EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

MEP Kathleen Van Brempt,
Chair of COVI Special Committee
European Parliament
Rue Wiertz 60, 1147
Brussels, Belgium

20 April 2023
EMA/150586/2023

Subject: Replies in follow up to the COVI exchange of views on 27 March 2023

Dear Ms van Brempt,
Dear members of the COVI Special Committee,

Thank you for the invitation for an exchange of views with the Special Committee on the COVID-19 pandemic (COVI) on 27 March 2023. As promised at the end of the exchange, please find below some additional information that I committed to provide in relation to some of the more specific questions that were addressed to me.

MEP Robert ROOS referred to statements made in the non-clinical evaluation report[i] on Comirnaty of January 2021 published by the Therapeutics Goods Administration (TGA) of Australia. Mr ROOS also asked about the **biodistribution of the lipid nanoparticles of mRNA COVID-19 vaccines following administration**; he specifically asked if EMA is aware that the vaccine spreads through the whole body and does not stay around the injection site and if there could be a possible link with vaccines' side effects. In a subsequent letter he asked for a comment on the publication of Röltgen *et al* as published in Cell[ii], which indicates that the mRNA is detected in lymph nodes for sixty days.

Please allow me to first explain the mode of action of messenger RNA vaccines: the vaccine delivers mRNA that contains instructions for producing the SARS-CoV-2 spike protein which triggers an immune response. Lipid nanoparticles are small fat particles which are used in mRNA vaccines to help deliver the mRNA into human cells. They also help to assure the quality of the vaccine during the storage period e.g. to maintain stability and ensure that vaccine components work.

I would like to stress that TGA and EMA have received the same non-clinical data in the Comirnaty dossier. EMA's and TGA's assessments are in fact aligned and the CHMP independently reached the same conclusions as TGA[iii]. In the published EMA's Comirnaty assessment report[iv] which summarises the scientific evaluation of Comirnaty at the time of initial marketing authorisation, it is acknowledged that lipid nanoparticles can distribute rather non-specifically to several organs such as liver, spleen, heart, kidney, lung and brain, with the liver appearing to be the organ where lipid nanoparticles distribute most. Results from repeat-dose and biodistribution (pharmacokinetics) studies assessed by CHMP and performed on rats using radiolabelled lipid nanoparticles and luciferase modified mRNA revealed no toxicological findings in gonads, which indicates that a broader biodistribution is not a safety concern. The much higher dose of the vaccine used in rats than in humans (500x margin to human dose based on weight) also supports a low risk of distribution to the gonads in humans. Please

Official address Domenico Scarlattilaan 6 ● 1083 HS Amsterdam ● The Netherlands
Address for visits and deliveries Refer to www.ema.europa.eu/how-to-find-us
Send us a question Go to www.ema.europa.eu/contact **Telephone** +31 (0)88 781 6000 An agency of the European Union

allow me to clarify that the studies I refer here are the same as those quoted by Mr ROOS in the TGA assessment report. This available evidence shows the amount of mRNA distributed to body organs is very small and is degraded within 6 to 9 days after injection, as per the degradation process that would naturally occur with any mRNAs present at physiological levels within cells. These animal studies give reasonable confidence that when vaccines are given to humans, no safety problems due to the temporal accumulation of lipid nanoparticles and mRNA in organs are expected. This is confirmed by the fact that no safety issues that could be linked to the distribution of the vaccine in the human body have been reported so far in post-marketing safety monitoring, even after hundreds of millions of individuals have been using these vaccines globally.

As regards the recent study published in Cell.com in vaccinated people which suggests that mRNA and derived spike protein may stay for a longer period in lymph nodes, we can confirm that this study was reviewed by our scientific experts and it does not change the overall benefit-risk assessment for the mRNA vaccines, as remaining presence of antigens in lymph nodes for longer periods is naturally expected. The study also notes the rapid removal of the vaccine antigen (spike protein) from the bloodstream (systemic circulation) in vaccinated individuals.

To conclude on the topic of biodistribution, I would like to add that the companies developing and marketing mRNA vaccines are conducting planned additional non-clinical studies beyond those discussed in the EMA public Assessment Reports to further characterise and assess the biodistribution and degradation of mRNA and the spike protein. Results from these studies will be submitted for assessment by EMA in 2023 and 2024.

In a follow up letter sent on 31 March 2023, Mr ROOS also asked me to explain how the **COVID-19 vaccines can be considered safe and effective for new-born children, women of childbearing potential, pregnant women and their children**, when the effects on fertility have not been reviewed since these groups have been excluded from clinical trials. As I explained during the COVI exchange, it is an established practice for any innovative medicine (not only for COVID-19) to exclude pregnant women from the initial clinical trials to avoid exposing them to potential risks at these early stages of development while knowledge on the effects of the medicinal product is still being gathered. Reproductive toxicity studies in animals are required by EU legislation for authorisation and to support inclusion of pregnant women in future clinical trials. These studies were provided at time of authorisation and showed no harmful effects on fertility and gestation, nor on embryo-foetal or offspring development. Furthermore, data from women who were included in the initial clinical trials and became pregnant during the clinical testing phase also did not show any harmful effects in pregnancy or post-natal development. Beyond the initial clinical trials, large amounts of data were collected from pregnant people who were vaccinated in real life. Observational studies collected these real-world data, which were submitted to and evaluated by the EMA, providing the necessary assurances about the safety of the vaccine in this population. In particular, a review by EMA COVID-19 Task Force (ETF) of several studies involving around 65,000 pregnancies at different stages did not find any sign of an increased risk of pregnancy complications, miscarriages, preterm births, or adverse effects in the unborn babies following COVID-19 vaccination[v]. The most common side effects seen in pregnant women match those seen in the overall vaccinated population. They include pain and swelling at the injection site, tiredness, headache, redness, muscle pain and chills. Based on this evidence it has been confirmed that COVID-19 vaccines are safe and effective also for pregnant women.

Consequently, following a request by the EMA's human medicines committee (CHMP), in February 2022 section 4.6 of the Summary of Product Characteristics and section 2 of the Patient Leaflet for Comirnaty and Spikevax were updated to reflect the large amount of observational data that were collected in 2021 from pregnant women vaccinated with these vaccines.

Given that pregnancy has been associated with a higher risk of severe COVID-19 particularly in the second and third trimesters, people who are pregnant or might become pregnant in the near future are still encouraged to get vaccinated in line with national recommendations.

Mr ROOS' second question from 31 March was related to excess mortality, which was also asked during the committee meeting by MEP ANDERSON, so I will cover both together further below in this letter.

MEP Cristian TERHEŞ asked if EMA was aware about the **existence of SARS-CoV-2 prior to December 2019** and asked for **clarification on the timing of certain studies** performed by companies of mRNA vaccines already in 2016-2017. EMA had been following the situation in China since December 2019, when unusual cases of bilateral pneumonia due to unknown causes started to be consistently reported. At that time EMA started discussions with relevant experts from its scientific network in line with its Health Threats Plan[vi] which has been in place since before the 2009 flu pandemic.

As I clarified during the COVI exchange, mRNA technology as a vaccine platform long predates the emergence of SARS-CoV-2. The technology was discovered in the late 1960s[vii] and then tested more extensively since the early 1990s against cancer, allergy and other pathogens such as rabies, HIV, influenza and cytomegalovirus (CMV). Several large pharmaceutical companies started to work on mRNA technology in the 2000s. This decades-long experience and the agility associated with this technology allowed, for example, Moderna to produce a prototype of a COVID-19 vaccine reportedly within a month of the virus genome sequence becoming available online on 10 January 2020[viii]. Moderna is then reported to have tested, together with the scientists at the US National Institutes of Health, the first doses of its most promising candidate COVID-19 vaccine in humans on 16 March 2020. In addition, as COVI members might be aware, SARS (severe acute respiratory syndrome) and MERS (Middle East respiratory syndrome), which are coronaviruses belonging to the same family as SARS-COV-2, caused severe outbreaks in the early 2000 and 2010s, and in those periods many candidate vaccines had already been developed and tested for those viruses, even if they did not progress into late stage clinical development. So, there was a large amount of knowledge on other coronaviruses prior to the emergence of SARS-CoV-2, and by early 2000s a considerable amount of experience had been generated with mRNA technologies in therapeutic areas other than respiratory infections, such as oncology.

MEP Virginie JORON asked whether it would be possible to set a free **phone number at EMA for patients to report side effects of COVID-19 vaccines**. I would like to note that the current EU legislation stipulates that any suspected side effects in the EU should be reported, either directly by the patients themselves or via their healthcare professional, to their National Competent Authorities or to the concerned Marketing Authorisation Holder (MAH). We note that under the current EU system the Member States have put in place reporting channels in the national languages which should further facilitate the spontaneous reporting by patients and these channels have shown to be working well. This can be seen by the fact that the number of reports submitted directly by patients and consumers through the National Competent Authorities and MAHs is already very significant[ix], pointing to the success of these measures. An additional hot-line at EMA may likely duplicate and overlap with existing national reporting channels without adding additional value. What EMA can do in this area is to share information and raise awareness on how to report side effects in the Member States as well as to inform on what type of information needs to be reported, which is indeed what is available on the EMA website at: https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/public-health-advice-during-covid-19-pandemic#reporting-suspected-side-effects-section. This includes reader friendly "Info-cards" specifically for patients and healthcare professionals in all EU languages. These additional information materials were developed by EMA in collaboration with patients and healthcare professionals[x].

MEP Francesca DONATO asked why EMA does not **publish vial batch numbers associated to reported suspected side effects** in the European database of suspected adverse drug reaction reports (or Adrreports.eu public portal)[xi]. Even though it might appear difficult to re-identify patients experiencing the suspected side effect purely from the batch number, when the latter is read in combination and cross-referenced with other data elements that are collected together with the safety report (e.g. country, date of birth, sex etc.) it can increase the likelihood of re-identification of patients, especially in countries with small populations or in countries where batch number distribution lists are published or accessible, which would go against the personal data protection legislation and the fundamental rights to privacy of EU citizens. The European legislation mandates that the EMA shall ensure that healthcare professionals and the public have appropriate levels of access to EudraVigilance, which is the database of suspected adverse reactions to medicines[xii], while guaranteeing personal data protection. Therefore, a precautionary approach has been adopted in the EMA Policy on Access to Data in EudraVigilance[xiii] to reduce the risk of re-identification and, at present, batch numbers are not pro-actively published on the public portal. The EudraVigilance Access Policy is currently being reviewed and, in the future, more data elements may be made publicly available in relation to the reported suspected side effects, but no decision has been taken yet, pending a full impact assessment and further discussion with our scientific experts from the Member States. Any changes to EudraVigilance Access Policy will need to be approved by all EEA Member States represented in EMA's Pharmacovigilance Risk Assessment Committee (PRAC) and then endorsed by EMA's Management Board before they become applicable.

Ms DONATO also asked me about **long COVID** and how EMA distinguishes it from COVID-19 vaccine side effects. In response to this, it should be noted that long COVID refers to multiple syndromes arising from actual SARS-CoV-2 infection and that there are still many challenges when it comes to classifying and reporting this heterogeneous condition or combination of conditions. Nevertheless, up to now, based on a very large amount of published data, there is no indication that the broad spectrum of medical conditions loosely termed as long COVID could be caused by COVID-19 vaccination (with billions of doses administered worldwide). In fact, long COVID was first detected following the initial wave of SARS-CoV-2 infection in spring 2020, well before COVID-19 vaccines were first authorised in the EU. Since then, there has been increasing evidence to show that vaccinated people who are later on infected with SARS-CoV-2 are less likely to report symptoms of long COVID than unvaccinated individuals[xiv,xv,xvi,xvii,xviii,xix,xx]. Nevertheless, EMA will continue to monitor the safety of COVID-19 vaccines and to review any possible role that vaccines may have in developing immune-mediated adverse reactions that can manifest as long COVID-like symptoms. EMA will also further discuss with developers about possible future treatments for Long COVID.

MEP Christine ANDERSON asked about the source of my statement that **COVID-19 mRNA vaccines saved about 20 million lives globally in the first year from authorisation**, i.e. from December 2020 to December 2021. This statement is based on the findings of Watson et al. in their study '*Global impact of the first year of COVID-19 vaccination: a mathematical modelling study'* which is published in the peer-reviewed journal of The Lancet Infectious Diseases of September 2022 (https://doi.org/10.1016/S1473-3099(22)00320-6).

With regard to Ms ANDERSON's and Mr ROOS' questions to know more on **independent research commissioned by EMA on COVID-19 vaccines**, I would like to explain that such additional monitoring by regulators is complementary to regular pharmacovigilance activities performed by marketing authorisation holders, national competent authorities and EMA, and aims to support the characterisation of new safety concerns, enriching the EMA's Pharmacovigilance Risk Assessment Committee (PRAC)'s assessments[xxi]. A dozen independent studies have been contracted by EMA so far to large consortia (including academic centres) specialising in vaccine observational research. All these studies have contributed, and continue to contribute, to the collective body of evidence supporting the

favourable benefit-risk profile of COVID-19 vaccines, including for important rare safety concerns still under intense monitoring by EMA such as myocarditis. Information on these studies is publicly available in summary form on the EMA website[xxii] and in full on the European Union electronic register of post-authorisation studies (EU PAS Register)[xxiii]. For ease of reference, a complete list of the COVID-19 EMA-funded real-world-evidence studies is also available in Annex at the end of this letter.

After the EMA's legal mandate was extended to strengthen the Agency's role in crisis preparedness as part of the EU Health Union, the legal basis for EMA to run observational studies to enhance vaccine safety monitoring was reinforced and enriched to include vaccine effectiveness studies. These can now be conducted by EMA in collaboration with ECDC through the EU Vaccine Monitoring Platform[xxiv], which the two Agencies created in 2022 to coordinate and oversee EU-funded, independent post-authorisation vaccine studies (also against infections other than COVID-19).

Coming now to Ms ANDERSON's question regarding the **number of serious suspected side effects and cases of deaths reported to EMA with COVID-19 mRNA vaccines per administered doses**, as well with reference to Mr ROOS' question on alleged levels of excess mortality, I would like to provide the following background explanations and details.

As presented also during the COVI delegation visit to EMA last September, EMA and the national competent authorities continuously monitor the EU database of suspected side effects, EudraVigilance, where all suspected reports are centralised, to detect any new safety issues. The monitoring detects unusual or unexpected patterns in the reports received for further investigation and risk assessment. Based on all reviewed safety data, as further explained below, we can confirm that no signals of increase in overall mortality have been identified in relation to COVID-19 vaccination.

Data on suspected side effects in EudraVigilance is made available to the public in aggregated format, with also the possibility to retrieve details of the individual case reports, via the EudraVigilance public portal (EU adverse drug reactions website[xxv]); data about COVID-19 vaccines exposure is published by the European Centre for Disease Prevention and Control (COVID-19 Vaccines Tracker)[xxvi]. In response to Ms ANDERSON, I can report our calculations based on the latest available figures from these two sources, which are as follows:

- As of 23 March 2023, 695,008,085 mRNA vaccines doses were administered in EU/EEA countries.
- Up to 31 March 2023, reported side effects in EudraVigilance for all COVID-19 mRNA vaccines (i.e. the original strains and the omicron-adapted) include:
    - 1,291,934 spontaneous reports of suspected side effects following vaccination in the EEA which corresponds to an estimated rate of 0.19 spontaneous reports of suspected side effects per hundred administered doses of mRNA vaccines;
    - 9,886 spontaneous reports of suspected side effects with reported fatal outcome in the EEA, which corresponds to an estimated rate of 0.0014 spontaneous reports of suspected side effects with reported fatal outcome per hundred administered doses of mRNA vaccines.

It is essential to explain that all the suspected side effects reports mentioned above are the reports submitted by patients and healthcare professionals and they describe medical events observed following the use of a vaccine. The fact that someone has had a medical issue or died after vaccination does not necessarily mean that this medical event was caused by the vaccine. This may have been caused, for example, by health problems not related to the vaccination (e.g. underlying medical conditions of the individual before vaccination or by other medicines taken in parallel or due to other

events entirely). It should also be kept into consideration that vaccination against COVID-19 will not reduce deaths from other causes that occur in close temporal association with receiving the vaccine.

Regulatory authorities in the EU thoroughly review all reports to determine if there is any possible link to the vaccine. Because reports of suspected side effects on their own are never sufficient to draw conclusions on the safety profile of a medicine, EMA's assessments take into account all available data from all sources to draw a robust conclusion. These data include clinical trial results, registries, the frequency of reported suspected adverse reaction in the vaccinated population compared to the frequency of the same medical event in the general population, epidemiological and other studies monitoring the safety of the vaccine, toxicological investigations and any other relevant information. This comprises exchanges of information on vaccine safety with other international regulators, which consistently show that also at global level there is no evidence of increased risk of death following administration of mRNA vaccines.

In general, the experience with pharmacovigilance assessment for other medicines shows that the vast majority of suspected side effects recorded in EudraVigilance are not eventually confirmed as causally associated. Similarly, following reviews of the reported cases, no safety signal for increased mortality with any of the authorised COVID-19 vaccines has been identified to date.

The monitoring activities above have shown that serious side effects of COVID-19 vaccines are very rare. The most accurate examination to establish with some degree of certainty if a fatal outcome might be related to the vaccine in an individual is a post-mortem autopsy which is hardly practicable and not available in all suspected cases. While difficult to verify, there could be a possibility that, in extremely rare cases, serious side effects for which a causal relationship to the vaccine is clearly established might have contributed to a fatal outcome. Most of the suspected side effects reported with fatal outcome are, however, associated with coincidental medical conditions not caused by the vaccine.

In conclusion I would like to stress once more that being up to date with COVID-19 vaccinations saves lives. Multiple peer-reviewed studies have demonstrated that the risk of serious illness, hospitalisation and death is higher for unvaccinated individuals in every age group[xxvii]. While COVID-19 vaccines like any other medicines have some risks, as indicated in the product information, the balance between their benefits and risks remains positive and their safety profile is very reassuring.

EMA will continue to closely monitor the safety of COVID-19 vaccines. Any new findings that should emerge in the future will be closely analysed, and if confirmed, adequate and immediate action will be taken, including updates to the product information to ensure that healthcare professionals and patients have up-to-date information available, are aware of possible adverse reactions and contra-indications and can take all the necessary precautions.

I believe this information completes the exchange with the COVI MEPs, but I remain available to provide any further clarification or additional information.

Yours sincerely,

Emer Cooke
Executive Director

Annex

EMA-funded real-world evidence (RWE) studies on COVID-19 vaccines (as of March 2023)

Topic	Date of final report/status	EU PAS Register no. Link to publications
Readiness EU infrastructure for COVID-19 vaccine monitoring ('ACCESS') • Background incidence rates of AESIs[1] • Template protocols for vaccine safety and effectiveness studies • Feasibility of monitoring vaccine coverage, safety and effectiveness in EU healthcare databases	15/12/2020 Completed	EUPAS37273 EUPAS39370 EUPAS39361 EUPAS39289 https://doi.org/10.5281/zenodo.5255870 Willame et al. 2022
Multicentre collaboration for COVID-19 patient medication cohort studies ('E-CORE')	27/09/2021 Completed	EUPAS38759
Readiness Impact of COVID-19 infection and medicines in pregnancy ('CONSIGN') *Several work packages (WPs) using different data sources. Not initially intended for vaccine research, but framework could be used*	Q3 2023 Ongoing	• WP1 (EHRs): 39438 • WP2 (COVI-PREG): 39226 Favre et al. 2022 • WP3 (INOSS): 40489 • Meta-analysis: 40317
Natural history of coagulopathy and use of anti-thrombotic agents in COVID-19 patients. *Developed for **readiness** at start of the pandemic* *Expanded with vaccinated cohort in 2021 to address the TTS signal*	15/10/2021 Completed	EUPAS40414 Burn et al. 2022 (1) Burn et al. 2022 (2)
Early safety monitoring (*Early-Covid-Vaccine-Monitor*/'ECVM') • Prospective in vaccinees (WP1): BE, SK, FR, DE, IT, NL, UK • EHRs (WP2): healthcare databases in ES, IT, NL, UK	• WP1: 06/04/2023 (extended into WP2 of CVM) • WP2: 31/01/2022 Completed	WP1: EUPAS39798 WP2: EUPAS40404 Sturkenboom et al. 2022 (medRxiv)

Extended safety monitoring (*Covid-Vaccine-Monitor*/'CVM')
• Prospective in vaccinees:
  ○ WP1 (special populations): NL, IT, PT, RO, SK, ES, CH, HR
  ○ WP2 (general population): NL, DE, BE, FR, IT, HR, RO, SK, IE, CH, ES
• EHRs (WP3/WP4): framework for signal strengthening and methodology, 9 databases in IT (3), ES (3), NL (1), UK (1), NO (1)
	06/04/2023
	Ongoing
		EUPAS42504 (WP1)
		EUPAS39798 (WP2)
		EUPAS42467 (WP3/WP4)
		Bots et al. 2022

Benefit/risk contextualisation of COVID-19 vaccines in the EU	25/05/2022 Completed	EUPAS44229
Association between thromboembolic events and COVID-19 vaccines	30/03/2022 Completed	EUPAS44469 Li et al. 2022 Xie et al. 2022 Markus et al. 2023

Topic	Date of final report/status	EU PAS Register no. Link to publications
Comparative effectiveness of heterologous and homologous primary- and booster SARS-CoV-2 vaccination schedules in the Nordic countries	January 2023 Completed	EUPAS46537 Andersson et al. (1) (medRxiv) Andersson et al. (2) (medRxiv)
Effectiveness of COVID-19 vaccination in 5 EU countries	February 2023 Completed	EUPAS47725
Association between COVID-19 vaccines and paediatric safety outcomes in children and adolescents aged 5-19 in the Nordic countries (myocarditis/pericarditis, thromboembolic events, immune-mediated diseases)	May 2023 Ongoing	EUPAS48979
Impact of EU label changes and regulatory communication on SARS-CoV-2 adenovirus vector vaccines in context of thrombosis with thrombocytopenia syndrome (TTS): risk awareness and adherence	Q2 2023 Ongoing	EUPAS44970

1. AESI: Adverse Event of Special Interest

[i] *Nonclinical Evaluation Report, BNT162b2 [mRNA] COVID-19 vaccine (COMIRNATYTM), Submission No: PM-2020-05461-1-2, Sponsor: Pfizer Australia Pty Ltd, January 2021 - https://www.tga.gov.au/sites/default/files/foi-2389-06.pdf*
[ii] https://www.cell.com/cell/pdf/S0092-8674(22)00076-9.pdf
[iii] See more details in the sections 2.3.2 and 2.3.5 of the European Public Assessment Report (EPAR) for Comirnaty https://www.ema.europa.eu/en/documents/assessment-report/comirnaty-epar-public-assessment-report_en.pdf and sections 2.3.3 and 2.3.6 of Spikevax EPAR https://www.ema.europa.eu/en/documents/assessment-report/spikevax-previously-covid-19-vaccine-moderna-epar-public-assessment-report_en.pdf
[iv] https://www.ema.europa.eu/en/documents/assessment-report/comirnaty-epar-public-assessment-report_en.pdf See page 53-54/140 for assessment of biodistribution.
[v] CHMP press release, January 2022 https://www.ema.europa.eu/en/news/covid-19-latest-safety-data-provide-reassurance-about-use-mrna-vaccines-during-pregnancy
[vi] https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats
[vii] See for example The tangled history of mRNA vaccines in Nature.com - https://www.nature.com/articles/d41586-021-02483-w , 14 September 2021
[viii] See The sprint to solve coronavirus protein structures — and disarm them with drugs in Nature.com- https://www.nature.com/articles/d41586-020-01444-z , 15 May 2020
[ix] 2022 Annual Report on EudraVigilance for the European Parliament, the Council and the Commission https://www.ema.europa.eu/en/documents/report/2022-annual-report-eudravigilance-european-parliament-council-commission_en.pdf#page=9&zoom=100,80,597
[x] https://www.ema.europa.eu/en/news/reporting-suspected-side-effects-medicines-patients-covid-19
[xi] https://www.adrreports.eu/en/covid19_message.html
[xii] https://www.ema.europa.eu/en/human-regulatory/research-development/pharmacovigilance/eudravigilance
[xiii] https://www.ema.europa.eu/en/documents/other/european-medicines-agency-policy-access-eudravigilance-data-medicinal-products-human-use-revision-4_en.pdf
[xiv] https://www.nature.com/articles/s41598-023-28839-y
[xv] https://www.cambridge.org/core/journals/antimicrobial-stewardship-and-healthcare-epidemiology/article/effectiveness-of-coronavirus-disease-2019-covid19-vaccine-in-the-prevention-of-postcovid19-conditions-a-systematic-literature-review-and-metaanalysis/0AD0EDEC8C9CC9DF455752E32D73147B
[xvi] https://ukhsa.koha-ptfs.co.uk/cgi-bin/koha/opac-retrieve-file.pl?id=fe4f10cd3cd509fe045ad4f72ae0dfff
[xvii] https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(22)00354-6/fulltext
[xviii] https://academic.oup.com/ofid/article/9/9/ofac464/6696170?login=true
[xix] https://bmjmedicine.bmj.com/content/2/1/e000385
[xx] https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2802877
[xxi] Durand et al., Safety monitoring of COVID-19 vaccines: perspective from the European Medicines Agency, Clin Pharmacol Ther . 2022 Dec 16;10.1002/cpt.2828. doi: 10.1002/cpt.2828. https://pubmed.ncbi.nlm.nih.gov/36524423/
[xxii] https://www.ema.europa.eu/en/human-regulatory/overview/public-health-threats/coronavirus-disease-covid-19/treatments-vaccines/monitoring-covid-19-medicines-0#observational-research-section
[xxiii] http://www.encepp.eu/encepp/studiesDatabase.jsp
[xxiv] https://www.ema.europa.eu/en/about-us/what-we-do/crisis-preparedness-management/vaccine-monitoring-platform
[xxv] https://www.adrreports.eu/en/covid19_message.html
[xxvi] https://vaccinetracker.ecdc.europa.eu/public/extensions/COVID-19/vaccine-tracker.html#uptake-tab
[xxvii] CDC-FDA Letter to FL Dept of Health, 10 March 2023, https://www.fda.gov/media/166159/download