO, Schaefers C, Langer F, Frenzel C, Wenzel U, Hengel FE, et al. Immune thrombocytopenic purpura after vaccination with COVID-19 vaccine (ChAdOx1 nCov-19). Blood. 2021 Sep 16;138(11):996–9.

297. Picod A, Rebibou JM, Dossier A, Cador B, Ribes D, Vasco-Moynet C, et al. Immune-mediated thrombotic thrombocytopenic purpura following COVID-19 vaccination. Blood. 2022 Apr 21;139(16):2565–9.

298. Tu TM, Yi SJ, Koh JS, Saffari SE, Hoe RHM, Chen GJ, et al. Incidence of Cerebral Venous Thrombosis Following SARS-CoV-2 Infection vs mRNA SARS-CoV-2 Vaccination in Singapore. JAMA Network Open. 2022 Mar 17;5(3):e222940.

299. Ostrowski SR, Søgaard OS, Tolstrup M, Stærke NB, Lundgren J, Østergaard L, et al. Inflammation and Platelet Activation After COVID-19 Vaccines - Possible Mechanisms Behind Vaccine-Induced Immune Thrombocytopenia and Thrombosis. Front Immunol. 2021;12:779453.

300. Choi JK, Kim S, Kim SR, Jin JY, Choi SW, Kim H, et al. Intracerebral Hemorrhage due to Thrombosis with Thrombocytopenia Syndrome after Vaccination against COVID-19: the First Fatal Case

in Korea. J Korean Med Sci. 2021 Aug 9;36(31):e223.

301. Pavord S, Scully M, Lester W, Makris M, Hunt BJ. Just how common is TTS after a second dose of the ChAdOx1 nCov-19 vaccine? The Lancet. 2021 Nov 13;398(10313):1801.

302. Vercruysse K, Devreese KMJ. Laboratory testing for post ChAdOx1 nCOV-19 vaccination VITT: A challenge. Comment on: Recommendations for the clinical and laboratory diagnosis of VITT against COVID-19: Communication from the ISTH SSC Subcommittee on Platelet Immunology. Journal of Thrombosis and Haemostasis. 2021 Sep 1;19(9):2355–7.

303. McDonnell T, Thornber M, Cooksley T, Jain S, McGlynn S. Left inferior ophthalmic vein thrombosis due to VITT: a case report. QJM. 2022 Jan 5;114(11):810–1.

304. Roberge G, Carrier M. Long VITT: A case report. Thrombosis Research. 2023 Mar 1;223:78–9.

305. Kehr S, Berg P, Müller S, Fiedler SA, Meyer B, Ruppert-Seipp G, et al. Long-term outcome of patients with vaccine-induced immune thrombotic thrombocytopenia and cerebral venous sinus thrombosis. npj Vaccines. 2022 Jul 5;7(1):1–4.

306. Elkoumy M, Schoen J, Loew A. Management of a severe bilateral pulmonary embolism as a complication of VITT following vaccination with AstraZeneca COVID-19 vaccine. BMJ Case Reports CP. 2022 May 1;15(5):e246770.

307. Chew HS, Al-Ali S, Butler B, Rajapakse D, Nader K, Chavda S, et al. Mechanical Thrombectomy for Treatment of Cerebral Venous Sinus Thrombosis in Vaccine-Induced Immune Thrombotic Thrombocytopenia. American Journal of Neuroradiology [Internet]. 2021 Dec 23 [cited 2024 Jun 26]; Available from: https://www.ajnr.org/content/early/2021/12/23/ajnr.A7381

308. Chan BT, Bobos P, Odutayo A, Pai M. Meta-Analysis of Risk of Vaccine-Induced Immune Thrombotic Thrombocytopenia Following ChAdOx1-S Recombinant Vaccine [Internet]. medRxiv; 2021 [cited 2024 Jun 26]. p. 2021.05.04.21256613. Available from: https://www.medrxiv.org/content/10.1101/2021.05.04.21256613v1

309. Matar RH, Than CA, Nakanishi H, Daniel RS, Smayra K, Sim BL, et al. Outcomes of patients with thromboembolic events following coronavirus disease 2019 AstraZeneca vaccination: a systematic review and meta-analysis. Blood Coagulation & Fibrinolysis. 2022 Mar;33(2):90.

310. Azzarone B, Veneziani I, Moretta L, Maggi E. Pathogenic Mechanisms of Vaccine-Induced Immune Thrombotic Thrombocytopenia in People Receiving Anti-COVID-19 Adenoviral-Based Vaccines: A Proposal. Front Immunol [Internet]. 2021 Aug 13 [cited 2024 Jun 26];12. Available from: https://www.frontiersin.org/journals/immunology/articles/10.3389/fimmu.2021.728513/full

311. Di Micco P, Camporese G, Cardillo G, Lodigiani C, Carannante N, Annunziata A, et al. Pathophysiology of Vaccine-Induced Prothrombotic Immune Thrombocytopenia (VIPIT) and Vaccine-Induced Thrombocytopenic Thrombosis (VITT) and Their Diagnostic Approach in Emergency. Medicina. 2021 Oct;57(10):997.

312. Battaglini D, Ball L, Robba C, Maiani S, Brunetti I, Benedetti L, et al. Patients With Suspected Severe Adverse Reactions to COVID-19 Vaccination Admitted to Intensive Care Unit: A Case Report. Front Med [Internet]. 2022 Mar 18 [cited 2024 Jun 26];9. Available from: https://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2022.823837/full

313. Kanack AJ, Singh B, George G, Gundabolu K, Koepsell SA, Abou-Ismail MY, et al. Persistence of

Ad26.COV2.S-associated vaccine-induced immune thrombotic thrombocytopenia (VITT) and specific detection of VITT antibodies. American Journal of Hematology. 2022;97(5):519–26.

314. Kheyrandish S, Rastgar A, Arab-Zozani M, Sarab GA. Portal Vein Thrombosis Might Develop by COVID-19 Infection or Vaccination: A Systematic Review of Case-Report Studies. Front Med [Internet]. 2021 Dec 14 [cited 2024 Jun 26];8. Available from: https://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2021.794599/full

315. Butler-Manuel W, Rana UI, Zafar M, Gadi A, Kiani A. Post COVID-19 Vaccine Related Cerebral Venous Sinus Thrombosis and Thrombocytopenia. Cureus. 2022 Jan;14(1):e20932.

316. Schneider J, Sottmann L, Greinacher A, Hagen M, Kasper HU, Kuhnen C, et al. Postmortem investigation of fatalities following vaccination with COVID-19 vaccines. Int J Legal Med. 2021 Nov 1;135(6):2335–45.

317. Varona JF, García-Isidro M, Moeinvaziri M, Ramos-López M, Fernández-Domínguez M. Primary adrenal insufficiency associated with Oxford-AstraZeneca ChAdOx1 nCoV-19 vaccine-induced immune thrombotic thrombocytopenia (VITT). Eur J Intern Med. 2021 Sep;91:90–2.

318. Kim EJ, Yoo SJ. Pulmonary Embolism after Vaccination with the COVID-19 Vaccine (Pfizer, BNT162b2): A Case Report. Vaccines. 2023 Jun;11(6):1075.

319. Jiang SK, Chen WL, Chien C, Pan CS, Tsai ST. Rapid progressive vaccine-induced immune thrombotic thrombocytopenia with cerebral venous thrombosis after ChAdOx1 nCoV-19 (AZD1222) vaccination: A case report. World J Clin Cases. 2022 Sep 16;10(26):9462–9.

320. Purkayastha P, Mckechnie C, Kalkur P, Scully M. Rare case of COVID-19 vaccine-associated intracranial haemorrhage with venous sinus thrombosis. BMJ Case Reports CP. 2021 Sep 1;14(9):e245092.

321. Iba T, Levy JH, Warkentin TE. Recognizing Vaccine-Induced Immune Thrombotic Thrombocytopenia. Crit Care Med. 2022 Jan 1;50(1):e80–6.

322. Hippisley-Cox J, Patone M, Mei XW, Saatci D, Dixon S, Khunti K, et al. Risk of thrombocytopenia and thromboembolism after covid-19 vaccination and SARS-CoV-2 positive testing: self-controlled case series study. BMJ. 2021 Aug 26;374:n1931.

323. Afshar ZM, Barary M, Babazadeh A, Hosseinzadeh R, Alijanpour A, Miri SR, et al. SARS-CoV-2-related and Covid-19 vaccine-induced thromboembolic events: A comparative review. Reviews in Medical Virology. 2022;32(4):e2327.

324. Pavord S, Makris M. Second-dose VITT: rare but real. Blood. 2022 Apr 28;139(17):2581–3.

325. Koch M, Fuld S, Middeke JM, Fantana J, Bonin S von, Beyer-Westendorf J. Secondary Immune Thrombocytopenia (ITP) Associated with ChAdOx1 Covid-19 Vaccination – A Case Report. TH Open. 2021 Jul 30;05:e315–8.

326. Kemper M, Lenz G, Mesters RM. Successful Treatment of Vaccine-Induced Immune Thrombotic Thrombocytopenia in a 26-Year-Old Female Patient. Acta Haematologica. 2021 Oct 6;145(2):210–3.

327. Khuhapinant A, Rungjirajittranon T, Suwanawiboon B, Chinthammitr Y, Ruchutrakool T. Successful venous thromboprophylaxis in a patient with vaccine-induced immune thrombotic thrombocytopenia (VITT): a case report of the first reported case in Thailand. Thrombosis J. 2021 Sep 8;19(1):65.

328. Tran H, Deng L, Wood N, Chen VM. The Clinicalpathological Features of Vaccine-Induced

Immune Thrombocytopenia and Thrombosis (VITT) Following ChAdOx1 (AstraZeneca AZD1222) Vaccination and Case Outcomes in Australia. Blood. 2022 Nov 15;140(Supplement 1):5654–5.

329. Kragholm K, Sessa M, Mulvad T, Andersen MP, Collatz-Christensen H, Blomberg SN, et al. Thrombocytopenia after COVID-19 vaccination. J Autoimmun. 2021 Sep;123:102712.

330. Geronikolou SA, Takan I, Pavlopoulou A, Mantzourani M, Chrousos GP. Thrombocytopenia in COVID-19 and vaccine-induced thrombotic thrombocytopenia. Int J Mol Med. 2022 Mar;49(3):35.

331. Clerici B, Pontisso E, Aloise C, Peroni B, Perricone R, Pisetta C, et al. Thrombosis and Bleeding in Patients with Vaccine-Induced Immune Thrombotic Thrombocytopenia: A Systematic Review of Published Cases. Thrombosis and Haemostasis. 2023 Dec 18;124:423–31.

332. Bano F, Badugama B, Chandra D. Thrombosis and thrombocytopaenia after ChAdOx1 nCoV-19 vaccination: a single UK centre experience. BMJ Case Reports CP. 2021 Jul 1;14(7):e243894.

333. Bekal S, Husari G, Okura M, Huang CA, Bukari MS. Thrombosis Development After mRNA COVID-19 Vaccine Administration: A Case Series. Cureus [Internet]. 2023 Jul [cited 2024 Jun 26];15(7). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10400017/

334. Jain N, Chaudhary P, Shrivastava A, Kaur T, Kaur S, Brar HS, et al. Thrombosis with Thrombocytopenia Syndrome (TTS) After ChAdOx1 nCoV-19 Immunization: An Investigative Case Report. Am J Case Rep. 2023 Mar 18;24:e938878-1-e938878-8.

335. Cattaneo M. Thrombosis with Thrombocytopenia Syndrome associated with viral vector COVID-19 vaccines. Eur J Intern Med. 2021 Jul;89:22–4.

336. Cari L, Naghavi Alhosseini M, Bergamo A, Pacor S, Pierno S, Sava G, et al. Thrombotic events with or without thrombocytopenia in recipients of adenovirus-based COVID-19 vaccines. Front Cardiovasc Med [Internet]. 2022 Sep 29 [cited 2024 Jun 26];9. Available from: https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2022.967926/full

337. Saluja P, Gautam N, Yadala S, Venkata AN. Thrombotic thrombocytopenic purpura (TTP) after COVID-19 vaccination: A systematic review of reported cases. Thrombosis Research. 2022 Jun 1;214:115–21.

338. Lee HP, Selvaratnam V, Rajasuriar JS. Thrombotic thrombocytopenic purpura after ChAdOx1 nCoV-19 vaccine. BMJ Case Reports CP. 2021 Oct 1;14(10):e246049.

339. Dan C, Sahai A, Dan D, Sahai A, Trehan R. Thrombotic Thrombocytopenic Purpura Following Pfizer-BioNTech COVID-19 Vaccination in a Patient With Multiple Myeloma: Case Report and Literature Review. Cureus. 15(10):e46784.

340. Rogers P, Walker I, Yeung J, Khan A, Gangi A, Mobashwera B, et al. Thrombus Distribution in Vaccine-induced Immune Thrombotic Thrombocytopenia after ChAdOx1 nCov-19 Vaccination. Radiology [Internet]. 2022 Jun 14 [cited 2024 Jun 26]; Available from: https://pubs.rsna.org/doi/10.1148/radiol.220365

341. John CV, Kumar R, Sivan AK, Jithin S, Abraham R, Philip CC. Vaccine-induced thrombotic thrombocytopenia (VITT): first report from India. Thrombosis J. 2022 Mar 4;20(1):11.

342. Ribeiro MI, Pimenta I, Conde I, Gonzalez FA. Vaccine-induced immune thrombocytopaenia and thrombosis (VITT) after COVID-19 vaccination. BMJ

Case Reports CP. 2022 May 1;15(5):e247346.

343. Cines DB, Greinacher A. Vaccine-induced immune thrombotic thrombocytopenia. Blood. 2023 Apr 6;141(14):1659–65.

344. Luciano PQ, Binatti R, Sodré AR, Zajac SR, Marson FAL, Ortega MM. Vaccine-induced immune thrombotic thrombocytopenia after ChAdOx1 nCoV-19 vaccine in an older patient: Minireview and a case report. Journal of Infection and Public Health. 2022 Jun 1;15(6):638–42.

345. Tejpal A, Economopoulos P, Andreou R, Stevenson J. Vaccine-Induced Immune Thrombotic Thrombocytopenia after Receiving the ChAdOx1 nCoV-19 Vaccine. Canadian Journal of General Internal Medicine. 2021 Jun 21;16(2):34–7.

346. Rodríguez C, Pérez-Nieva A, Máiz L, Meijón M del M, Llamas P, Monreal M, et al. Vaccine-induced immune thrombotic thrombocytopenia after the BNT162b2 mRNA Covid-19 vaccine: A case study. Thrombosis Research. 2021 Dec 1;208:1–3.

347. Sharifian-Dorche M, Bahmanyar M, Sharifian-Dorche A, Mohammadi P, Nomovi M, Mowla A. Vaccine-induced immune thrombotic thrombocytopenia and cerebral venous sinus thrombosis post COVID-19 vaccination; a systematic review. J Neurol Sci. 2021 Sep 15;428:117607.

348. Lin TC, Fu PA, Hsu YT, Chen TY. Vaccine-Induced Immune Thrombotic Thrombocytopenia following BNT162b2 mRNA COVID-19 Booster: A Case Report. Vaccines. 2023 Jun;11(6):1115.

349. Mendes-de-Almeida DP, Bise Viegas AP, Júlio LC, Pietrowski Bertuol AP, Fernandes EG, Marques de Figueiredo R, et al. Vaccine-induced immune thrombotic thrombocytopenia post COVID-19 booster vaccination in Brazil: a case series. Research and Practice in Thrombosis and Haemostasis. 2023 Nov 1;7(8):102243.

350. Clarke L, Brighton T, Chunilal SD, Lee CSM, Passam F, Curnow J, et al. Vaccine-induced immune thrombotic thrombocytopenia post dose 2 ChAdOx1 nCoV19 vaccination: Less severe but remains a problem. Vaccine. 2023 May 11;41(20):3285–91.

351. Page D, Zhu N, Sawler D, Sun HW, Turley E, Pai M, et al. Vaccine-induced immune thrombotic thrombocytopenia presenting with normal platelet count. Research and Practice in Thrombosis and Haemostasis. 2021;5(6):e12596.

352. Kim MK, Jang S, Na SH, Bang SM, Kim JH. Vaccine-Induced Immune Thrombotic Thrombocytopenia: First Case Report in South Korea. J Clin Neurol. 2021 Oct;17(4):570–2.

353. Fanni D, Saba L, Demontis R, Gerosa C, Chighine A, Nioi M, et al. Vaccine-induced severe thrombotic thrombocytopenia following COVID-19 vaccination: A report of an autoptic case and review of the literature. 2021 [cited 2024 Jun 26]; Available from: https://iris.unica.it/handle/11584/317314

354. Swan D, Enright H, Desmond R, Le G, El Hassadi E, Hennessy B, et al. Vaccine-induced thrombosis and thrombocytopenia (VITT) in Ireland: A review of cases and current practices. Thrombosis Update. 2021 Dec 1;5:100086.

355. Naeem B, Saleem J, Qureshi MA. Vaccine-Induced Thrombotic Thrombocytopenia (VITT) Associated with AstraZeneca Vaccine: A Comprehensive Review. Annals of King Edward Medical University. 2023;29(4).

356. Sukumar CA, Singh A, Fatima N, Jayaram S, Vidyasagar S. Vaccine-induced thrombotic thrombocytopenia (VITT) in COVID-19 vaccination: Demystified. Journal of the Indian Academy of Clinical Medicine. 2023;24(2).

357. Silva L, Pombal R, Fidalgo M, Freitas A, Barbosa M, Magalhães L, et al. Vaccine-Induced Thrombotic Thrombocytopenia: A Case Report. Cureus. 2022 Mar;14(3):e23196.

358. Zimmermann S, Federbusch M, Isermann B, Kohli S. Vaccine-Induced Thrombotic Thrombocytopenia: Insights from Blood Smear. Thrombosis and Haemostasis. 2021 Nov 30;121:1696–8.

359. Major A, Carll T, Chan CW, Christenson C, Aldarweesh F, Wool GD, et al. Refractory vaccine-induced immune thrombotic thrombocytopenia (VITT) managed with delayed therapeutic plasma exchange (TPE). J Clin Apher. 2022 Feb;37(1):117–21.

360. Blauenfeldt RA, Kristensen SR, Ernstsen SL, Kristensen CCH, Simonsen CZ, Hvas AM. Thrombocytopenia with acute ischemic stroke and bleeding in a patient newly vaccinated with an adenoviral vector-based COVID-19 vaccine. Journal of Thrombosis and Haemostasis. 2021;19(7):1771–5.

361. Al-Mayhani T, Saber S, Stubbs MJ, Losseff NA, Perry RJ, Simister RJ, et al. Ischaemic stroke as a presenting feature of ChAdOx1 nCoV-19 vaccine-induced immune thrombotic thrombocytopenia. J Neurol Neurosurg Psychiatry. 2021 Nov 1;92(11):1247–8.

362. Cascio Rizzo A, Giussani G, Agostoni EC. Ischemic Stroke and Vaccine-Induced Immune Thrombotic Thrombocytopenia following COVID-19 Vaccine: A Case Report with Systematic Review of the Literature. Cerebrovasc Dis. 2022 May 5;1–13.

363. Ferro JM, Sousa DA de, Coutinho JM, Martinelli I. European stroke organization interim expert opinion on cerebral venous thrombosis occurring after SARS-CoV-2 vaccination. European Stroke Journal. 2021 Sep 1;6(3):CXVI–CXXI.

364. Mereuta OM, Rossi R, Douglas A, Gil SM, Fitzgerald S, Pandit A, et al. Characterization of the 'White' Appearing Clots that Cause Acute Ischemic Stroke. Journal of Stroke and Cerebrovascular Diseases. 2021 Dec 1;30(12):106127.

365. Rahmig J, Altarsha E, Siepmann T, Barlinn K. Acute Ischemic Stroke in the Context of SARS-CoV-2 Vaccination: A Systematic Review. Neuropsychiatr Dis Treat. 2022;18:1907–16.

366. Saleh M, Zimmermann J, Lehnen NC, Pötzsch B, Weller JM. Late-Onset Vaccine-Induced Immune Thombotic Thrombocytopenia (VITT) with Cerebral Venous Sinus Thrombosis. J Stroke Cerebrovasc Dis. 2022 Apr;31(4):106311.

367. Stefanou MI, Palaiodimou L, Sousa DA de, Theodorou A, Bakola E, Katsaros DE, et al. Acute Arterial Ischemic Stroke Following COVID-19 Vaccination: A Systematic Review and Meta-analysis. Neurology. 2022 Oct 4;99(14):e1465–74.

368. Wills A, Swallow G, Kirkman MA, Rajan K, Subramanian G. Arterial and venous thrombotic stroke after ChAdOx1 nCoV-19 vaccine. Clin Med (Lond). 2022 Mar;22(2):184–6.

369. van de Munckhof A, Lindgren E, Kleinig TJ, Field TS, Cordonnier C, Krzywicka K, et al. Outcomes of Cerebral Venous Thrombosis due to Vaccine-Induced Immune Thrombotic Thrombocytopenia After the Acute Phase. Stroke. 2022 Oct;53(10):3206–10.

370. Alonso Castillo R, Martínez Castrillo JC. Neurological manifestations associated with COVID-19 vaccine. Neurologia (Engl Ed). 2022 Oct 23;S2173-5808(22)00141-9.

371. Mohseni Afshar Z, Sharma A, Babazadeh A, Alizadeh-Khatir A, Sio TT, Taghizadeh Moghadam MA, et al. A review of the potential neurological adverse events of COVID-19 vaccines. Acta Neurol Belg. 2022 Nov 16;1–36.

372. Dutta S, Kaur R, Charan J, Bhardwaj P, Ambwani SR, Babu S, et al. Analysis of Neurological Adverse Events Reported in VigiBase From COVID-19 Vaccines. Cureus. 2022 Jan;14(1):e21376.

373. Mirandola L, Arena G, Pagliaro M, Boghi A,

Naldi A, Castellano D, et al. Massive cerebral venous sinus thrombosis in vaccine-induced immune thrombotic thrombocytopenia after ChAdOx1 nCoV-19 serum: case report of a successful multidisciplinary approach. Neurol Sci. 2022 Mar 1;43(3):1499–502.

374. Sriwastava S, Sharma K, Khalid SH, Bhansali S, Shrestha AK, Elkhooly M, et al. COVID-19 Vaccination and Neurological Manifestations: A Review of Case Reports and Case Series. Brain Sci. 2022 Mar 18;12(3):407.

375. Dutta A, Ghosh R, Bhattacharya D, Bhat S, Ray A, Pandit A, et al. Anti-PF4 antibody negative cerebral venous sinus thrombosis without thrombocytopenia following immunization with COVID-19 vaccine in an elderly non-comorbid Indian male, managed with conventional heparin-warfarin based anticoagulation. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2021 Jul 1;15(4):102184.

376. Park J, Park MS, Kim HJ, Song TJ. Association of Cerebral Venous Thrombosis with mRNA COVID-19 Vaccines: A Disproportionality Analysis of the World Health Organization Pharmacovigilance Database. Vaccines. 2022 May;10(5):799.

377. Taquet M, Husain M, Geddes JR, Luciano S, Harrison PJ. Cerebral venous thrombosis: a retrospective cohort study of 513,284 confirmed COVID-19 cases and a comparison with 489,871 people receiving a COVID-19 mRNA vaccine. :23.

378. Fan BE, Shen JY, Lim XR, Tu TM, Chang CCR, Khin HSW, et al. Cerebral venous thrombosis post BNT162b2 mRNA SARS-CoV-2 vaccination: A black swan event. Am J Hematol. 2021 Sep 1;96(9):E357–61.

379. Franchini M, Testa S, Pezzo M, Glingani C, Caruso B, Terenziani I, et al. Cerebral venous thrombosis and thrombocytopenia post-COVID-19 vaccination. Thrombosis Research. 2021 Jun 1;202:182–3.

380. de Gregorio C, Colarusso L, Calcaterra G, Bassareo PP, Ieni A, Mazzeo AT, et al. Cerebral Venous Sinus Thrombosis following COVID-19 Vaccination: Analysis of 552 Worldwide Cases. Vaccines. 2022 Feb;10(2):232.

381. Omidian N, Mohammadi P, Sadeghalvad M, Mohammadi-Motlagh HR. Cerebral microvascular complications associated with SARS-CoV-2 infection: How did it occur and how should it be treated? Biomed Pharmacother. 2022 Oct;154:113534.

382. De Michele M, Iacobucci M, Nicolini E, Chistolini A, Pulcinelli F, Cerbelli B, et al. Malignant cerebral infarction, systemic venous thrombosis and thrombocytopenia after ChAdOx1 nCov vaccination: a possible catastrophic variant of vaccine induced thrombotic thrombocytopenia [Internet]. In Review; 2021 May [cited 2022 Dec 4]. Available from: https://www.researchsquare.com/article/rs-448338/v1

383. Schulz JB, Berlit P, Diener HC, Gerloff C, Greinacher A, Klein C, et al. COVID-19 Vaccine-Associated Cerebral Venous Thrombosis in Germany. Annals of Neurology. 2021;90(4):627–39.

384. Fadul A, Abdalla Elm, Abdelmahmuod E, Abdulgayoom M, Ali E, Al-Warqi A, et al. COVID-19 Vaccine-Induced Cerebral Sinus Thrombosis: Coincidence vs. Cause? Cureus. 2022 Jun;14(6):e26436.

385. Libruder C, Hershkovitz Y, Ben-Yaish S, Tanne D, Keinan-Boker L, Binyaminy B. An Increased Risk for Ischemic Stroke in the Short-Term Period following COVID-19 Infection: A Nationwide Population-Based Study. Neuroepidemiology. 2023 Jul 3;57(4):253–9.

386. Rojko M, Suligoj NC, Zorc M, Noc M. Patent Foramen Ovale-associated Stroke and COVID-19 Vaccination. Interv Cardiol. 2023 Apr 5;18:e10.

387. Ihle-Hansen H, Bøås H, Tapia G, Hagberg G, Ihle-Hansen H, Berild JD, et al. Stroke After SARS-CoV-2 mRNA Vaccine: A Nationwide Registry Study. Stroke. 2023 May;54(5):e190–3.

388. Lu Y, Matuska K, Nadimpalli G, Ma Y, Duma N, Zhang HT, et al. Stroke Risk After COVID-19 Bivalent Vaccination Among US Older Adults. JAMA. 2024 Mar 19;331(11):938–50.

389. El Naamani K, Amllay A, Chen CJ, Capone S, Abbas R, Sioutas GS, et al. The Effect of COVID-19 Vaccines on Stroke Outcomes: A Single-Center Study. World Neurosurgery. 2023 Feb 1;170:e834–9.

390. Bs T. Acute Hemoglobin Decline with Signs of Hemolysis in Chronically Transfused Beta-thalassemia Patient Post Pfizer-BioNTech COVID-19 (BNT162b2) Vaccine: A Case Report. :4.

391. Kumar TA, Sunka S. A Rare Case of M-RNA Vaccine (COVID-19) Induced Autoimmune Hemolytic Anaemia. Indian Journal of Critical Care Medicine. 2022;S13–S13.

392. Delaporta P, Lampropoulou E, Moschoviti A, Binenbaum I, Kyriakopoulou D, Ioakeimidou N, et al. Adverse Events Following COVID-19 Vaccination in Transfusion-Dependent -Thalassemia Patients. Blood. 2021 Nov 23;138:2015.

393. Ferrer F, Roldão M, Figueiredo C, Lopes K. Atypical Hemolytic Uremic Syndrome after ChAdOx1 nCoV-19 Vaccination in a Patient with Homozygous CFHR3/CFHR1 Gene Deletion. NEF. 2022;146(2):185–9.

394. Fattizzo B, Barcellini W. Autoimmune hemolytic anemia: causes and consequences. Expert Review of Clinical Immunology. 2022 Jul 3;18(7):731–45.

395. Rico AC, Ferreirol AG, Zorilla SR, Gonzalez AM. Drug-induced autoimmune hemolytic anemia, as an adverse effect to a vaccine against COVID-19, description of 1 case and review of the literature. Galicia Clinica. 2021;218–9.

396. Kamura Y, Sakamoto T, Yokoyama Y, Nishikii H, Sakata-Yanagimoto M, Chiba S, et al. Hemolysis induced by SARS-CoV-2 mRNA vaccination in patients with paroxysmal nocturnal hemoglobinuria. Int J Hematol. 2022 Jul 1;116(1):55–9.

397. Al-kuraishy HM, Al-Gareeb AI, Kaushik A, Kujawska M, Batiha GES. Hemolytic anemia in COVID-19. Ann Hematol. 2022 Sep 1;101(9):1887–95.

398. Pérez-Lamas L, Moreno-Jiménez G, Tenorio-Núñez MC, Velázquez-Kennedy K, Jiménez-Chillón C, Astibia-Mahillo B, et al. Hemolytic crisis due to Covid-19 vaccination in a woman with cold agglutinin disease. Am J Hematol. 2021 Aug;96(8):E288–91.

399. Boshkos MC, Fives KR, Phrathep DD, Healey KD, Patel M. Breakthrough Hemolysis Associated With COVID-19 Vaccination and Active COVID-19 Infection in a Patient With Paroxysmal Nocturnal Hemoglobinuria Maintained on Pegcetacoplan: A Case Report. Cureus. 2023 Mar;15(3):e36240.

400. Jacobs JW, Booth GS. COVID-19 and Immune-Mediated RBC Destruction: A Systematic Review. American Journal of Clinical Pathology. 2022 Jun 1;157(6):844–51.

401. Bouwmeester RN, Bormans EMG, Duineveld C, van Zuilen AD, van de Logt AE, Wetzels JFM, et al. COVID-19 vaccination and Atypical hemolytic uremic syndrome. Front Immunol [Internet]. 2022 Dec 1 [cited 2024 Jun 25];13. Available from: https://www.frontiersin.org/journals/immunology/articles/10.3389/fimmu.2022.1056153/full

402. Gerber GF, Yuan X, Yu J, Cher BAY, Braunstein EM, Chaturvedi S, et al. COVID-19 vaccines induce severe hemolysis in paroxysmal nocturnal hemoglobinuria. Blood. 2021 Jul 1;137(26):3670–3.

403. Duchemann B, Lazarian G. Post–SARS-CoV-2 vaccination acute hemolysis in an older man: don’t

forget to look at the blood smear. Blood. 2021 Nov 25;138(21):2153.

404. Nomura J, Seki M, Abe S, Kobayashi T, Okitsu Y, Fukuhara N, et al. Progression of hemolysis in a patient with hereditary spherocytosis after the second dose of COVID-19 mRNA vaccine. Human Vaccines & Immunotherapeutics [Internet]. 2023 Jan 2 [cited 2024 Jun 25]; Available from: https://www.tandfonline.com/doi/abs/10.1080/21645515.2023.2165381

405. Shakoor MT, Birkenbach MP, Lynch M. ANCA-Associated Vasculitis Following Pfizer-BioNTech COVID-19 Vaccine. American Journal of Kidney Diseases. 2021 Oct 1;78(4):611–3.

406. Mücke VT, Knop V, Mücke MM, Ochsendorf F, Zeuzem S. First description of immune complex vasculitis after COVID-19 vaccination with BNT162b2: a case report. BMC Infect Dis. 2021 Sep 16;21(1):958.

407. Al-Yafeai Z, Horn BJM, Terraccaine W, Jose A, Krishnan P. A Case of Antineutrophil Cytoplasmic Antibodies (ANCA)-Associated Vasculitis Post COVID-19 Vaccination. Cureus. 14(3):e23162.

408. Marouço C, Pereira TA, Fonseca NM, Menezes MDM, Carvalho D, Magriço R, et al. #6178 ANCA-ASSOCIATED VASCULITIS FOLLOWING PFIZER-BIONTECH COVID-19 VACCINE: TRUE ASSOCIATION OR CIRCUMSTANTIAL? Nephrology Dialysis Transplantation. 2023 Jun 1;38(Supplement_1):gfad063d_6178.

409. Alsubaie A, Alshabanat A, Almizel A, Omair M, Alodaini R. A 20-Year-Old Man with IgA Vasculitis following COVID-19 Vaccination. [cited 2024 Jun 25]; Available from: https://onlinelibrary.wiley.com/doi/10.1155/2023/9505383

410. Kinariwalla N, London AO, Soliman YS, Niedt GW, Husain S, Gallitano SM. A case of generalized Sweet syndrome with vasculitis triggered by recent COVID-19 vaccination. JAAD Case Reports. 2022 Jan 1;19:64–7.

411. Greb CS, Aouhab Z, Sisbarro D, Panah E. A Case of Giant Cell Arteritis Presenting After COVID-19 Vaccination: Is It Just a Coincidence? Cureus. 2022 Jan;14(1):e21608.

412. Nazir HI, Hess AA, Soni A, Potter KA. A Case of Leukocytoclastic Vasculitis and Associated Conjunctivitis Following MMR Vaccine Administration. Case Rep Dermatol Med. 2023 Feb 6;2023:9001287.

413. Ball-Burack MR, Kosowsky JM. A Case of Leukocytoclastic Vasculitis Following SARS-COV-2 Vaccination. J Emerg Med. 2022 Aug;63(2):e62–5.

414. Kim BC, Kim HS, Han KH, Han SY, Jo HA. A Case Report of MPO-ANCA-Associated Vasculitis Following Heterologous mRNA1273 COVID-19 Booster Vaccination. J Korean Med Sci. 2022 Jun 20;37(26):e204.

415. Chen Y, Li Y, Zhan T. A case report of possible concurrent vasculitis in vertebral bodies and partial transverse myelitis following COVID-19 vaccination. Medicine. 2022 Sep 30;101(39):e30814.

416. Chandrasekaran PR. A Curious Case of Occlusive Retinal Vasculitis in a Young Individual Associated with COVID-19 Vaccination. Ocular Immunology and Inflammation. 2023 Jul 3;31(6):1254–60.

417. Serrano Gomez Y, Grella B, Wang H. A Rare Cutaneous Manifestation: Leukocytoclastic Vasculitis after Pfizer-BioNTech COVID-19 Vaccination. Case Reports in Dermatological Medicine. 2022;2022(1):4267930.

418. Qaisar I, Sunmboye K. Ab1516 a Case of Severe Anca Associated Vasculitis After Covid-19 Vaccination. Annals of the Rheumatic Diseases. 2022 Jun 1;81(Suppl 1):1860–1860.

419. Negrini S, Guadagno A, Greco M, Parodi A, Burlando M. An unusual case of bullous haemorrhagic vasculitis in a COVID-19 patient. J Eur Acad Dermatol Venereol. 2020 Nov;34(11):e675–6.

420. Seif N, Ellis CL, Wadhwani S. ANCA-associated glomerulonephritis and vasculitis following COVID-19 vaccination in a patient with giant cell arteritis. Journal of the American Society of Nephrology. 2021;87–87.

421. Prabhahar A, Naidu GSRSNK, Chauhan P, Sekar A, Sharma A, Sharma A, et al. ANCA-associated vasculitis following ChAdOx1 nCoV19 vaccination: case-based review. Rheumatol Int. 2022 Apr 1;42(4):749–58.

422. Yadav R, Shah S, Chhetri S. ANCA-associated vasculitis following Johnson and Johnson COVID-19 vaccine. Annals of Medicine and Surgery [Internet]. 2022 Jul [cited 2024 Jun 25];79. Available from: https://journals.lww.com/annals-of-medicine-and-surgery/fulltext/2022/07000/anca_associated_vasculitis_following_johnson_and.171.aspx?casa_token=wdPPrJRwE5EAAAAA:Ue-2HBNI8mwKptmci48K9o2lI4TLX5PpfTh4iibZI8ipcjay-ItB2pNXrdIFUIEmivccYwDLqpZdVxitl6cbZw

423. Zamoner W, Scardini JB, De Dio BJ, Marques A de M, Silva V dos S, Garcia AL, et al. ANCA-associated vasculitis following Oxford-AstraZeneca COVID-19 vaccine in Brazil: Is there a causal relationship? A case report. Front Med [Internet]. 2022 Oct 6 [cited 2024 Jun 25];9. Available from: https://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2022.1003332/full

424. El Hasbani G, Uthman I. ANCA-Associated Vasculitis following the First Dose of Pfizer-BioNTech COVID-19 Vaccine. Nephron. 2023 Mar 21;147(2):103–7.

425. Christodoulou M, Iatridi F, Chalkidis G, Lioulios G, Nikolaidou C, Badis K, et al. ANCA-Associated Vasculitis May Result as a Complication to Both SARS-CoV-2 Infection and Vaccination. Life. 2022 Jul;12(7):1072.

426. Łysak K, Walulik A, Błaszkiewicz M, Gomułka K. ANCA-Positive Small-Vessel Vasculitis Following SARS-CoV-2 Vaccination—A Systematic Review. Vaccines. 2024 Jun;12(6):656.

427. Yoshino Y, Ishida T. Anti-neutrophil Cytoplasmic Antibody-Associated Vasculitis With Periaortitis That Developed After mRNA COVID-19 Vaccination. Cureus. 2023 Apr;15(4):e37480.

428. Uddin K, Mohamed KH, Agboola AA, Naqvi WA, Hussaini H, Mohamed AS, et al. Antineutrophil Cytoplasmic Antibody (ANCA)-Associated Renal Vasculitis Following COVID-19 Vaccination: A Case Report and Literature Review. Cureus. 14(10):e30206.

429. Javadian P, Fadaei-Tirani N, Amoosoltani-Forooshani Z, Reisi-Vanani V, Borran M. Antineutrophil Cytoplasmic Antibody (ANCA)-associated vasculitis following COVID-19 BBIBP-CorV vaccine: A case report. Clinical Infection in Practice. 2024 Jan 1;21:100337.

430. Suzuki M, Sekiguchi Y, Sasaki M, Inaba S, Oyama S, Inoue Y, et al. Antineutrophil Cytoplasmic Antibody-associated Vasculitis after COVID-19 Vaccination with Pfizer-BioNTech. Intern Med. 2022;61(19):2925–9.

431. Felzer JR, Fogwe DT, Samrah S, Michet Jr CJ, Specks U, Baqir M, et al. Association of COVID-19 antigenicity with the development of antineutrophilic cytoplasmic antibody vasculitis. Respirology Case Reports. 2022;10(1):e0894.

432. Hébert M, Couture S, Schmit I. Bilateral Panuveitis with Occlusive Vasculitis following Coronavirus Disease 2019 Vaccination. Ocular Immunology and Inflammation. 2023 Mar 16;31(3):660–4.

433. Juan CK, Chiu YT, Yen CY. Bullous vasculitis

following COVID-19 vaccination. Dermatologica Sinica. 2023;41(1):58–9.

434. Iwata H, Kamiya K, Kado S, Nakaya T, Kawata H, Komine M, et al. Case of immunoglobulin A vasculitis following coronavirus disease 2019 vaccination. J Dermatol. 2021 Dec;48(12):e598–9.

435. Hakroush S, Tampe B. Case Report: ANCA-Associated Vasculitis Presenting With Rhabdomyolysis and Pauci-Immune Crescentic Glomerulonephritis After Pfizer-BioNTech COVID-19 mRNA Vaccination. Front Immunol [Internet]. 2021 Sep 30 [cited 2024 Jun 25];12. Available from: https://www.frontiersin.org/journals/immunology/articles/10.3389/fimmu.2021.762006/full

436. Chen CC, Chen HY, Lu CC, Lin SH. Case Report: Anti-neutrophil Cytoplasmic Antibody-Associated Vasculitis With Acute Renal Failure and Pulmonary Hemorrhage May Occur After COVID-19 Vaccination. Front Med (Lausanne). 2021;8:765447.

437. Mohamed S, Chan CK, Tsang CW, Szeto SK, Fong AH, Chan JC, et al. Case Report: Retinal Vasculitis in Two Adolescents After COVID-19 Vaccination. Ocular Immunology and Inflammation [Internet]. 2023 Jul 3 [cited 2024 Jun 25]; Available from: https://www.tandfonline.com/doi/abs/10.1080/09273948.2022.2129694

438. Jedlowski PM, Jedlowski MF. Coronavirus disease 2019-associated immunoglobulin A vasculitis/Henoch–Schönlein purpura: A case report and review. The Journal of Dermatology. 2022;49(1):190–6.

439. Arora K singh, Ariff M, Malik R, Kasar A, Patel C. COVID-19 Pfizer Vaccine associated case of Leukocytoclastic vasculitis. Cureus Journal of Medical Science [Internet]. [cited 2024 Jun 25]; Available from: https://www.cureus.com/posters/1807-covid-19-pfizer-vaccine-associated-case-of-leukocytoclastic-vasculitis

440. Mai AS, Tan EK. COVID-19 vaccination precipitating de novo ANCA-associated vasculitis: clinical implications. Clin Kidney J. 2022 May;15(5):1010–1.

441. Kim Y, Kang J, Lee SG, Kim GT. COVID-19 vaccination-related small vessel vasculitis with multiorgan involvement. Z Rheumatol. 2022;81(6):509–12.

442. Dash S, Behera B, Sethy M, Mishra J, Garg S. COVID-19 vaccine-induced urticarial vasculitis. Dermatol Ther. 2021 Sep;34(5):e15093.

443. Giryes S, Bragazzi NL, Bridgewood C, De Marco G, McGonagle D. COVID-19 Vasculitis and vasculopathy-Distinct immunopathology emerging from the close juxtaposition of Type II Pneumocytes and Pulmonary Endothelial Cells. Semin Immunopathol. 2022 May 1;44(3):375–90.

444. Zoppi M, Gandara V, Zoppi J. Cutaneous leukocytoclastic vasculitis following COVID-19 vaccination. JEADV Clinical Practice. 2023;2(4):915–8.

445. Đorđević Betetto L, Luzar B, Pipan Tkalec Ž, Ponorac S. Cutaneous leukocytoclastic vasculitis following COVID-19 vaccination with Ad26.COV2.S vaccine: a case report and literature review. Acta Dermatovenerol Alp Pannonica Adriat. 2022 Jun;31(2):83–7.

446. Shahrigharahkoshan S, Gagnon LP, Mathieu S. Cutaneous Leukocytoclastic Vasculitis Induction Following ChAdOx1 nCoV-19 Vaccine. Cureus. 2021 Oct;13(10):e19005.

447. Vassallo C, Boveri E, Brazzelli V, Rampino T, Bruno R, Bonometti A, et al. Cutaneous lymphocytic vasculitis after administration of COVID-19 mRNA vaccine. Dermatol Ther. 2021 Sep;34(5):e15076.

448. Ungari M, Pezzarossa E. Cutaneous

Lymphocytic Vasculitis After Administration of the Second Dose of AZD1222 (Oxford–AstraZeneca) Severe Acute Respiratory Syndrome Coronavirus 2 Vaccination: Casuality or Causality? The American Journal of Dermatopathology. 2022 Jan;44(1):80.

449. Berry CT, Eliliwi M, Gallagher S, Panaccione S, Klein WM, Healy AL, et al. Cutaneous small vessel vasculitis following single-dose Janssen Ad26.COV2.S vaccination. JAAD Case Reports. 2021 Sep 1;15:11–4.

450. Kar BR, Singh BS, Mohapatra L, Agrawal I. Cutaneous small-vessel vasculitis following COVID-19 vaccine. J Cosmet Dermatol. 2021 Nov;20(11):3382–3.

451. Pournazari M, Assar S, Farsad F, Mohamadzadeh D. Cutaneous vasculitis after COVID-19 vaccination in a 41-year-old male. Clinical Case Reports. 2023;11(4):e7238.

452. Colia R, Rotondo C, Corrado A, Cantatore FP. Cutaneous vasculitis after severe acute respiratory syndrome coronavirus 2 vaccine. Rheumatology Advances in Practice. 2021 Aug 31;5(3):rkab050.

453. Maronese CA, Zelin E, Avallone G, Moltrasio C, Romagnuolo M, Ribero S, et al. Cutaneous vasculitis and vasculopathy in the era of COVID-19 pandemic. Front Med (Lausanne). 2022 Aug 23;9:996288.

454. Gázquez Aguilera EM, Rodríguez García M, Cantón Yebra MT. Cutaneous vasculitis due to COVID-19 vaccination. Med Clin (Barc). 2022 May 27;158(10):493–4.

455. Bozorgmehr R, Enteshari K, Bagheri AK, Esfehani RJ, Abdollahimajd F. Cutaneous vasculitis following COVID-19 vaccination: a case-based review. Frontiers in Emergency Medicine. 2022 Mar 4;6(3):e41–e41.

456. Egawa H, Tomita Y. Cutaneous Vasculitis Suggestive of IgA Vasculitis and Acute Exacerbation of Ulcerative Colitis after COVID-19 Vaccination in a Patient with Ulcerative Colitis in Remission. Journal of Hospital General Medicine. 2022;4(2):80–6.

457. Corrà A, Verdelli A, Mariotti EB, Ruffo di Calabria V, Quintarelli L, Aimo C, et al. Cutaneous vasculitis: Lessons from COVID-19 and COVID-19 vaccination. Front Med [Internet]. 2022 Dec 9 [cited 2024 Jun 25];9. Available from: https://www.frontiersin.org/journals/medicine/articles/10.3389/fmed.2022.1013846/full

458. Fillon A, Sautenet B, Barbet C, Moret L, Thillard EM, Jonville-Béra AP, et al. De novo and relapsing necrotizing vasculitis after COVID-19 vaccination. Clin Kidney J. 2021 Dec 20;15(3):560–3.

459. Oniszczuk J, Bettuzzi T, Anjou L, Audard V, Sbidian E, El Karoui K, et al. De novo IgA vasculitis following adenovirus-based SARS-CoV-2 vaccination. Clin Kidney J. 2022 Mar;15(3):587–9.

460. Mohamed MMB, Wickman TJ, Fogo AB, Velez JCQ. De Novo Immunoglobulin A Vasculitis Following Exposure to SARS-CoV-2 Immunization. Ochsner Journal. 2021 Dec 21;21(4):395–401.

461. Tang X, Liu F, Li Q, Fu H, Wang J, Mao J. De Novo Vasculitis after COVID-19 Vaccination. Curr Rheumatol Rev. 2023;19(2):151–8.

462. Anderegg MA, Liu M, Saganas C, Montani M, Vogt B, Huynh-Do U, et al. De novo vasculitis after mRNA-1273 (Moderna) vaccination. Kidney International. 2021 Aug 1;100(2):474–6.

463. Feghali EJ, Zafar M, Abid S, Santoriello D, Mehta S, Feghali EJ, et al. De-novo Antineutrophil Cytoplasmic Antibody-Associated Vasculitis Following the mRNA-1273 (Moderna) Vaccine for COVID-19. Cureus [Internet]. 2021 Nov 16 [cited 2024 Jun 25];13. Available from: https://www.cureus.com/articles/75962-de-novo-antineutrophil-cytoplasmic-antibody-associated-vasculitis-following-the-mrna-1273-moderna-vaccine-for-covid-19#!/

464. Kawamura T, Nakazawa D, Nishio S, Isozaki T, Komatsumoto M, Atsumi T. Development of ANCA-associated vasculitis followed by SARS-CoV-2 vaccination in a patient with HLA-DRB1*09:01 allele. Modern Rheumatology Case Reports. 2023 Jul 1;7(2):426–30.

465. Wakabayashi H, Iwayanagi M, Sakai D, Sugiura Y, Hiruta N, Matsuzawa Y, et al. Development of giant cell arteritis after vaccination against SARS-CoV2: A case report and literature review. Medicine (Baltimore). 2023 Jun 2;102(22):e33948.

466. Sugita K, Kaneko S, Hisada R, Harano M, Anno E, Hagiwara S, et al. Development of IgA vasculitis with severe glomerulonephritis after COVID-19 vaccination: a case report and literature review. CEN Case Rep. 2022 Nov 1;11(4):436–41.

467. Hekmat M, Naeini SJ, Abbasi Z, Dadkhahfar S. Drug induced vasculitis , Thiazide or COVID-vaccine ? : A case report and literature review. [cited 2024 Jun 25]; Available from: https://www.authorea.com/doi/full/10.22541/au.164581633.39945960?commit=47bd902d19912cff2226a547e26894ee11640dd7

468. Baier E, Olgemöller U, Biggemann L, Buck C, Tampe B. Dual-Positive MPO- and PR3-ANCA-Associated Vasculitis Following SARS-CoV-2 mRNA Booster Vaccination: A Case Report and Systematic Review. Vaccines. 2022 May;10(5):653.

469. Martínez-Ortega JI, Perez-Hernandez F, Fernández-Reyna I, Eljure Lopez N. First Onset of IgA Vasculitis and Nephritis Following COVID-19 Vaccination. Cureus. 15(7):e42448.

470. Liang I, Swaminathan S, Lee AYS. Emergence of de novo cutaneous vasculitis post coronavirus disease (COVID-19) vaccination. Clin Rheumatol. 2022 May;41(5):1611–2.

471. Yoshimoto K, Kaneda S, Asada M, Taguchi H, Kawashima H, Yoneima R, et al. Giant Cell Arteritis after COVID-19 Vaccination with Long-Term Follow-Up: A Case Report and Review of the Literature. Medicina. 2023 Dec;59(12):2127.

472. Gillion V, Jadoul M, Demoulin N, Aydin S, Devresse A. Granulomatous vasculitis after the AstraZeneca anti-SARS-CoV-2 vaccine. Kidney Int. 2021 Sep;100(3):706–7.

473. Casini F, Magenes VC, De Sanctis M, Gattinara M, Pandolfi M, Cambiaghi S, et al. Henoch-Schönlein purpura following COVID-19 vaccine in a child: a case report. Ital J Pediatr. 2022 Sep 2;48(1):158.

474. Hines AM, Murphy N, Mullin C, Barillas J, Barrientos JC. Henoch-Schönlein purpura presenting post COVID-19 vaccination. Vaccine. 2021 Jul 30;39(33):4571–2.

475. Suszek D, Grzywa-Celińska A, Emeryk-Maksymiuk J, Krusiński A, Redestowicz K, Siwiec J. IgA vasculitis after COVID-19: a case-based review. Rheumatol Int. 2024 Jul 1;44(7):1353–7.

476. Elvana R, Arjana S, Kristi S, Florida Y, Majlinda I. IgA Vasculitis Following COVID-19 Vaccination. Cureus [Internet]. 2023 [cited 2024 Jun 25];15(1). Available from: https://www.proquest.com/docview/2780647969/abstract/3D16DF2E610D48A6PQ/1

477. Nishimura N, Shiomichi Y, Takeuchi S, Akamine S, Yoneda R, Yoshizawa S. IgA vasculitis following COVID-19 vaccination. Modern Rheumatology Case Reports. 2023 Jan 1;7(1):122–6.

478. Rista E, Strakosha A, Saliaj K, Ymeri F, Ikonomi M. IgA Vasculitis Following COVID-19 Vaccination. Cureus. 15(1):e33938.

479. Ramdani Y, Galempoix JM, Augusto JF, Dekmeer E, Perard L, Ferreira N, et al. Immunoglobulin A Vasculitis Following COVID-19: A French Multicenter Case Series. The Journal of Rheumatology. 2022 Dec 1;49(12):1390–4.

480. Badier L, Toledano A, Porel T, Dumond S, Jouglen J, Sailler L, et al. IgA vasculitis in adult patient following vaccination by ChadOx1 nCoV-19. Autoimmun Rev. 2021 Nov;20(11):102951.

481. Soleimani P, Yadollahifarsani S, Motieian M, Moghadam MSC, Alimohammadi S, Khayyat A, et al. Cancer recurrence or aggravation following COVID-19 vaccination. J Nephropharmacol. 2023 Apr 15;12(2):e10593–e10593.

482. Cho I, Kim JK, Kim SG. IgA vasculitis presenting as nephrotic syndrome following COVID-19 vaccination: a case report. BMC Nephrol. 2022 Dec 15;23(1):403.

483. Ito C, Odajima K, Niimura Y, Fujii M, Sone M, Asakawa S, et al. IgA vasculitis with transient glomerular hematuria, diarrhea, and pericarditis following COVID-19 mRNA vaccination in a young patient with possible pre-existing ulcerative colitis. CEN Case Rep. 2023 Feb 1;12(1):84–90.

484. Dicks AB, Gray BH. Images in Vascular Medicine: Leukocytoclastic vasculitis after COVID-19 vaccine booster. Vasc Med. 2022 Feb;27(1):100–1.

485. Aguilar-Aragon JA, Mauro AG. Immunoglobulin A (De Novo) Vasculitis After mRNA Moderna COVID-19 Vaccination: A Case Report. Infectious Diseases in Clinical Practice. 2022 Sep;30(5):e1147.

486. Seo HM, Park SK, Joh HC, Oh SU, Choi HS, Kim JS. Immunoglobulin A Vasculitis Following ChadOx1 nCoV-19/AZD1222 (AstraZeneca COVID-19 Vaccine) Vaccination. Annals of Dermatology. 2023;35:S173–5.

487. Takeyama R, Fukuda K, Kouzaki Y, Koga T, Hayashi S, Ohtani H, et al. Intracerebral hemorrhage due to vasculitis following COVID-19 vaccination: a case report. Acta Neurochir. 2022 Feb 1;164(2):543–7.

488. Gabrielli R, Siani A, Smedile G, Rizzo AR, De Vivo G, Accrocca F, et al. Isolated popliteal artery lesion due to giant cell vasculitis post COVID-19 mRNA vaccine and COVID-19 asymptomatic infection. Vascular. 2024 Feb 1;32(1):226–30.

489. Katsouli OK, Lainis VG, Kapellos GG, Vlachoyiannopoulos PG. Large Vessel Vasculitis After the Administration of Oxford-AstraZeneca COVID-19 Vaccine. Mediterr J Rheumatol. 2023 Mar 31;34(1):97–100.

490. Gilio M, De Stefano G. Large-vessel vasculitis following the Pfizer-BioNTech COVID-19 vaccine. Intern Emerg Med. 2022 Jun 1;17(4):1239–41.

491. El Ochi MR, Bahadi N, Zaizaa M, Hallab I, Allaoui M, Essaoudi A, et al. Leucocytoclastic Vasculitis Following Coronavirus Vaccine: A Case Report. Saudi J Med Pharm Sci. 8(2):82–5.

492. Ireifej B, Weingarten M, Dhamrah U, Weingarten M, Hadi S. Leukocytoclastic Vasculitic Rash Following Second Dose of Moderna COVID-19 Vaccine. J Investig Med High Impact Case Rep. 2022 Mar 16;10:23247096211066283.

493. Fiorillo G, Pancetti S, Cortese A, Toso F, Manara S, Costanzo A, et al. Leukocytoclastic vasculitis (cutaneous small-vessel vasculitis) after COVID-19 vaccination. Journal of Autoimmunity. 2022 Feb 1;127:102783.

494. Jin WJ, Ahn SW, Jang SH, Hong SM, Seol JE, Kim H. Leukocytoclastic vasculitis after coronavirus disease 2019 vaccination. J Dermatol. 2022 Jan;49(1):e34–5.

495. Altun E, Kuzucular E. Leukocytoclastic vasculitis after COVID-19 vaccination. Dermatologic Therapy. 2022;35(3):e15279.

496. Fritzen M, Funchal GDG, Luiz MO, Durigon GS. Leukocytoclastic vasculitis after exposure to COVID-19 vaccine. An Bras Dermatol. 2022 Feb 18;97:118–21.

497. Oskay T, Isık M. Leukocytoclastic vasculitis

after the third dose of CoronaVac vaccination. Clin Rheumatol. 2022 Jun 1;41(6):1931–3.

498. Fernández Prada M, Alonso Penanes P, Morales Del Burgo P, Pérez Martinez I, Villa Del Amo MC. Leukocytoclastic vasculitis after vaccination in a patient with inflammatory bowel disease. Rev Esp Enferm Dig. 2019 May;111(5):402–4.

499. Erler A, Fiedler J, Koch A, Heldmann F, Schütz A. Leukocytoclastic Vasculitis After Vaccination With a SARS-CoV-2 Vaccine. Arthritis Rheumatol. 2021 Dec;73(12):2188.

500. Missoum S, Lahmar M, Khellaf G. [Leukocytoclastic vasculitis and acute renal failure following inactivated SARS-CoV-2 vaccine]. Nephrol Ther. 2022 Jul;18(4):287–90.

501. Sandhu S, Bhatnagar A, Kumar H, Dixit PK, Paliwal G, Suhag DK, et al. Leukocytoclastic vasculitis as a cutaneous manifestation of ChAdOx1 nCoV-19 corona virus vaccine (recombinant). Dermatol Ther. 2021 Nov 1;34(6):e15141.

502. Cohen SR, Prussick L, Kahn JS, Gao DX, Radfar A, Rosmarin D. Leukocytoclastic vasculitis flare following the COVID-19 vaccine. International Journal of Dermatology. 2021 Aug;60(8):1032–3.

503. Sebastian J, Mathew M, Sharsty V, Ramesh M. Leukocytoclastic Vasculitis Following COVID-19 Vaccination: A Case Report. Hosp Pharm. 2022 Aug;57(4):564–7.

504. Casale JJ, Muse ME, Snow TJ, Gould KP, Depcik-Smith ND. Leukocytoclastic Vasculitis following the First Dose of the Elasomeran COVID-19 Vaccination. Case Reports in Dermatological Medicine. 2022;2022(1):1469410.

505. Carrillo-Garcia P, Sánchez-Osorio L, Gómez-Pavón J. Leukocytoclastic vasculitis in possible relation to the BNT162b2 mRNA COVID-19 vaccine. J Am Geriatr Soc. 2022 Apr;70(4):971–3.

506. Yun SY, Choi JY, Yu DS, Lee YB. Leukocytoclastic Vasculitis with Ischemic Colitis Following COVID-19 AstraZeneca Vaccine. Ann Dermatol. 2023 Nov;35(Suppl 2):S342–4.

507. Ohmura S ichiro, Ohkubo Y, Ishihara R, Otsuki Y, Miyamoto T. Medium-vessel Vasculitis Presenting with Myalgia Following COVID-19 Moderna Vaccination. Intern Med. 2022 Nov 15;61(22):3453–7.

508. Obata S, Hidaka S, Yamano M, Yanai M, Ishioka K, Kobayashi S. MPO-ANCA-associated vasculitis after the Pfizer/BioNTech SARS-CoV-2 vaccination. Clin Kidney J. 2021 Sep 28;15(2):357–9.

509. Lo Sardo L, Parisi S, Ditto MC, De Giovanni R, Maletta F, Grimaldi S, et al. New Onset of Giant Cell Arteritis following ChAdOx1-S (Vaxevria®) Vaccine Administration. Vaccines (Basel). 2023 Feb 13;11(2):434.

510. Nakatani S, Mori K, Morioka F, Hirata C, Tsuda A, Uedono H, et al. New-onset kidney biopsy-proven IgA vasculitis after receiving mRNA-1273 COVID-19 vaccine: case report. CEN Case Rep. 2022 Aug 1;11(3):358–62.

511. Bostan E, Gulseren D, Gokoz O. New-onset leukocytoclastic vasculitis after COVID-19 vaccine. Int J Dermatol. 2021 Oct;60(10):1305–6.

512. Nune A, Durkowski V, Pillay SS, Barman B, Elwell H, Bora K, et al. New-Onset Rheumatic Immune-Mediated Inflammatory Diseases Following SARS-CoV-2 Vaccinations until May 2023: A Systematic Review. Vaccines. 2023 Oct;11(10):1571.

513. Bostan E, Zaid F, Akdogan N, Gokoz O. Possible case of mRNA COVID-19 vaccine-induced small-vessel vasculitis. J Cosmet Dermatol. 2022 Jan;21(1):51–3.

514. Sanker V, Mylavarapu M, Gupta P, Syed N, Shah M, Dondapati VVK. Post COVID-19 vaccination medium vessel vasculitis: a systematic review of case

reports. Infection. 2024 Mar 14;1–7.

515. Grossman ME, Appel G, Little AJ, Ko CJ. Post-COVID-19 vaccination IgA vasculitis in an adult. J Cutan Pathol. 2022 Apr;49(4):385–7.

516. Al-Allaf AW, Razok A, Al-Allaf Y, Aker L. Post-COVID-19 vaccine medium-vessel vasculitis and acute anterior uveitis, causation vs temporal relation; case report and literature review. Annals of Medicine and Surgery [Internet]. 2022 Mar [cited 2024 Jun 25];75. Available from: https://journals.lww.com/annals-of-medicine-and-surgery/fulltext/2022/03000/Post_COVID_19_vaccine_medium_vessel_vasculitis_and.72.aspx?casa_token=XwmgTNeuVMEAAAAA:6-3-urwoCCuuXU_eDWxDfd2V5NMVetggEpBdO2-6HlTj2h0BPbjwvY3uUFbS5wcVDFKMy2H_u0htP9xGlsCesA

517. Okuda S, Hirooka Y, Sugiyama M. Propylthiouracil-Induced Antineutrophil Cytoplasmic Antibody-Associated Vasculitis after COVID-19 Vaccination. Vaccines. 2021 Aug;9(8):842.

518. Obeid M, Fenwick C, Pantaleo G. Reactivation of IgA vasculitis after COVID-19 vaccination. The Lancet Rheumatology. 2021 Sep 1;3(9):e617.

519. Maye JA, Chong HP, Rajagopal V, Petchey W. Reactivation of IgA vasculitis following COVID-19 vaccination. BMJ Case Reports CP. 2021 Nov 1;14(11):e247188.

520. Vornicu A, Berechet A, Frățilă G, Obrişcă B, Jurcuţ C, Ismail G. Relapse of cryoglobulinemic vasculitis with new-onset severe renal involvement in two patients following mRNA COVID-19 vaccination: A case report. Medicine. 2022 Jun 10;101(23):e29431.

521. Gambichler T, Abu Rached N, Scholl L, Behle B, Mansour R, Nick M, et al. Reproducible leukocytoclastic vasculitis following severe acute respiratory syndrome coronavirus 2 vaccination. J Dermatol. 2022 Apr;49(4):145–6.

522. Abdelmaksoud A, Wollina U, Temiz SA, Hasan A. SARS-CoV-2 vaccination-induced cutaneous vasculitis: Report of two new cases and literature review. Dermatologic Therapy. 2022;35(6):e15458.

523. Chang T, Tachibana F, Wang V, Yusin J. SECONDARY URTICARIAL VASCULITIS AND CHRONIC SPONTANEOUS URTICARIA ASSOCIATED WITH COVID-19 VACCINATION. Annals of Allergy, Asthma & Immunology. 2022 Nov 1;129(5, Supplement):S94.

524. Wollina U, Schönlebe J, Kodim A, Hansel G. SEVERE LEUKOCYTOCLASTIC VASCULITIS AFTER COVID-19 VACCINATION - CAUSE OR COINCIDENCE? CASE REPORT AND LITERATURE REVIEW. Georgian Med News. 2022 Mar;(324):134–9.

525. Bencharattanaphakhi R, Rerknimitr P. Sinovac COVID-19 vaccine–induced cutaneous leukocytoclastic vasculitis. JAAD Case Reports. 2021 Dec 1;18:1–3.

526. Nastro F, Fabbrocini G, di Vico F, Marasca C. Small vessel vasculitis related to varicella-zoster virus after Pfizer-BioNTech COVID-19 vaccine. J Eur Acad Dermatol Venereol. 2021 Nov;35(11):e745–7.

527. Guzmán-Pérez L, Puerta-Peña M, Falkenhain-López D, Montero-Menárguez J, Gutiérrez-Collar C, Rodríguez-Peralto JL, et al. Small-vessel vasculitis following Oxford-AstraZeneca vaccination against SARS-CoV-2. J Eur Acad Dermatol Venereol. 2021 Nov;35(11):e741–3.

528. Park S, Kim K, Baek K. Sudden Cardiac Death Caused by Cardiac Small Vessel Vasculitis after COVID-19 Vaccination (BNT162b2 nCov-19): A Case Report. Korean J Leg Med. 2021 Nov 30;45(4):133–8.

529. Choi Y, Lee CH, Kim KM, Yoo WH. Sudden Onset of IgA Vasculitis Affecting Vital Organs in Adult Patients following SARS-CoV-2 Vaccines. Vaccines. 2022 Jun;10(6):923.

530. N AM, Saleh AM, Khalid A, Alshaya AK, Alanazi SMM. Systemic lupus erythematosus with acute pancreatitis and vasculitic rash following COVID-19 vaccine: a case report and literature review. Clin Rheumatol. 2022 May 1;41(5):1577–82.

531. Nakatani K, Sakata E, Fujihara M, Mizukawa K, Koyama T. Systemic Vasculitis Following SARS-CoV-2 mRNA Vaccination Demonstrated on FDG PET/CT. Clinical Nuclear Medicine. 2022 May;47(5):e403.

532. Batu ED, Sener S, Ozomay Baykal G, Arslanoglu Aydin E, Özdel S, Gagro A, et al. The Characteristics of Patients With COVID-19–Associated Pediatric Vasculitis: An International, Multicenter Study. Arthritis & Rheumatology. 2023;75(4):499–506.

533. Farooq H, Aemaz Ur Rehman M, Asmar A, Asif S, Mushtaq A, Qureshi MA. The pathogenesis of COVID-19-induced IgA nephropathy and IgA vasculitis: A systematic review. Journal of Taibah University Medical Sciences. 2022 Feb 1;17(1):1–13.

534. Tozinameran : Medium-vessel vasculitis and acute anterior uveitis: case repor. Reactions Weekly. 2022 Jan 1;1903(1):352–352.

535. Ahmer S, Bourke J, Ardakani NM. Transient cryoglobulinaemic vasculitis following ChAdOx1 nCoV-19 vaccine. BMJ Case Rep. 2022 Jul 18;15(7):e250913.

536. Chomičienė A, Černiauskas K, Linauskienė K, Meškauskas R, Malinauskienė L. Two case reports of skin vasculitis following the COVID-19 immunization. Open Medicine. 2022 Jan 1;17(1):1944–8.

537. Ono H, Yamaguchi R, Shimizu A. Urticarial vasculitis after COVID-19 vaccination: A case report and literature review. Dermatol Ther. 2022 Aug;35(8):e15613.

538. Nazzaro G, Maronese CA. Urticarial vasculitis following mRNA anti-COVID-19 vaccine. Dermatol Ther. 2022 Mar;35(3):e15282.

539. Pathak P, Patel S, Gaylord B, Reddy PJ. Vasculitis After a Vaccine: Rare Adverse Reaction Following a COVID-19 Vaccine. AIM Clinical Cases. 2023 Oct;2(10):e221043.

540. Hočevar A, Simonović Z, Rotar Ž, Tomšič M. Vasculitis as Temporally Associated With COVID-19 Infection or Vaccination: A Single-center Experience. The Journal of Rheumatology. 2022 Feb 1;49(2):232–3.

541. Criado PR, Giordani LP, Yoshimoto TA, Vieira IC, Landman G, Pincelli TP. Vasculitis in the setting of COVID-19: From the disease to the vaccine. Report of a case of cutaneous vasculitis after immunization. Dermatol Ther. 2022 May;35(5):e15367.

542. Chen CY, Chen TT, Hsieh CY, Lien MY, Yeh SP, Chen CC. Case reports of management of aplastic anemia after COVID-19 vaccination: a single institute experience in Taiwan. Int J Hematol [Internet]. 2022 Sep 4 [cited 2022 Dec 4]; Available from: https://doi.org/10.1007/s12185-022-03445-2

543. Jaydev F, Kumar V, Khatri J, Shahani S, Beganovic S. A Case of Autoimmune Hemolytic Anemia after the First Dose of COVID-19 mRNA-1273 Vaccine with Undetected Pernicious Anemia. Case Reports in Hematology. 2022 Jan 29;2022:e2036460.

544. Brito S, Ferreira N, Mateus S, Bernardo M, Pinto B, Lourenço A, et al. A Case of Autoimmune Hemolytic Anemia Following COVID-19 Messenger Ribonucleic Acid Vaccination. Cureus [Internet]. 2021 May 15 [cited 2022 Dec 4];13(5). Available from: https://www.cureus.com/articles/58777-a-case-of-autoimmune-hemolytic-anemia-following-covid-19-messenger-ribonucleic-acid-vaccination

545. Bruyne SD, Landeghem SV, Schauwvlieghe A,

Noens L. Life-threatening autoimmune hemolytic anemia following mRNA COVID-19 vaccination: don't be too prudent with the red gold. Clinical Chemistry and Laboratory Medicine (CCLM). 2022 May 1;60(6):e125–8.

546. Röth A, Bertram S, Schroeder T, Haverkamp T, Voigt S, Holtkamp C, et al. Acquired aplastic anemia following SARS-CoV-2 vaccination. European Journal of Haematology. 2022;109(2):186–94.

547. PVS S, Koka H, Suvvari TK, Mounish Reddy R, Godavari ST, Thomas V. An unusual case of acquired aplastic anemia following SARS-CoV-2 vaccination: A case report. IDCases. 2023 Jun 20;33:e01826.

548. Jafarzadeh A, Jafarzadeh S, Pardehshenas M, Nemati M, Mortazavi SMJ. Development and exacerbation of autoimmune hemolytic anemia following COVID-19 vaccination: A systematic review. International Journal of Laboratory Hematology. 2023;45(2):145–55.

549. Tabata S, Hosoi H, Murata S, Takeda S, Mushino T, Sonoki T. Severe aplastic anemia after COVID-19 mRNA vaccination: Causality or coincidence? J Autoimmun. 2022 Jan;126:102782.

550. Woo S, Kim B, Lee SC, Kim MS, Yoon YA, Choi YJ. Very severe immune aplastic anemia after mRNA vaccination against COVID-19 responds well to immunosuppressive therapy: clinical characteristics and comparison to previous reports. Hematology. 2022 Dec 31;27(1):1191–5.

551. Kmira Z, Sabrine K, Monia G, Imen A, Dorra C, Rania B, et al. A Case of Acquired Aplastic Anemia after Severe Hepatitis- Probably Induced by the Pfizer/BioNTech Vaccine: A Case Report and Review of Literature. Vaccines. 2023 Jul;11(7):1228.

552. Cecchi N, Giannotta JA, Barcellini W, Fattizzo B. A case of severe aplastic anaemia after SARS-CoV-2 vaccination. Br J Haematol. 2022 Mar;196(6):1334–6.

553. Murdych TM. A case of severe autoimmune hemolytic anemia after a receipt of a first dose of SARS-CoV-2 vaccine. Int J Lab Hematol. 2022 Feb;44(1):e10–2.

554. Stöllberger C, Kastrati K, Dejaco C, Scharitzer M, Finsterer J, Bugingo P, et al. Necrotizing pancreatitis, microangiopathic hemolytic anemia and thrombocytopenia following the second dose of Pfizer/BioNTech COVID-19 mRNA vaccine. Wien Klin Wochenschr. 2023 Aug 1;135(15):436–40.

555. Yamamoto M, Keino D, Sumii S, Yokosuka T, Goto H, Inui A, et al. Severe Hepatitis-associated Aplastic Anemia Following COVID-19 mRNA Vaccination. Internal Medicine. 2023;62(12):1813–6.

556. Fattizzo B, Pasquale R, Croci GA, Pettine L, Cassanello G, Barcellini W. Aplastic anemia after SARS-CoV-2 infection or vaccines: case series and literature review: Aplastic anemia and SARS-CoV-2. Blood Transfusion. 2024;22(3):266–72.

557. Mesina FZ. Severe Relapsed Autoimmune Hemolytic Anemia after Booster with mRNA-1273 COVID-19 vaccine. Hematology, Transfusion and Cell Therapy [Internet]. 2022 May 30 [cited 2022 Dec 4]; Available from: https://www.sciencedirect.com/science/article/pii/S2531137922000827

558. Yilmaz F, Albayrak M, Aras MR, Maral S, Afacan öztürk HB, Tiğlioğlu P, et al. RECURRENT AUTOIMMUNE HEMOLYTIC ANEMIA AFTER MRNA COVID-19 VACCINE (PFIZER-BIONTECH). Hematology, Transfusion and Cell Therapy. 2021 Nov 1;43:S50.

559. Kimura H, Furukawa M, Shiga Y, Kai T, Yasuda I, Katoh S, et al. Exacerbation of autoimmune hemolytic anemia associated with pure red cell aplasia after COVID-19: A case report. Journal of Infection and Chemotherapy. 2023 Aug 1;29(8):787–91.

560. Xu W, Nian W. A rare adverse effects of COVID-19 vaccine in a patient with a latent tumor: A case report and literature review. Front Oncol. 2023 Dec 5;13:1269735.

561. Babakhanlou R, Kadia T, Chien K, Sasaki K, Thompson PA. Aplastic anemia following the severe acute respiratory syndrome coronavirus-2 vaccine. EJHaem. 2022 Nov 4;4(1):288–90.

562. Chaudhary MH, Yennam AK, Bojanki NLSVA, Cruz ANGD, Chaudhary NK, Kinha H, et al. Autoimmune Hemolytic Anemia Secondary to COVID-19 Vaccine: A Case Report. Cureus [Internet]. 2023 Oct 8 [cited 2024 Jun 25];15. Available from: https://www.cureus.com/articles/192453-autoimmune-hemolytic-anemia-secondary-to-covid-19-vaccine-a-case-report#!/

563. Insiripong S, Anantasetagoon T, Sanglutong L. Autoimmune Hemolytic Anemia After Inactivated Virus COVID-19 Vaccination: A Report of 2 Cases. Ramathibodi Medical Journal. 2022 Sep 26;45(3):42–7.

564. Fatima Z, Reece BRA, Moore JS, Means RT. Autoimmune Hemolytic Anemia After mRNA COVID Vaccine. Journal of Investigative Medicine High Impact Case Reports. 2022 Jan 1;10:23247096211073258.

565. Jacobs JW. Autoimmune hemolytic anemia and COVID-19 vaccination. Hematol, Transfus Cell Ther. 2023 Oct 9;45:410–1.

566. Suzuki Y, Shiba T. Chronic cold agglutinin disease after a third COVID-19 mRNA vaccination. Int J Hematol [Internet]. 2022 Oct 29 [cited 2022 Dec 4]; Available from: https://doi.org/10.1007/s12185-022-03480-z

567. Misawa K, Yasuda H, Koyama D, Inano T, Inoguchi A, Shirasu C, et al. Adult paroxysmal cold hemoglobinuria following mRNA COVID-19 vaccination. eJHaem. 2022 Aug;3(3):992–5.

568. Camacho-Domínguez L, Rodríguez Y, Polo F, Restrepo Gutierrez JC, Zapata E, Rojas M, et al. COVID-19 vaccine and autoimmunity. A new case of autoimmune hepatitis and review of the literature. Journal of Translational Autoimmunity. 2022 Jan 1;5:100140.

569. Mörz M. A Case Report: Multifocal Necrotizing Encephalitis and Myocarditis after BNT162b2 mRNA Vaccination against COVID-19. Vaccines. 2022 Oct;10(10):1651.

570. Gill JR, Tashjian R, Duncanson E. Autopsy Histopathologic Cardiac Findings in 2 Adolescents Following the Second COVID-19 Vaccine Dose. Archives of Pathology & Laboratory Medicine. 2022 Feb 14;146(8):925–9.

571. United States Population (2023) - Worldometer [Internet]. [cited 2023 May 26]. Available from: https://www.worldometers.info/world-population/us-population/

572. Ritchie H, Mathieu E, Rodés-Guirao L, Appel C, Giattino C, Ortiz-Ospina E, et al. Coronavirus Pandemic (COVID-19). Our World in Data [Internet]. 2020 Mar 5 [cited 2022 Jul 25]; Available from: https://ourworldindata.org/covid-deaths

573. Statista [Internet]. [cited 2023 May 25]. Number of blood transfusions U.S. 2019. Available from: https://www.statista.com/statistics/1204079/number-blood-tranfusions-us/

574. Hanna N, Heffes-Doon A, Lin X, Manzano De Mejia C, Botros B, Gurzenda E, et al. Detection of Messenger RNA COVID-19 Vaccines in Human Breast Milk. JAMA Pediatrics [Internet]. 2022 Sep 26 [cited 2022 Oct 4]; Available from: https://doi.org/10.1001/jamapediatrics.2022.3581

575. CDC. Centers for Disease Control and Prevention. 2020 [cited 2023 May 26]. COVID Data

Tracker. Available from: https://covid.cdc.gov/covid-data-tracker

576. NVSS - Birth Data [Internet]. 2023 [cited 2023 May 26]. Available from: https://www.cdc.gov/nchs/nvss/births.htm

577. Centers for Disease Control and Prevention [Internet]. 2023 [cited 2023 May 26]. 2022 Breastfeeding Report Card. Available from: https://www.cdc.gov/breastfeeding/data/reportcard.htm

578. Rose J. Critical Appraisal of VAERS Pharmacovigilance: Is the U.S. Vaccine Adverse Events Reporting System (VAERS) a Functioning Pharmacovigilance System? 2023 Apr 21;

579. Young BE, Seppo AE, Diaz N, Rosen-Carole C, Nowak-Wegrzyn A, Cruz Vasquez JM, et al. Association of Human Milk Antibody Induction, Persistence, and Neutralizing Capacity With SARS-CoV-2 Infection vs mRNA Vaccination. JAMA Pediatrics. 2022 Feb 1;176(2):159–68.

580. Narayanaswamy V, Pentecost BT, Schoen CN, Alfandari D, Schneider SS, Baker R, et al. Neutralizing Antibodies and Cytokines in Breast Milk After Coronavirus Disease 2019 (COVID-19) mRNA Vaccination. Obstet Gynecol. 2022 Feb 1;139(2):181–91.

581. Schenk-Braat EAM, van Mierlo MMKB, Wagemaker G, Bangma CH, Kaptein LCM. An inventory of shedding data from clinical gene therapy trials. The Journal of Gene Medicine. 2007;9(10):910–21.

582. Mendonça SA, Lorincz R, Boucher P, Curiel DT. Adenoviral vector vaccine platforms in the SARS-CoV-2 pandemic. npj Vaccines. 2021 Aug 5;6(1):1–14.

583. Kedl RM, Hsieh EWY, Morrison TE, Samayoa-Reyes G, Flaherty S, Jackson CL, et al. Evidence for Aerosol Transfer of SARS-CoV-2–Specific Humoral Immunity. Immunohorizons. 2023 May 9;7(5):307–9.

584. Purpura LJ, Alukal J, Chong AM, Liu L, Cantos A, Shah J, et al. SARS-CoV-2 RNA Shedding in Semen and Oligozoospermia of Patient with Severe Coronavirus Disease 11 Weeks after Infection. Emerg Infect Dis. 2022 Jan;28(1):196–200.

585. Lestari SW, Restiansyah G, Yunihastuti E, Pratama G. Comparison of sperm parameters and DNA fragmentation index between infertile men with infection and vaccines of COVID-19. Asian Journal of Andrology. :10.4103/aja202310.

586. Dong Y, Li X, Li Z, Zhu Y, Wei Z, He J, et al. Effects of inactivated SARS-CoV-2 vaccination on male fertility: A retrospective cohort study. Journal of Medical Virology. 2023;95(1):e28329.

587. Gat I, Kedem A, Dviri M, Umanski A, Levi M, Hourvitz A, et al. Covid-19 vaccination BNT162b2 temporarily impairs semen concentration and total motile count among semen donors. Andrology. 2022;10(6):1016–22.

588. Olana S, Mazzilli R, Salerno G, Zamponi V, Tarsitano MG, Simmaco M, et al. 4BNT162b2 mRNA COVID-19 vaccine and semen: What do we know? Andrology. 2022;10(6):1023–9.

589. Ma YC, Cheng C, Yuan C, Xiang LY, Wen J, Jin X. The effect of COVID-19 vaccines on sperm parameters: a systematic review and meta-analysis. Asian Journal of Andrology. 2023 Aug;25(4):468.

590. Lassen E, Pacey A, Skytte AB, Montgomerie R. Recent decline in sperm motility among donor candidates at a sperm bank in Denmark. Hum Reprod. 2024 Jun 4;deae115.

591. Banoun H. Current state of knowledge on the excretion of mRNA and spike produced by anti-COVID-19 mRNA vaccines; possibility of contamination of the entourage of those vaccinated by these products. Infectious Diseases Research. 2022 Nov 14;2022;3(4):22.

592. Craddock V, Mahajan A, Spikes L, Krishnamachary B, Ram AK, Kumar A, et al. Persistent circulation of soluble and extracellular vesicle-linked Spike protein in individuals with postacute sequelae of COVID-19. Journal of Medical Virology. 2023;95(2):e28568.

593. Dobhal G, Datta A, Ayupova D, Teesdale-Spittle P, Goreham RV. Isolation, characterisation and detection of breath-derived extracellular vesicles. Sci Rep. 2020 Oct 15;10(1):17381.

594. Sinha A, Yadav AK, Chakraborty S, Kabra SK, Lodha R, Kumar M, et al. Exosome-enclosed microRNAs in exhaled breath hold potential for biomarker discovery in patients with pulmonary diseases. Journal of Allergy and Clinical Immunology. 2013 Jul 1;132(1):219-222.e7.

595. Lucchetti D, Santini G, Perelli L, Ricciardi-Tenore C, Colella F, Mores N, et al. Detection and characterisation of extracellular vesicles in exhaled breath condensate and sputum of COPD and severe asthma patients. European Respiratory Journal [Internet]. 2021 Aug 1 [cited 2024 Feb 15];58(2). Available from: https://erj.ersjournals.com/content/58/2/2003024

596. Parry PI, Lefringhausen A, Turni C, Neil CJ, Cosford R, Hudson NJ, et al. 'Spikeopathy': COVID-19 Spike Protein Is Pathogenic, from Both Virus and Vaccine mRNA. Biomedicines. 2023 Aug;11(8):2287.

597. Yamamoto M, Kase M, Sano H, Kamijima R, Sano S. Persistent varicella zoster virus infection following mRNA COVID-19 vaccination was associated with the presence of encoded spike protein in the lesion. Journal of Cutaneous Immunology and Allergy. 2023;6(1):18–23.

598. Yonker LM, Swank Z, Bartsch YC, Burns MD, Kane A, Boribong BP, et al. Circulating Spike Protein Detected in Post–COVID-19 mRNA Vaccine Myocarditis. Circulation. 2023 Mar 14;147(11):867–76.

599. Castruita JAS, Schneider UV, Mollerup S, Leineweber TD, Weis N, Bukh J, et al. SARS-CoV-2 spike mRNA vaccine sequences circulate in blood up to 28 days after COVID-19 vaccination. APMIS. 2023 Mar;131(3):128–32.

600. Duquesnoy RJ. Are We Ready for Epitope-Based HLA Matching in Clinical Organ Transplantation? Transplantation. 2017 Aug;101(8):1755–65.

601. Aita KSU, Monte SJH, Silva AS, Moita Neto JM, Vieira RS, Machado VP, et al. Time is life: EpAssistant - a new tool for the automatic identification of anti-HLA antibody epitope specificity in transplant programs. Transplant Immunology. 2018 Dec 1;51:1–5.

602. Opelz G, Wujciak T, Döhler B, Scherer S, Mytilineos J. HLA compatibility and organ transplant survival. Collaborative Transplant Study. Rev Immunogenet. 1999 Jan 1;1(3):334–42.

603. Harhay MN, Klassen AC, Zaidi H, Mittelman M, Bertha R, Mannon RB, et al. Living Organ Donor Perspectives and Sources of Hesitancy about COVID-19 Vaccines. Kidney360. 2021 Apr 22;2(7):1132–40.

604. Pullen LC. COVID-19 Spurs Transplant Vaccination Policy. American Journal of Transplantation. 2021;21(12):3817–8.

605. Kates OS, Stohs EJ, Pergam SA, Rakita RM, Michaels MG, Wolfe CR, et al. The limits of refusal: An ethical review of solid organ transplantation and vaccine hesitancy. American Journal of Transplantation. 2021;21(8):2637–45.

606. Hippen BE, Axelrod DA, Maher K, Li R, Kumar D, Caliskan Y, et al. Survey of current transplant center practices regarding COVID-19 vaccine mandates in the United States. American Journal of Transplantation. 2022;22(6):1705–13.

607. Kute V, Meshram HS, Sharma A, Chaudhury AR, Sudhindran S, Gokhale AK, et al. Update on Coronavirus 2019 Vaccine Guidelines for Transplant Recipients. Transplantation Proceedings. 2022 Jul 1;54(6):1399–404.

608. Kute VB, Asthana S, Gupta S, Agarwal SK, Guditi S, Sahay M, et al. NOTTO guidelines for vaccine-induced thrombotic thrombocytopenia in organ donation and transplantation. Indian Journal of Transplantation. 2022 Jan 1;16(1):3.

609. Uzun G, Bohnert BN, Althaus K, Nann D, Nadalin S, Heyne N, et al. Organ Donation From a Brain Dead Donor With Vaccine-induced Immune Thrombotic Thrombocytopenia After Ad26.COV2.S: The Risk of Organ Microthrombi. Transplantation. 2022 Mar;106(3):e178–80.

610. Hann A, Hartog H, Nutu A, Quist K, Sanabria-Mateos R, Greenhall GHB, et al. Liver graft outcomes from donors with vaccine induced thrombosis and thrombocytopenia (VITT): United Kingdom multicenter experience. American Journal of Transplantation. 2022;22(3):996–8.

611. Greenhall GHB, Ushiro-Lumb I, Pavord S, Hunt BJ, Sharma H, Mehra S, et al. Kidney Transplantation From Deceased Donors With Vaccine-induced Immune Thrombocytopenia and Thrombosis: An Updated Analysis of the UK Experience. Transplantation. 2022 Sep;106(9):1824–30.

612. Greenhall GHB, Ushiro-Lumb I, Pavord S, Currie I, Perera MTPR, Hartog H, et al. Organ transplantation from deceased donors with vaccine-induced thrombosis and thrombocytopenia. Am J Transplant. 2021 Dec;21(12):4095–7.

613. Loupy A, Goutaudier V, Jacquelinet C, Kerbaul F. Solid organ procurement and transplantation from deceased donors with vaccine-induced thrombosis and thrombocytopenia. American Journal of Transplantation. 2021;21(12):4098–101.

614. van Bruchem M, van Rosmalen M, Warmerdam A, Vos R, Ceulemans LJ, van Raemdonck D, et al. Outcome After Organ Transplantation From Brain-dead Donors After a Cerebral Insult Following SARS-CoV-2 Vaccination Within the Eurotransplant Region. Transplantation. 2022 Jan;106(1):e100.

615. Centonze L, Lauterio A, De Carlis R, Ferla F, De Carlis L. Successful Liver Transplantation From a Deceased Donor With Vaccine-Induced Thrombotic Thrombocytopenia Causing Cerebral Venous Sinus and Hepatic Veins Thrombosis After ChAdOx1 nCov-19 Vaccination. Transplantation. 2021 Oct;105(10):e144.

616. Valsecchi M, Lauterio A, Crocchiolo R, De Carlis R, Pugliano M, Centonze L, et al. New-Onset Antibodies to Platelet Factor 4 Following Liver Transplantation From a Donor With Vaccine-Induced Thrombotic Thrombocytopenia. Liver Transpl. 2022 Feb;28(2):314–6.

617. Jamme M, Elalamy I, d'Izarny Gargas T, Pettenati C, Desire E, Tissot A, et al. Transplantation Outcome in Recipients Engrafted With Organs Recovered From the First French Deceased Donor With a SARS-COV-2 Vaccine-induced Thrombotic Thrombocytopenia. Transplantation. 2021 Aug;105(8):e84.

618. Kramer AH, Baht R, Doig CJ. Time trends in organ donation after neurologic determination of death: a cohort study. CMAJ Open. 2017 Jan 13;5(1):E19–27.

619. Verhoeven CJ, Simon TC, de Jonge J, Doukas M, Biermann K, Metselaar HJ, et al. Liver grafts procured from donors after circulatory death have no increased risk of microthrombi formation. Liver Transplantation. 2016;22(12):1676–87.

620. Dubbeld J, Hoekstra H, Farid W, Ringers J, Porte RJ, Metselaar HJ, et al. Similar liver transplantation survival with selected cardiac death donors and brain death donors. British Journal of

Surgery. 2010 Apr 9;97(5):744–53.

621. Grewal HP, Willingham DL, Nguyen J, Hewitt WR, Taner BC, Cornell D, et al. Liver transplantation using controlled donation after cardiac death donors: An analysis of a large single-center experience. Liver Transplantation. 2009;15(9):1028–35.

622. Yamamoto S, Wilczek HE, Duraj FF, Groth CG, Ericzon BG. Liver Transplantation with Grafts from Controlled Donors after Cardiac Death: A 20-Year Follow-up at a Single Center. American Journal of Transplantation. 2010 Mar 1;10(3):602–11.

623. Vivalda S, Zhengbin H, Xiong Y, Liu Z, Wang Z, Ye Q. Vascular and Biliary Complications Following Deceased Donor Liver Transplantation: A Meta-analysis. Transplantation Proceedings. 2019 Apr 1;51(3):823–32.

624. Swissmedic 2019 © Copyright. Evaluation of haemovigilance reports in 2021 [Internet]. [cited 2022 Dec 11]. Available from: https://www.swissmedic.ch/swissmedic/en/home/humanarzneimittel/marktueberwachung/haemovigilance/haemovigilance-publications-events/haemovigilance-report-2021.html

625. Actualité - Rapport d'activité hémovigilance 2021 - ANSM [Internet]. [cited 2022 Dec 11]. Available from: https://ansm.sante.fr/actualites/rapport-dactivite-hemovigilance-2021

626. Funk M, Heiden M, Müller S, et al. Hämovigilanz-Bericht des Paul-Ehrlich-Instituts 2020: Auswertung der Meldungen von Reaktionen und Zwischenfällen nach § 63i AMG [Internet]. [cited 2022 Dec 11]. Available from: www.pei.de/haemovigilanzbericht.

627. Martina V. Hämovigilanzbericht 2021. [Internet]. [cited 2022 Dec 11]. Available from: https://dski.dk/wp-content/uploads/2023/03/blood-donation-adverse-reaction-and-events-annual-report-2021.pdf

628. Danish Hemovigilance Committee. Blood donation adverse reactions and events Annual report 2021 [Internet]. [cited 2023 May 25]. Available from: https://dski.dk/wp-content/uploads/2023/03/blood-donation-adverse-reaction-and-events-annual-report-2021.pdf

629. S Narayan (Ed) D Poles et al. The 2021 Annual SHOT Report [Internet]. Serious Hazards of Transfusion (SHOT) Steering Group; 2022 [cited 2022 Dec 11]. Available from: https://www.shotuk.org/wp-content/uploads/myimages/SHOT-REPORT-2021-FINAL-bookmarked-V3-November.pdf

630. 2020 to 2021 Cells, tissues, and organs surveillance system (CTOSS) [Internet]. 2022 [cited 2023 May 25]. Available from: https://www.canada.ca/en/public-health/services/surveillance/blood-safety-contribution-program/cells-tissues-organs-surveillance-system-2020-2021-infographic.html

631. Haemovigilance by JRCS 2021 [Internet]. Japanese Red Cross; [cited 2023 May 25]. Available from: https://www.jrc.or.jp/mr/english/pdf/Haemovigilance%20by%20JRCS%202021.pdf

632. Banoun H. mRNA: Vaccine or Gene Therapy? The Safety Regulatory Issues. International Journal of Molecular Sciences. 2023 Jan;24(13):10514.

633. Research C for BE and. Design and Analysis of Shedding Studies for Virus or Bacteria-Based Gene Therapy and Oncolytic Products [Internet]. FDA; 2019 [cited 2024 Jun 27]. Available from: https://www.fda.gov/regulatory-information/search-fda-guidance-documents/design-and-analysis-shedding-studies-virus-or-bacteria-based-gene-therapy-and-oncolytic-products

634. Quality, preclinical and clinical aspects of gene therapy medicinal products - Scientific guideline | European Medicines Agency [Internet]. [cited 2024 Jun 27]. Available from: https://www.ema.europa.eu/en/quality-preclinical-clinical-aspects-gene-therapy-medicinal-products-scientific-guideline

Abbreviations

AE: Adverse events
CDC: Centers for Disease Control (USA)
DBD: Donor dies from a Brain Death
DCD: Donor dies from a Cardiac Death
EMA: European Medicines Agency
FDA: Food and Drug Administration
HLA: Human Leukocyte Antigen
IFR: Infection Fatality Rate
LNPs: Lipid Nanoparticles
mRNA: Messenger RNA
PF4: Platelet Factor 4
SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2
VAERS: Vaccine Adverse Event Reporting System
VITT: Vaccine-induced Thrombosis and Thrombocytopenia
WHO: World Health Organization