Review

A SYSTEMATIC REVIEW OF AUTOPSY FINDINGS IN DEATHS AFTER COVID-19 VACCINATION

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Word Count: 2281

Abstract

Background: The rapid development and widespread deployment of COVID-19 vaccines, combined with a high number of adverse event reports, have led to concerns over possible mechanisms of injury including systemic lipid nanoparticle (LNP) and mRNA distribution, spike protein-associated tissue damage, thrombogenicity, immune system dysfunction, and carcinogenicity. The aim of this systematic review is to investigate possible causal links between COVID-19 vaccine administration and death using autopsies and post-mortem analysis.

Methods: We searched for all published autopsy and necropsy reports relating to COVID-19 vaccination up until May 18th, 2023. We initially identified 678 studies and, after screening for our inclusion criteria, included 44 papers that contained 325 autopsy cases and one necropsy case. Three physicians independently reviewed all deaths and determined whether COVID-19 vaccination was the direct cause or contributed significantly to death.

Findings: The most implicated organ system in COVID-19 vaccine-associated death was the cardiovascular system (53%), followed by the hematological system (17%), the respiratory system (8%), and multiple organ systems (7%). Three or more organ systems were affected in 21 cases. The mean time from vaccination to

death was 14.3 days. Most deaths occurred within a week from last vaccine administration. A total of 240 deaths (73.9%) were independently adjudicated as directly due to or significantly contributed to by COVID-19 vaccination.

Interpretation: The consistency seen among cases in this review with known COVID-19 vaccine adverse events, their mechanisms, and related excess death, coupled with autopsy confirmation and physician-led death adjudication, suggests there is a high likelihood of a causal link between COVID-19 vaccines and death in most cases. Further urgent investigation is required for the purpose of clarifying our findings.

Keywords: Autopsy; necropsy; COVID-19; COVID-19 vaccines; mRNA; SARS-CoV-2 vaccination; death; excess mortality; spike protein; organ system

Research in context

Evidence before this study

COVID-19 vaccines, with known mechanisms of injury to the human body and a substantial number of adverse event reports, represent an exposure that we hypothesized to be possibly linked to death in some cases. Thus, we searched PubMed and ScienceDirect for all published autopsy and necropsy reports relating to COVID-19 vaccination through May 18th, 2023 using keywords relating to COVID-19 vaccines, death, autopsy, and necropsy. We found that no comprehensive review of autopsy findings in a large series of deaths after COVID-19 vaccination that accounts for the current state of knowledge has been conducted. The mechanisms of death from COVID-19 vaccination remain largely unexplored.

Added value of this study

Because the state of knowledge has advanced since the time of the original publications, new assessments regarding COVID-19 vaccine adverse events can be made. Based on the previously published literature of COVID-19 vaccine adverse events, their mechanisms, and related excess death, coupled with autopsy confirmation and physician-led death adjudication, we found a high likelihood of a causal link between COVID-19 vaccines and death among most of the 326

included cases. This is the first study that indicates a high probability of causality between COVID-19 vaccine administration and death in many cases. To date, this is the largest review of autopsy findings in deaths after COVID-19 vaccination, helping the medical community to better understand fatal COVID-19 vaccine syndromes.

Implications of all the available evidence

Further urgent investigation is required aimed at confirming our results and further elucidating the mechanisms underlying the described fatal outcomes with the goal of risk mitigation for the large numbers of individuals who have taken one or more COVID-19 vaccines. If a large number of deaths are indeed causally linked to COVID-19 vaccination, the implications could be immense, including: the complete withdrawal of all COVID-19 vaccines from the global market, suspension of all remaining COVID-19 vaccine mandates and passports, loss of public trust in government and medical institutions, investigations and inquiries into the censorship, silencing and persecution of doctors and scientists who raised these concerns, and compensation for those who were harmed as a result of the administration of COVID-19 vaccines.

Introduction

As of May 31st, 2023, SARS-CoV-2 has infected an estimated 767,364,883 people globally, resulting in 6,938,353 deaths[1]. As a direct response to this worldwide catastrophe, governments adopted a coordinated approach to limit caseloads and mortality utilizing a combination of non-pharmaceutical interventions (NPIs) and novel gene-based vaccine platforms. The first doses of vaccine were administered less than 11 months after the identification of the SARS-CoV-2 genetic sequence (in the United States, under the Operation Warp Speed initiative), which represented the fastest vaccine development in history with limited assurances of short and long-term safety[2]. At the time of writing, about 69% of the world population have been inoculated with at least one dose of a COVID-19 vaccine[1].

The most frequently utilized COVID-19 vaccine platforms include inactivated virus (Sinovac – CoronaVac), protein subunit (Novavax – NVX-CoV2373), viral vector (AstraZeneca – ChAdOx1 nCoV-19, Johnson & Johnson – Ad26.COV2.S), and messenger RNA (Pfizer-BioNTech – BNT162b2, Moderna – mRNA-1273)[3]. All utilize mechanisms that can cause serious adverse events; most involve the uncontrolled synthesis of the spike glycoprotein (SP) as the basis of the immunological response. Circulating SP is the likely deleterious mechanism

through which COVID-19 vaccines produce adverse effects[4,5,7,8,10,11]. SP and/or subunits/peptide fragments can trigger ACE2 receptor degradation and internalization, which may also cause destabilization of the renin–angiotensin system (RAS), resulting in possible enhanced inflammation, vasoconstriction, and thrombosis[4]. SP activates platelets, causes endothelial damage, and directly promotes arterial and venous thrombosis[5]. Moreover, immune system cells that have taken up the lipid nanoparticles (LNPs) then release them back into the circulation with elevated numbers of exosomes containing SP and microRNAs that play a role in inducing a signaling response in recipient cells at distant sites, resulting in severe inflammatory consequences[5]. Further, long term cancer control may be jeopardized in those injected with mRNA COVID-19 vaccines because of IRF7 and IRF9 suppression[5]. There is a distinct potential of a causal link between SARS-CoV-2 mRNA vaccination and neurodegenerative disease, myocarditis, immune thrombocytopenia, Bell's palsy, liver disease, impaired adaptive immunity, impaired DNA damage response and tumorigenesis[5].

These findings are supported by the recent discovery that repeated COVID-19 vaccination with mRNA-based vaccines causes production of abnormally high levels of IgG4 antibodies which can lead to immune tolerance to SP, immune suppression, and promote the development of autoimmune diseases, myocarditis, and cancer growth[6].

Neurotoxic effects of SP may cause or contribute to the post-COVID syndrome, including headache, tinnitus, autonomic dysfunction, and small fiber neuropathy[7]. Specific to the administration of viral vector COVID-19 vaccines (AstraZeneca; Johnson and Johnson) a new clinical syndrome called vaccine-induced immune thrombotic thrombocytopenia (VITT) was identified in 2021 and characterized by the development of thromboses at atypical body sites combined with severe thrombocytopenia after vaccination[9]. The pathogenesis of this life-threatening side effect is currently unknown, though it has been proposed that VITT is caused by post-vaccination antibodies against platelet factor 4 (PF4) triggering extensive platelet activation[9]. mRNA-based vaccines rarely cause VITT, but they are associated with myocarditis, or inflammation of myocardium[10]. The mechanisms for the development of myocarditis after COVID-19 vaccination are not clear, but it has been hypothesized that it may be caused by molecular mimicry of SP and self-antigens, immune response to mRNA, and dysregulated cytokine expression[10]. In adolescents and young adults diagnosed with post-mRNA vaccine myocarditis, free SP was detected in the blood while vaccinated controls had no circulating SP[11]. It has been demonstrated that SARS-CoV-2 spike mRNA vaccine sequences can circulate in the blood for at least 28 days after vaccination[12]. These

data indicate that adverse events may occur for an unknown period after vaccination, with SP playing an important potential etiological role.

A Freedom of Information Act (FOIA) document obtained from the Australian Government, titled Nonclinical Evaluation of BNT162b2 [mRNA] COVID-19 vaccine (COMIRNATY), shows systemic distribution of the LNPs containing mRNA after vaccine administration in rats, concluding that LNPs reached their highest concentration at the injection site, followed by the liver, spleen, adrenal glands, ovaries, and bone marrow (femur) over 48 hours[13]. This biodistribution data suggests that SP may be expressed in cells from many vital organ systems, raising significant concerns regarding the safety profile of COVID-19 vaccines. Given the identified vaccination syndromes and their possible mechanisms, the frequency of adverse event reports is expected to be high, especially given the vast number of vaccine doses administered globally.

Through May 5th, 2023, the Vaccine Adverse Events Reporting System (VAERS) contained 1,556,050 adverse event reports associated with COVID-19 vaccines, including 35,324 deaths, 26,928 myocarditis and pericarditis, 19,546 heart attacks, and 8,701 thrombocytopenia reports[14]. If the alarmingly high number of reported deaths are indeed causally linked to COVID-19 vaccination, the

implications could be immense, including: the complete withdrawal of all COVID-19 vaccines from the global market, suspension of all remaining COVID-19 vaccine mandates and passports, loss of public trust in government and medical institutions, investigations and inquiries into the censorship, silencing and persecution of doctors and scientists who raised these concerns, and compensation for those who were harmed as a result of the administration of COVID-19 vaccines. Using VAERS data alone to establish a causal link between COVID-19 vaccination and death, however, is not possible due to many limitations and confounding factors.

Autopsies are one of the most powerful diagnostic tools in medicine to establish cause of death and clarify the pathophysiology of disease[15]. COVID-19 vaccines, with plausible mechanisms of injury to the human body and a substantial number of adverse event reports, represent an exposure that may be causally linked to death in some cases. The purpose of this systematic review is to investigate possible causal links between COVID-19 vaccine administration and death using autopsies and post-mortem analysis.

Methods

We performed a systematic review of all published autopsy and necropsy reports relating to COVID-19 vaccination through May 18th, 2023. All autopsy studies that include COVID-19 vaccines as a possible cause of death were included. All necropsy (analysis of dead tissue) studies that include COVID-19 vaccines as a possible cause of organ death were included. No other restrictions were imposed. The following databases were used: PubMed and ScienceDirect. The following keywords were used: 'COVID-19 Vaccine', 'SARS-CoV-2 Vaccine', 'COVID Vaccination', and 'Post-mortem', 'Autopsy', or 'Necropsy'. All selected studies were screened for relevant literature contained in their references. Because the state of knowledge has advanced since the time of the original publications, we performed a contemporary review: three physicians (RH, WM, PAM) with experience in death adjudication and anatomical/clinical pathology independently reviewed the available information of each case and determined whether or not COVID-19 vaccination was the direct cause or contributed significantly to the mechanism of death described. Agreement was reached when two or more physicians adjudicated the case concordantly. For the study by Chaves[20], only cardiovascular and hematological system related cases were adjudicated as being linked to the vaccine due to a high probability of COVID-19 vaccination contributing to death and missing individual case information for the other individuals. Given the presence of some missing data, we used all available

information to calculate the descriptive statistics. Estimated age (exact age not given) and inferred time from last vaccine administration to death (no definitive time given) were excluded from calculations.

Results

A database search yielded 678 studies that had potential to meet our inclusion criterion. 562 duplicates were screened out. Out of the remaining 116 papers, 36 met our specified inclusion criterion. Through further analysis of references, we located 18 additional papers, with 8 of them meeting our inclusion criterion. In total, we found 44 studies that contained autopsy or necropsy reports of COVID-19 vaccinees (Figure 1).

Table 1 summarizes the 44 studies[16-59]. There were a total of 325 autopsy cases and 1 necropsy case (heart). The mean age of death was 70.4 years and there were 139 females (42.6%). Most received a Pfizer/BioNTech vaccine (41%), followed by Sinovac (37%), AstraZeneca (13%), Moderna (7%), Johnson & Johnson (1%), and Sinopharm (1%).

The cardiovascular system was most frequently implicated (53%), followed by hematological (17%), respiratory (8%), multiple organ systems (7%),

neurological (4%), immunological (3%), and gastrointestinal (1%). In 7% of cases, the cause of death was either unknown, non-natural (drowning, head injury, etc.) or infection (Figure 2). One organ system was affected in 302 cases, two in 3 cases, three in 8 cases, and four or more in 13 cases (Figure 3).

The number of days from vaccination until death was 14.3 (mean), 3 (median) irrespective of dose, 7.8 (mean), 3 (median) after one dose, 23.2 (mean), 2 (median) after two doses, and 5.7 (mean), 2 (median) after three doses. The distribution of days from last vaccine administration to death is highly right skewed, showing that most of the deaths occurred within a week from last vaccination (Figure 4). 240 deaths (73.9%) were independently adjudicated by three physicians to be significantly linked to COVID-19 vaccination (Table S1). Among adjudicators, there was complete independent agreement (all three physicians) of vaccination causing or contributing to death in 203 cases (62.5%). The one necropsy case was judged to be linked to vaccination with complete agreement.

Discussion

We found 73.9% of deaths after COVID-19 vaccination were attributable to fatal vaccine injury syndromes. The cardiovascular system was by far the most

implicated organ system in death, followed by hematological, respiratory, multiple organ systems, neurological, immunological, and gastrointestinal (Figure 2), with three or more organ systems affected in 21 cases (Figure 3). The majority of deaths occurred within a week from last vaccine administration (Figure 4) and were independently adjudicated by three physicians to be significantly associated with vaccination (Table S1). These results corroborate known COVID-19 vaccine-induced syndromes and show significant, temporal associations between COVID-19 vaccination and death involving multiple organ systems, with a predominant implication of the cardiovascular and hematological systems. Criteria of causality from an epidemiological perspective have been met including biological plausibility, temporal association, internal and external validity, coherence, analogy, and reproducibility with each successive report of death after COVID-19 vaccination.

Our findings amplify concerns regarding COVID-19 vaccine adverse events and their mechanisms. SP's deleterious effects[5,6,7,8,10,11], especially on the heart[10,11], likely explains the high proportion of cardiovascular deaths seen in our study. They also highlight the involvement of multiple organ systems in some of the deaths associated with COVID-19 vaccination. This might be attributed to the Multisystem Inflammatory Syndrome (MIS) that has been detected following

COVID-19 vaccination in both children[60] and adults[61]. A possible mechanism by which MIS occurs after vaccination could be the systemic distribution of the LNPs containing mRNA after vaccine administration[13] and the consequent systemic SP expression and circulation resulting in system-wide inflammation. A significant proportion of cases were due to hematological system adverse events, which is not surprising given that VITT[62] and pulmonary embolism (PE)[63] have been reported in the literature as serious adverse events following COVID-19 vaccination. Deaths caused by adverse effects to the respiratory system were also relatively common in our review, a finding that is in line with the possibility of developing acute respiratory distress syndrome (ARDS) or drug-induced interstitial lung disease (DIILD) after COVID-19 vaccination[64,65]. Although uncommon among cases in this study, immunological[66], neurological[67], and gastrointestinal[68] adverse events can still occur after COVID-19 vaccination and, as with the cardiovascular system, may be directly or indirectly caused by the systemic expression or circulation of SP. Given the average time (14.3 days) in which cases died after vaccination, a temporal association between COVID-19 vaccination and death among most cases is further supported by the finding that SARS-CoV-2 spike mRNA vaccine sequences can circulate in the blood for at least 28 days after vaccination[12]. Most of the deployed vaccine platforms are associated with death, suggesting that they share a common feature that causes adverse effects, which is most likely SP.

The large number of COVID-19 vaccine induced deaths evaluated in this review is consistent with multiple papers that report excess mortality after vaccination. Pantazatos and Seligmann found that all-cause mortality increased 0-5 weeks post-injection in most age groups resulting in 146,000 to 187,000 vaccine-associated deaths in the United States between February and August of 2021[69]. With similar findings, Skidmore estimated that 278,000 people may have died from the COVID-19 vaccine in the United States by December 2021[70]. These concerning results were further elucidated by Aarstad and Kvitastein, who found that among 31 countries in Europe, a higher population COVID-19 vaccine uptake in 2021 was positively correlated with increased all-cause mortality in the first nine months of 2022 after controlling for alternative explanations[71]. Furthermore, excess mortality from non-COVID-19 causes has been detected in many countries since the mass vaccination programs began[72,73,74,75,76,77], suggesting a common deleterious exposure among populations. Pantazatos estimated that VAERS deaths are underreported by a factor of 20[69]. If we apply this underreporting factor to the May 5th, 2023, VAERS death report count of 35,324[14], the number of deaths in the United States alone becomes 706,480. If this extrapolated number of deaths were to be confirmed, the COVID-19 vaccines would represent the largest medical failure in human history.

In summary, we identified a large series of deaths after COVID-19 vaccination, confirmed with autopsy and necropsy, to help the medical community better understand fatal COVID-19 vaccine syndromes. The consistency seen among cases in this review with known COVID-19 vaccine adverse events, their mechanisms, and related excess death, coupled with autopsy confirmation and expert physician death adjudication, suggests there is a high likelihood of a causal link between COVID-19 vaccines and death in most cases. Even with substantial evidence, our paper cannot definitively determine causality as our paper has all the limitations of systematic reviews of previously published papers including selection bias, publication bias, and confounding variables. Further urgent investigation is required aimed at confirming our results and further elucidating the mechanisms underlying the described fatal outcomes with the goal of risk mitigation for the large numbers of individuals who have taken one or more COVID-19 vaccines.

Acknowledgements

None.

Conflict of Interest

Drs Alexander, Amerling, Hodkinson, Makis, McCullough, Risch, Trozzi are affiliated with and receive salary support and or hold equity positions in The

Wellness Company, Boca Raton, FL which had no role in funding, analysis, or publication.

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Figure Legends

Figure 1: Preferred Reporting Items for Systemic Reviews and Meta-Analyses (PRISMA) flow diagram detailing the study selection process.

Figure 2: Proportion of Cases by Affected Organ System

Figure 3: Number of Affected Organ Systems by Cases

Figure 4: Distribution of Time from Last Vaccine Administration to Death

Table Legends

Table 1: Characteristics of included studies on COVID-19 vaccination possibly causing death.

Supplemental Table 1: Detailed Case Information and Death Adjudications

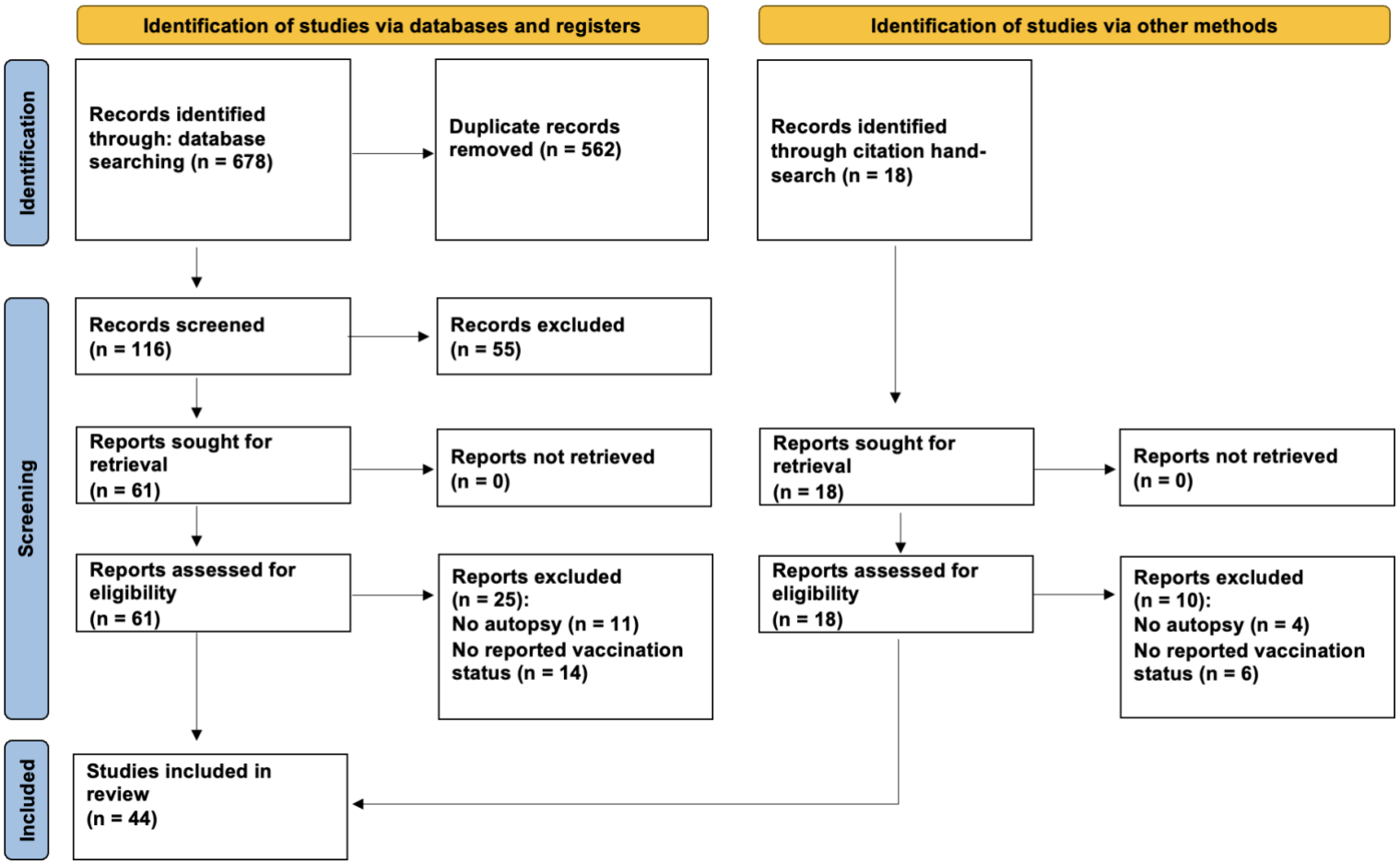
Identification of studies via databases and registers
Identification of studies via other methods
Identification
Screening
Included
Records identified through: database searching (n = 678)
Duplicate records removed (n = 562)
Records identified through citation hand-search (n = 18)
Records screened (n = 116)
Records excluded (n = 55)
Reports sought for retrieval (n = 61)
Reports not retrieved (n = 0)
Reports sought for retrieval (n = 18)
Reports not retrieved (n = 0)
Reports assessed for eligibility (n = 61)
Reports excluded (n = 25): No autopsy (n = 11) No reported vaccination status (n = 14)
Reports assessed for eligibility (n = 18)
Reports excluded (n = 10): No autopsy (n = 4) No reported vaccination status (n = 6)
Studies included in review (n = 44)

Figure 1.

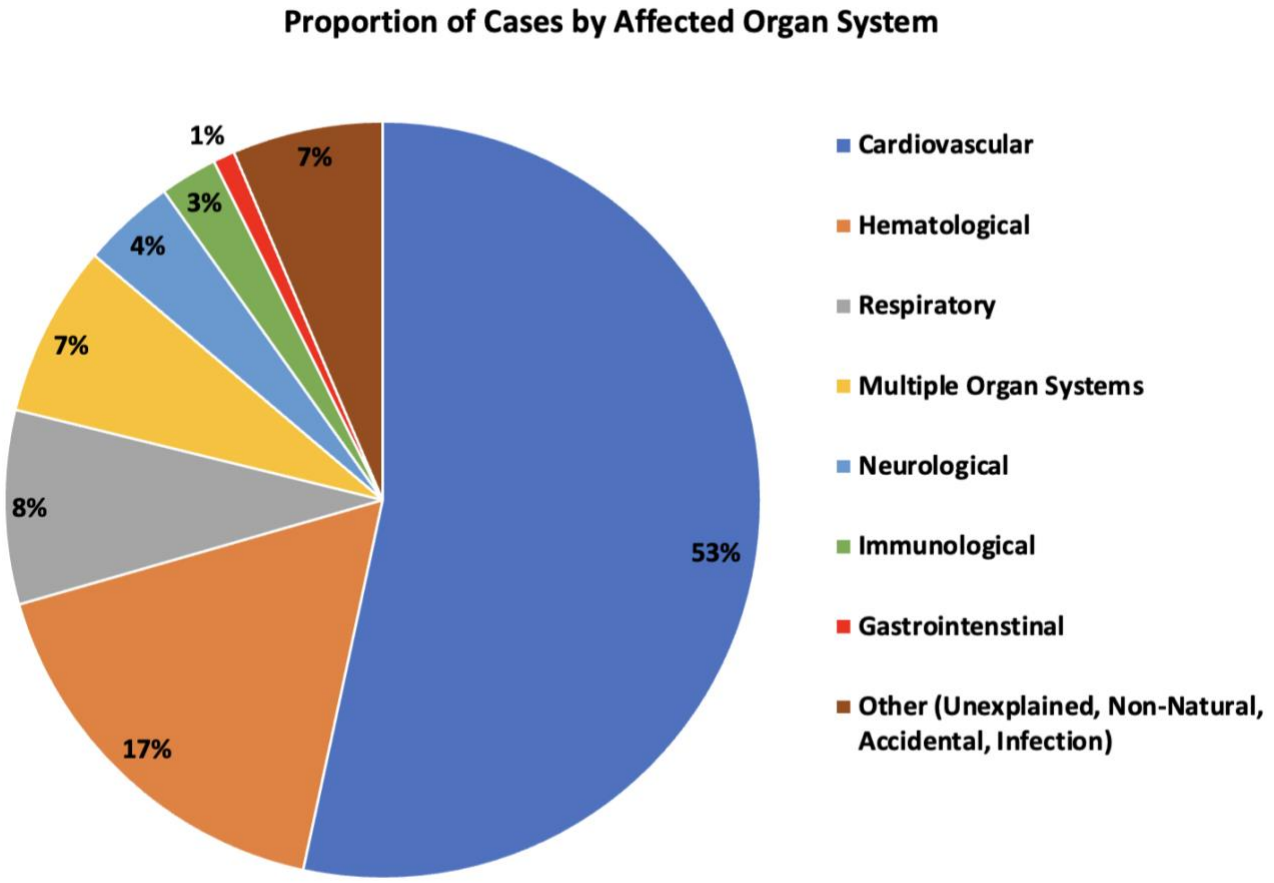
Proportion of Cases by Affected Organ System
53%
17%
8%
7%
4%
3%
1%
7%
Cardiovascular
Hematological
Respiratory
Multiple Organ Systems
Neurological
Immunological
Gastrointenstinal
Other (Unexplained, Non-Natural, Accidental, Infection)

Figure 2.

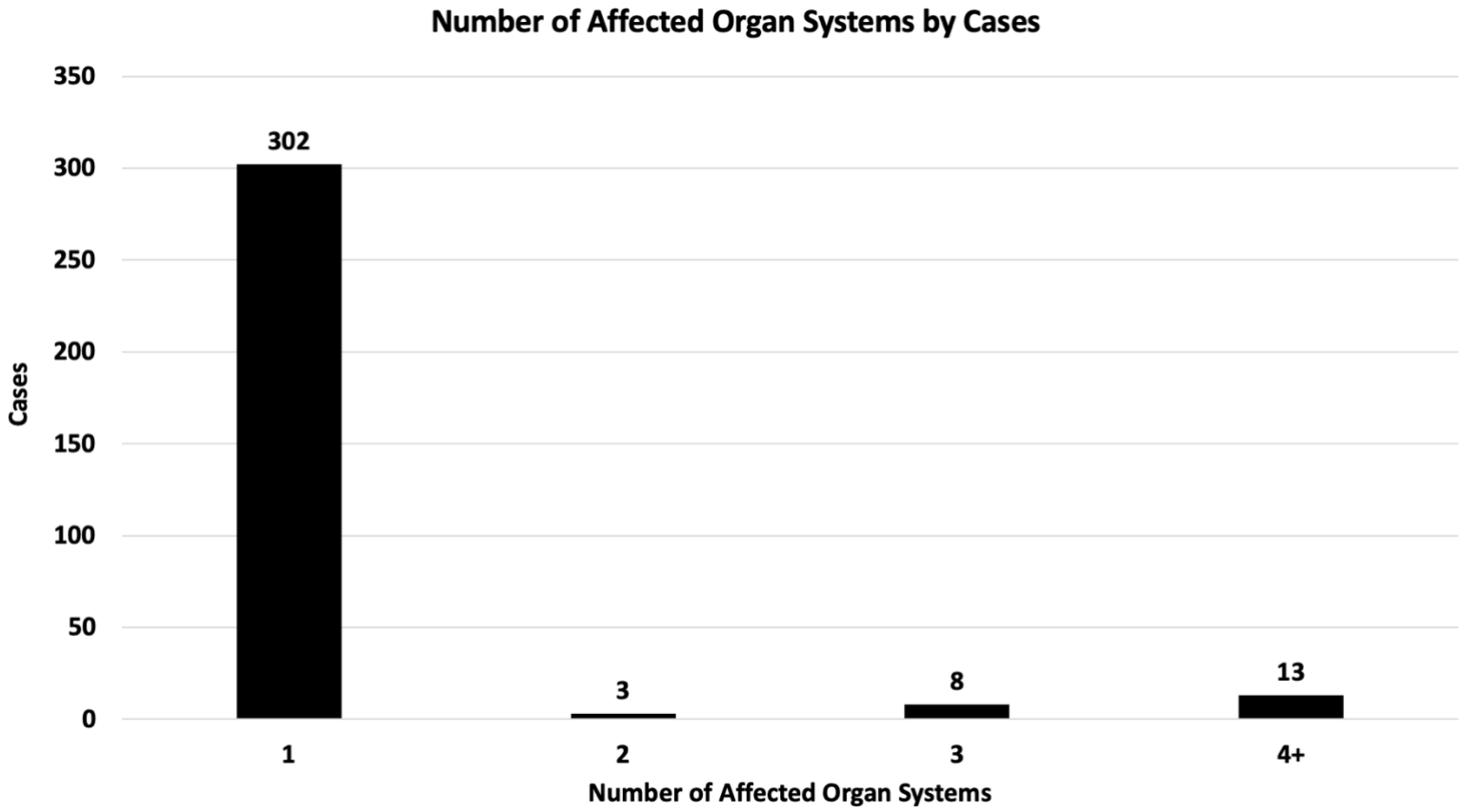
Number of Affected Organ Systems by Cases
350
300
250
200
150
100
50
0
Cases
302
3
8
13
1
2
3
4+
Number of Affected Organ Systems

Figure 3.

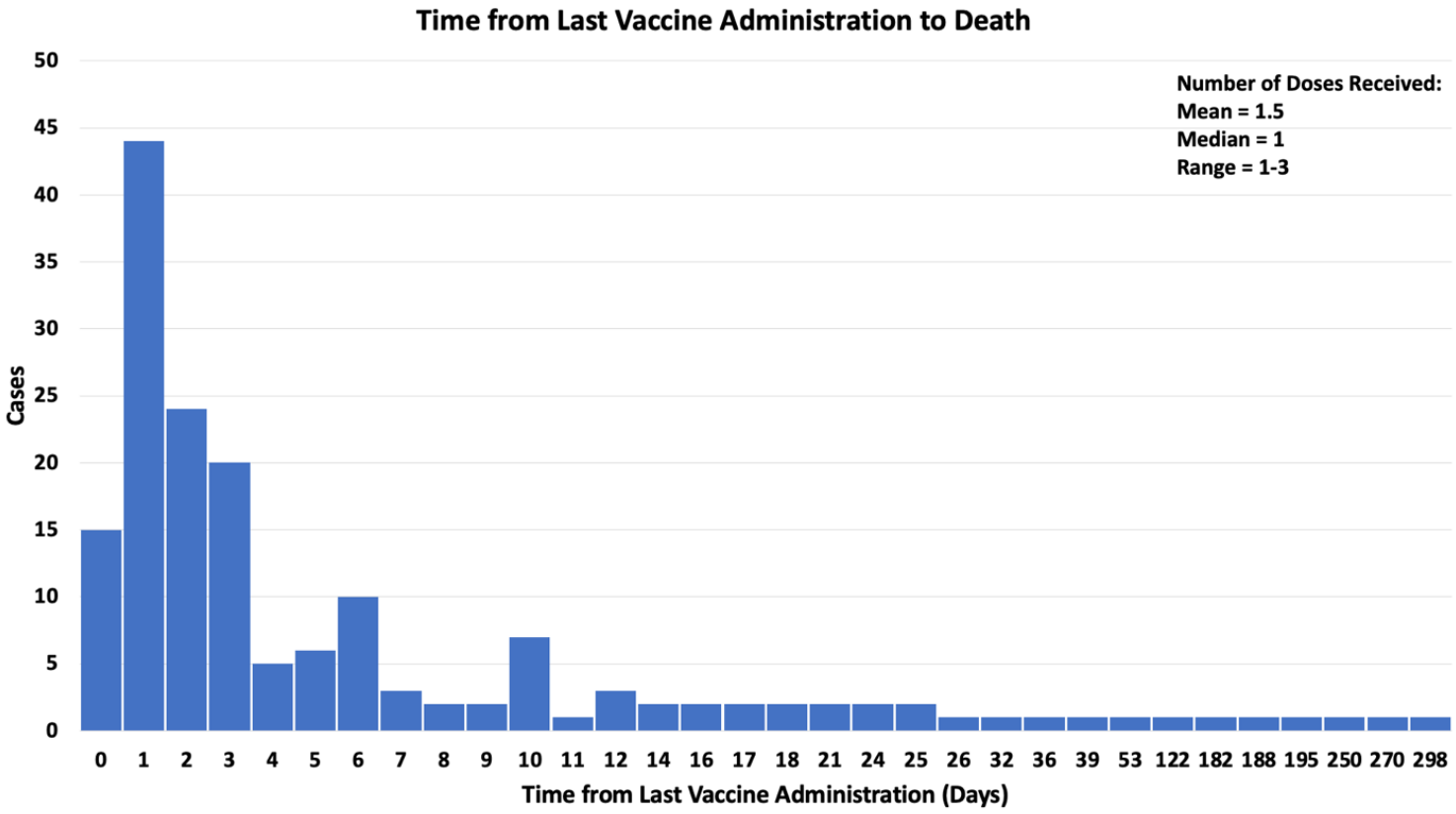
Time from Last Vaccine Administration to Death
Number of Doses Received:
Mean = 1.5
Median = 1
Range = 1-3
Cases
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 14 16 17 18 21 24 25 26 32 36 39 53 122 182 188 195 250 270 298
Time from Last Vaccine Administration (Days)

Figure 4.

AUTHOR	YEAR	COUNTRY	CASES*	AGE	SEX	VACCINE	DOSE**	DISEASE	ORGAN SYSTEM	PERIOD***	PROCEDURE
HOJBERG [16]	**2023**	**USA**	**1**			**Moderna**		**Eosinophilia**	**Immunological**	**'recent'**	**Autopsy**
NUSHIDA [17]	**2023**	**Japan**	**1**	**14**	**F**	**Pfizer**	**3**	**MIS**	**MIS**	**2 days**	**Autopsy**
JEON [18]	**2023**	**Korea**	**1**	**19**	**M**	**Pfizer**	**2**	**Multiple sclerosis**	**Neurological**	**182 days**	**Autopsy**
ESPOSITO [19]	**2023**	**Italy**	**1**	**83**	**M**	**Pfizer**	**2**	**COVID-19**	**MIS**		**Autopsy**
CHAVES [20]	**2022**	**Columbia**	**121**	**84 (mean)**	**52% F**	**Sinovac, AZ, Pfizer**	**1-2**	**SCD, MI, PE**	**Cardiovascular, Hematological**		**Autopsy**
MORZ [21]	**2022**	**Germany**	**1**	**76**	**M**	**Pfizer**	**2**	**Encephalitis, myocarditis**	**MIS**	**21 days**	**Autopsy**
ALUNNI [22]	**2022**	**France**	**1**	**70**	**M**	**AZ**	**1**	**VITT**	**Hematological**	**25 days**	**Autopsy**
TAKAHASHI [23]	**2022**	**Japan**	**1**	**'90s'**	**M**	**Pfizer**	**3**	**Pericarditis**	**Cardiovascular**	**14 days**	**Autopsy**
MURATA [24]	**2022**	**Japan**	**4**	**34 (mean)**	**M**	**Moderna, Pfizer**	**2**	**Cytokine Storm**	**Immunological**	**1-10 days**	**Autopsy**
SATOMI [25]	**2022**	**Japan**	**1**	**61**	**F**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**10 days**	**Autopsy**

SUZUKI [26]	**2021**	**Japan**	**54**	**68.1 (mean)**	**37% F**	**Pfizer, Moderna**	**1-2**	**Various**	**Various**	**<7 days**	**Autopsy**
MELE [27]	**2022**	**Italy**	**1**	**54**	**M**	**J&J**	**1**	**VITT**	**Hematological**	**~21 days**	**Autopsy**
YOSHIMURA [28]	**2022**	**Japan**	**1**	**88**	**F**	**Moderna**	**2**	**VI-ARDS**	**Respiratory**	**18 days**	**Autopsy**
RONCATI [29]	**2022**	**Italy**	**3**	**72.3 (mean)**	**2 F**	**Pfizer**	**1-2**	**VITT**	**Hematological**	**18-122 days**	**Autopsy**
KANG [30]	**2022**	**Korea**	**1**	**48**	**F**	**AZ, Pfizer**	**2**	**Myocarditis (required transplant, no death)**	**Cardiovascular**	**15 days**	**Necropsy (heart)**
KAMURA [31]	**2022**	**Japan**	**1**	**57**	**M**	**Moderna**	**1**	**Thrombosis/rhabdomyolysis**	**MIS**	**53 days**	**Autopsy**
ISHIOKA [32]	**2022**	**Japan**	**1**	**67**	**M**	**Pfizer**	**1**	**Exacerbation of UIP**	**Respiratory**	**3 days**	**Autopsy**
GILL [33]	**2022**	**USA**	**2**	**‘teenage’**	**M**	**Pfizer**	**2**	**Myocarditis**	**Cardiovascular**	**3-4 days**	**Autopsy**
POMARA [34]	**2022**	**Italy**	**1**	**37**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**24 days**	**Autopsy**
YEO [35]	**2022**	**Singapore**	**28**	**65.1 (mean)**	**17.9 % F**	**Pfizer, Moderna**	**1-2**	**Various**	**Various**	**<3 days**	**Autopsy**
AMERATUNGA [36]	**2022**	**New Zealand**	**1**	**57**	**F**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**3 days**	**Autopsy**

GUNTHER [37]	**2021**	**Germany**	**1**	**54**	**M**	**AZ**	**1**	**VITT**	**Hematological**	**~121 days**	**Autopsy**
PERMEZEL [38]	**2022**	**Australia**	**1**	**63**	**M**	**AZ**	**1**	**ADEM**	**Neurological**	**32 days**	**Autopsy**
CHOI [39]	**2021**	**Korea**	**1**	**22**	**M**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**5 days**	**Autopsy**
SCHNEIDER [40]	**2021**	**Germany**	**18**	**62.6 (mean)**	**50% F**	**AZ, Pfizer, Moderna, J&J**	**1-2**	**Various**	**Various**	**1-14 days**	**Autopsy**
VERMA [41]	**2021**	**USA**	**1**	**42**	**M**	**Moderna**	**2**	**Myocarditis**	**Cardiovascular**	**~14 days**	**Autopsy**
WIEDMANN [42]	**2021**	**Norway**	**4**	**41.8 (mean)**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**7-25 days**	**Autopsy**
POMARA [43]	**2021**	**Italy**	**2**	**43.5 (mean)**	**1 F**	**AZ**		**VITT**	**Hematological**	**16-24 days**	**Autopsy**
ALTHAUS [44]	**2021**	**Germany**	**2**	**36 (mean)**	**1 F**	**AZ**	**1**	**VITT**	**Hematological**	**16-17 days**	**Autopsy**
EDLER [45]	**2021**	**Germany**	**3**	**‘elderly’**	**1 F**	**Pfizer**	**1**	**COVID-19, MI, PE**	**Cardiovascular, Hematological, Respiratory**	**2-12 days**	**Autopsy**
HANSEN [46]	**2021**	**Germany**	**1**	**86**	**M**	**Pfizer**	**1**	**Renal/respiratory failure**	**MIS**	**26 days**	**Autopsy**

BARONTI [47]	**2022**	**Italy**	**5**	**64 (mean)**	**1 F**	**Pfizer, Moderna**	**1-2**	**MI**	**Cardiovascular**	**<1 day – 21 days**	**Autopsy**
ITTIWUT [48]	**2022**	**Thailand**	**13**	**42.8 (mean)**	**23% F**	**AZ, Sinopharm, Sinovac, Pfizer, Moderna**	**1-3**	**Various**	**Various**	**1-7 days**	**Autopsy**
GREINACHER [49]	**2021**	**Germany**	**1**	**49**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**10 days**	**Autopsy**
MAURIELLO [50]	**2021**	**Italy**	**1**	**48**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**39 days**	**Autopsy**
BJØRNSTAD-TUVENG [51]	**2021**	**Norway**	**1**	**'young'**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**~10 days**	**Autopsy**
SCULLY [52]	**2021**	**U.K.**	**1**	**52**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**~>10 days**	**Autopsy**
CHOI [53]	**2021**	**Korea**	**1**	**38**	**M**	**J&J**	**1**	**SCLS**	**Hematological**	**2 days**	**Autopsy**
SCHWAB [54]	**2023**	**Germany**	**5**	**57.6 (mean)**	**3 F**	**Pfizer, Moderna**	**1-2**	**Myocarditis**	**Cardiovascular**	**<7 days**	**Autopsy**
HIRSCHBUHL [55]	**2022**	**Germany**	**29**	**32-97**	**45% F**	**Pfizer, AZ, Sinovac**	**1-2**	**COVID-19**	**Various**	**~1-307 days**	**Autopsy**
HOSHINO [56]	**2022**	**Japan**	**1**	**27**	**M**	**Moderna**	**1**	**Myocarditis**	**Cardiovascular**	**36 days**	**Autopsy**

COLOMBO [57]	**2023**	**Italy**	**5**	**72 (mean)**	**2 F**	**Pfizer**	**2**	**Various**	**Respiratory, MIS**	**188-298 days**	**Autopsy**
MOSNA [58]	**2022**	**Slovakia**	**1**	**71**	**M**	**Pfizer**	**2**	**GBS**	**Neurological**	**10 days**	**Autopsy**
KAIMORI [59]	**2022**	**Japan**	**1**	**72**	**F**	**Pfizer**	**1**	**TMA**	**Hematological**	**2 days**	**Autopsy**

***Cases = Number of deaths examined post-mortem**
****Dose = Cumulative number of vaccine doses received**
*****Period = Time (in days) from most recent vaccine administration to death**
~ = Inferred Period (Estimated period using all available information, definitive period not given)

Table 1.

A REVIEW OF AUTOPSY FINDINGS IN DEATHS AFTER COVID-19 VACCINATION

Supplementary Appendix

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Author	Case	Age	Sex	Vaccine	Dose	Disease	Organ System	Period	Procedure	Post-Mortem Findings	Link to Vaccine (Y/N)
Hojberg [16]	**1**			**Moderna**		**Eosinophilia**	**Immunological**	**“recent”**	**Autopsy**	**Eosinophilic enteritis, associated with ascites, and elsewhere, including the lungs and heart. Abundant eosinophils detected in tissues, including the small intestines, epicardium, and lungs.**	Y, Y, Y: **Y**
Nushida [17]	**1**	**14**	**F**	**Pfizer**	**3**	**MIS**	**MIS**	**2 days**	**Autopsy**	**Congestive edema of the lungs, T-cell lymphocytic and macrophage infiltration in the lungs, pericardium, and myocardium of the left atria and left ventricle, liver, kidneys, stomach, duodenum, bladder, and diaphragm.**	Y, Y, Y: **Y**
Jeon [18]	**1**	**19**	**M**	**Pfizer**	**2**	**Multiple sclerosis**	**Neurological**	**182 days**	**Autopsy**	**Multifocal gray-tan discoloration in the cerebrum. The lesions consisted of active and inactive demyelinated plaques in the perivenous area of the white matter. Perivascular lymphocytic infiltration and microglial cell proliferation were observed in both white matter and cortex.**	Y, Y, Y: **Y**
Esposito [19]	**1**	**83**	**M**	**Pfizer**	**2**	**COVID-19**	**MIS**		**Autopsy**	**Lungs showed massive interstitial pneumonia, areas of inflammation with interstitial lympho-plasma cell infiltrate, and interstitial edema. The liver showed granulocytes within the hepatic parenchyma. In the brain, perivasal edema and perineuronal edema was found. The heart showed myofiber breakup and colliquative myocytolysis.**	Y, Y, Y: **Y**

Chaves [20] (individual case data unavailable)	**121**	**84 (mean)**	**52 %F**	**Sinovac, AZ, Pfizer**	**1 – 2(7.63 %)**	**SCD, MI, PE**	**Cardiovascular, Hematological**		**Autopsy**	**SCD was the leading cause of death with 69 cases (57.02%), followed by acute myocardial infarction in 53 patients (43.8%) and other cardiovascular diseases (aortic dissection, aortic aneurysms, arrhythmias) in 23 patients (19%). 45 of the SCD cases were secondary to acute myocardial infarction and a further 18 cases secondary to other cardiovascular diseases. In 6 cases of SCD no diagnostic findings were found. Pulmonary embolism (PE) was found in 25 cases (20.66%). Other diagnoses included respiratory failure not secondary to bacterial pneumonia in 7 patients (5.78%), metabolic conditions in 3 patients (2.47%), bacterial pneumonia in 2 patients (1.65%), neoplasia in 2 patients (1.65%), 1 case of sepsis (0.82%) and one case of sudden unexpected death in epilepsy (0.82%). 105 (86.8%) cases were cardiac/hematological related.**	Y, Y, Y: **Y (105 CASES) N (16 CASES)**
Morz [21]	**1**	**76**	**M**	**Pfizer**	**2**	**Encephalitis, myocarditis**	**MIS**	**21 days**	**Autopsy**	**Signs of aspiration pneumonia and systemic arteriosclerosis were evident. Brain examination uncovered acute vasculitis (predominantly lymphocytic) as well as multifocal necrotizing encephalitis of unknown etiology with pronounced inflammation including glial and lymphocytic reaction. In the heart, signs of chronic cardiomyopathy as well as mild acute lympho-histiocytic myocarditis and vasculitis were present. Only spike protein**	Y, Y, Y: **Y**

										but no nucleocapsid protein could be detected within the foci of inflammation in both the brain and the heart. Also, mild acute splenitis, gastric mucosal bleeding, liver lipofuscinosis, and mild active nephritis were found.	
Alunni [22]	**1**	**70**	**M**	**AZ**	**1**	**VITT**	**Hematological**	**25 days**	**Autopsy**	**Venous hemorrhagic infarction with the presence of thrombi within dural venous sinuses, and extensive hemorrhagic necrosis of the central part of the adrenal glands. Antibodies against platelet factor 4 (PF4) were strongly positive in postmortem fluids.**	Y, Y, Y: **Y**
Takahashi [23]	**1**	**"90s"**	**M**	**Pfizer**	**3**	**Pericarditis**	**Cardiovascular**	**14 days**	**Autopsy**	**Dissection of the ascending aorta and pericardial hemotamponade. The heart showed a white villous surface, and the pericardium was fibrously thick. Microscopic examination revealed pericarditis with predominantly macrophage and lymphocyte infiltration.**	Y, Y, Y: **Y**
Murata [24]	**1**	**30**	**M**	**Pfizer**	**2**	**Cytokine Storm**	**Immunological**	**2 days**	**Autopsy**	**No information regarding COD detected in autopsy other than congestion of primary organs. Postmortem interval inferred from postmortem phenomena and coroner's rectal temperature measurements estimated high body temperatures for all cases at the time of death. RNA sequencing revealed that genes involved in neutrophil degranulation and cytokine signaling were upregulated.**	Y, Y, Y: **Y**

	2	**52**	**M**	**Pfizer**	**2**	**Cytokine Storm**	**Immunological**	**3 days**	**Autopsy**	**Same as Case 1.**	Y, Y, Y: **Y**
	3	**23**	**M**	**Moderna**	**2**	**Cytokine Storm**	**Immunological**	**10 days**	**Autopsy**	**Same as Case 1.**	Y, Y, Y: **Y**
	4	**31**	**M**	**Pfizer**	**2**	**Cytokine Storm**	**Immunological**	**1 day**	**Autopsy**	**Same as Case 1.**	Y, Y, Y: **Y**
Satomi [25]	**1**	**61**	**F**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**10 days**	**Autopsy**	**The heart showed moderate dilatation of both ventricles, and the myocardium showed an uneven color change and decreased elasticity. Histologically, severe myocarditis with extensive myocytolysis was observed. The myocarditis showed severe inflammatory cell infiltration with T-lymphocyte and macrophage predominance, and vast nuclear dust accompanying neutrophilic infiltration was observed. In the bone marrow and lymph nodes, hemophagocytosis was observed. SARS-CoV-2 nucleic acids were not detected using multivirus real-time PCR system.**	Y, Y, Y: **Y**
Suzuki [26]	**1**	**72**	**M**	**Pfizer**	**1**	**Adhesion ileus**	**MIS**	**3 days**	**Autopsy**	**Adhesion of the small intestine and enlargement of the duodenum and the small intestine, post sigmoid colectomy. Further, diabetic ketoacidosis, cardiomegaly, severe coronary sclerosis, and liver cirrhosis also detected.**	N, N, N: **N**
	2	**86**	**F**	**Pfizer**	**1**	**MI**	**Cardiovascular**	**6 days**	**Autopsy**	**Cardiac tamponade due to a rupture of myocardial infarction in the posterior wall, severe coronary sclerosis with thrombus in the left circumflex branch,**	Y, N, Y: **Y**

										cardiomegaly, cavernous hemangioma in the liver.	
	3	**86**	**F**	**Pfizer**	**1**	**Drowning**	**Other**	**1 day**	**Autopsy**	**Emphysema aquosum, watery gastric content. Hypertensive and diabetic nephrosclerosis.**	N, N, N: **N**
	4	**91**	**M**	**Moderna**	**1**	**Ischemic heart disease, myocarditis**	**Cardiovascular**	**6 days**	**Autopsy**	**Old myocardial infarction in the post lateral wall, severe coronary artery sclerosis, leukocyte and lymphocyte infiltration in the left anterior wall, diabetic nephropathy, aortic sclerosis.**	Y, N, Y: **Y**
	5	**90**	**M**			**Ischemic heart disease**	**Cardiovascular**	**3 days**	**Autopsy**	**Cardiomegaly with old infarction of the anteroseptal wall, severe coronary sclerosis, elevation of NT-pro BNP in blood (27400 pg/ml), aortic sclerosis, benign nephrosclerosis.**	Y, N, N: **N**
	6	**74**	**F**	**Pfizer**	**1**	**Drowning**	**Other**	**6 days**	**Autopsy**	**Emphysema aquosum, watery gastric content, pleural effusion, coronary sclerosis, hypertensive and diabetic nephrosclerosis, old lung tuberculosis.**	N, N, N: **N**
	7	**87**	**F**	**Pfizer**	**1**	**Drowning**	**Other**	**1 day**	**Autopsy**	**Emphysema aquosum, watery gastric content, pleural effusion, benign nephrosclerosis.**	N, N, N: **N**
	8	**79**	**M**	**Pfizer**	**1**	**Pulmonary artery thromboembolism**	**Hematological**	**4 days**	**Autopsy**	**Thromboembolism in the bilateral pulmonary trunk, deep vein thrombosis of the left lower extremity (containing organized thrombus), cardiomegaly, coronary sclerosis, unruptured abdominal aortic aneurysm, benign nephrosclerosis.**	Y, Y, Y: **Y**
	9	**80**	**M**	**Pfizer**	**1**	**Volvulus of sigmoid colon**	**Gastrointestinal**	**7 days**	**Autopsy**	**Pan-peritonitis due to a rupture of the volvulus of the sigmoid colon, chronic subdural hematoma, Alzheimer's disease.**	N, N, N: **N**

	10	**77**	**F**	**Pfizer**	**2**	**Incarceration of inguinal hernia**	**MIS**	**3 days**	**Autopsy**	**Strangulation ileus due to an incarceration of inguinal hernia, aspiration of vomitus, chronic pyelonephritis, cardiomegaly, lacuna infarction.**	N, N, N: **N**
	11	**81**	**M**		**1**	**Ischemic heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe coronary sclerosis, cardiomegaly with mild fibrotic scar, elevation of NT-pro BNP in blood (27400 pg/ml), aortic sclerosis.**	Y, N, N: **N**
	12	**79**	**F**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe sclerosis in the left anterior descending coronary artery, mild amyloid disposition in the interstitial space of the cardiomyocytes.**	Y, N, N: **N**
	13	**76**	**M**	**Pfizer**	**2**	**Drowning**	**Other**	**1 day**	**Autopsy**	**Emphysema aquosum, watery gastric content, pleural effusion, unruptured thoracic aortic aneurysm, benign nephrosclerosis, multiple renal cysts.**	N, N. N: **N**
	14	**78**	**F**	**Pfizer**	**1**	**Ischemic colitis**	**MIS**	**6 days**	**Autopsy**	**Pan-peritonitis due to extensive necrosis of the small intestine, thrombus in the peripheral side of the superior mesenteric artery, coronary sclerosis, aortic sclerosis, fatty liver.**	Y, Y, Y: **Y**
	15	**82**	**F**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe sclerosis with stent implantation in the right and left coronary arteries, multiple small fibrotic scars in the myocardium, elevation of NT-pro BNP in blood (9980 pg/ml), benign nephrosclerosis, aortic sclerosis.**	Y, N, N: **N**
	16	**77**	**F**	**Pfizer**		**Malnutrition**	**Other**	**6 days**	**Autopsy**	**Body mass index 13.2, elevation of acetone in the blood (15.9 µg/ml), chronic hepatitis, hepatoma, aortic sclerosis.**	N, N, N: **N**

	17	**83**	**F**	**Pfizer**	**2**	**Aortic dissection**	**Cardiovascular**	**1 day**	**Autopsy**	**Rupture of aortic dissection, hemothorax, cystic medial necrosis in the aorta, aortic sclerosis.**	Y, Y, N: **Y**
	18	**67**	**F**	**Pfizer**	**2**	**Pyelonephritis**	**Other**	**5 days**	**Autopsy**	**Swelling of the right kidney, neutrophil infiltration in the tubule and the interstitial space of the kidney, cardiomegaly, coronary sclerosis, end-stage kidney disease.**	Y, N, N: **N**
	19	**85**	**M**	**Pfizer**		**Hemopneumothorax**	**Respiratory**	**6 days**	**Autopsy**	**Hemothorax (right 350 ml, left 50 ml), multiple bullae in the apex, emphysema, coronary sclerosis, aortic sclerosis, benign nephrosclerosis.**	Y, N, N: **N**
	20	**79**	**M**	**Pfizer**		**Gastric cancer**	**MIS**	**4 days**	**Autopsy**	**Carcinomatosis peritonitis due to gastric cancer in the cardia (sized 4 × 4 cm), pneumonia, old cerebral infarction, benign nephrosclerosis, aortic sclerosis.**	N, N, N: **N**
	21	**77**	**M**	**Pfizer**	**1**	**Diabetic ketoacidosis**	**Immunological**	**1 day**	**Autopsy**	**Elevation of ketone in blood (3590 μmol/l), diabetic nephropathy, cardiomegaly, old cerebral infarction.**	Y, N, N: **N**
	22	**87**	**F**		**1**	**Drowning**	**Other**	**2 days**	**Autopsy**	**Emphysema aquosum, microbubbles in the trachea, cardiomegaly, benign nephrosclerosis, fatty liver.**	N, N, N: **N**
	23	**70**	**F**	**Pfizer**	**2**	**Sigmoid colon cancer**	**MIS**	**3 days**	**Autopsy**	**Sigmoid colon cancer (sized 4 × 3.2 cm), liver metastasis with extensive hemorrhage and necrosis, lung edema, pleural effusion.**	N, N, N: **N**
	24	**83**	**F**		**2**	**Drowning**	**Other**	**2 days**	**Autopsy**	**Emphysema aquosum, watery gastric content, cardiomegaly, aortic sclerosis, benign nephrosclerosis.**	N, N, N: **N**
	25	**82**	**M**	**Pfizer**	**2**	**Lung cancer**	**MIS**	**2 days**	**Autopsy**	**Hemothorax (right 2100 ml) due to lung cancer (S6, sized 6 × 6 cm), multiple metastasis in the lung and liver, cardiomegaly, benign nephrosclerosis.**	N, N, N: **N**

	26	**74**	**F**	**Pfizer**	**2**	**Heart failure**	**Cardiovascular**	**1 day**	**Autopsy**	**Hypertrophy of the anterior mitral leaflet, cardiomegaly, elevation of NT-pro BNP in blood (6220 pg/ml), coronary sclerosis, old cerebral infarction.**	Y, N, N: **N**
	27	**84**	**F**	**Pfizer**	**1**	**MI**	**Cardiovascular**	**2 days**	**Autopsy**	**Cardiac tamponade due to a rupture of myocardial infarction in the post lateral wall, aortic sclerosis.**	Y, N, Y: **Y**
	28	**59**	**M**		**1**	**MI**	**Cardiovascular**	**6 days**	**Autopsy**	**Cardiac tamponade due to a rupture of myocardial infarction in the lateral wall, severe coronary sclerosis, cardiomegaly, aortic sclerosis.**	Y, N, Y: **Y**
	29	**53**	**F**	**Pfizer**	**1**	**Alcohol intoxication**	**Other**	**3 days**	**Autopsy**	**Blood ethanol level (3.5 mg/ml), urine ethanol level (3.89 mg/ml), liver cirrhosis.**	N, N, N: **N**
	30	**65**	**M**	**Pfizer**		**Ischemic heart disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Old myocardial infarction in the anterior and lateral wall, severe sclerosis in the left coronary artery, cardiomegaly, fatty liver, aortic sclerosis.**	Y, N, N: **N**
	31	**66**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**3 days**	**Autopsy**	**Old myocardial infarction in the anteroseptal wall, severe coronary sclerosis, lung edema, tonsillar hypertrophy.**	Y, N, Y: **Y**
	32	**69**	**M**			**Unknown**	**Other**	**1 day**	**Autopsy**	**Severe postmortem change of the whole organ, malnutrition, emphysema, coronary sclerosis**	Y, N, N: **N**
	33	**55**	**M**	**Pfizer**	**2**	**Bacterial pneumonia**	**Respiratory**	**0 days**	**Autopsy**	**Significant neutrophil infiltration and bacteria in the alveoli of bilateral lungs, aspiration of vomitus, myotonic dystrophy, coronary sclerosis.**	Y, N, N: **N**
	34	**51**	**M**	**Pfizer**	**2**	**Bacterial pneumonia**	**Respiratory**	**2 days**	**Autopsy**	**Lobar pneumonia in the middle lobe of the right lung, elevation of CRP in blood (28.03 mg/dl), liver cirrhosis, malnutrition.**	N, N, N: **N**

	35	**40**	**M**	**Moderna**	**2**	**Ischemic heart disease**	**Cardiovascular**	**3 days**	**Autopsy**	**Severe coronary sclerosis, fatty liver.**	Y, N, Y: **Y**
	36	**65**	**M**		**2**	**Gastric cancer**	**MIS**	**2 days**	**Autopsy**	**Gastric cancer (sized 12 × 10 cm), metastasis in multiple organs (heart, adrenal gland, bone marrow), old myocardial infarction, coronary sclerosis.**	N, N, N: **N**
	37	**74**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe coronary sclerosis, lung edema and congestion, old renal infarction.**	Y, N, N: **N**
	38	**88**	**F**	**Pfizer**	**2**	**Strangulation ileus**	**MIS**	**2 days**	**Autopsy**	**Incarceration of hernia (greater omentum), necrosis of the jejunum, secondary pneumonia, senile amyloidosis, aortic sclerosis, benign nephrosclerosis, old lung tuberculosis.**	N, N, N: **N**
	39	**55**	**M**	**Pfizer**	**1**	**Poisoning**	**Other**	**2 days**	**Autopsy**	**Methamphetamine (2.69 μg/ml), bromazepam (0.58 μg/ml) and myanserin hydrochloride (0.14 μg/ml) in blood, fatty liver.**	N, N, N: **N**
	40	**24**	**M**	**Moderna**	**2**	**Myocarditis**	**Cardiovascular**	**3 days**	**Autopsy**	**Scattered necrosis and fibrosis of cardiomyocytes with a perivascular pattern of inflammatory cell infiltration (consisting of predominantly lymphocytes).**	Y, Y, Y: **Y**
	41	**53**	**M**	**Pfizer**	**1**	**Ischemic heart disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Severe coronary sclerosis, myocardial infarction in the anteroseptal wall, fatty liver.**	Y, N, N: **N**
	42	**59**	**M**		**2**	**Diabetic ketoacidosis**	**Immunological**	**6 days**	**Autopsy**	**Elevation of ketone in blood (13000 μmol/l), dehydration, diabetic nephropathy, fibrosis of the pancreas, old myocardial infarction, coronary sclerosis.**	Y, N, N: **N**

	43	**47**	**M**	**Pfizer**	**1**	**Ischemic heart disease**	**Cardiovascular**	**5 days**	**Autopsy**	**Severe coronary sclerosis, contraction band in cardiomyocytes, fatty liver.**	Y, N, Y: **Y**
	44	**84**	**M**		**2**	**Cor pulmonale**	**Cardiovascular**	**5 days**	**Autopsy**	**Hypertrophy of the right ventricle, emphysema, elevation of NT-pro BNP in blood (57900 pg/ml), bronchitis, coronary sclerosis, old cerebral hemorrhage.**	Y, N, N: **N**
	45	**49**	**M**		**2**	**Pulmonary artery thromboembolism**	**Hematological**	**5 days**	**Autopsy**	**Thromboembolism in the bilateral pulmonary trunk, deep vein thrombosis of bilateral lower extremities (containing organized thrombus), fatty liver.**	Y, Y, Y: **Y**
	46	**67**	**F**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Severe coronary sclerosis, lung edema, benign nephrosclerosis, aortic sclerosis.**	Y, N, N: **N**
	47	**56**	**M**	**Moderna**	**2**	**Ischemic heart disease**	**Cardiovascular**	**2 days**	**Autopsy**	**Cardiomegaly with multiple fibrotic scars, severe coronary sclerosis, lung edema and congestion, benign nephrosclerosis, fatty liver.**	Y, N, Y: **Y**
	48	**52**	**M**		**1**	**Cerebral hemorrhage**	**Neurological**	**1 day**	**Autopsy**	**Transverse sinus thrombosis, massive cerebral hemorrhage (sized 10 × 10 cm) with ischemic lesion, gastromalacia.**	Y, Y, Y: **Y**
	49	**48**	**F**	**Moderna**	**1**	**Diabetic ketoacidosis**	**Immunological**	**3 days**	**Autopsy**	**Elevation of ketone (9820 μmol/l) and HbA1c (10.3%) in blood, dehydration.**	Y, N, N: **N**
	50	**39**	**M**	**Pfizer**	**2**	**Unknown**	**Other**	**3 days**	**Autopsy**	**Lung edema, a slight lymphocyte and macrophage infiltration in the internal space of cardiac muscle.**	Y, Y, Y: **Y**
	51	**52**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**3 days**	**Autopsy**	**Severe coronary sclerosis, cardiomegaly, lung edema, benign nephrosclerosis, fatty liver.**	Y, N, Y: **Y**
	52	**56**	**M**	**Pfizer**	**2**	**Subarachnoid**	**Neurological**	**2 days**	**Autopsy**	**Dissection of the left vertebral artery, lung edema, cardiomegaly.**	Y, Y, N: **Y**

						hemorrhage					
	53	**49**	**M**	**Pfizer**	**2**	**Unknown**	**MIS**	**0 days**	**Autopsy**	**Hypoxic encephalopathy, severe coronary sclerosis, cardiomegaly, liver cirrhosis, pneumonia.**	Y, N, N: **N**
	54	**39**	**M**	**Moderna**	**2**	**Myocarditis**	**Cardiovascular**	**3 days**	**Autopsy**	**Scattered inflammatory cell infiltration (consisting of predominantly monocytes) in the interstitial space of cardiomyocytes/around the coronary arteries, interstitial edema, eosinophilic and wavy change of cardiomyocytes, Lung edema, coronary sclerosis.**	Y, Y, Y: **Y**
Mele [27]	**1**	**54**	**M**	**J&J**	**1**	**VITT**	**Hematological**	**~21 days**	**Autopsy**	**Skull dissection showed a marked and widespread congestion and cerebral edema. The vascular structures showed thrombotic-like material within the superior sagittal sinus as well as within the transverse sinus, the sigmoid sinuses and the large saphenous vein in the proximal tract of left thigh. Microscopic examination of the thrombotic-like material revealed consolidated agglomerations of platelets and red blood cells. Inside the large saphenous vein's thrombotic material was neocapillarization and moderate intra-lesional fibroblastic proliferation.**	Y, Y, Y: **Y**
Yoshimura [28]	**1**	**88**	**F**	**Moderna**	**2**	**VI-ARDS**	**Respiratory**	**18 days**	**Autopsy**	**Both lungs were edematous and heavy. Very early-phase diffuse alveolar damage in the whole lung without other lung diseases was found. PCR confirmed that SARS-CoV-2 was not present in the lung**	Y, N, N: **N**

										and other organs. The lesions were entirely immunohistochemically negative for both the SARS-CoV-2 spike and N protein.	
Roncati [29]	**1**	**81**	**F**	**Pfizer**	**1**	**VITT**	**Hematological**	**18 days**	**Autopsy**	**Widespread thrombotic phenomena in the micro-/macrocirculation of both the lungs were found. Immunohistochemistry confirmed the presence of a large number of activated platelets inside the thrombi. Patient was negative for SARS-CoV-2 shortly before death.**	Y, Y, Y: **Y**
	2	**84**	**F**	**Pfizer**	**2**	**VITT**	**Hematological**	**122 days**	**Autopsy**	**Chest X-ray showed bilateral pneumothorax, pneumomediastinum and massive subcutaneous thoraco-abdominal emphysema extended to the upper limbs and neck thrombotic phenomena inside the lung microcirculation was found. Patient was negative for SARS-CoV-2 shortly before death.**	Y, Y, Y: **Y**
	3	**52**	**M**	**Pfizer**	**1**	**VITT**	**Hematological**	**17 days**	**Autopsy**	**Patient was negative of SARS-CoV-2. Autopsy revealed mural thrombosis of the right heart ventricle and of a subendocardial vessel.**	Y, Y, Y: **Y**
Kang [30]	**1**	**48**	**F**	**AZ then Pfizer**	**2**	**Myocarditis (required transplant, no death)**	**Cardiovascular**	**15 days**	**Necropsy (heart)**	**Heart transplant needed due to heart failure. Organ autopsy of the explanted heart revealed giant cell myocarditis: diffuse cardiomyocyte necrosis and mixed inflammation in the atria, ventricles, and interventricular septum. The mixed inflammatory infiltrations consisted of lymphocytes, macrophages, and eosinophils. Scattered multinucleated giant cells were detected.**	Y, Y, Y: **Y**

Kamura [31]	**1**	**57**	**M**	**Moderna**	**1**	**Thrombosis /rhabdomyolysis**	**MIS**	**53 days**	**Autopsy**	**Autopsy showed multiple microvascular arterial thrombosis, organ/muscle necrosis, and C3 deposition in the renal glomeruli were confirmed on autopsy, suggesting immune-mediated complement activation.**	Y, Y, Y: **Y**
Ishioka [32]	**1**	**67**	**M**	**Pfizer**	**1**	**Exacerbation of UIP**	**Respiratory**	**3 days**	**Autopsy**	**SARS-CoV-2 antigen test and polymerase chain reaction were both negative. The lungs had subpleural dense fibrosis with alternating areas of normal lung. Scattered fibroblastic foci were also observed, which was suggestive of usual interstitial pneumonia. The lung pathology report revealed diffuse alveolar damage that was characterized by infiltration of inflammatory cells and hyaline membranes with protein-rich edema fluid.**	N, N, N: **N**
Gill [33]	**1**	**'Teenage'**	**M**	**Pfizer**	**2**	**Myocarditis**	**Cardiovascular**	**3 days**	**Autopsy**	**No molecular evidence of SARS-CoV-2 infection. Global myocardial injury with areas of coagulative myocytolysis and contractions bands, with a perivascular pattern of inflammation consisting of mainly neutrophils and histocytes, scant lymphocytes, and occasional eosinophils. No acute or organizing thrombi were detected. Pattern of injury is consistent with stress cardiomyopathy.**	Y, Y, Y: **Y**
	2	**'Teenage'**	**M**	**Pfizer**	**2**	**Myocarditis**	**Cardiovascular**	**4 days**	**Autopsy**	**No molecular evidence of SARS-CoV-2 infection. As with the previous case, global myocardial injury was found but with more widespread transmural ischemic**	Y, Y, Y: **Y**

										changes and more interstitial inflammation. Subepicardial distribution of injury was not seen. No acute or organizing thrombi were detected.	
Pomara [34]	**1**	**37**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**24 days**	**Autopsy**	**Autopsy revealed thrombosis of the cerebral venous district, of the upper and lower limbs. The organ samples were studied through light microscope both in hematoxylin-eosin and immunohistochemical examination and showed a strong inflammatory response in all samples and at the site of thrombosis.**	Y, Y, Y: **Y**
Yeo [35]	**1**	**86**	**F**	**Pfizer**	**1**	**Spontaneous acute right intracerebral hemorrhage**	**Neurological**	**2 days**	**Autopsy**	**In all 28 cases, anaphylactic reactions, myocarditis and pericarditis, and thrombotic complications were not detected by the examiners. All available information is given:** **Total Tryptase (ug/l): 5.3** **IgE (IU/mL): n/a** **CRP (mg/L): 197** **Pneumonia with consolidation changes in the lungs was found.**	Y, Y, Y: **Y**
	2	**67**	**M**	**Pfizer**	**1**	**Sigmoid volvulus**	**Gastrointestinal**	**2 days**	**Autopsy**	**Total Tryptase (ug/l): 4.4** **IgE (IU/mL): n/a** **CRP (mg/L):28.8**	N, N, N: **N**
	3	**74**	**M**	**Pfizer**	**1**	**Coronary artery disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Total Tryptase (ug/l): 18.7** **IgE (IU/mL): 28.8** **CRP (mg/L): 1.9**	Y, Y, Y: **Y**
	4	**86**	**M**	**Pfizer**	**1**	**Bleeding duodenal ulcer**	**Gastrointestinal**	**2 days**	**Autopsy**	**Total Tryptase (ug/l): 5.8** **IgE (IU/mL): 129** **CRP (mg/L): 18.4**	Y, N, N: **N**

	5	**63**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 20.2 IgE (IU/mL): 2529 CRP (mg/L): 1**	Y, Y, Y: **Y**
	6	**67**	**M**	**Pfizer**	**2**	**Hypertensive and ischemic heart disease**	**Cardiovascular**	**3 days**	**Autopsy**	**Total Tryptase (ug/l): 18.9 IgE (IU/mL): 23.9 CRP (mg/L): 3.9**	Y, Y, Y: **Y**
	7	**76**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**2 days**	**Autopsy**	**Total Tryptase (ug/l): 102 IgE (IU/mL):27.5 CRP (mg/L): 21.2 Lung and splenic tissue were submitted for further histological evaluation and stained with anti-mast cell tryptase antibody. Very scattered mast cells staining positively for anti-mast cell tryptase antibody were seen in the lung tissue and only focally present in the splenic tissue.**	Y, Y, Y: **Y**
	8	**91**	**M**	**Pfizer**	**2**	**Ruptured acute myocardial infarction**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 6.1 IgE (IU/mL): 311 CRP (mg/L): 89.8**	Y, N, Y: **Y**
	9	**76**	**F**	**Pfizer**	**2**	**Subarachnoid hemorrhage due to ruptured berry aneurysm**	**Neurological**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 20.1 IgE (IU/mL): 62.9 CRP (mg/L): 7**	Y, Y, Y: **Y**

	10	**80**	**M**	**Pfizer**	**1**	**Ischemic heart disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Total Tryptase (ug/l): 8.1 IgE (IU/mL): 4405 CRP (mg/L): 1.7**	Y, Y, Y: **Y**
	11	**86**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 6.2 IgE (IU/mL): 1 CRP (mg/L): 4.8**	Y, N, Y: **Y**
	12	**94**	**F**	**Pfizer**	**2**	**Hypertensive heart disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 14.9 IgE (IU/mL): 113 CRP (mg/L): 1**	Y, Y, Y: **Y**
	13	**69**	**M**	**Pfizer**	**2**	**Ischemic heart disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Total Tryptase (ug/l): 17.7 IgE (IU/mL): 502 CRP (mg/L): 0.3**	Y, Y, Y: **Y**
	14	**63**	**M**	**Pfizer**	**2**	**Ruptured ascending aortic dissection**	**Cardiovascular**	**0 days**	**Autopsy**	**Total Tryptase (ug/l): 9.2 IgE (IU/mL): 245 CRP (mg/L): 0.6**	Y, Y, N: **Y**
	15	**53**	**M**	**Pfizer**	**1**	**Acute right coronary thrombosis**	**Hematological**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 7.4 IgE (IU/mL): n/a CRP (mg/L): n/a Acute coronary thrombus was found at autopsy, which was confirmed histologically with no evidence of vasculitis or eosinophilic infiltration.**	Y, Y, Y: **Y**
	16	**69**	**M**	**Pfizer**	**2**	**Severe interstitial lung disease with coronary artery disease**	**MIS**	**0 days**	**Autopsy**	**Total Tryptase (ug/l): 4.8 IgE (IU/mL): 17.8 CRP (mg/L): 19**	Y, N, N: **N**

	17	**23**	**M**	**Pfizer**	**2**	**Severe obesity, with associated cardiomyopathy, hypoventilation syndrome and obstructive sleep apnea**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): >200 IgE (IU/mL): 594 CRP (mg/L): 16.8 The heart showed features consistent with obesity and hypertension-related changes and there was no eosinophilia detected in the organs on histological evaluation. An increased amount of mast cells staining positively for anti-mast cell tryptase antibody in the lung tissue was found.**	Y, Y, Y: **Y**
	18	**65**	**M**	**Moderna**	**2**	**Head injury**	**Other**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 39.2 IgE (IU/mL): 173 CRP (mg/L): 28.1**	N, N, N: **N**
	19	**56**	**M**	**Moderna**	**2**	**Cerebral infarction with hemorrhage**	**Neurological**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): >200 IgE (IU/mL): 35.3 CRP (mg/L): n/a An increased amount of mast cells staining positively for anti-mast cell tryptase antibody in the lung tissue was found.**	Y, Y, Y: **Y**
	20	**52**	**M**	**Pfizer**	**1**	**Coronary artery disease**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 28.8 IgE (IU/mL): 9.6 CRP (mg/L): 5.5**	Y, Y, Y: **Y**
	21	**53**	**M**	**Moderna**	**2**	**Right coronary artery anomalous origin with atherosclerotic ostial stenosis**	**Cardiovascular**	**2 days**	**Autopsy**	**Total Tryptase (ug/l): 9.1 IgE (IU/mL): 279 CRP (mg/L): 17.3**	Y, Y, Y: **Y**

	22	**51**	**M**	**Moderna**	**2**	**Coronary artery disease**	**Cardiovascular**	**3 days**	**Autopsy**	**Total Tryptase (ug/l): 20.4 IgE (IU/mL): 19.8 CRP (mg/L): 5.9**	Y, Y, Y: **Y**
	23	**53**	**F**	**Pfizer**	**2**	**Coronary atherosclerosis**	**Cardiovascular**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 8.4 IgE (IU/mL): 42.5 CRP (mg/L): 10.1**	Y, N, Y: **Y**
	24	**33**	**M**	**Moderna**	**2**	**Multi organ failure following cardiac arrest due to right ventricular dysplasia**	**MIS**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 10.3 IgE (IU/mL): 243 CRP (mg/L): 155**	Y, Y, Y: **Y**
	25	**39**	**M**	**Pfizer**	**1**	**Ischemic heart disease**	**Cardiovascular**	**0 days**	**Autopsy**	**Total Tryptase (ug/l): 43.4 IgE (IU/mL): 513 CRP (mg/L): 2.4 Lung and splenic tissue were submitted for further histological evaluation and stained with anti-mast cell tryptase antibody. Very scattered mast cells staining positively for anti-mast cell tryptase antibody were seen in the lung tissue and only focally present in the splenic tissue.**	Y, Y, Y: **Y**
	26	**72**	**F**	**Pfizer**	**1**	**Ischemic heart disease**	**Cardiovascular**	**2 days**	**Autopsy**	**Total Tryptase (ug/l): 44.5 IgE (IU/mL): 6.3 CRP (mg/L): 0.5**	Y, Y, Y: **Y**

										Lung and splenic tissue were submitted for further histological evaluation and stained with anti-mast cell tryptase antibody. Very scattered mast cells staining positively for anti-mast cell tryptase antibody were seen in the lung tissue and only focally present in the splenic tissue.	
	27	**60**	**M**	**Pfizer**	**1**	**Ischemic heart disease**	**Cardiovascular**	**2 days**	**Autopsy**	**Total Tryptase (ug/l): 9.7** **IgE (IU/mL): 24** **CRP (mg/L): 2.3**	Y, N, Y: **Y**
	28	**67**	**M**	**Pfizer**	**2**	**Head injury**	**Other**	**1 day**	**Autopsy**	**Total Tryptase (ug/l): 52** **IgE (IU/mL): 59.3** **CRP (mg/L): 3.2** **Lung and splenic tissue were submitted for further histological evaluation and stained with anti-mast cell tryptase antibody. Very scattered mast cells staining positively for anti-mast cell tryptase antibody were seen in the lung tissue and only focally present in the splenic tissue.**	Y, Y, Y: **Y**
Ameratunga [36]	**1**	**57**	**F**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**3 days**	**Autopsy**	**Left pleural mass originating from the mediastinum was found. Multifocal inflammatory cell infiltration in the myocardium and areas of eosinophil-rich inflammatory aggregates with myocyte necrosis were found. An abundant eosinophilic infiltrate with myocyte**	Y, Y, Y: **Y**

										necrosis was observed. Antibodies to SARS-CoV-2 were not detected.	
Gunther [37]	**1**	**54**	**M**	**AZ**	**1**	**VITT**	**Hematological**	**~121 days**	**Autopsy**	**A residual thrombus in the left sinus transversus without evidence for other thromboembolic pathology in the brain or other solid organs was found. The brain showed signs of severe edema and several hemorrhages were detectable mostly in the left hemisphere. Microscopic analysis revealed large hemorrhages, as well as small perivascular hemorrhages and extensive neuronal death together with brain edema. Also, a florid bronchopneumonia and a small liver hemangioma were diagnosed.**	Y, Y, Y: **Y**
Permezel [38]	**1**	**63**	**M**	**AZ**	**1**	**ADEM**	**Neurological**	**32 days**	**Autopsy**	**Serial coronal sections of the brain showed multiple areas of ill-defined demyelination in the white matter of the left superior frontal gyrus, the right cingulate gyrus extending into the corpus callosum, and in the left and right parietal regions. Histological examination confirmed the presence of large geographic areas of acute demyelination, focally in a perivenular distribution. The foci were characterized by loss of myelin. The lesions showed reactive astrocytes, microglia, and foamy macrophages. No evidence of meningitis, vasculitis or encephalitis was found. No virus was found in the brain.**	N, Y, Y: **Y**
Choi [39]	**1**	**22**	**M**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**5 days**	**Autopsy**	**Histological examination of the heart showed isolated atrial myocarditis, with**	Y, Y, Y: **Y**

										neutrophil and histiocyte predominance. Immunohistochemical C4d staining showed scattered single-cell necrosis of myocytes which was not accompanied by inflammatory infiltrates. Extensive contraction band necrosis was seen in the atria and ventricles. There was no evidence of microthrombosis or infection in the heart and other organs.	
Schneider [40]	**1**	**82**	**M**	**Moderna**	**1**	**Most likely severe pre-existing cardiac changes with infarction scars**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe coronary sclerosis, massive cardiac hypertrophy, extensive myocardial infarction scars, anaphylaxis diagnostics negative.**	Y, N, N: **N**
	2	**91**	**F**	**Moderna**	**1**	**Most likely severe pre-existing cardiac changes with infarction scars**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe coronary sclerosis, massive cardiac hypertrophy, myocardial infarction scars, anaphylaxis diagnostics negative.**	Y, N, N: **N**
	3	**32**	**F**	**AZ**	**1**	**Massive cerebral hemorrhage**	**Neurological**	**12 days**	**Autopsy**	**Massive cerebral hemorrhage, anti-PF4 heparin antibody tests: positive, HIPA-Test: positive, PIPA-Test: positive.**	Y, Y, Y: **Y**
	4	**34**	**F**	**AZ**	**1**	**Recurrent myocardial infarction**	**Cardiovascular**	**1 day**	**Autopsy**	**Obesity, massive cardiac hypertrophy, myocardial infarction scars, fresh**	Y, N, Y: **Y**

						in the presence of massive cardiac hypertrophy				**myocardial infarction, anaphylaxis diagnostics negative.**	
	5	**48**	**F**	**AZ**	**1**	**Bleeding from ruptured aorta**	**Hematological**	**10 days**	**Autopsy**	**Aortic dissection with rupture, high blood loss.**	Y, Y, Y: **Y**
	6	**65**	**M**	**Pfizer**	**1**	**Myocarditis in the presence of severe pre-existing cardiac changes**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe coronary sclerosis, massive cardiac hypertrophy, myocardial infarction scars, myocarditis, anaphylaxis diagnostics negative.**	Y, Y, Y: **Y**
	7	**71**	**M**	**Pfizer**	**1**	**Most likely severe pre-existing cardiac changes with infarction scars**	**Cardiovascular**	**1 day**	**Autopsy**	**Massive cardiac hypertrophy, coronary sclerosis, anaphylaxis diagnostics negative.**	Y, N, Y: **Y**
	8	**57**	**F**	**Moderna**	**2**	**Hyperglycemic coma**	**MIS**	**6 days**	**Autopsy**	**Severe coronary sclerosis, fatty liver, high levels of glucose and lactate in CSF and aqueous humor exceeding the cumulative levels of Traub.**	Y, Y, Y: **Y**
	9	**63**	**M**	**AZ**	**1**	**Most likely severe pre-existing**	**Cardiovascular**	**14 days**	**Autopsy**	**Severe coronary sclerosis, cardiac hypertrophy, myocardial infarction scars, liver cirrhosis.**	Y, N, Y: **Y**

						cardiac changes				
	10	**61**	**M**	**AZ**	**1**	**Most likely severe pre-existing cardiac changes with infarction scars**	**Cardiovascular**	**1 day**	**Autopsy**	**Severe coronary sclerosis, massive cardiac hypertrophy, anaphylaxis diagnostics negative.**	Y, N, Y: **Y**
	11	**71**	**M**	**AZ**		**Pulmonary embolism in the presence of DVT**	**Hematological**	**10 days**	**Autopsy**	**DVT, pulmonary embolism, severe coronary sclerosis, massive cardiac hypertrophy, myocardial infarction scars, VITT-diagnostics negative.**	Y, Y, Y: **Y**
	12	**38**	**F**	**AZ**	**2**	**Hypoxic brain damage following an anaphylactic reaction to anesthetics**	**MIS**	**8 days**	**Autopsy**	**Multiple fresh thrombi, including in the cerebral venous sinuses, cardiac hypertrophy, fresh myocardial infarction, hypoxic brain damage, anti-PF4 heparin antibody tests: positive, HIPA-Test: positive, PIPA-Test: positive.**	Y, Y, Y: **Y**
	13	**72**	**F**	**Pfizer**	**1**	**Massive cerebral hemorrhage**	**Neurological**	**12 days**	**Autopsy**	**Massive cerebral hemorrhage, coronary sclerosis, cardiac hypertrophy, VITT diagnostics negative.**	Y, Y, Y: **Y**
	14	**65**	**F**	**AZ**	**1**	**CVT and cerebral hemorrhage with hypoxic**	**Neurological**	**10 days**	**Autopsy**	**Signs of a bleeding diathesis, cerebral hemorrhages, CVT, mild coronary sclerosis, anti-PF4 heparin antibody tests: positive, HIPA-Test: positive, PIPA-Test: positive.**	Y, Y, Y: **Y**

						brain damage					
	15	**79**	**M**	**Pfizer**	**2**	**Pulmonary embolism in the presence of DVT**	**Hematological**	**6 days**	**Autopsy**	**DVT, massive pulmonary embolism, coronary sclerosis, pericarditis, chronic pulmonary emphysema, VITT diagnostics negative.**	Y, Y, Y: **Y**
	16	**57**	**M**	**AZ**		**Recurrent myocardial infarction**	**Cardiovascular**	**2 days**	**Autopsy**	**Severe coronary sclerosis, massive cardiac hypertrophy, extensive myocardial infarction scars, fresh myocardial infarction.**	Y, Y, Y: **Y**
	17	**72**	**F**	**Pfizer**	**2**	**Coronary thrombosis with fresh myocardial infarction**	**Cardiovascular**	**0 days**	**Autopsy**	**Severe coronary sclerosis with coronary thrombosis, myocardial infarction scars, fresh myocardial infarction, anaphylaxis diagnostics negative.**	Y, Y, Y: **Y**
	18	**69**	**M**	**J&J**	**1**	**Coronary thrombosis with fresh myocardial infarction**	**Cardiovascular**	**9 days**	**Autopsy**	**CVT, severe coronary sclerosis with coronary thrombosis, massive cardiac hypertrophy, fresh myocardial infarction, anti-PF4 heparin antibody tests: positive, HIPA-Test: positive, PIPA-Test: positive.**	Y, Y, Y: **Y**
Verma [41]	**1**	**42**	**M**	**Moderna**	**2**	**Myocarditis**	**Cardiovascular**	**~14 days**	**Autopsy**	**Autopsy revealed biventricular myocarditis. An inflammatory infiltrate admixed with macrophages, T-cells, eosinophils, and B cells was also observed.**	Y, Y, Y: **Y**
Wiedmann [42]	**1**	**34**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**8 days**	**Autopsy**	**Autopsy showed an edematous brain with sparse subarachnoid hemorrhage and a large hemorrhagic infarction in the right hemisphere. Thrombi were present in both transverse sinuses. Scattered petechial and flame-shaped hemorrhages were observed on the skin, peritoneal membranes, and mucosal surfaces.**	Y, Y, Y: **Y**

	2	**42**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**25 days**	**Autopsy**	**At autopsy, a red-white clot was confirmed present in the left transverse and sigmoid sinus, as well as remnants of white clots attached to the endothelium in the sagittal sinus. Massive hemorrhagic infarction was present in the left hemisphere. In the lungs, peripheral areas with infarction were demonstrated. Microscopic examination confirmed multiple arteriolar thrombi in organization. In addition, small venules with intraluminal fibrin clots were present in several lung lobes and in the myocardium.**	Y, Y, Y: **Y**
	3	**37**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**11 days**	**Autopsy**	**Examination revealed a large hemorrhagic infarction in the left cerebral hemisphere, extensive hemorrhagic changes in the cerebellum, as well as focal white substance hemorrhages in the cerebral hemispheres and in the brainstem. Thrombi were present in the left transverse and sigmoid sinuses. Scattered small hemorrhages were observed on the skin and peritoneal membranes.**	Y, Y, Y: **Y**
	4	**54**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**9 days**	**Autopsy**	**Examination demonstrated a white clot in the posterior sagittal sinus and both transverse sinuses. Massive hemorrhagic venous infarction was confirmed in the right parietal lobe and bilateral hemorrhagic infarctions in multiple cortical areas. There were multiple extra-cerebral manifestations of coagulation disturbance, with leech-like white thrombi**	Y, Y, Y: **Y**

										in the inferior vena cava, left subclavian trunk, right inter-atrial septum, and both portal and hepatic veins. Microscopically, these extra-cerebral thrombi were rich in platelets, fibrin, and leukocytes with abundance of monocytes, and were attached to the endothelium, but without signs of organization. In the spleen, subcapsular hemorrhages were present as well as multiple intralobular arterioles with fibrinoid necrosis.	
Pomara [43]	**1**	**50**	**M**	**AZ**	**1**	**VITT**	**Hematological**	**16 days**	**Autopsy**	**Portal vein thrombosis with smaller thrombi in the splenic and upper mesenteric veins was found. Intracranial hemorrhage in the subarachnoid region was detected. The microscopic examination revealed numerous vascular thrombi and intense hemorrhagic phenomena localized in the meningeal space and extravasated in the brain tissue.**	Y, Y, Y: **Y**
	2	**37**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**24 days**	**Autopsy**	**Occlusive thrombus in the superior sagittal sinus and a very large hemorrhage in the frontal cerebral lobe was found. Moreover, in the axillary region of the left arm, a thrombus was detected. The microscopic examination revealed numerous vascular thrombi and intense hemorrhagic phenomena localized in the meningeal space and extravasated in the brain tissue.**	Y, Y, Y: **Y**
Althaus [44]	**1**	**48**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**16 days**	**Autopsy**	**Autopsy showed complete thrombotic obstruction of the straight, sagittal, and transversal cerebral sinuses, subarachnoid**	Y, Y, Y: **Y**

										hemorrhage, cerebral edema and bilateral pulmonary embolism in mid-sized arteries and obstruction of glomerular arterioles and capillaries by hyaline microthrombi containing fibrin and platelets.	
	2	**24**	**M**	**AZ**	**1**	**VITT**	**Hematological**	**17 days**	**Autopsy**	**Autopsy showed massive cerebral hemorrhage and cerebral edema, bilateral pulmonary thromboembolism, and obstruction of glomeruli by hyaline microthrombi.**	Y, Y, Y: **Y**
Edler [45]	**1**	**'elderly'**	**F**	**Pfizer**	**1**	**Pulmonary artery embolism**	**Hematological**	**5 days**	**Autopsy**	**Autopsy revealed pulmonary artery embolism with infarction of the right lower lobe of the lung with deep leg vein thromboses on both sides. On the left upper arm, an injection site was found over the deltoid muscle. The axillary lymph nodes appeared inconspicuous macroscopically. A postmortem nasopharyngeal swab for SARS-CoV-2 RNA was negative.**	Y, Y, Y: **Y**
	2	**'elderly'**	**M**	**Pfizer**	**1**	**COVID-19 Pneumonia**	**Respiratory**	**12 days**	**Autopsy**	**The autopsy revealed chronic and acute pancreatitis. Pneumonia was confirmed as the cause of death. Histologically, the markedly congested lungs showed alveoli filled with activated type II pneumocytes, fibroblasts, and partially lined with hyaline membranes. Giant cells and squamous metaplasia were present in some areas. The medium-sized arteries showed predominantly lymphocellular infiltrates in the outer wall layers. Microthromboses were found in small arterioles. Shortly before death, the**	Y, Y, Y: **Y**

										patient was PCR positive for SARS-CoV-2 RNA.	
	3	**'elderly'**	**M**	**Pfizer**	**1**	**MI**	**Cardiovascular**	**2 days**	**Autopsy**	**From the autopsy, organ pathologies typical of old age were found in the form of signs of chronic obstructive pulmonary disease (COPD) and chronic renal dysfunction. The cause of death was a recurrent myocardial infarction with severe coronary heart disease and severe general arteriosclerosis. The lungs showed, besides advanced organized ones, a fresh, non-fulminant pulmonary artery thromboembolism in peripheral segments. Signs of an acute inflammatory event or a systemic abnormality (of the type of a vaccination complication) could not be verified; individual axillary lymph nodes were swollen near the injection site**	Y, Y, Y: **Y**
Hansen [46]	**1**	**86**	**M**	**Pfizer**	**1**	**Renal/respiratory failure**	**MIS**	**26 days**	**Autopsy**	**Autopsy revealed acute bilateral bronchopneumonia with abscesses, sometimes being surrounded by bacterial cocci. There were no findings of commonly described manifestations of COVID-19-associated pneumonitis. In the heart, we found biventricular hypertrophy (weight 580 g) and histologically, we diagnosed ischemic cardiomyopathy. We detected amyloidosis of the transthyretin type in the heart and to a lesser extent in the lungs. The kidneys revealed both chronic damage with arteriolosclerosis and interstitial fibrosis, and acute renal failure with hydropic tubular degeneration. The**	N, Y, Y: **Y**

										examination of the brain revealed a left parietal pseudocystic tissue necrosis, which was diagnosed as an old infarction area. SARS-CoV-2 RNA was detected in nearly all organs examined except for the liver and the olfactory bulb. Patient tested positive for COVID-19 2 days before death, with no clinical symptoms typically ascribed to COVID-19.	
Baronti [47]	**1**	**69**	**M**	**Pfizer**	**1**	**MI**	**Cardiovascular**	**2 days**	**Autopsy**	**Hemopericardium, heart laceration on the posterior wall of the left ventricle, pre-existing critical three-vessel atherosclerotic disease, and coronary thrombosis were detected. Coronary thrombosis of right coronary artery with significant stenosis. MI at the rupture site was seen.**	Y, N, Y: **Y**
	2	**58**	**M**	**Pfizer**	**2**	**MI**	**Cardiovascular**	**0 days**	**Autopsy**	**Pre-existing three-vessel atherosclerotic disease, coronary thrombosis, and hypoplastic right coronary artery were found. Coronary thrombosis of left anterior descending artery was seen. IHC diagnostic of MI. PM-CMR indicated ischemic damage.**	Y, Y, Y: **Y**
	3	**76**	**M**	**Pfizer**	**1**	**MI**	**Cardiovascular**	**21 days**	**Autopsy**	**Hemopericardium, heart laceration posterior wall of the left ventricle, and pre-existing three-vessel atherosclerotic disease was found. MI at the rupture site was seen.**	Y, Y, Y: **Y**
	4	**68**	**M**	**Pfizer**	**2**	**MI**	**Cardiovascular**	**3 days**	**Autopsy**	**Pre-existing three-vessel atherosclerotic disease and coronary thrombosis were detected. Coronary thrombosis of left anterior descending artery was seen. IHC**	Y, Y, Y: **Y**

										diagnostic of MI. PM-CMR indicated ischemic damage.	
	5	**50**	**F**	**Moderna**	**1**	**MI**	**Cardiovascular**	**0 days**	**Autopsy**	**Pre-existing three-vessel atherosclerotic disease and coronary thrombosis were found. Coronary thrombosis of left anterior descending artery detected. IHC diagnostic of MI. PM-CMR indicated ischemic damage.**	Y, Y, Y: **Y**
Ittiwut [48]	**1**	**23**	**M**	**Sinovac then AZ**	**2**	**Unexplained**	**Other**	**1 day**	**Autopsy**	**'Unexplained': Patient had no underlying conditions, reported having a fever, headache, and fatigue before death.**	N, Y, Y: **Y**
	2	**33**	**M**	**Sinovac then AZ**	**2**	**Unexplained**	**Other**	**1 day**	**Autopsy**	**'Unexplained': Patient had schizophrenia and took clonazepam, diazepam, and fluoxetine.**	N, Y, Y: **Y**
	3	**43**	**M**	**2 Sinovac, then Pfizer**	**3**	**Dilated cardiomyopathy (DCM)**	**Cardiovascular**	**1 day**	**Autopsy**	**Autopsy found DCM in the heart. Patient reported fever and myalgia before death and had asthma and gout.**	Y, Y, Y: **Y**
	4	**46**	**M**	**Sinovac**	**1**	**Unexplained**	**Other**	**3 days**	**Autopsy**	**'Unexplained': Patient had hyperthyroidism.**	N, Y, Y: **Y**
	5	**28**	**F**	**Sinovac**	**1**	**Ventricular dysplasia**	**Cardiovascular**	**7 days**	**Autopsy**	**Autopsy indicated arrhythmogenic right ventricular dysplasia.**	Y, Y, Y: **Y**
	6	**35**	**M**	**Sinopharm**	**1**	**Unexplained**	**Other**	**1 day**	**Autopsy**	**'Unexplained': Patient complained of fever and knee pain before death.**	N, Y, Y: **Y**
	7	**36**	**M**	**Sinovac then AZ**	**2**	**Unexplained**	**Other**	**1 day**	**Autopsy**	**'Unexplained': Patient had alcoholic hepatitis.**	N, Y, Y: **Y**
	8	**38**	**M**	**Sinopharm**	**2**	**Coronary atherosclerosis**	**Cardiovascular**	**1 day**	**Autopsy**	**Autopsy indicated coronary atherosclerosis.**	Y, Y, Y: **Y**
	9	**72**	**M**	**AZ**	**1**	**Coronary atherosclerosis**	**Cardiovascular**	**1 day**	**Autopsy**	**Autopsy indicated coronary atherosclerosis. Patient complained of chest pain before death.**	Y, Y, Y: **Y**

	10	**53**	**F**	**AZ**	**1**	**Thalassemia with liver cirrhosis**	**Hematological**	**1 day**	**Autopsy**	**Autopsy found thalassemia with liver cirrhosis. Patient had Beta thalassemia.**	N, Y, Y: **Y**
	11	**59**	**F**	**AZ**	**1**	**Coronary atherosclerosis**	**Cardiovascular**	**1 day**	**Autopsy**	**Autopsy indicated coronary atherosclerosis.**	Y, Y, Y: **Y**
	12	**34**	**M**	**AZ**	**1**	**Unexplained**	**Other**	**1 day**	**Autopsy**	**'Unexplained'**	N, Y, Y: **Y**
	13	**56**	**M**	**Moderna**	**1**	**Coronary atherosclerosis**	**Cardiovascular**	**4 days**	**Autopsy**	**Autopsy indicated coronary atherosclerosis.**	Y, Y, Y: **Y**
Greinacher [49]	**1**	**49**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**10 days**	**Autopsy**	**Autopsy revealed cerebral venous thrombosis. Before death, portal-vein thrombosis including the splenic and upper mesenteric veins was detected; in addition, small thrombi were visualized in the infrarenal aorta and both iliac arteries.**	Y, Y, Y: **Y**
Mauriello [50]	**1**	**48**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**39 days**	**Autopsy**	**Autopsy examination revealed a massive cerebral hemorrhage complicated by a purulent abscess involving the right fronto-temporo-parietal lobes, the nucleus of the right base, with midline shift and wedging of the cerebellar tonsils and an internal and external haemocephalus. Bilateral confluent foci of bronchopneumonia associated to a right apical pulmonary infarction of both lungs were also observed. Postmortem analysis of bone marrow, including hematoxylin and eosin stain, immunohistochemistry, and transmission electron microscopy (TEM), showed focal megakaryocyte**	Y, Y, Y: **Y**

										hyperplasia associated with morphological dysplastic changes.	
Bjørnstad-Tuveng [51]	**1**	**"young"**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**~10 days**	**Autopsy**	**Postmortem examination showed antibodies to PF4, and fresh small thrombi were found in the transverse sinus, frontal lobe and pulmonary artery.**	Y, Y, Y: **Y**
Scully [52]	**1**	**52**	**F**	**AZ**	**1**	**VITT**	**Hematological**	**~>10 days**	**Autopsy**	**Postmortem examination found thrombosis in the lungs and intestine, CVT, ICH.**	Y, Y, Y: **Y**
Choi [53]	**1**	**38**	**M**	**J&J**	**1**	**SCLS**	**Hematological**	**2 days**	**Autopsy**	**Autopsy results showed no evidence of acute infection or cardiovascular disease in the internal organs. We identified pulmonary edema, pleural effusion, and pericardial effusion. Although pulmonary edema is atypical in acute SCLS attacks (leak phase), prolonged cardiopulmonary resuscitation and fluid administration might have affected the autopsy findings. Histopathologic findings in both kidneys suggested autolysis or acute tubular necrosis.**	Y, Y, Y: **Y**
Schwab [54]	**1**	**46**	**M**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**0 days**	**Autopsy**	**Histological examination showed inflammatory infiltration of the myocardium. The infiltrate was focal and interstitial. It was predominantly detected in sections taken from the right ventricular wall and interventricular septum. The histological and immunohistochemical characterization revealed that the inflammatory infiltrate was predominantly composed of lymphocytes. Micro focal myocyte injury**	Y, Y, Y: **Y**

										was demonstrable. Lacked pre-existing, clinically relevant heart disease.	
	2	**50**	**F**	**Moderna**	**1**	**Myocarditis**	**Cardiovascular**	**1 day**	**Autopsy**	**Histological examination showed inflammatory infiltration of the myocardium. The infiltrate was focal and interstitial. It was predominantly detected in sections taken from the right ventricular wall and interventricular septum. The histological and immunohistochemical characterization revealed that the inflammatory infiltrate was predominantly composed of lymphocytes. Micro focal myocyte injury was demonstrable. An inflammatory infiltration of the epicardium and the subepicardial fat tissue was concomitantly found. Lacked pre-existing, clinically relevant heart disease.**	Y, Y, Y: **Y**
	3	**62**	**F**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**7 days**	**Autopsy**	**Histological examination showed inflammatory infiltration of the myocardium. The infiltrate was focal and interstitial. It was predominantly detected in sections taken from the right ventricular wall and interventricular septum. The histological and immunohistochemical characterization revealed that the inflammatory infiltrate was predominantly composed of lymphocytes. Micro focal myocyte injury was demonstrable. An inflammatory infiltration of the epicardium and the subepicardial fat tissue was concomitantly**	Y, Y, Y: **Y**

										found. Lacked pre-existing, clinically relevant heart disease.	
	4	**55**	**M**	**Pfizer**	**2**	**Myocarditis**	**Cardiovascular**	**4 days**	**Autopsy**	**Histological examination showed inflammatory infiltration of the myocardium. The infiltrate was focal and interstitial. It was predominantly detected in sections taken from the right ventricular wall and interventricular septum. The histological and immunohistochemical characterization revealed that the inflammatory infiltrate was predominantly composed of lymphocytes. An inflammatory infiltration of the epicardium and the subepicardial fat tissue was concomitantly found. Lacked pre-existing, clinically relevant heart disease.**	Y, Y, Y: **Y**
	5	**75**	**F**	**Pfizer**	**1**	**Myocarditis**	**Cardiovascular**	**1 day**	**Autopsy**	**Histological examination showed inflammatory infiltration of the myocardium. The infiltrate was focal and interstitial. It was predominantly detected in sections taken from the right ventricular wall and interventricular septum. The histological and immunohistochemical characterization revealed that the inflammatory infiltrate was predominantly composed of lymphocytes. An inflammatory infiltration of the epicardium and the subepicardial fat tissue was concomitantly found. Lacked pre-existing, clinically relevant heart disease. Analysis for potential infectious agents causing a myocarditis**	Y, Y, Y: **Y**

										revealed low viral copy numbers of human herpes virus 6.	
Hirschbuhl [55]	**1**	**50s**	**M**	**Pfizer**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~10 days**	**Autopsy**	**Acute and organizing DAD, small areas with acute pneumonia.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 21** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 14**	N, N, N: **N**
	2	**70s**	**M**	**Pfizer**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~18 days**	**Autopsy**	**Acute DAD with focal signs of organization.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 45** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 1.3**	N, N, N: **N**
	3	**70s**	**F**	**Pfizer**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~192 days**	**Autopsy**	**Acute DAD, hemorrhage, congestion, acute pneumonia, aspergillosis.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: >2500** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 2.8**	N, N, N: **N**
	4	**90s**	**F**	**Pfizer**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~23 days**	**Autopsy**	**Acute and organizing DAD.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 34**	N, N, N: **N**

										SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: n.a.	
	5	**60s**	**M**	**Pfizer**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~8 days**	**Autopsy**	**Acute DAD.**	N, N, N: **N**
	6	**60s**	**F**	**AZ**	**1**	**Traumatic (cerebral bleeding)**	**Neurological**	**~19 days**	**Autopsy**	**No DAD, emphysema, mild edema.**	N, Y, Y: **Y**
	7	**50s**	**M**	**Pfizer**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~25 days**	**Autopsy**	**No DAD, severe congestion, edema, fibrosis, emphysema.**	N, N, N: **N**
	8	**70s**	**M**	**AZ**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~46 days**	**Autopsy**	**Acute and organizing DAD, aspergillosis.**	N, N, N: **N**
	9	**60s**	**F**		**1**	**COVID-19 Pneumonia**	**Respiratory**	**~5 days**	**Autopsy**	**Acute DAD, severe congestion, acute pneumonia.**	N, N, N: **N**
	10	**80s**	**M**	**Pfizer**	**1**	**COVID-19 Pneumonia**	**Respiratory**		**Autopsy**	**Acute DAD.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: <0.8**	N, N, N: **N**
	11	**50s**	**F**	**AZ**	**1**	**COVID-19 Pneumonia**	**Respiratory**	**~20 days**	**Autopsy**	**Acute DAD, acute pneumonia, organizing pneumonia.**	N, N, N: **N**
	12	**70s**	**M**	**Pfizer**	**1**	**COVID-19 Pneumonia**	**Respiratory**	**~17 days**	**Autopsy**	**Acute and organizing DAD.**	N, N, N: **N**
	13	**70s**	**F**	**Pfizer**	**1**	**Cardiac failure**	**Cardiovascular**		**Autopsy**	**No DAD, congestion, emphysema.**	Y, N, N: **N**
	14	**70s**	**M**	**Pfizer**	**1**	**Hemorrhagic shock**	**Hematological**	**~14 days**	**Autopsy**	**Acute DAD, hemorrhage, congestion, acute pneumonia.**	Y, Y, Y: **Y**
	15	**90s**	**F**	**Pfizer**	**1**	**COVID-19 pneumonia**	**Respiratory**	**~39 days**	**Autopsy**	**Acute DAD, severe acute pneumonia.**	N, N, N: **N**
	16	**60s**	**F**	**AZ**	**1**	**Cerebral ischemia**	**Neurological**	**~33 days**	**Autopsy**	**Organizing pneumonia, microthrombi.**	Y, Y, Y: **Y**
	17	**70s**	**M**	**Pfizer**	**2**	**COVID-19 pneumonia and MI**	**MIS**		**Autopsy**	**Acute DAD.**	N, Y, Y: **Y**

										SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 407 **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: negative**	
	18	**80s**	**M**	**Pfizer**	**2**	**COVID-19 pneumonia and cardiac failure**	**MIS**	**~254 days**	**Autopsy**	**Mild acute DAD, acute pneumonia, aspergillosis, severe emphysema, severe congestion.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: <0.8** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: negative**	N, N, N: **N**
	19	**80s**	**F**	**AZ**	**2**	**COVID-19 associated respiratory failure**	**Respiratory**	**~68 days**	**Autopsy**	**No DAD, congestion of blood vessels in lung parenchyma.**	N, N, N: **N**
	20	**80s**	**F**	**Pfizer**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~292 days**	**Autopsy**	**Mild acute DAD and acute pneumonia.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: >2500** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: negative**	N, Y, Y: **Y**
	21	**70s**	**F**	**Pfizer**	**2**	**MI or pulmonary embolism COVID-19 associated**	**Hematological**	**~152 days**	**Autopsy**	**Mild unspecific alterations to lung parenchyma, no DAD.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 278**	Y, Y, Y: **Y**

										SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: negative	
	22	**70s**	**M**	**Pfizer**	**2**	**Sepsis**	**Other**	**~234 days**	**Autopsy**	**Acute pneumonia, very mild acute DAD, marked mixed pneumoconiosis.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: >2500** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: negative**	N, Y, Y: **Y**
	23	**70s**	**M**	**Sinovac**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~41 days**	**Autopsy**	**Mild acute DAD, congestion.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: <0.8** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 2.89**	N, N, N: **N**
	24	**60s**	**F**	**Pfizer**	**2**	**Aspiration pneumonia**	**Respiratory**	**~107 days**	**Autopsy**	**Emphysema, acute pneumonia.**	N, N, N: **N**
	25	**60s**	**M**	**Pfizer**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~106 days**	**Autopsy**	**Acute/organizing DAD severe emphysema, acute pneumonia.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: >2500** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: negative**	N, Y, Y: **Y**

	26	**70s**	**M**	**Pfizer**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~170 days**	**Autopsy**	**Moderate acute DAD.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 223** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 33**	N, N, N: **N**
	27	**70s**	**M**	**Pfizer**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~168 days**	**Autopsy**	**Acute/organizing DAD.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: >2500** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 21.6**	N, N, N: **N**
	28	**50s**	**M**	**Pfizer**	**2**	**COVID-19 pneumonia**	**Respiratory**	**~156 days**	**Autopsy**	**Organizing DAD with residual acute DAD, aspergillosis.** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: 154** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 11.1**	N, N, N: **N**
	29	**90s**	**F**	**Pfizer**	**2**	**Myocardial infarction and nephric abscess**	**Cardiovascular**	**~121 days**	**Autopsy**	**In lungs, UIP, no DAD** **SARS-CoV-2 spike serology [normal:<0.8 U/ml]: >2500** **SARS-CoV-2 nucleocapsid serology [normal:< COI 1]: 120**	Y, N, N: **N**
Hoshino [56]	**1**	**27**	**M**	**Moderna**	**1**	**Myocarditis**	**Cardiovascular**	**36 days**	**Autopsy**	**An autopsy revealed asymmetric left ventricular hypertrophy, thickening of the right ventricular wall (550 g; LV wall, 11–16 mm; RV wall, 5–7 mm), myxomatous**	Y, Y, Y: **Y**

										degeneration of the posterior leaflet of the mitral valve, and hypertrophy of the posteromedial papillary muscle. Microscopic findings revealed that cardiac myocytolysis and widespread fibrosis were observed, and significant mixed inflammatory infiltration (T cells, macrophages, and eosinophils) was observed in the left ventricular free wall and the anterior potion of the ventricular septum.	
Colombo [57]	**1**	**78**	**F**	**Pfizer**	**2**	**COVID-19 ARDS**	**Respiratory**	**195 days**	**Autopsy**	**COVID-19 positive. Autopsy found patient died of acute respiratory distress syndrome.** **Brain atrophy found, possibly due to pre-diagnosed Parkinson's.** **Lung findings: Edema, bilateral fibrosis.** **Heart findings: Eccentric hypertrophy, biventricular dilation. Moderate aortic atherosclerosis; coronary stenosis above 50%.**	N, N, N: **N**
	2	**81**	**M**	**Pfizer**	**2**	**MI, respiratory failure, abdominal fibromatosis, pulmonary embolism**	**MIS**	**270 days**	**Autopsy**	**COVID-19 positive. Autopsy found patient died of myocardial infarction, respiratory failure due to bacterial bronchopneumonia and abdominal fibromatosis. Patient had chronic ischemic cardiomyopathy.**	Y, N, Y: **Y**

										Lung findings: Congestion, lower lobe fibrosis and pneumonia, pulmonary embolism. **Heart findings: Eccentric hypertrophy, biventricular dilation. Aortic and mitral valve stenosis; moderate aortic atherosclerosis.**	
	3	**60**	**F**	**Pfizer**	**2**	**Heart failure and small bowel ischemia**	**MIS**	**188 days**	**Autopsy**	**COVID-19 positive. Autopsy found patient died of heart failure due to auricle thrombosis and small bowel ischemia. Patient had paroxysmal AFib, active cancer for 5 years.** **Lung findings: Edema and congestion. Lower left lung fibrosis. Right lung pneumonia.** **Heart findings: Biventricular dilation, mild aortic atherosclerosis.**	Y, N, N: **N**
	4	**66**	**M**	**Pfizer**	**2**	**Respiratory failure, cardiomyopathy, encephalopathy**	**MIS**	**250 days**	**Autopsy**	**COVID-19 positive. Autopsy found patient died of respiratory failure due to bacterial pneumonia, cirrhotic cardiomyopathy, and encephalopathy.** **Brain findings: Patient had microglial activation, swollen astrocytes with pale nuclei, eosinophilic nucleoli, scanty cytoplasm, perivascular blood extravasations. Patient was previously diagnosed with hepatic encephalopathy.**	Y, N, N: **N**

										Lung findings: Edema and congestion. Focal fibrosis and right lung pneumonia. **Heart findings: Concentric hypertrophy. Moderate aortic atherosclerosis; coronary stenosis.**	
	5	**75**	**M**	**Pfizer**	**2**	**Pneumonia, brain hemorrhaging**	**MIS**	**298 days**	**Autopsy**	**COVID-19 positive. Autopsy found patient died of rheumatoid arthritis related organizing pneumonia.** **Brain findings: Perivascular microhemorrhages, microglial nodules and astroglial activation due to ischemic hypoxic damage with small vessels damage and hyaline arteriolosclerosis. Patient was previously diagnosed with epilepsy and cerebral vasculopathy.** **Lung findings: Congestion, bilateral focal fibrosis, lower left lobe pneumonia.** **Heart findings: Biventricular dilation, mild aortic atherosclerosis.**	Y, N, N: **N**
Mosna [58]	**1**	**71**	**M**	**Pfizer**	**2**	**GBS**	**Neurological**	**10 days**	**Autopsy**	**The pleural cavity revealed firm adhesion between the visceral and parietal pleura on the right side. The lungs were bilaterally increased in size and weight (right 1260 g, left 950 g. Histological examination indicated post-aspiration absceding bronchopneumonia as the immediate cause of death of the patient.**	N, Y, Y: **Y**

										Gross and microscopic examination of the brain tissue and meninges did not reveal any pathological changes apart from slight edema. A thorough examination of the peripheral nerves of the lumbar plexus showed areas of focal demyelination, prevalently perivascular infiltration by T-lymphocytes with a slight prevalence of T-cytotoxic over T-helper phenotype and the presence of numerous macrophages.	
Kaimori [59]	**1**	**72**	**F**	**Pfizer**	**1**	**TMA**	**Hematological**	**2 days**	**Autopsy**	**Autopsy revealed multiple microthrombi in the heart, brain, liver, kidneys, and adrenal glands. The thrombi were CD61 and CD42b positive and were located in the blood vessels primarily in the pericardial aspect of the myocardium and subcapsular region of the adrenal glands; their diameters were approximately 5-40 µm. Macroscopically, a characteristic myocardial hemorrhage was observed, and the histopathology of the characteristic thrombus distribution, which differed from that of hemolytic uremic syndrome and disseminated intravascular coagulation, suggested that the underlying pathophysiology may have been similar to that of thrombotic microangiopathy**	Y, Y, Y: **Y**

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