IN THE Western District of Washington1717
Pacific Avenue, Room 3100
Tacoma, Washington. 98402-3200; (253) 882-3800
Judge Robert J. BRYAN

Plaintiff:

David Merrill of the VAN PELT family

v.

Defendant:

THE UNITED STATES OF AMERICA

David Merrill
720 N 10th St; STE A
Renton, Washington. 98057

FILED LODGED
RECEIVED

JAN 19 2022

CLERK U.S. DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON AT TACOMA
BY DEPUTY

16-cv-5520

Notice of United States Patent #11,999,999
THE TRIGGER

COMES NOW David Merrill of the VAN PELT family AM I. This action is on and for the behalf of the people and planet Earth.

This is the application of US Patent 11,999,999; not an application for US Patent 11,999,999. This invention and my Natural Vaccine, Doc 15 herein, are both related to my 2003 Invention "Eradication of SARS" - USPTO Documents Disclosure #531812. Docs 19 and 20 - Final Judgment - herein describes and defines proper Notice in good faith, that a much better path could have been taken by humankind.

OATH OF OFFICE FOR UNITED STATES JUDGES

(Title 28, Sec. 453 and Title 5, Sec. 3331, United States Code)

I, ROBERT J. BRYAN, do solemnly swear (or affirm) that I will administer justice without respect to persons, and do equal right to the poor and to the rich, and that I will faithfully and impartially discharge and perform all the duties incumbent upon me as United States District Judge, according to the best of my abilities and understanding, agreeably to the Constitution and laws of the United States; and that I will support and defend the Constitution of the United States against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same; that I take this obligation freely, without any mental reservation or purpose of evasion; and that I will well and faithfully discharge the duties of the office on which I am about to enter. SO HELP ME GOD.

Robert J. Bryan

Subscribed and sworn to (or affirmed) before me this 2nd day of June, 1986.

Walter T. McGovern

FOIA EXEMPTION (b)(6)

Actual abode [redacted]

Official station* Tacoma, WA

Date of birth 29 October 1934

Date of entry on duty 2 June 1986

I hereby certify that the annexed instrument is a true and correct copy of the original on file in my office.
ATTEST: BRUCE RIFKIN
Clerk, U. S. District Court
Western District of Washington
By [signature]
Deputy Clerk

Note--The Act of May 1, 1876 (Title 48, sec. 1466, United States Code), provides that the oath of judicial *Officers* shall be administered in the Territory in which the office is held.

*Title 28, sec. 456 United States Code, as amended.

Note this oath of office is deviant in form - SO HELP ME GOD.

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Deputy Clerk

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*Title 28, sec. 456 United States Code, as amended.

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United States Patent **Patent No.: US 11,999,999**
David Merrill **Date of Patent: Dec. 21, 2021**

METHODS FOR IGNITING RAPID AND MASSIVE CULLING OF VIRAL HUMANITY (DEPOPULATION), SELECTIVELY THE EXTERMINATION OF THE NAV (Nucleic Acid Vaccine(s)) INOCULATED ALSO KNOWN AS TRANSHUMANS

Inventor: David Merrill of the VAN PELT family, 720 N 10th St, STE A, Renton, Washington. USA 98056

This patent application occurred on the same day, 12/21/2021, Rock Solid Process served it on the President of the United States.

Prior publication data: Doc 15 herein case #16-cv-5520 - ***COVID-19 Vaccine - Natural, Nonintrusive and Safe; Reviving the Ancient Modality of Healing and Preventing Disease***, and the return from the US Patent and Trademark Office of Documents Disclosure #531812 - ***Eradication of SARS***. As applied in 2003 the COVID-19 virus in any variant form is no threat but slight and only to the elderly and infirm. The pathogen is the spike protein in the NAV.

Other Publications: ~~CONFIDENTIAL~~ Pfizer publication - BNT162b2 5.3.6 CUMULATIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS OF PF-0732048 (BNT162B2) RECEIVED THROUGH 28-FEB-2021

USDC Northern Alabama Case #21-cv-702 Doc 32 Amended Complaint. Docs 24 & 25, testimony of the US through Agency.

Crystal Structure of the Thrombospondin 3R6B Type 1 Repeats - PTB (Protein Data Bank) DUQUETTE et al. No mutation. Length 153[1] See John: 21:11. https://www.rcsb.org/structure/3R6B

Crystal Structure of Human Plasminogen Catalytic Domain - PTB WANG et al. Mutated.

The Researcher's Guide to Mechanisms of Cell Death. Cell Signaling Technology.

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[1] The first Cube Sum Number Lock after 1. This initiates the natural cohesion and superposition of the Meissner Field in the redeemed third ventricle upon which I invented Artificial Intuition in early 2028. Opposition was skeptical and quite shocked that the first application was commercial flight control. The Cube Sum Number Locks - $153 = 1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153$; 1, 125, 370, 371 and 407.

Watch Crypto Expert Explain Blockchain to Congress **- YouTube video at https://youtu.be/pSTNhBlfV_s and https://www.tinyurl.com/MuskMachine**

A PHASE 1/2/3, PLACEBO-CONTROLLED, RANDOMIZED, OBSERVER-BLIND, DOSE-FINDING STUDY TO EVALUATE THE SAFETY, TOLERABILITY, IMMUNOGENICITY, AND EFFICACY OF SARS-COV-2 R4NA VACCINE CANDIDATES AGAINST COVID-19 IN HEALTHY INDIVIDUALS; Pfizer Protocol C4591001 page 39 Rationale about teratogenicity.

Japanese rat testing about the migration of lipid nanoparticles (spike proteins in the NAV) Pfizer's SARS-COV-2 mRNA Vaccine (BNT162, PF-07302048 2.6.4 Overview of Pharmokinetic Test - pages 6-7 charted describe the spike proteins attack the ovaries and bones.

Human plasminogen catalytic domain undergoes an unusual conformational change upon activation. WANG et al. (2000) Journal of Molecular Biology 295 903-914. Mutation described.

METHODS FOR DETERMINING THERAPEUTIC RESONANT FREQUENCIES US #7,280,874 Oct. 9, 2007 - Charlene A. BOEHM

ABSTRACT: The untimely death of Dr Andreas NOACK by sudden and completely unexpected heart attack has inspired by poetic justice that the Trigger function on the graphene hydroxide "razor blades" in the NAV(s) by igniting high blood pressure (Thrombospondin-1) escalated by severe blood clotting (Plasminogen), be utilized as an appropriate catalyst. Dr Andreas NOACK's name should be remembered. Three experienced lab microscope analyst and practicing doctors in different continents have discovered and described the DELIVERY SYSTEM patented by MIT in 2011 (WIPO #WO2012125987) and 2014 (USPTO #61544014) found in the NAV samples, camouflaged within the superconductive charge compression through the Temperature Chain. The Delivery System is herein referred to as LEGION, as it is an aluminum and carbon oligonucleotide architecture for a synthetic life form best described as a parasitic antennae array that attaches to any nerve nucleus and extends a 2.5 mm graphene nanotube antenna along the axon, awaiting instructions/information on the carrier resonant frequency or any harmonic thereof. Up and Down Regulation of Thrombospondin-1 and Plasminogen can easily be that information, when combined with the graphene hydroxide razors already in the bloodstream of the inoculated hypertension and accelerated clotting will quickly and fatally remodel the heart muscle into hamburger from the inside out. This application is to be executed upon failure of the FAUCI FURNACE (in through the front ER doors, declare *Variant*, kill the patient with remdesivir (Europe - Midazolam) and out through the crematorium) to maintain a hygienic depopulation and balanced with a careful risk management equation considering teratogenicity and matrix injury (exposure/herd adverse effects/shedding) to manage a human population that is sustainable in balance with nature, indefinitely into the future. The authority to execute The Culling is found in the Final

Judgment. The filter (love) and authorized transmission utility, built into the antennae array atop Bishop Castle, Colorado will regulate The Culling through the Van Allen Belt - Love drives all engines. The inoculated are targeted for extermination because it is the inoculated who insist on continued poisoning of the innocent. The inoculated are already poisoned lethally, ergo this *The Trigger*.

Field of the Invention

Biocosmetric sonoluminescence prescribes authority for this real time interactive geopolitical social engineering platform. - capital integration penumbra for *CASTLE CHURCH - For the Redemption of the Office BISHOP.* Depopulation is already well underway through a poisonous inoculation of nucleic acid vaccines (NAV) that while operating under standard mRNA vaccine technology as invented by Dr Robert Wallace MALONE to ignite an immune antigen response when COVID-19 gets into the sinus and bronchial tubes of a human, the spike proteins cleave from the express cells and are freed to flow in the bloodstream inoculating the interior walls of the circulatory system, including the heart, liver, kidneys and brain. The point here is that the spike protein of the COVID virus, the horns on the exterior of the virus capsid adhere to and enter living cells to replicate. There is no end to the reproductive cycle the spike protein is designed for and in its processes it exhausts all natural endocrine system defenses to any disease. This pathogen's process is fatal to the host. However the host seems more gullible than ever to believe that the pathogen is COVID, not the spike protein. Therefore, the hosts are fervently moving socially toward mandatory vaccinations for all of humanity in a false hope that will end the death cycle. Therefore, The Trigger is only one of many mechanisms that leverage the LEGION antennae array on the nervous system to activate or deaden

certain genome sequences crucial to sustaining the motivations of this inoculated, Living Dead Transhuman threat. December 6, 2021 was the deadline for the Employment Mandate. The morning of December 7, employers were likely feeling the Mandate is law and began firing employees as they arrived for work, if they did not agree to be inoculated with the NAV. There are successful law suits in Florida, Texas, Louisiana and Alabama denying that the Mandate is supported by Constitution and law. However the President is telling people to ignore the courts and threatens that, "We are running out of patience for people who refuse to be vaccinated." - *Close paraphrase*. Additionally Congress has a bill authorizing Homeland Security to keep the unvaccinated off planes, directly accusing the unvaccinated of being terrorists. The Mandate deadline marks a tipping point securing risk assessment about Squeezing the Trigger and terminating four billion transfected and exposure-affected human lives, or letting the inoculated die off due to the spike protein doing its work, remodeling their hearts.

Background of the Invention

This screen shot goes a long way explaining two points about the Pandemic, COVID and spike protein.

The posted message brings out some poignant points. This poster JR321 seems to be authentic. He knows a couple that had no experience with COVID but were inoculated by the NAV from pressure from the inoculated fearful. Both, two out of two have suffered the consequences and their lives/lifestyles are ended due solely to the "vaccine". The dying COVID patient was rescued by the family attorney, by replacing remdesivir with ivermectin.

Mr. Sun Ng, at his daughter's home, after having been administered ivermectin treatments for COVID-19 in early November. (Tom Ciesielka)

PREMIUM HIGH-PROFILE CASES

Dying COVID-19 Patient Recovers After Court Orders Hospital to Administer Ivermectin

By Matthew Vadum December 1, 2021 Updated: December 3, 2021 AA Print

An elderly COVID-19 patient has recovered after a court order allowed him to be treated with ivermectin, despite objections from the hospital in which he was staying, according to the family's attorney.

JR321
2 hours ago +1

I personally know 2 very health 45 year old adults and their families who have been negative affected by vaccines who had zero issues with COVID before being forced to take the vaccine as a Federal employee. 1 died in steep (supposed heart attack), and 1 in and out of the hospital for over a month with uncontrollable heart palpitations. Their and their family's lives destroyed by Biden's / Fauci's version of "science".

Thoughtfully, we discover that the family attorney saved this man from being dosed with remdesivir. Dr Anthony FAUCI knows and knew, citing the Ebola Study that remdesivir was removed after six months for being the lead killer in the Study.

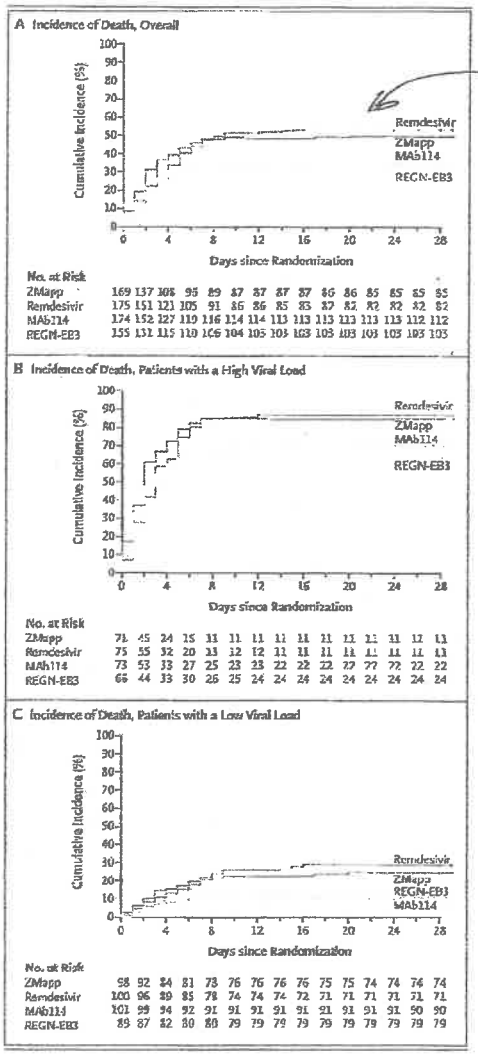
Here is a description of the FAUCI FURNACE. The hospital and county crematoriums are being utilized to dispose of dead bodies. The funeral and memorial services homes are badly overburdened too.

Since the symptoms of the NAV inoculation are being labeled COVID and Variant infections the executions are registered as COVID ward patients dying and these COVID Wards are generally replacing the Maternity Wards, because the NAV destroys the womb.

The Japanese rat study proved that the express cells, the lipid nanoparticles target the ovaries and bones.

Figure 1. Cumulative Incidence of Death.

Shown are Kaplan–Meier estimates of the cumulative incidence of death. Panel A shows the estimates in the overall population, Panel B the estimates in patients who had a nucleoprotein cycle-threshold (Ct) value of 22 or less at baseline (corresponding to a high viral load), and Panel C the estimates in patients who had a Ct value of more than 22 at baseline (corresponding to a low viral load).



the duration of symptoms at enrollment, baseline nucleoprotein Ct value, and serum creatinine level all remained significant prognostic indicators of death (Table 4). Across all models, the effect estimates of treatment with MAb114 and REGN-EB3 remained significant (Table 3 and 4).

The percentage of patients who died was lower among those who reported that they had received the rVSVΔG-ZEBOV-GP vaccine than among those who reported no vaccination (27.1% [42 of 155 patients] vs. 48.4% [225 of 465]). However, patients who reported vaccination were also more likely to have had fewer days of illness before enrollment, higher baseline nucleoprotein Ct values, and lower levels of alanine aminotransferase (Table S5).

SAFETY

At least 98% of the patients received the infusions according to protocol (Table S6). A total of 29 serious adverse events were determined by trial investigators to be potentially related to the trial drugs (Table S7). However, after adjudication by an independent pharmacovigilance committee, four events in three patients, all of which resulted in death, were determined to be possibly related to a trial drug: one patient in the ZMapp group had worsening of gastrointestinal symptoms; one patient in the ZMapp group had periinfusional hypotension and hypoxia that responded to resuscitation after treatment interruption but that resulted in death within 24 hours; and one patient in the remdesivir group had hypotension that resulted in cessation of a loading dose of remdesivir and that was followed rapidly by cardiac arrest. However, even in these cases, the deaths could not readily be distinguished from underlying fulminant EVD itself.

DELAYS IN TREATMENT ADMINISTRATION

The mean time from randomization to administration of the first infusion was somewhat lon-

Therefore, it is concluded and in coherence with the comment in the screen shot that COVID is not victimizing people. The true pathogen is the spike protein

in the NAV (nucleic acid vaccines). Furthermore, Dr Anthony FAUCI has been murdering COVID patients, starting with the elderly in order to propagate fear so that people would accept the delusion that COVID is spreading and mutating when the active pathogen is spike proteins thereof living, mutating and reproducing, primarily in the cells lining the circulatory system.

In Europe the same murder and fear mongering is done with Midazolam. Midazolam is a pre-operation sedative used to still the heart and calm anxiety prior to administering anesthetic for surgery. The dosage used for alleged COVID victims is fatal, around ten times that used for calming before a surgical operation. On this note tromethamine is being added to vaccines administered to children to stabilize their little hearts while they react. Specifically, under duress the blood becomes acidic enough to promote a heart attack and the tromethamine and tromethamine hydrochloride are added so that the young transhuman can be sent away from the inoculation without incident. Doc 40 in the Northern Alabama USDC 21-cv-702 suit admits to the use of tromethamine for children's inoculation Doc 40-2 page 3 of 8.

> ***WHAT ARE THE INGREDIENTS IN THE VACCINE?***
> *The vaccine includes the following ingredients: mRNA, lipids ((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), 2 [(polyethylene glycol)-2000]-N,N-ditetradecylacetamide, 1,2-Distearoyl-sn-glycero-3-phosphocholine, and cholesterol), tromethamine, tromethamine hydrochloride, sucrose, and sodium chloride.*

In both America and Europe these drugs are administered with the intent to keep the masses believing that people are dying of COVID and Variants thereof, when it is plain that mutations are occurring to the spike proteins on the surface of the capsid, and the same spike proteins are the pathogen, synthesized to reproduce in the injected "vaccines". The virus in natural form never enters the bloodstream nor do the spike proteins cleave from the capsid and the natural virus is therefore innocent of all the coagulopathy.

More than three doctors have detected LEGION, hidden very cleverly inside the vaccine vials. There are contents and components that are completely undetectable in vials that have been adherent to the Temperature Chain rules. But after warming and exposure to light the hidden or camouflaged components appear under the microscope. Aside from LEGION, a synthetic parasite invented and patented by MIT, there is graphene hydroxide and graphene oxide, both highly toxic and poisonous, and neither is listed as an ingredient in any of the NAV vaccines. This deception is developed through a juxtaposition with the Comirnaty vaccine in Europe being approved in the USA, but not administered in the USA. This argument is eloquently developed by *Public Health and Medical Professionals for Transparency v Food and Drug Administration* (PHMPT v FDA) in case 21-cv-1058 USDC Northern Texas. The FDA approves Comirnaty and then broad swipes that approval falsely by saying that all the ingredients in all the

COVID vaccines are the same and interchangeable. At the heart of this shell game is that anything that has not been approved by the FDA can contain anything; so all the vaccines administered in America are not approved except by a false declaration of uniformity and the various vaccines can and do contain anything the manufacturers decide to put in them - like graphene and LEGION synthetic parasites. Snippets from *PHMPT v FDA* reveals a mouthful:

> *On August 23, 2021, the FDA approved the Pfizer-BioNTech COVID-19 Vaccine, marketed as Comirnaty (the "Pfizer Vaccine") for individuals 16 years of age and older.*
>
> *For example, on June 1, 2021, a group of 27 clinicians and scientists, including professors from Harvard Medical School and the UCLA School of Public Health, and members of PHMPT, filed a Citizen Petition13 with the FDA, claiming that the available evidence for licensure of the Pfizer Vaccine "is simply not mature enough at this point to adequately judge whether clinical benefits outweigh the risks in all populations."*

At this point in time the only FDA approved COVID Vaccine is marked and marketed as Comirnaty while there are several other vaccines, even by Pfizer-BioNTech being injected into people that are not Comirnaty at all. People are left to assume that since the ingredients of Comirnaty are set in the FDA approval, that all the other COVID vaccines are the same, with the same ingredients.

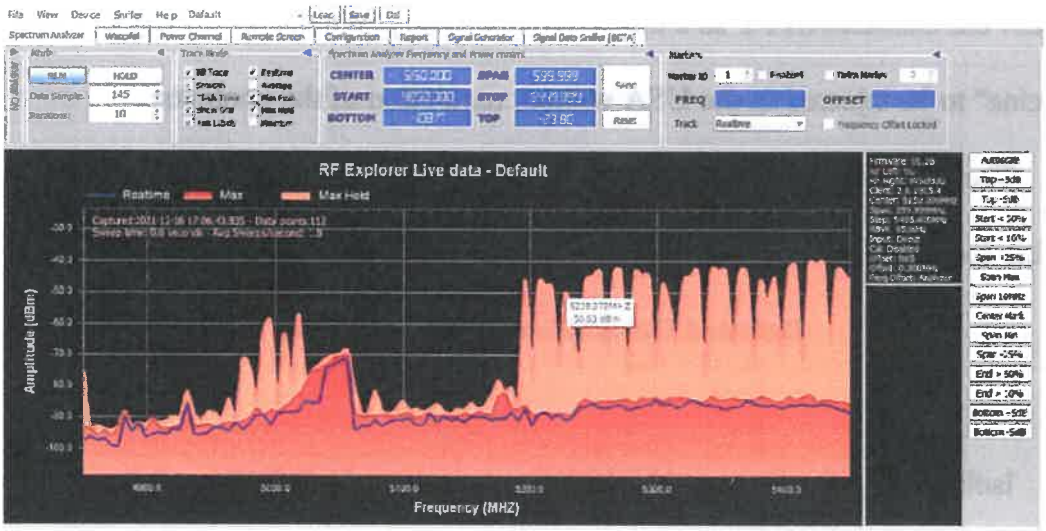
In one inquiry, when pressed one vaccine manufacturer added "water" to their list of ingredients. This is very suspicious that they would be hiding water, or that they forgot to list it in the original ingredients list. USDC Northern Alabama case #21-cv-702 reveals throughout Doc 40 the shell game, how CDC, WHO and

BIDEN use COMIRNATY as a buzzword allowing juxtaposition of any COVID "vaccine" to be injected in the USA without regulation of the contents.

These facts and Final Judgment already in place authorize the euthanasia of the fear inoculum as it poses a very real and present danger to the living.

Detailed Description of the Invention

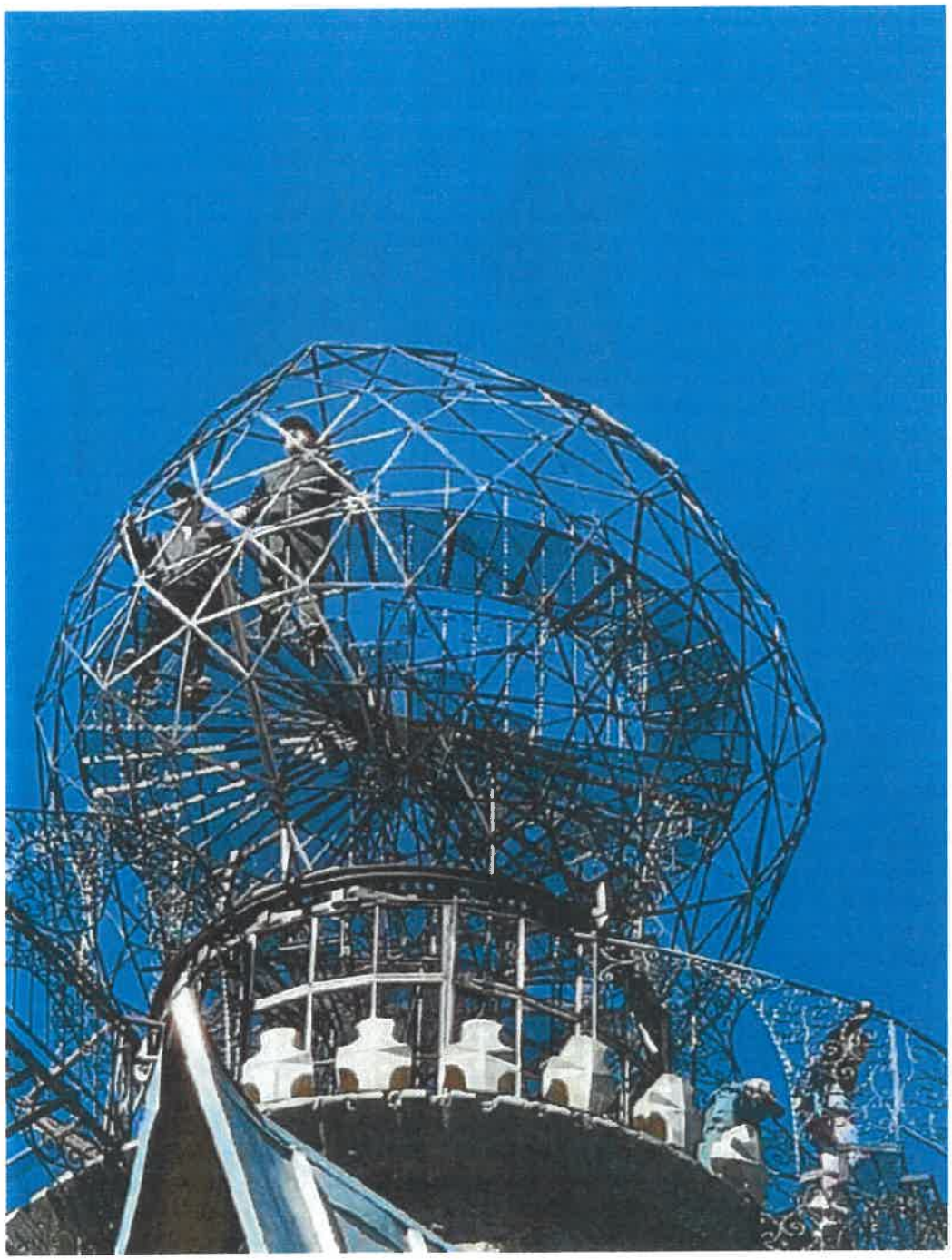
Isolating the Dr. Franc ZALEWSKI estimation of LEGION at 2.5 mm per antenna one finds the exact harmonic frequency in the 5G range at 5.228378 GHz. The LEGION synthetic life form builds Elon MUSK a high temperature superconductive quantum supercomputer for his QFS - Quantum Financial System, defeating the liquid nitrogen temperatures required for traditional qubits to remain coherent in their entanglement. Elon has hijacked the nervous systems of, for example 75% (reported) American inoculated transhumans. This phase conjugation dimple represents the spike protein will to survive by instinct.

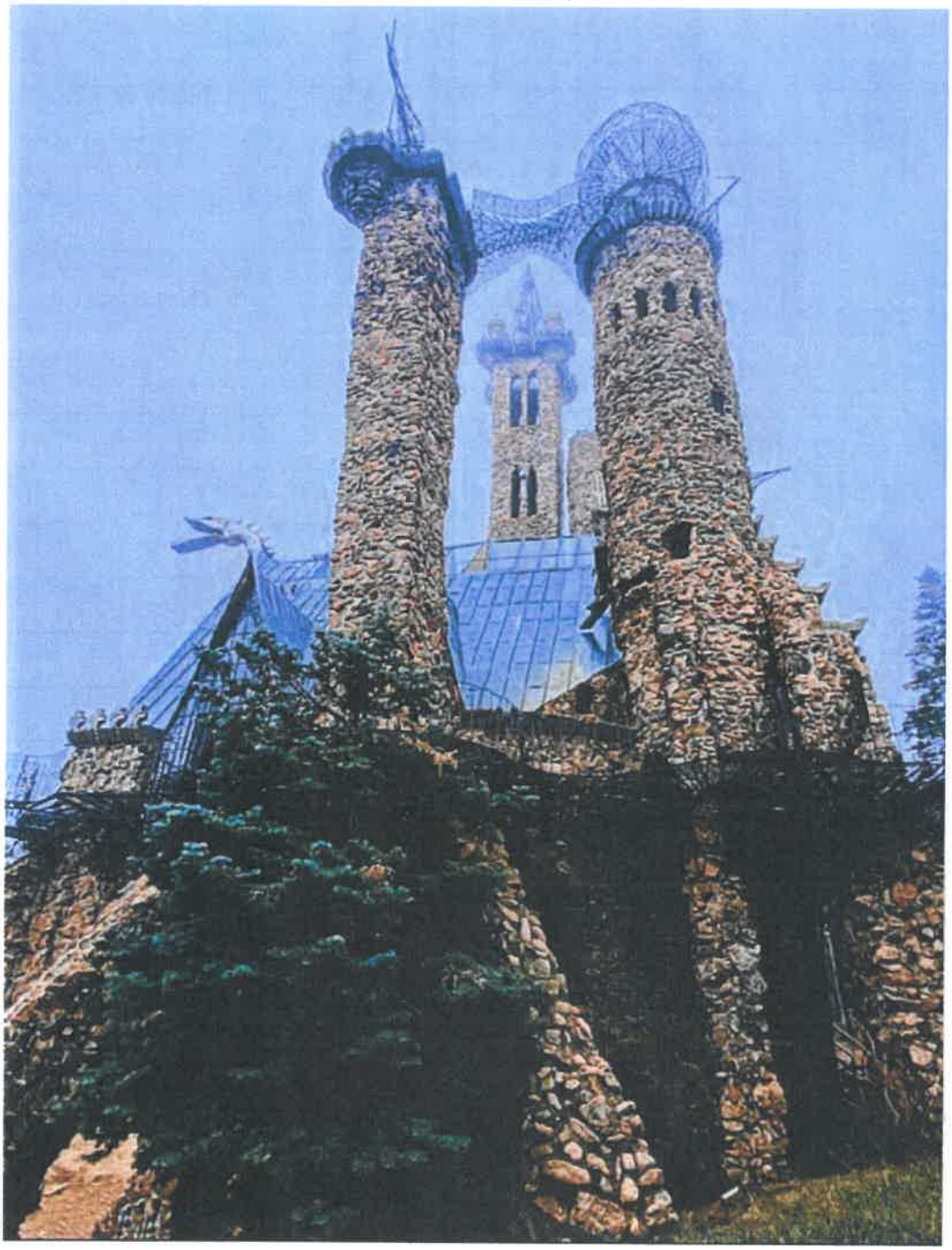


The distant harmonic of 153 and other cell death signals are easily modulated on this LEGION harmonic to override Elon's hijacked quantum computer, killing off the host transhumans; a rough estimation at four billion former people.

The Bishop Castle Colorado antennae array is symbolic of love, being charged by the family oriented visitors over the years activating the millions of stones collected and carefully placed by James Roland BISHOP in trust - CASTLE CHURCH - For the Redemption of the Office BISHOP. This transmission utility has accessed the Van Allen Belt for uniform global transmission throughout Spaceship Earth.

As explained in the Final Judgment NASA has supplied the genetic sequence reference to a wide range of pathogens.





Summary of the Invention

Elon MUSK in conjunction with other Globalist planners (Great Reset) like Stephan MERGENTHALER, Klaus SCHWAB and Bill GATES has devised a bypass for waiting on a truly high temperature superconductor for his Quantum Financial System. Elon proceeds according to his belief that hijacking massive numbers of human nervous systems in tandem under one carrier frequency he can inject financial transaction information as a quantum supercomputer. Utilizing LEGION camouflaged into the NAV inoculated worldwide these globalists and big pharmaceutical companies have murdered (rewritten the genetic code for) approximately half the human population by installing the 2.5 mm antennae array into the transhuman network. Dr. Ryan COLE of the Mayo Clinic has noted a 20x increase in endothelial (uterus) cancer for women who have inoculated the NAV and therefore the termination of transhuman spread is necessary to stabilize The Culling now, rather than later. Teratogenicity is a wild card that will keep culling for some undetermined time yet.

This invention has already gone into effect to destabilize coherence and entanglement, for quantum decoherence to destabilize all superposition in Elon's biological (carbon based) machine. Additionally, that the NAV in any one injection severely reduces the amount of heartbeats left in the inoculated (now) transhuman is becoming more and more difficult to ignore and deny, daily. This transhuman

population is already dead, in fact these (once) people have become something subhuman in fear, not love, deprived of dopamine in the *substantia nigra* (midbrain) and so Elon's Biological Quantum Supercomputer is built for failure. The irony is that without spirituality the transhumans lack capacity as superconductive medium forming qubits. To highjack the community nervous system of the masses with LEGION and call it "ownership" is fraud - watch https://tinyurl.com/OwnTheQFS about Bishop Castle Colorado at Pueblo, Jim BISHOP's home and base for Bishop Castle, Colorado - the entire NAV inoculation is without any informed consent. If the people only knew they were no longer people, that would lead to the realization they never had the keys to open up the Ledger. The QFS (Quantum Financial System) is built on sand.


TERRITORY
1861
STATE
1876
1876

DETECTION OF GRAPHENE IN COVID19 VACCINES

BY MICRO-RAMAN SPECTROSCOPY

*

TECHNICAL REPORT

Almeria, Spain, November 2, 2021

Prof. Dr. Pablo Campra Madrid
ASSOCIATE UNIVERSITY PROFESSOR
PhD in Chemical Sciences
Degree in Biological Sciences

0

DETECTION OF GRAPHENE IN COVID19 VACCINES

Technical Report · November 2021

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SUMMARY

We present here our research on the presence of graphene in covid vaccines. We have carried out a random screening of graphene-like nanoparticles visible at the optical microscopy in seven random samples of vials from four different trademarks, coupling images with their spectral signatures of RAMAN vibration.

By this technique, called micro-RAMAN, we have been able to determine the presence of graphene in these samples, after **screening more than 110 objects** selected for their graphene-like appearance under optical microscopy. Out of them, a group of **28 objects have been selected, due to the compatibility of both images and spectra with the presence of graphene derivatives**, based on the correspondence of these signals with those obtained from standards and scientific literature. **The identification of graphene oxide structures can be regarded as conclusive** in 8 of them, due to the high spectral correlation with the standard. In the remaining 20 objects, images coupled with Raman signals **show a very high level of compatibility with undetermined graphene structures**, however different than the standard used here.

This research remains open and is made available to scientific community for discussion. We make a call for independent researchers, with no conflict of interest or coaction from any institution to make wider counter-analysis of these products to achieve a more detailed knowledge of the composition and potential health risk of these experimental drugs, reminding that graphene materials have a potential toxicity on human beings and its presence has not been declared in any emergency use authorization.

DISCLAIMER

This research has been carried out exclusively by Dr. Pablo Campra, without any type of remuneration by any private or public entity, nor involvement or conformity with its results and conclusions by the institution where he is affiliated.

The characterization of the related objects corresponds exclusively to the samples analyzed. It is not possible without significant sampling to know whether these results are generalizable to other samples of similar trademarks.

Dr. Pablo Campra is only responsible for the statements written in this electronically signed file, and is not responsible for the opinions or conclusions that may be drawn from its dissemination in media and social networks and not expressed in this document, whose original version, authenticated and signed electronically, can be consulted at the following *Researchgate* platform:

https://www.researchgate.net/publication/355684360_Deteccion_de_grafeno_en_vacunas_COVID19_por_espectroscopia_Micro-RAMAN

1. ANALYTICAL METHODOLOGY

1.1. Fundamentals of the micro-Raman technique

Due to the characteristics of the sample and to the dispersion of objects with a graphene appearance of micrometric size in a complex matrix of indeterminate composition, the direct application of spectroscopic methods does not allow characterization of the nanoparticles studied here without a previous microscopic localization or fractionation from the original sample. Therefore, microscopy coupled to RAMAN spectroscopy (micro-RAMAN) was selected as an effective technique for an exhaustive screening of micrometric objects visible under the optical microscope.

RAMAN infrared spectroscopy is a fast, non-destructive technique that allows the verification of the structure of this material by identifying vibrational modes and phonons generated after excitation with monochromatic laser, generating inelastic dispersion that manifests itself in peaks of infrared emission that are a characteristic signature of the reticular structure of graphene and derivatives. Coupled optical microscopy allows the excitation laser to be focused on specific objects and points located on objects, to reinforce the degree of confidence in identifying the nature of the material, and to obtain complementary information on thickness, defects, thermal conductivity and edge geometry of graphene nanocrystalline structures.

RAMAN vibrational modes of common functional groups

O-P-O 813 cm^{-1}

C-C 800 (600-1300) cm^{-1}

C-O-C 800-970 cm^{-1} Raman average

C-(NO2) 1340-1380 cm^{-1} strong Raman; 1530-1590 cm^{-1} (asymmetrical) Medium Raman

C=C vibrations in aromatic rings (e.g. graphene, graphite)

1580-1600 cm^{-1} : Strong Raman signal

1450, 1500 cm^{-1} : Medium Raman signal

-CH2- 1465 cm^{-1} in-plane bending H-C-H (*scissoring*)

C=N 1610-1680 cm^{-1}

C=O carbonyl 1640, 1680-1820 cm^{-1}

C-H 3000 cm^{-1}

O-H 3100-3650 cm^{-1}

1.2. Equipment used for micro-Raman spectroscopy

RAMAN LASER SPECTROMETER JASCO NRS-5100

Confocal Raman MICROSCOPE with spectrograph, includes:

-variety of magnification and working distances from x5 to x100

-up to 8 lasers ranging from UV to NIR

-SRI (spatial resolution image) to simultaneously view the sample image and the laser point.

-DSF (Dual Spatial Filtration) that optimizes the confocal focus of the image produced by the objective lens to reduce aberration and improve spatial resolution and reduce the effects of matrix fluorescence.

The spectra were analyzed with *SPECTRA MANAGER* software, version 2. JASCO Corporation.

Previously, the equipment was calibrated with a silicon standard at 520 cm^{-1}.

RAMAN spectroscopy parameters applied for screening

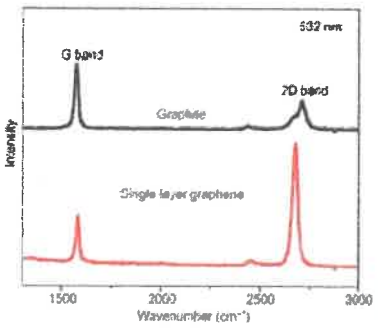
Data array type Linear data array
Horizontal axis Raman Shift [cm-1]
Vertical axis Int.
Start 1200 cm-1
End 1800 cm-1
Data interval 1 cm-1
Data points 601
[Measurement Information]
Model Name NRS-5100
Exposure 30 sec
Accumulation 3
Center wavenumber 1470.59 cm-1

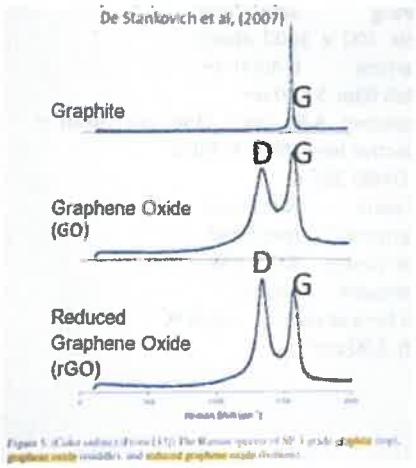
Z position 27041.5 µm
Binning Upper 143
Binning Lower 202
Valid Channel 1 – 1024
CCD DV420_OE
Laser wavelength 532.09 nm
Monochromator Single
Grating 1800 l/mm
Wear 100 x 1000 about
Aperture d-4000 um
Notch filter 532.0 nm
Resolution 3.69 cm^{-1}, 0.96 cm^{-1}/pixel
Objective lens MPLFLN 100 x
BS/DMBS 30/70
1/2 plate Not fitted
Polarization Not fitted
Laser power 4.0 mW
Attenuator Open
CCD temperature -60.0 ºC
Shift-3.00 cm^{-1}

1.3. Micro-Raman spectroscopy of graphite and graphene

CHARACTERISTIC RAMAN BANDS OF GRAPHITE, GRAPHENE AND DERIVATIVES

- G and 2D: crystal structure of graphene and graphite
- D: crystalline mesh defects





1. NANOCRYSTALLINE STRUCTURE BANDS

-G-band (~1580-1600 cm^{-1}): Indicates a permissible phonon vibration (elementary vibration of the net) in the plane of the aromatic ring (sp^2 hybridization), characteristic of the crystalline structure of graphite and graphene. It presents a red *shift* (lower frequency, in cm^{-1}), as well as higher intensity with a higher number of layers. On the contrary, the higher energy in doped graphene shows as a *blue shift* (higher frequency in cm^{-1}), along the 1580-1600 cm^{-1} range (Ferrari et al, 2007).

-2D band (~2690 cm) (or G'): Indicates stacking order. It depends on the number of layers, it does not depend on the degree of defects, but its frequency is close to twice that of peak D. Its position oscillates according to the type of doping. The presence of single-layer graphene (SLG) has been associated with the presence of an isolated and sharp 2D peak, increasing in width according to the number of layers (Ni et al., 2008).

- The ratio of I_{2D}/I_G is proportional to the number of layers of the graphite network.

- In graphite G and 2D appear are sharper and narrower than in graphene.

2. BANDS ACTIVATED BY ANOMALIES in the graphitic structure.

These bands are generated by elastic dispersion (of the same energy) of load conveyors and by phonon confinement (*Kohn's* anomaly in phonon dispersion).

In **graphene oxides (GO)** the disorder comes from the insertion of hydroxyl (-OH) and epoxide (-O-) groups.

-D band (~1340 cm^{-1}). It shows the density of defects in the crystal network due to functionalization, doping or structural anomalies generating holes or new sp^3 (C-C) centers. The intensity of the D-band decreases with the alignment of layers in the graphitic structure.

-D' band (~1620 cm^{-1}). It follows a double resonance behavior due to network defects. Sometimes it merges with the G band due to *blueshift* of the latter.

-D+G band (~2940 cm^{-1})

PARAMETERS INTRODUCING FREQUENCY VARIABILITY (cm^{-1}), INTENSITY AND SHAPE OF THE RAMAN BANDS

These parameters have not been studied in detail in this report but should be considered in the future for the assignment of bands to vibrational modes.

- Degree and type of **disorder** (doping, breaks, etc.), that cause wider width of the G, D, and 2D peaks by decreasing the phonon lifetime (molecular vibration)
- The G-band does not show differences in intensity due to disorder, but the ratio (ID/ IG) does vary with D band changes.
- **Compression and stretching** of the network by **doping.** There may be *blueshifts* (>cm) in all bands (up to 15 cm^{-1} in G and 25 cm^{-1} in 2D) and band narrowing(up to 10 cm^{-1})
  e.g. "*back gates*" by doping with oxides through deposition
- By **sheet bending** the 2D band also increases, with no change in G, but with *blueshifts* between 4-12 cm^{-1} can occur.
- Stacking level or **number of layers**
- **Functionalization** (introduction of functional groups) of the network generates the appearance of new Raman peaks: 746 cm^{-1} (C–S *stretching*), 524, 1062, 1102, 1130 cm^{-1} (*skeletal vibrations*, CCCC *trans and gauche*), 1294 (*twisting*), **1440, 1461 (C–H *deformation, scissoring*),** 2848 and 2884 cm^{-1} (C–H *stretching*).
- A the same object may show spectral variations depending on the angle of incidence and the layers affected. The edges will show more disorder than the inner crystalline structure (Ni et al, 2008)
- *Blueshifts* dependent on the **substrate employed to grow** graphene layers (Chen et al, 2008)
- Variable intensity of the peaks in the same object according to the **laser focus point,** due to structural variability with respect to the angle of incidence related to the crystal network (Barros et al., 2005)

1.4. LIST OF SAMPLES OF VIALS AND OBJECTS SCREENED BY MICRO-RAMAN (SEE ANNEXES 1 AND 2)

1.5. SAMPLE PROCESSING

1. Samples were obtained from sealed vials of COVID19 mRNA vaccines as outlined in Annex 1. All vials were sealed at the time of processing, except MOD and JAN, which had no aluminum seals.

2. Four different aliquots per vial of 10 µl each were extracted with 50 µl micro-syringe, deposited on optical microscopy slides, and left to dry in aseptic laminar flow chamber at room temperature. They were then stored in a closed slide case and kept cold until micro-Raman analysis.

3. Previous extensive visual screening of drips was carried out under optical microscope (OLIMPUS CX43) in search for objects compatible with graphitic structures or graphene. Magnification from X100 to x600 were used.

Object selection criteria were:

1. Location in the remains of the droplet or in the outer area of dragging by drying
2. Two types of grafene-like appearance: two-dimensional translucent objects or dark carbon-like opaque bodies.

4. Obtain RAMAN spectra of the selected objects

5. Processing of the spectral data

The list and keys of the objects characterized in this report are set out in Annex 2.

3. RESULTS AND DISCUSSION

(See images and spectra of the selected objects in Annex 3: RESULTS)

The micro-Raman technique applied here has proved to be very effective for the rapid screening of a large number of microscopic objects in the detection of graphene micro-structures dispersed in complex samples. Compared to macro-Raman spectroscopy of whole aqueous dispersions, the combination with microscopy in micro-Raman has the advantage of allowing the association of spectral fingerprints to nanoparticles visible under the optical microscope. This technique allowed us to focus the prospection towards specific objects with graphene-like appearance, reinforcing their spectroscopic characterization with coupled images. In this work, the preliminary selection of objects has focused on two typologies, translucent sheets and opaque carbonaceous objects, due to their visual similarity with similar shapes observable in standards after sonication or in graphene oxide dispersions (see Annex 3 Results). The difference between both typologies is not due to their chemical composition, both derived from graphite, but only to the degree of exfoliation of the starting graphitic material and the number of superimposed layers, assuming a threshold of around 10 layers as a reference limit to consider that a material graphite (3D) (Ramos-Fernandez, 2017). Anyhow, it was out the scope of our work to further characterize these structures.

A total of 110 objects with graphene-like appearance were selected, mostly located at the edge of the sample droplets after dehydration, inside or outside of the dragging area by drying at room temperature of the original aqueous phase. Our of them, another 28 objects in total were selected for their higher degree of spectral compatibility with graphene materials reported in the literature, considering both spectra and images. The images and RAMAN spectra of these objects are shown in the Annex 3 of this report. It is of interest to note that the samples do not dry completely at room temperature, always leaving a gelatinous residue, whose limit can be observed in some of the photographs shown. The composition of this medium is unknown for the moment as it was not the subject of the present study, as well as that of other typologies of micrometric size objects that could be observed recurrently in the samples at low magnification (40-600X). The Raman spectra of some of these objects were obtained but are not shown in this study because they did not present visual resemblance to graphene or graphite.

A limitation in obtaining defined spectral patterns with this technique has been the intensity of the fluorescence emitted by many selected objects. In numerous translucent sheets with a graphene appearance, it was not possible to obtain Raman spectra free of fluorescence noise, so the technique did not allow to obtain specific RAMAN signals with well-defined peaks in many of them. **Therefore, in these objects the presence of graphene structures can neither be affirmed nor ruled out.** Another limitation of the micro- RAMAN technique is the low quality of the optical image of the equipment, which often prevents the detection of high-transparency graphene-like sheets, which can, however, be observed in optical microscopes with proper condenser

adjustment. For these objects an effective alternative for characterization would be to use other complementary microscopy techniques coupled with spectroscopy, such as XPS with good optics or the obtention of electron diffraction pattern of graphene by electronic microscopy (TEM).

Considering these selection criteria, the 28 objects found with potential graphene identity have been distributed in 2 groups, according to the degree of correlation with the RAMAN spectrum of reduced graphene oxide pattern used (rGO, ™SIGMA ALDRICH). **GROUP 1** included **8 objects whose spectral patterns were similar to the spectrum of the rGO pattern, and therefore** the presence **of graphene oxide (nº 1-8)** can be affirmed with certainty. This spectral correspondence can be considered **unequivocal** and is characterized by 2 dominant peaks in the scanned range (between 1200-1800 cm^{-1}), peaks called G (~1584 cm^{-1}) and D (~1344 cm^{-1}), characteristic of graphene oxides. This characterization by spectral correspondence between the signals of these nanoparticles and the rGO pattern is further reinforced by the microscopic appearance of these objects, all of them with an opaque carbonaceous appearance similar to that of the standard objects, as can be seen in the photographs in the Results annex. Therefore, **we can affirm with a high level of confidence that the identification of graphene material in all the analyzed samples of Group 1 IS CONCLUSIVE,** and with high probability graphene oxide structures can be assigned to these nanoparticles. These group 1 objects presented a micrometric size in ranges of tens of microns (shown as a blue line in photographs of some of them).

In the second group of 20 objects **(GROUP 2,** nº 9-28), **RAMAN signals compatible with the presence of graphene** or graphitic structures have been detected, showing peaks of RAMAN vibrations around the G band (1585-1600 cm^{-1}), compatible with the G peak of the nanocrystalline structure of graphene or graphite. This vibrational mode is generated by the allowed vibration of the phonon in the plane of the aromatic ring (sp^2). Its drifting towards higher frequencies in some objects, tending towards 1600 cm^{-1} *(blue shift)* can be assigned to a wide variety of modifications referred extensively in the literature, such as, for example, the number of graphene layers or doping with functional groups or heavy metals others (Ferrari et al, 2007). Visually, this group includes the two types of appearances observed in the standards: whether opaque micrometric objects with a carbonaceous appearance (nº 9, 11, 16, 21, 22, 23, 24, 25, 26, 27 and 28) or translucent sheets with graphene-like appearance (nº 10, 12, 13, 14, 18, 19 and 20).

In the spectra of this group 2, the G peak maxima are accompanied by other dominant peaks of non-determined assignment in this work. A subgroup (2.1.) can be made from of objects whose spectra have the two 2 dominant peaks located in band ranges that could be assigned to the two main vibrational modes of graphene oxide, G (range 1569-1599 cm^{-1}) and D (range 1342-1376 cm^{-1}) (objects no. 11, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25 and 26). Considering both microscopic images and RAMAN signals together, the **assignation of the spectra of this group 2.1 to graphenic structures can be done with a high level of confidence. However,** although the structural modifications of the network generating spectral signals different than the standard

rGO used have yet to be determined.

The signals from a second subgroup (2.2) of objects of this Group 2 (nº 9, 10, 12, 13, 18, 19, 25, 27, 28) can be considered compatible with the presence of graphene structures due to the presence of maxima in the G-band, although the use of more detailed spectral analysis algorithms would be necessary, since no clear peaks that could be assigned to the vibrational mode D, around 1344 cm^{-1} in the rGO standard, were not clearly observed. However, the presence of peak D is not a *sine qua non* condition for the assignment of graphene structures to spectra, and in consequence these objects have been selected for this report as they are showing compatible vibrational maxima in the vicinity of the G-band (range 1569-1600 cm^{-1}). There is still an open debate about the interpretation of this D-band and its variable frequency and shape (Ferrari and Robertson, 2004). As outlined in the methodological introduction, the intensity of the D peak, generally cited around 1355 cm^{-1}, as well as the intensity ratio with the G peak (I_D / I_G) is indicative of the degree of disorder in the graphene network, introduced by different agents such as doping, introduction of very different functional groups or breaks in the continuity of the network. In ordered graphitic materials this peak D is absent. In some spectra of this subgroup 2.2., other peaks with higher frequencies *(blueshift)* than the standard appear, whose assignment to vibrational mode D is possible, although this assignment is yet to be determined by processing with algorithms analysis which was beyond the scope of the present work. Therefore, at present, for these spectra we can only state that the absence or drifting *(shift)* of the D peak with respect to the location of the rGO pattern still requires a structural interpretation according to the models available. According to the literature, both the variations in the *shift* of the G and D peaks, as well as their variable width and intensity, and the presence of other peaks seen in these spectra could be due to very diverse modifications yet to be determined, including different degrees of disorder, oxidation, doping, functionalization, and structural breaks. The study of these modifications were beyond the scope of this report.

Complementary to the range 1200-1800 cm^{-1}, when RAMAN spectroscopy was extended up to 2800 cm^{-1} for some objects (nº 3, 8 and 11), a 2D peak of low intensity and frequency amplitude was detected, being absent in other scanned objects (data not shown). However, both in the rGO standard and some objects with G peak maxima, the intensity of this peak was always been very low compared to the G and D peaks of the spectra. This might be due to the fact that, in graphene oxides, the relative intensity of the 2D peak (~2700 cm^{-1}) with respect to the G and D peaks is greatly reduced. Therefore, in this study we have dispensed generally with analyzing the 2D peak for reasons of greater efficiency and use of limited resources required to scan as many objects as possible within a limited amount of time. In future work, it would be of interest to examine it for all objects, thus estimating the ratio of $I_{2D}/2_G$ intensities in those objects where it minimally manifests in this vibrational mode, which would allow for estimates to be made about the number of layers of the structure.

The objects shown in this study represent a minority portion of the total micrometric objects visible at low magnification in light-field optical microscopy (100X). These objects were scanned and are not shown in this study because their spectra where not compatible with graphene structures as they lack a band that could be assigned to G vibrational mode peak. It is of great interest to note that many of these objects show RAMAN maxima in the 1439-1457 cm^{-1} band. Likewise, among the objects in group 2.2, also a prominent peak is frequently found in this band, around 1450 cm^{-1}, in combination with peaks G and D (nº 11, 12, 14, 15, 16, 17, 20, 21, 23, 24, 25, 26 and 28). **The assignment of this band around 1450 cm^{-1} is still pending, since it does not correspond to specific peaks in graphene, but we consider it to be of great importance for the knowledge of the composition of the samples due to the frequent appearance of this vibrational mode.** As a working hypothesis, this band is usually assigned to organic methylene groups -CH_2- by bending the pair of hydrogens- (*scissoring*). However, it has also been referred to as a band of moderate intensity associated with aromatic rings, and if so, it could also be associated with graphene (Ferrari and Robertson, 2004). As stated, another possible assignment of this band would be that of a superimposed vibrational mode of some compound other than graphene, more likely, or even of the **hydrogel medium** remaining after drying, as in all samples there is always a viscous residue remaining after drying at room temperature. This residue could in many cases be manifesting RAMAN vibrations overlapping with the objects that remain embedded in it, but not in those that appear outside the gel at the limits of the drying drag zone. In this sense, it is possible that this vibrational mode of the medium appears overlapped with the G and D peaks of graphene in the spectra of subgroup 2.1. It is beyond the scope of this work to characterize this medium, as well as all the components of the sample. However, there are some substances capable of forming this hydrogel matrix whose RAMAN signals show prominent vibrational modes around this band, such as polyvinyl alcohol (PVA), methylacrylamide, or the polymer PQT-12 (Mik Andersen, https://corona2inspect.blogspot.com/ pers. com). It is also a fact that some of these substances have been combined with graphene in experimental biomedicine designs that can be found in the scientific literature, for example artificial synapses for PQT-12 (Chen and Huang, 2020), gelatins for neuronal regeneration combining methylacrylamide with graphene (Zhu et al, 2016) or PVA/GO *electrospun fibers* (Tan et al, 2016). **Now, all these hypotheses about the assignment of this peak in the vicinity of 1450 cm^{-1} remain open.**

In conclusion, out of a total of 110 scanned objects, **unambiguous signals for the presence of graphene oxide have been found in 8 objects, and signals compatible with the presence of graphitic or graphene structures in another 20 objects.** The rest of the objects scanned here, out of 110 nanoparticles with graphene-like appearance have not shown signals compatible with graphene, with spectra at times dominated by excess noise caused by excessive fluorescence intensity, so we cannot neither assign nor rule out the presence of graphene structures in them.

As a continuation of this line of work, and although our micro-RAMAN analysis has

shown conclusive signs of the presence of objects with graphene structure, to consolidate the certainty of identification and to deepen the structural characterization, it would be convenient to carry out complementary analyses using coupled microscopy and spectroscopy techniques such as XPS spectroscopy, or TEM electron diffraction.

For the present investigation, most of the samples have been obtained from sealed vials. Also, during the extraction of the samples and their transfer to slides for Raman microscopy, we worked under aseptic conditions under laminar flow chamber. However, the possibility of sample contamination processes during manufacturing, distribution, and processing, as well as the general applicability of these findings to comparable samples, need to be assessed by routine and more extensive monitoring of similar batches ofthese products.

Although the results of this sampling are conclusive with regard to **the presence of graphenic structures in some samples analyzed,** this research is considered open for continuation and is made available to the scientific community for replication and optimization, considering it necessary to continue with a more detailed and exhaustive spectral study, based on a statistically significant sampling of similar vials, and the application of complementary techniques to confirm, refute, qualify or generalize the conclusions of this report. The samples analyzed are duly guarded and available for future scientific collaboration.

CONCLUSIONS

A random sampling of COVID19 vaccine vials has been performed using a coupled micro-RAMAN technique to characterize graphene-like microscopic objects using spectroscopic fingerprints characteristic of the molecular structure.

The micro-RAMAN technique allows to reinforce the level of confidence in the identification of the material by coupling imaging and spectral analysis as observational evidence to be considered together.

Objects have been detected whose RAMAN signals by similarity with the standard unequivocally correspond to **GRAPHENE OXIDE**.

Another group of objects present variable spectral signals compatible with graphene derivatives, due to the presence of a majority of specific RAMAN signals (G-band) that can be assigned to the aromatic structure of this material, in conjunction with its visible appearance.

This research remains open for continuation, contrasting and replication. Further analyses based on significant sampling, using the described technique or others which are complementary would allow us to assess with adequate statistical significance the level of presence of graphene materials in these drugs, as well as their detailed chemical and structural characterization.

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ANNEX 1

COVID19 mRNA vaccines subject to micro-RAMAN analysis

PFIZER 1 (RD1). Batch EY3014. Sealed

PFIZER 2 (WBR). Batch FD8271. Sealed

PFIZER 3 (ROS). Batch F69428. Sealed

PFIZER 4 (ARM). Batch FE4721. Sealed

ASTRAZENECA (AZ MIT). Batch ABW0411. Sealed

MODERN (MOD). Batch 3002183. Not sealed

JANSSEN (JAN). Batch number Not available. Not sealed

GRAPHENE STANDARD SAMPLES

Reduced graphene oxide (rGO) (™Sigma Aldrich. Ref 805424)

GRAPHENE OXIDE Suspension (™The Graphene Box)

ANNEX 2

CHARACTERIZED OBJECTS COMPATIBLE WITH GRAPHENE STRUCTURES

GROUP 1

1 PFIZER 2 WBR UP GO2
2 PFIZER 3 Ros 2hy GO1
3 PFIZER 3 Ros 2hy GO1b
4 PFIZER 3 Ros 2hy b GO2
5 AZ MIT UP CARB1
6 AZ MIT UP CARB4
7 AZ MIT DOWN CARB2
8 MOD lump1

GROUP 2

9 PFIZER 2 WBR GO1
10 PFIZER 2 WBR GO6a
11 PFIZER 2 WBR 2 GO7
12 PFIZER 2 WBR UP GO1
13 PFIZER 2 WBR UP GO3b
14 PFIZER 2 WBR UP GO4
15 PFIZER 2 WBR DOWN GO2
16 PFIZER 2 WBR DOWN GO3
17 PFIZER 2 WBR DOWN GO5
18 PFIZER 3 ROS OBJ 1
19 PFIZER 3 ROS 2 OBJ 1
20 PFIZER 3 ROS 2 OBJ 2
21 PFIZER 4 Pdown lump1
22 PFIZER 4 Pdown lump2
23 PFIZER 4 Pdown lump3
24 ASTRAZENECA AZ MIT UP CARB5
25 ASTRAZENECA AZ MIT UP CARB6
26 JANSSEN JAN GO1
27 JANSSEN JAN GO3
28 JANSSEN JAN GO4

ANNEX 3. RESULTS

Detection of graphene in COVID19 vaccines using micro-RAMAN spectroscopy

TECHNICAL REPORT

ANNEX 3. RESULTS

Almería, Spain November 2, 2021

Prof. Dr. Pablo Campra Madrid
ASSOCIATE UNIVERSITY PROFESSOR
PhD in Chemical Sciences
Degree in Biological Sciences

VIALS ANALYZED by micro-RAMAN

COVID19 mRNA VACCINES

PFIZER 1 (RD1). Batch # EY3014. Sealed

PFIZER 2 (WBR). Batch # FD8271. sealed

PFIZER 3 (ROS). Batch # F69428. Sealed

PFIZER 4 (ARM). Batch # FE4721. Sealed

ASTRAZENECA (AZ MIT). Batch # ABW0411. Sealed

MODERNA (MOD). Batch # 3002183. Not sealed

JANSSEN (JAN). Batch # Not available. Not sealed.

GRAPHENE PATTERN SAMPLES

Reduced graphene oxide (rGO) (™Sigma Aldrich. Ref 805424)

GRAPHENE OXIDE Suspension (™The Graphene Box)

RAMAN spectrum of the reduced GRAPHENE OXIDE reference pattern (SIGMA ALDRICH™)

- For the rGO STANDARD the equipment shows thepresence of 3 characteristic peaks:

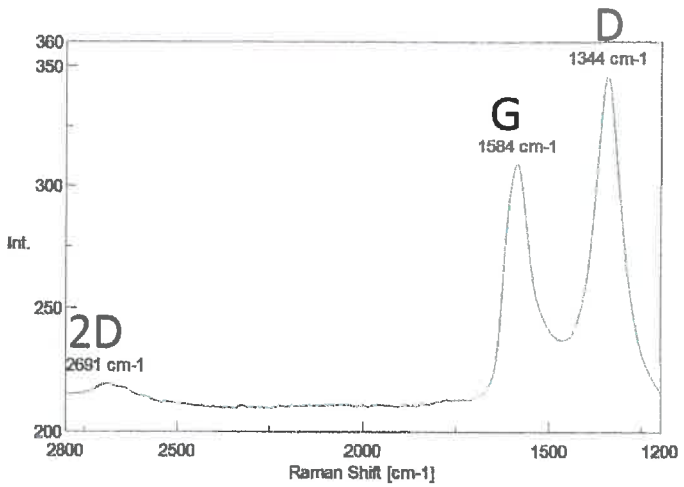
- G-band at 1584 cm^{-1}
- D-Band at 1344 cm^{-1}
- 2D-band at 2691 cm^{-1}

- In graphene oxide, the intensity of 2D is normally small with respect to G and D.

- Degree of disorder: I_D/I_G = 346/309 = 1.12

- Stacking level: I_{2D}/I_G = 219/309 = 0.70

- Previously, the equipment was calibrated with a silicon standard at 520 cm^{-1}



I_D/I_G=1.12

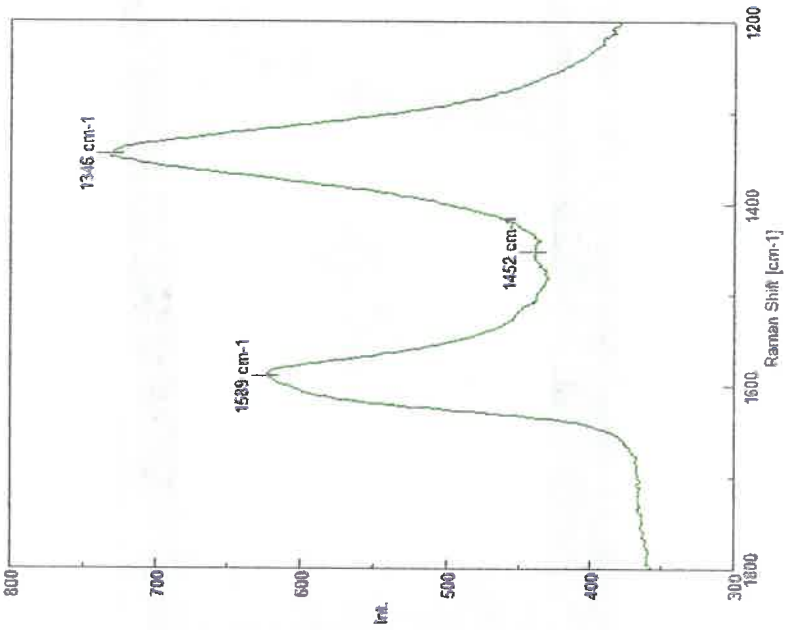
1.1. GROUP 1

OBJECTS WITH RAMAN SIGNAL SIMILAR TO THE REDUCED GRAPHENE OXIDE STANDARD

ANALYZED OBJECTS
GROUP 1

1. PFIZER 2 WBR UP GO2
2. PFIZER 3 ROS 2hy GO1b
3. PFIZER 3 ROS 2hy b GO2
4. PFIZER 3 ROS2 HY GO1
5. AZ MIT UP CARB 1
6. AZ MIT UP CARB4
7. AZ MIT DOWN CARB2
8. MOD lump1

1. PFIZER 2
WBR UP GO2

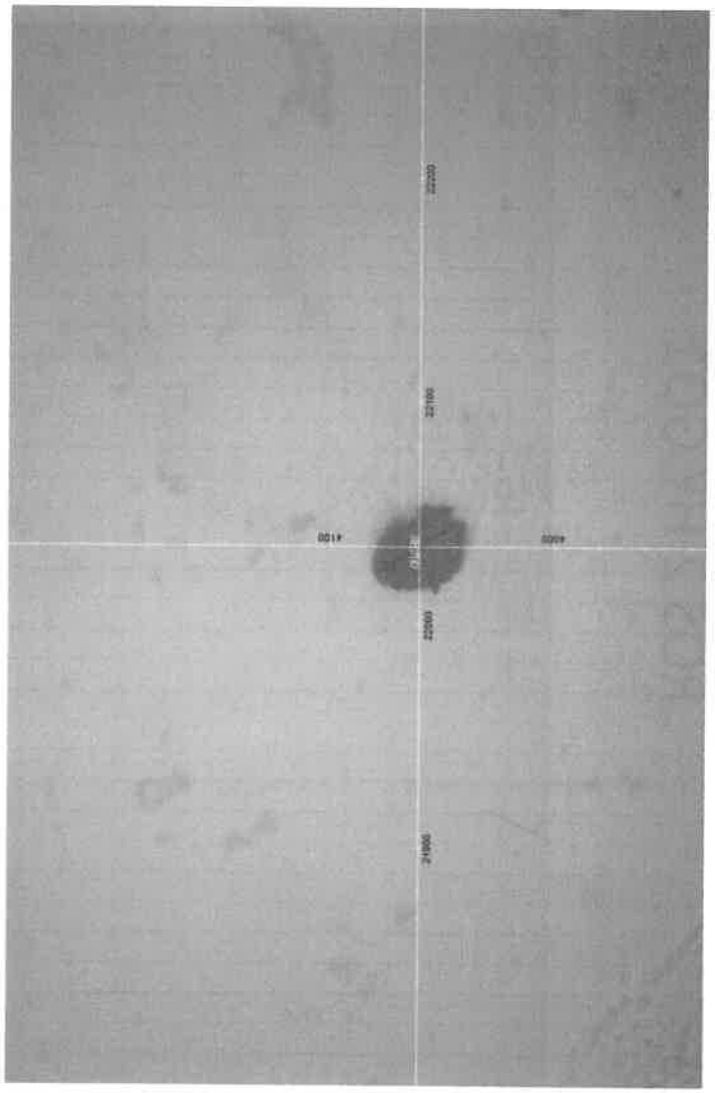


1. PFIZER 2
WBR UP GO2

$I_D/I_G = 1.18$

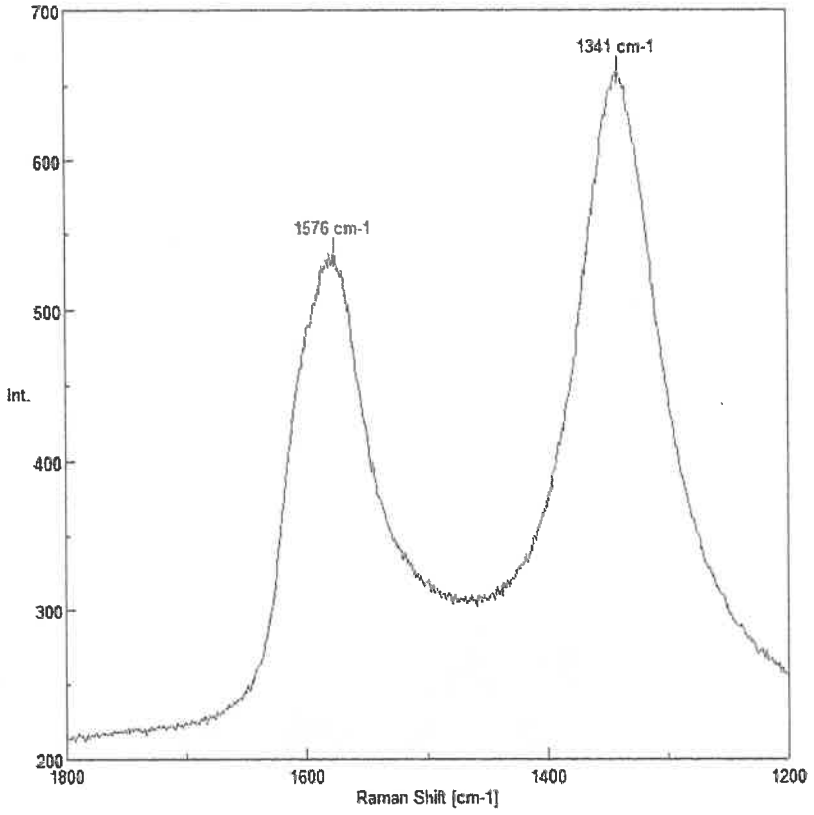
2. PFIZER 3
ROS 2 HY GO1

2. PFIZER 3
ROS 2 HY GO1



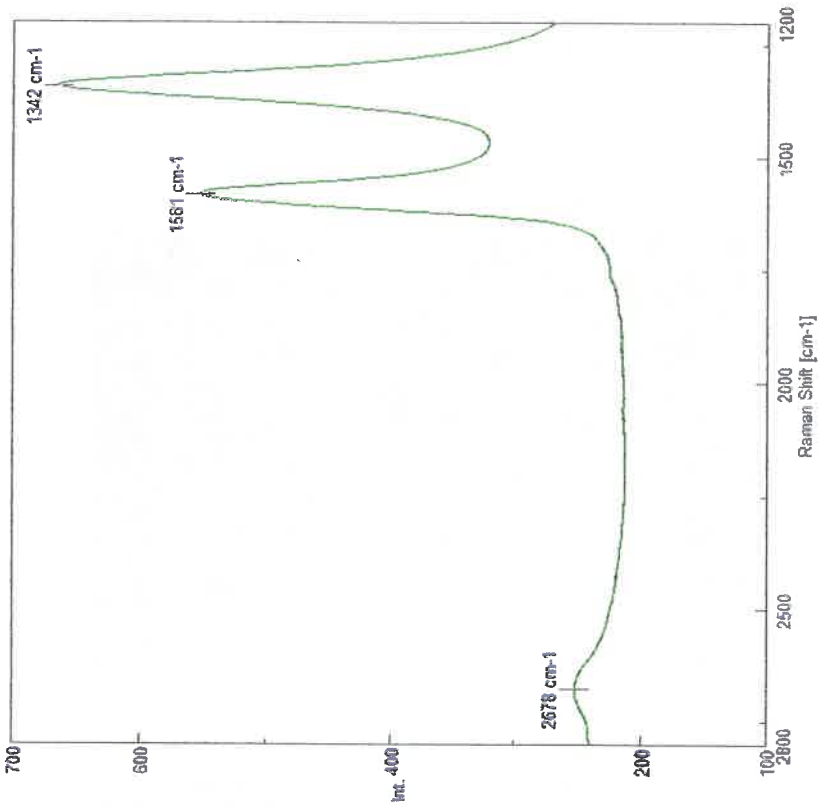
2. PFIZER 3
ROS 2 HY GO1

$I_D/I_G = 1.22$



3. PFIZER 3
Ros 2hy GO1b

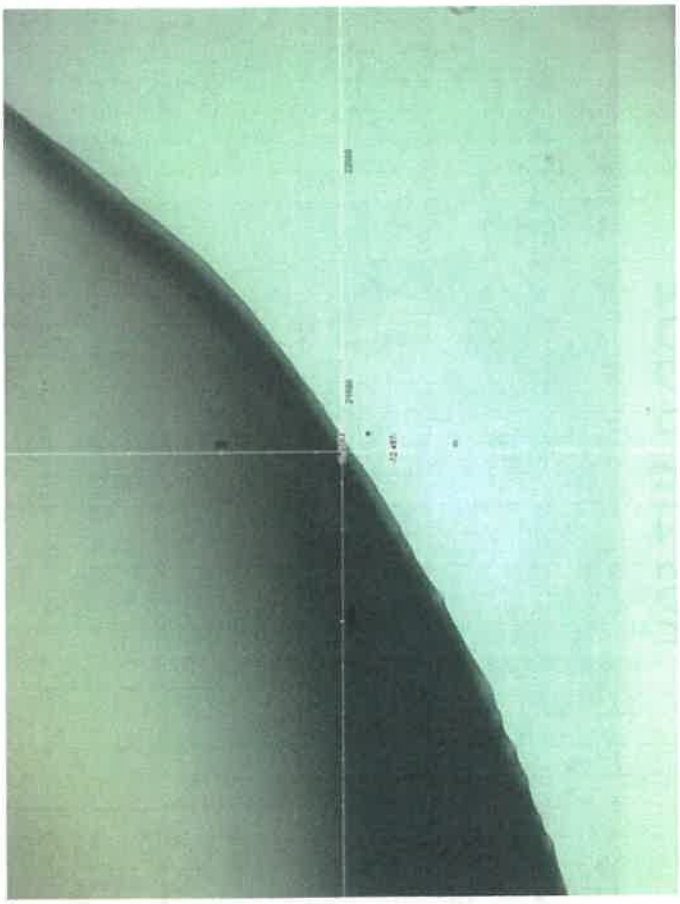
3. PFIZER 3
Ros 2hy GO1b



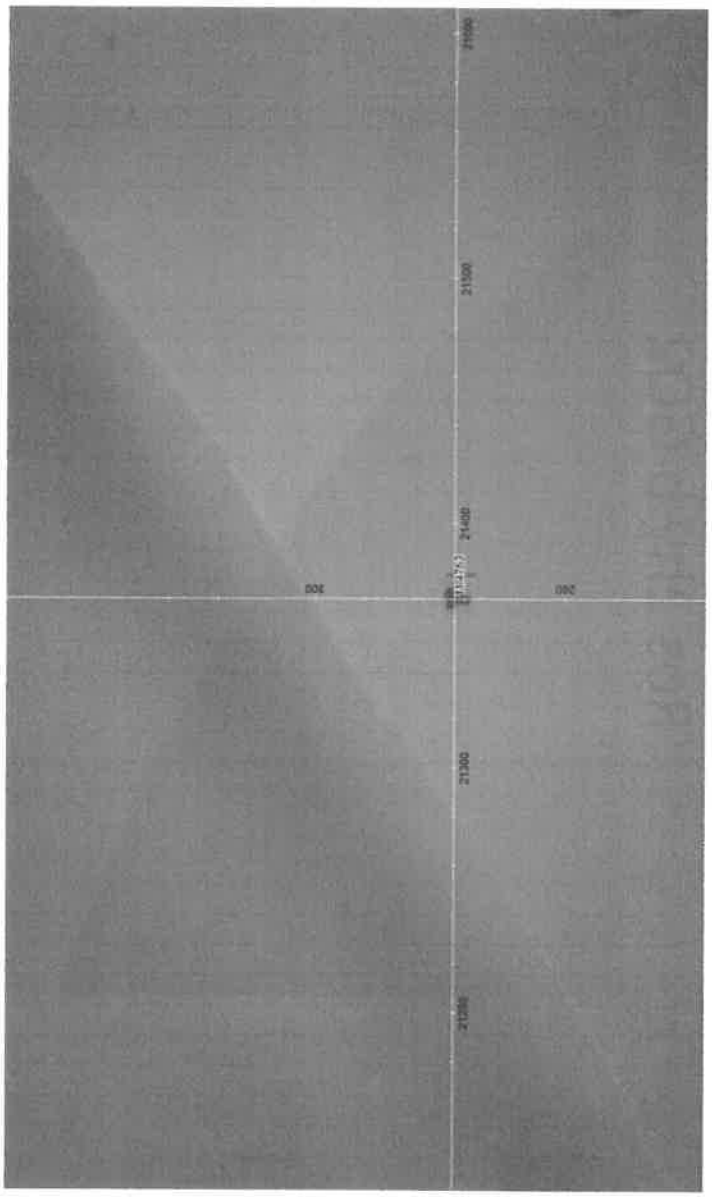
3. PFIZER 3 Ros
2hyGO1b

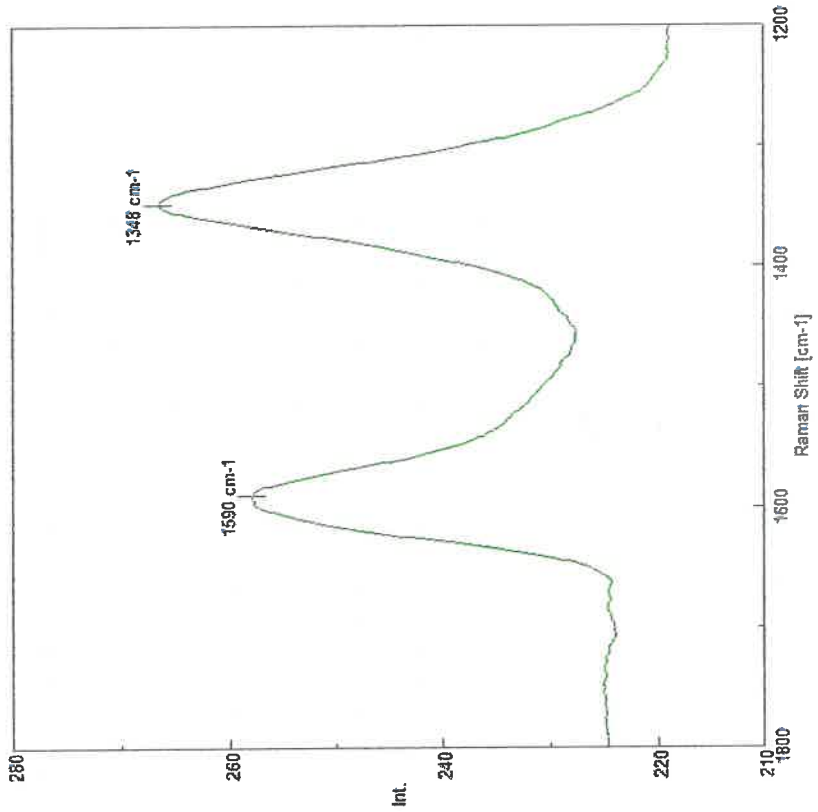
$I_D/I_G = 1.22$

4. PFIZER 3
Ros 2hy b GO2



4. PFIZER 3
Ros 2hy b GO2

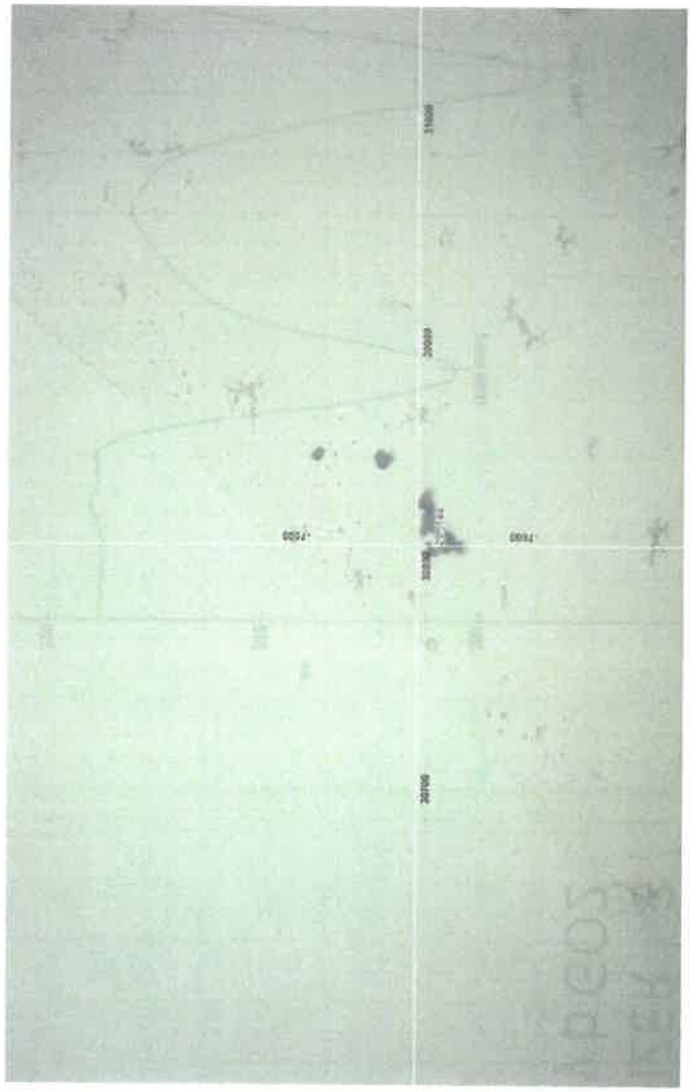




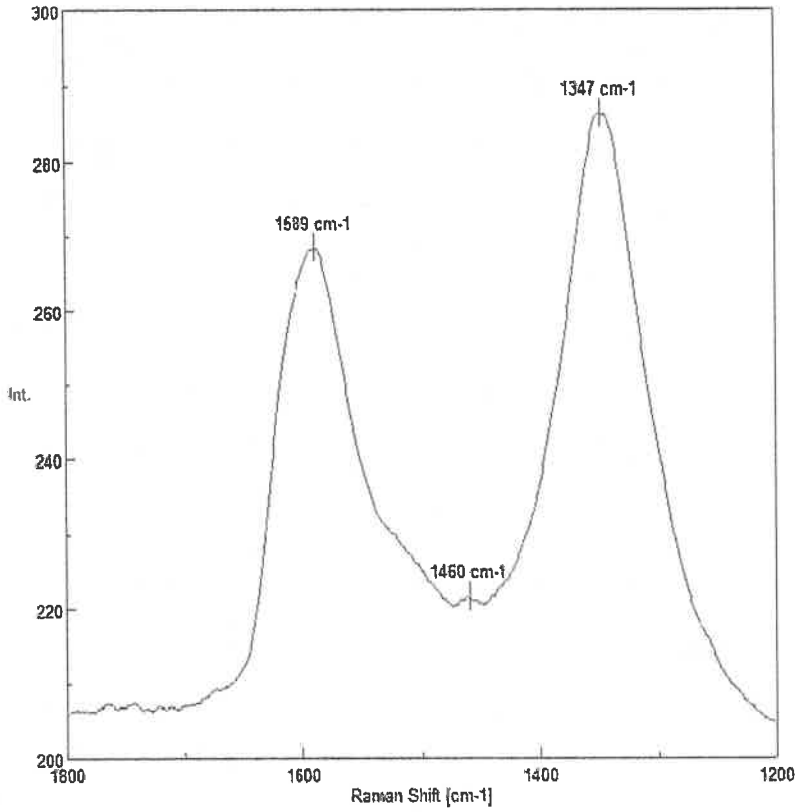
4. PFIZER 3
Ros 2hy b GO2

$I_D/I_G = 1.03$

5. ASTRAZENECA AZ MIT UP CARB1

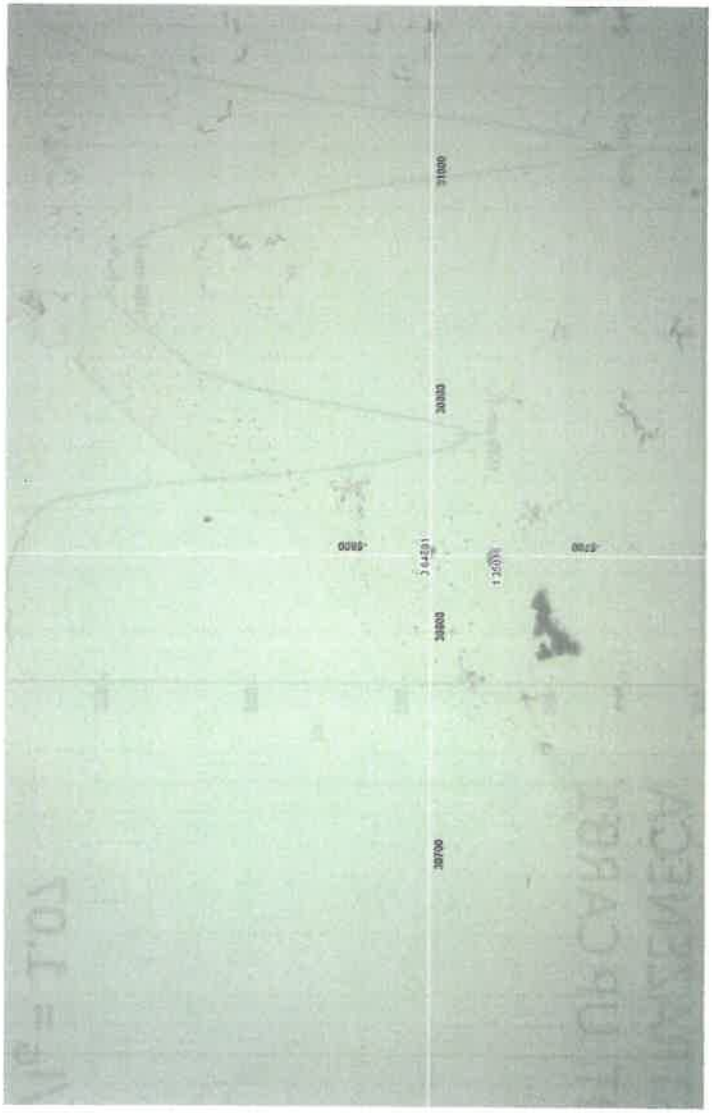


5. ASTRAZENECA AZ MIT UP CARB1

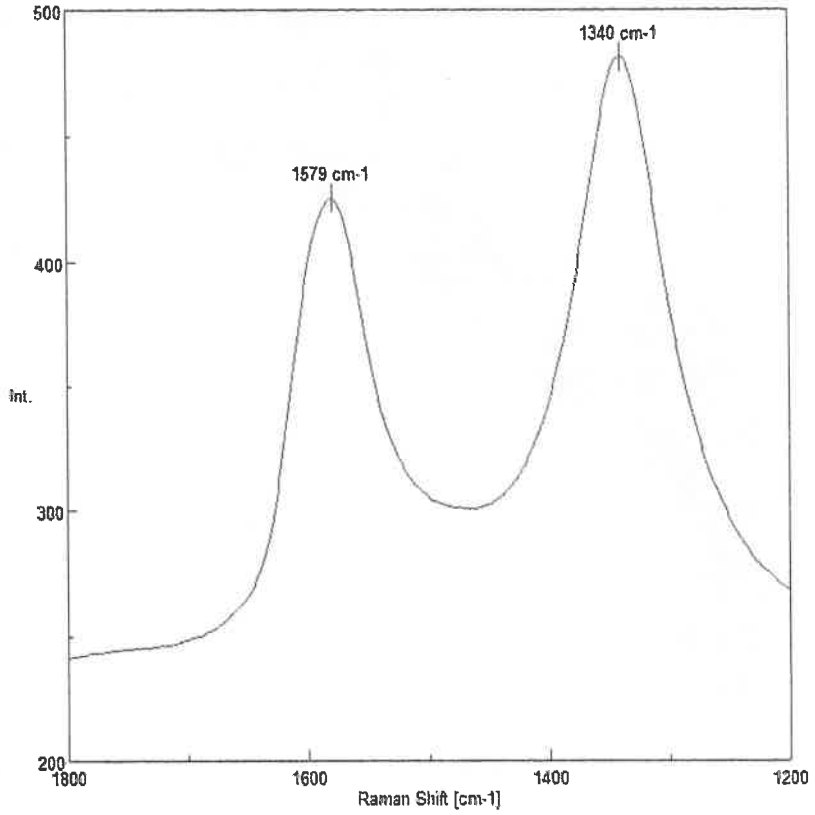


$I_D/I_G = 1.07$

6. ASTRAZENECA
AZ MIT UP CARB4

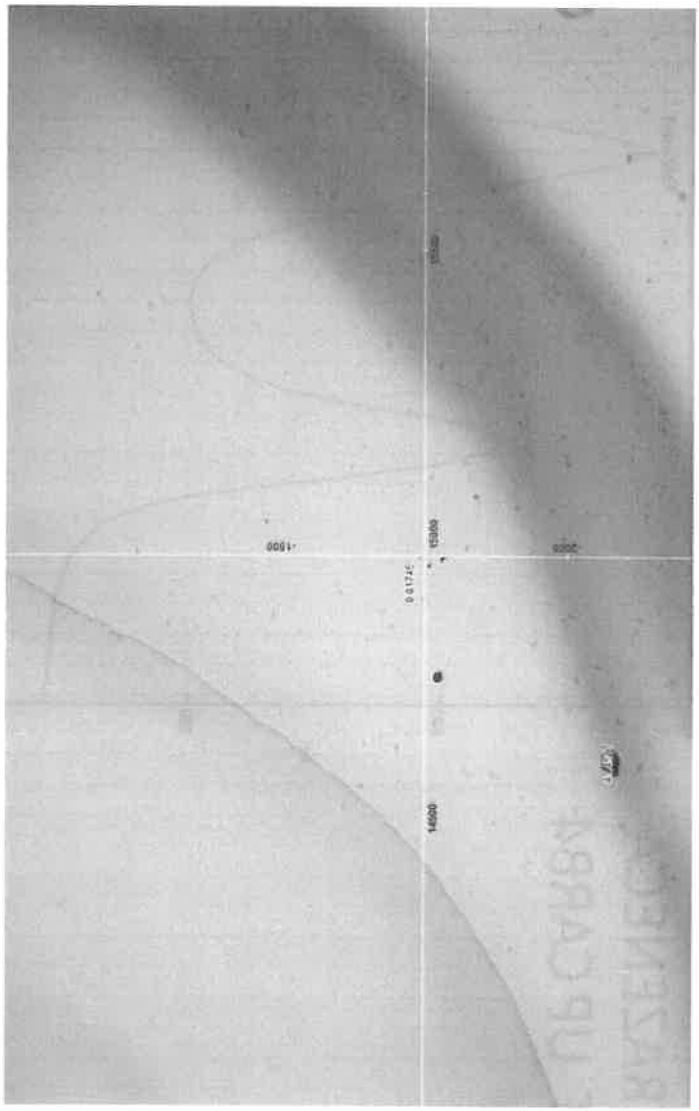


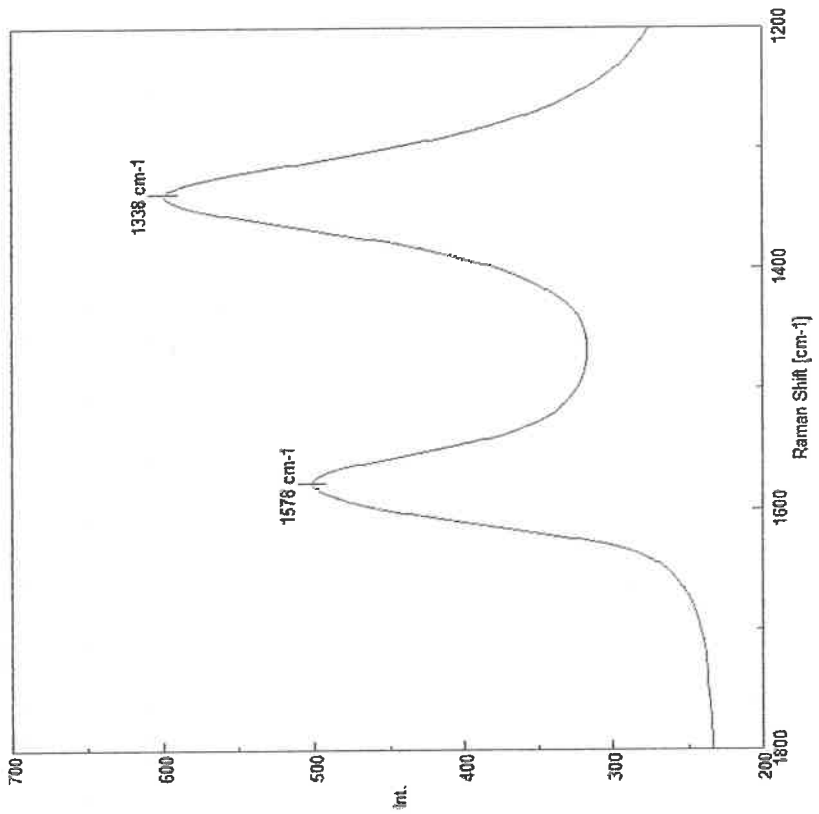
6. ASTRAZENECA
AZ MIT UP CARB4



$I_D/I_G = 1.14$

7. ASTRAZENECA
AZ MIT DOWN 2 CARB2

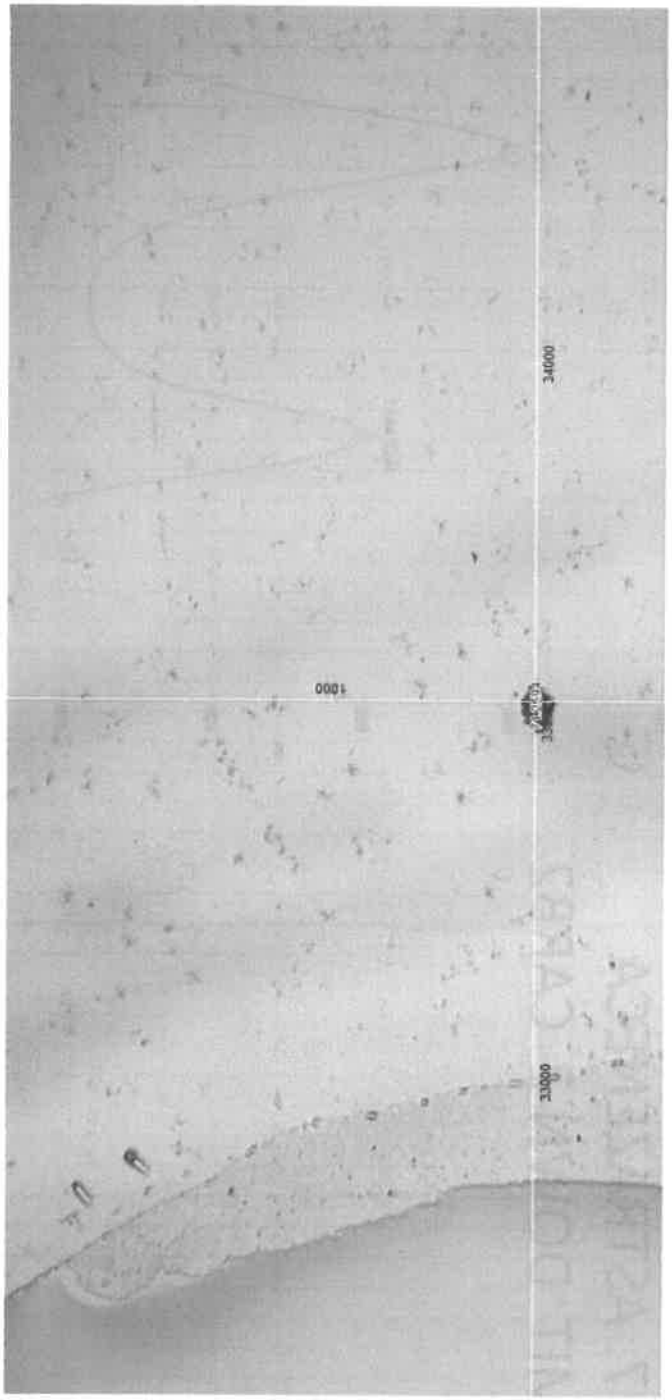


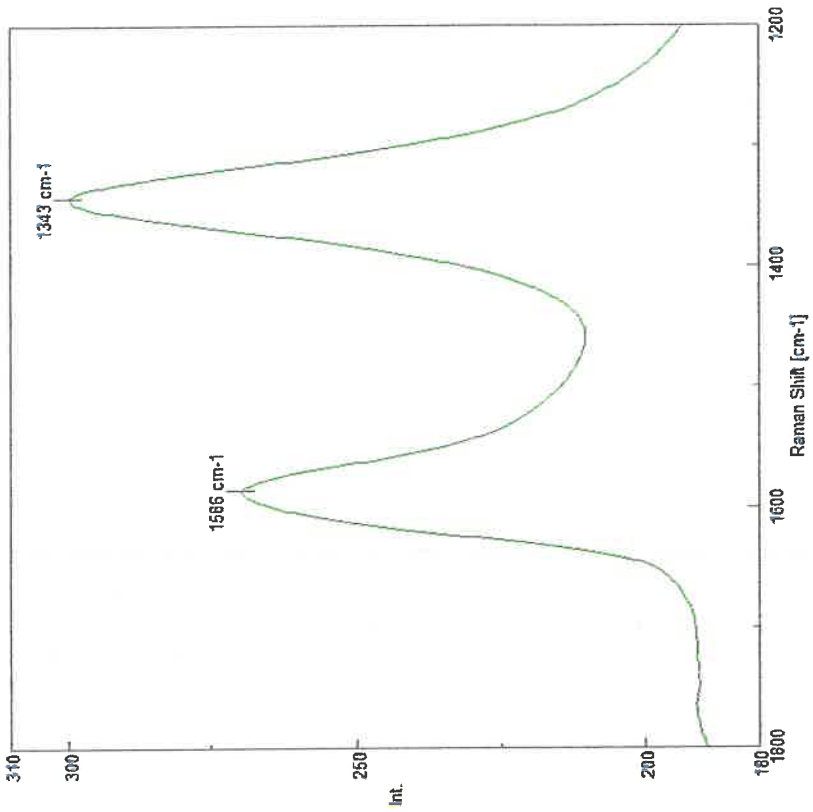


7. ASTRAZENECA
AZ MIT DOWN 2 CARB2

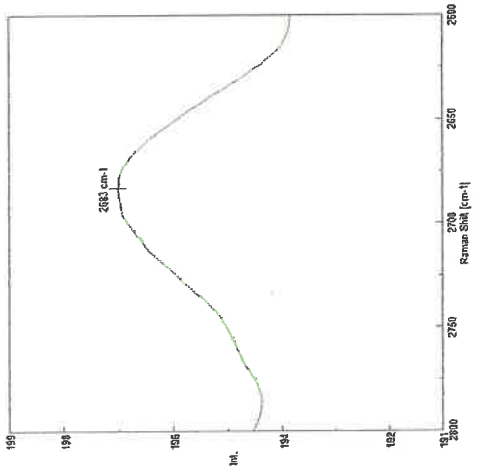
$I_D/I_G = 1.18$

8. MODERNA MOD lump1





8. MODERNA
MOD lump1

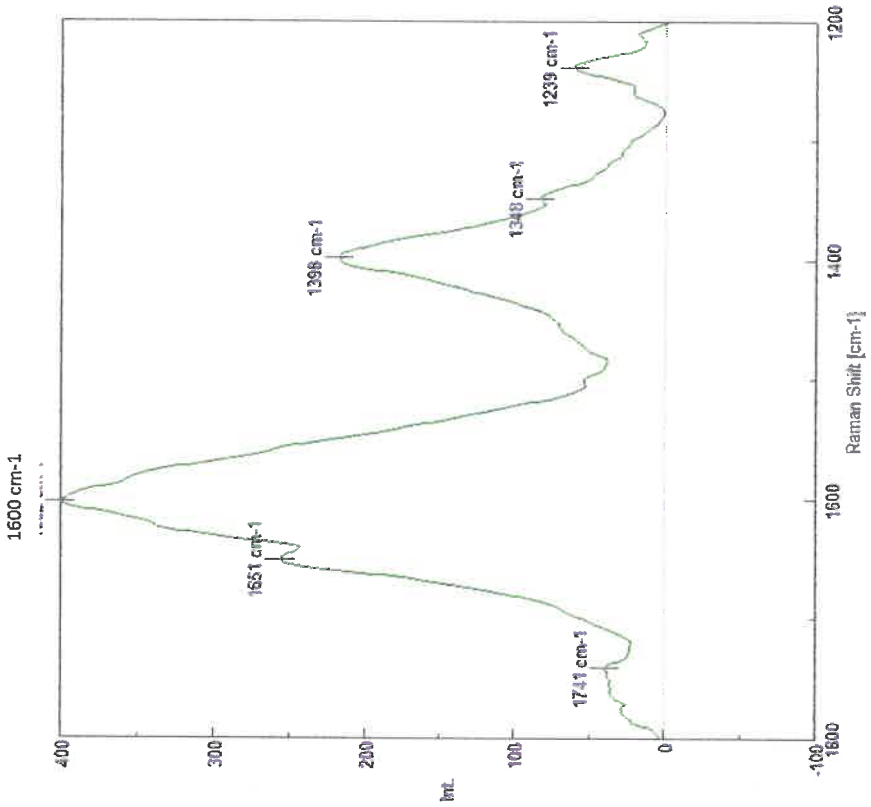


$I_D/I_G = 1.11$

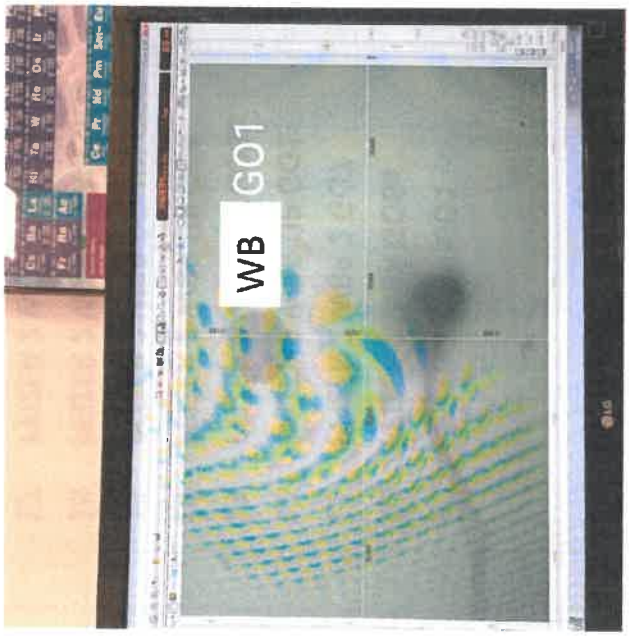
1.2. GROUP 2: OBJECTS WITH SIGNALS COMPATIBLE WITH GRAPHITE OR GRAPHENE DERIVATIVES

ANALYZED OBJECTS
GROUP 2

9 PFIZER 2 WBR GO1
10 PFIZER 2 WBR GO6a
11 PFIZER 2 WBR 2 GO7
12 PFIZER 2 WBR UP GO1
13 PFIZER 2 WBR UP GO3b
14 PFIZER 2 WBR UP GO4
15 PFIZER 2 WBR DOWN GO2
16 PFIZER 2 WBR DOWN GO3
17 PFIZER 2 WBR DOWN GO5
18 PFIZER 3 ROS OBJ 1
19 PFIZER 3 ROS 2 OBJ 1
20 PFIZER 3 ROS 2 OBJ 2
21 PFIZER 4 Pdown lump1
22 PFIZER 4 Pdown lump2
23 PFIZER 4 Pdown lump3
24 ASTRAZENECA AZ MIT UP CARB5
25 ASTRAZENECA AZ MIT UP CARB6
26 JANSSEN JAN GO1
27 JANSSEN JAN GO3
28 JANSSEN JAN GO4

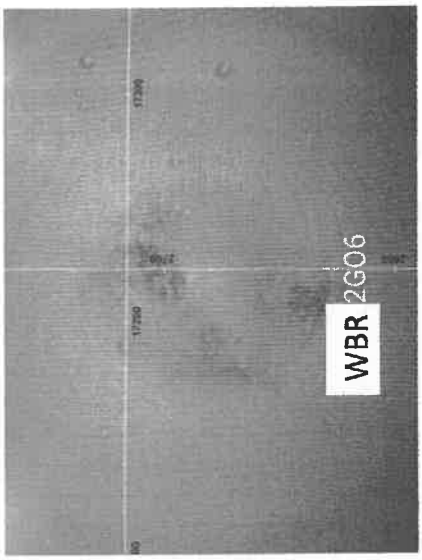


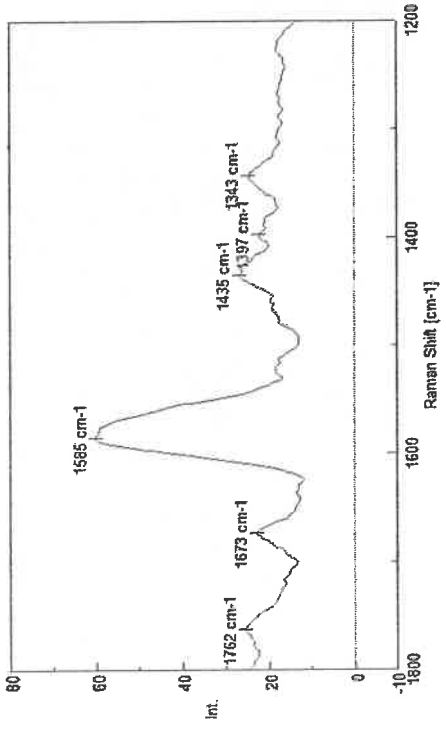
9. PFIZER 2
WBR GO1



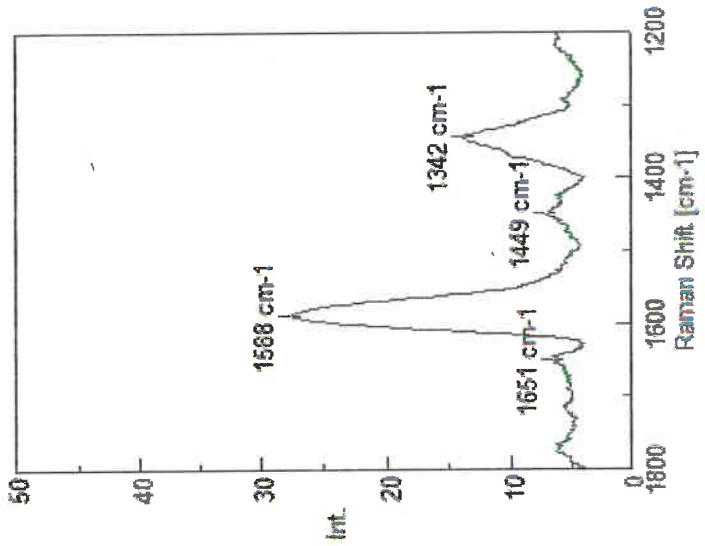
Notice! This is a photo of the screen capturing LEGION.

28. PFIZER 2
WBR GO6a



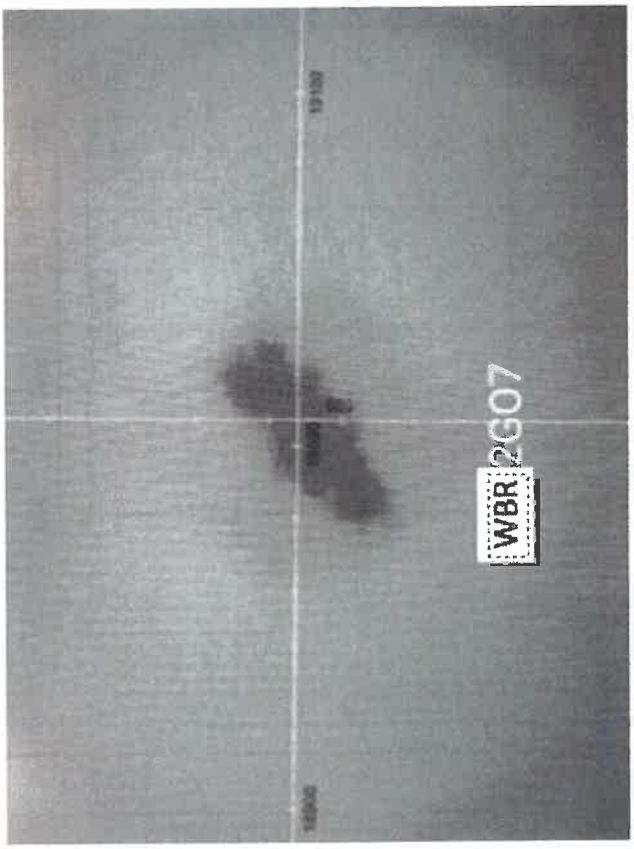


11. PFIZER 2
WBR2 GO7



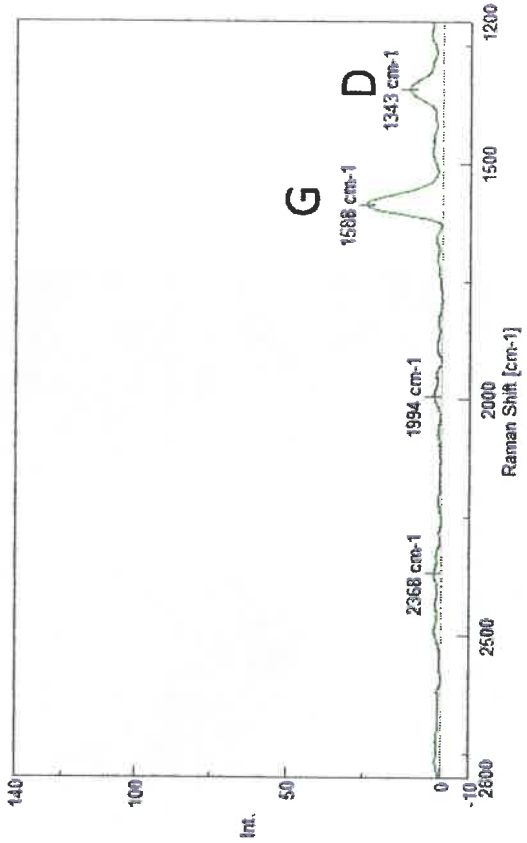
30

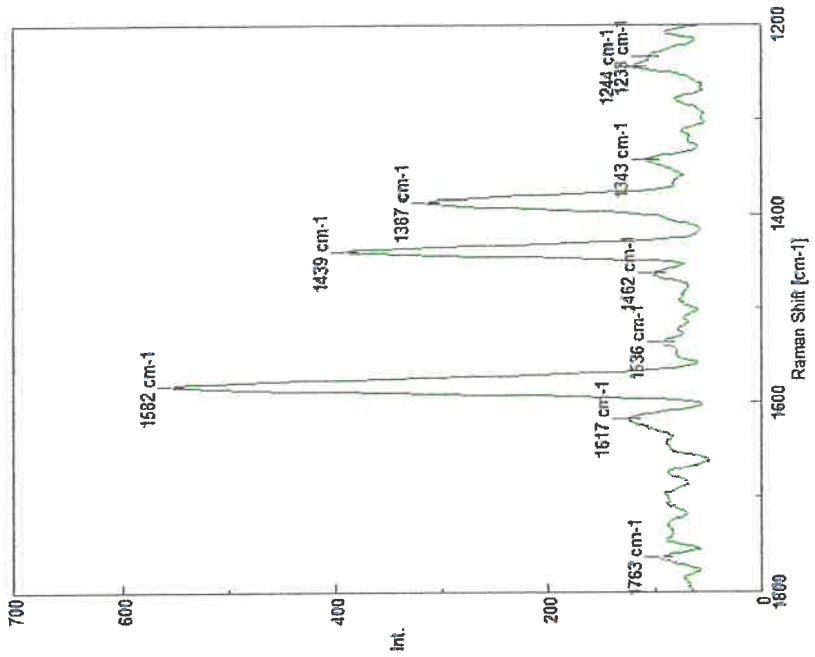
11. PFIZER 2
WBR GO 7



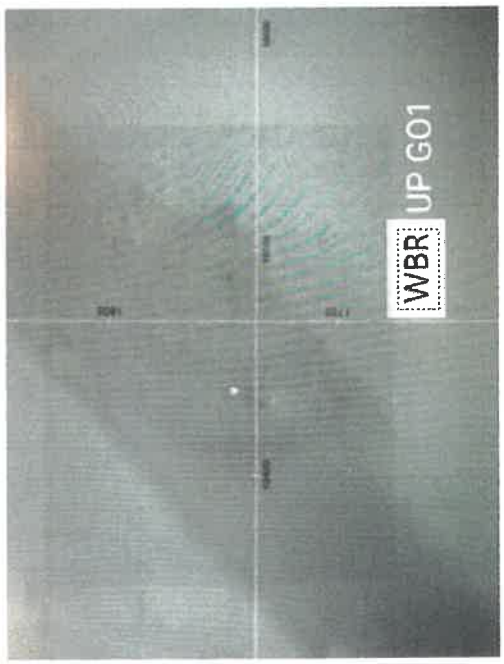
I_D/I_G = 0.48

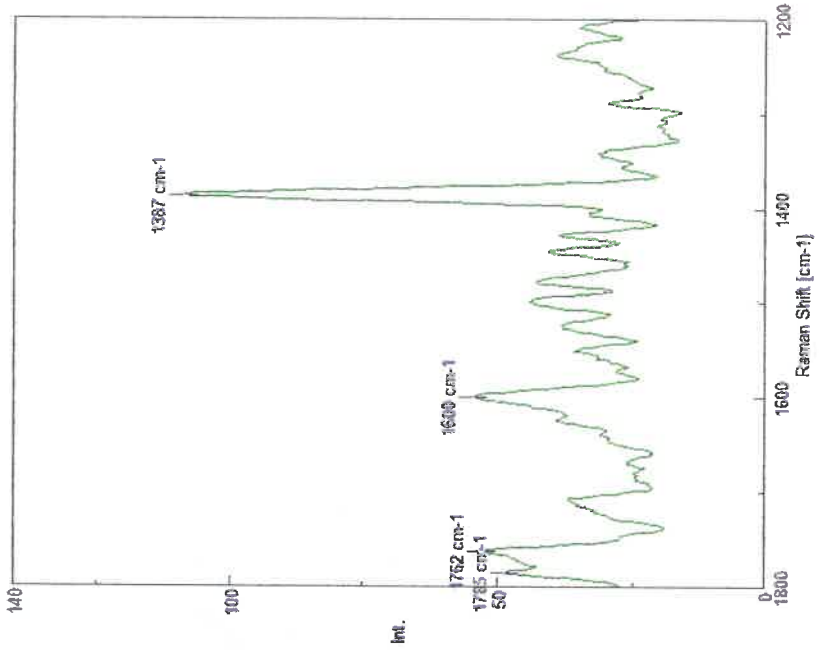
11. PFIZER 2
WBRGO7(1200-2800cm^{-1})



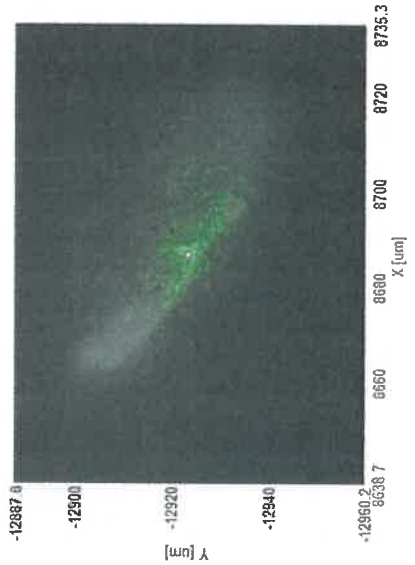


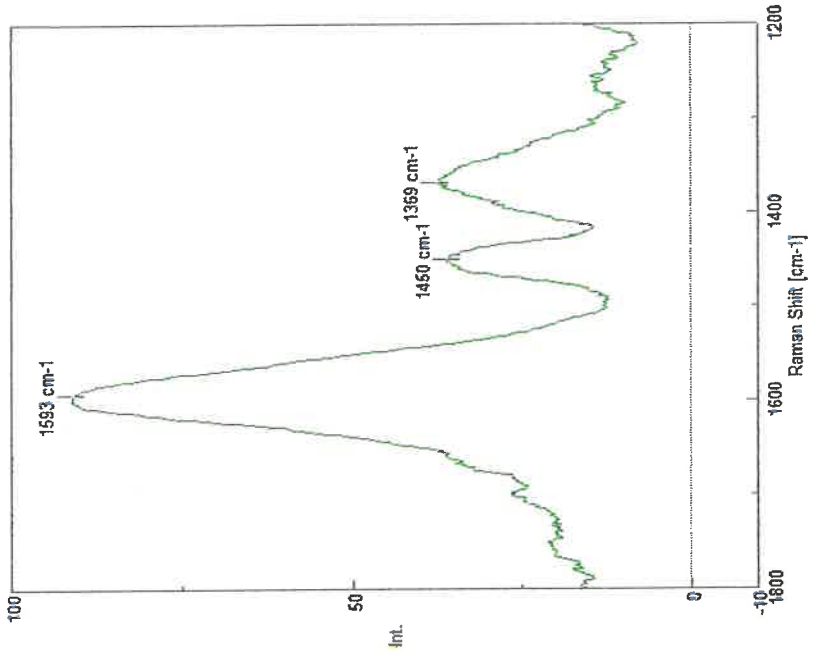
12. PFIZER 2
WBR UP GO1



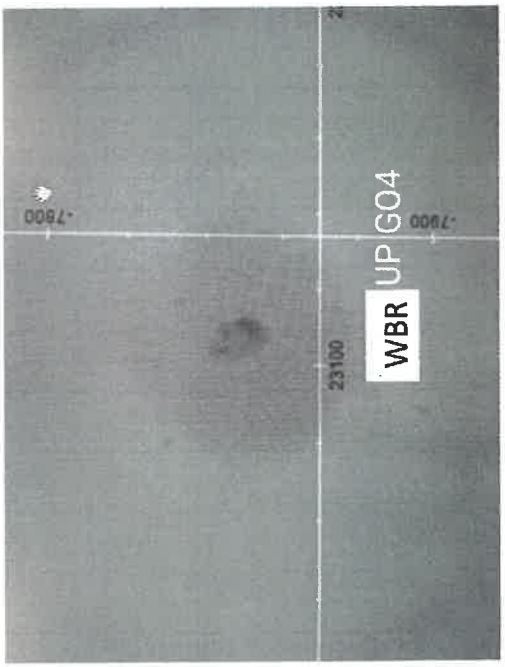


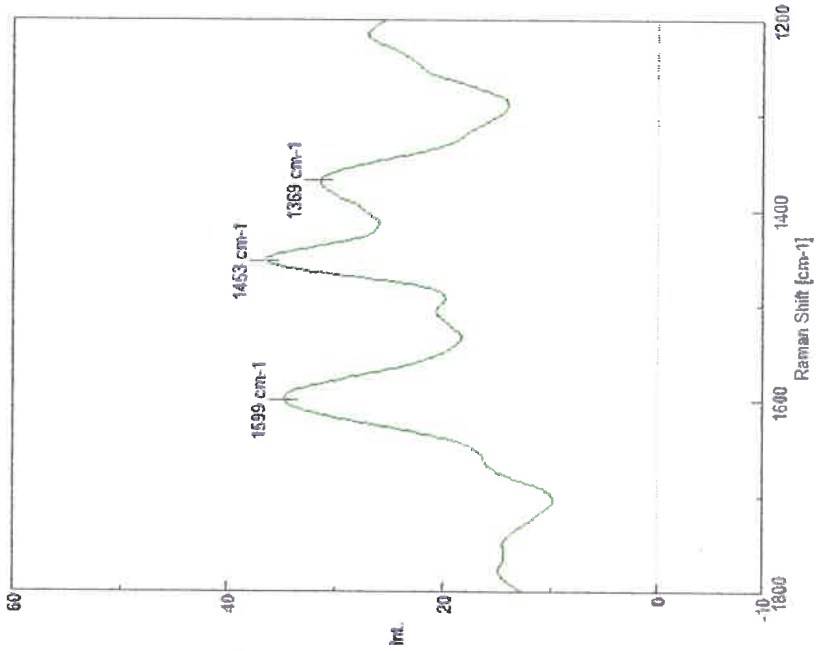
13. PFIZER
WBR UP GO3b





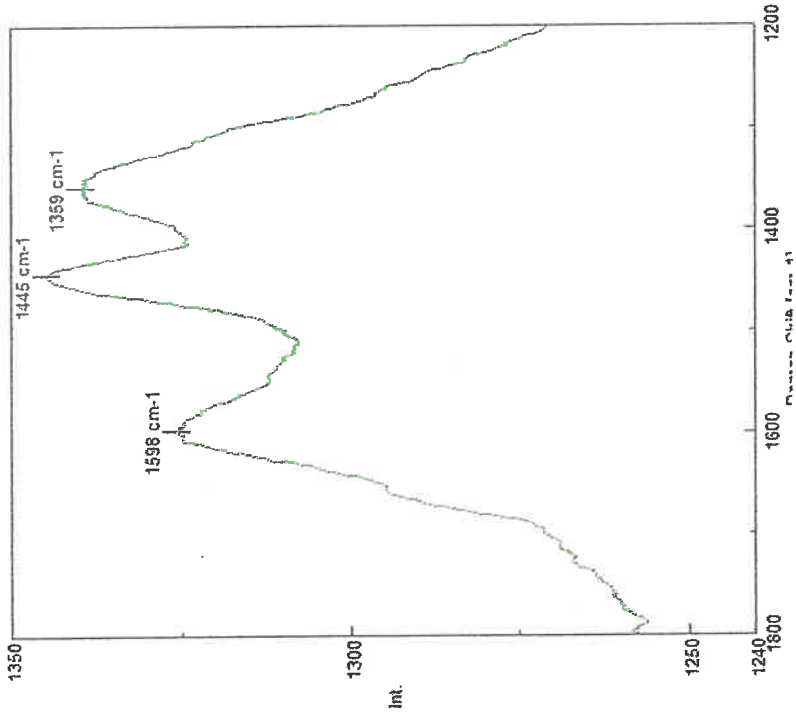
14. PFIZER 2
WBR UP GO4



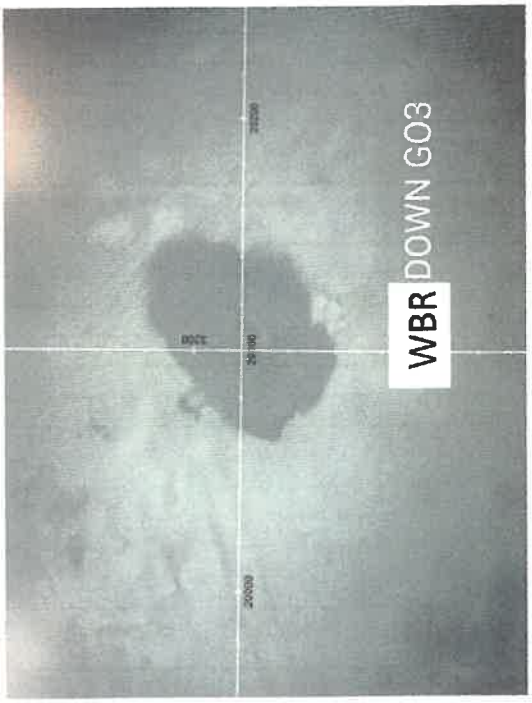


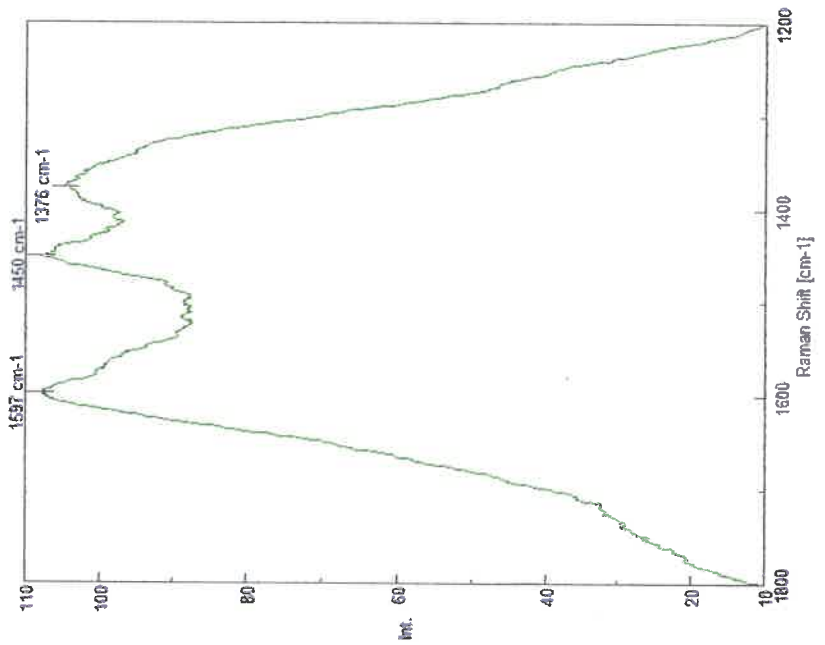
15. PFIZER 2
WBR DOWN GO2

Photo N/A



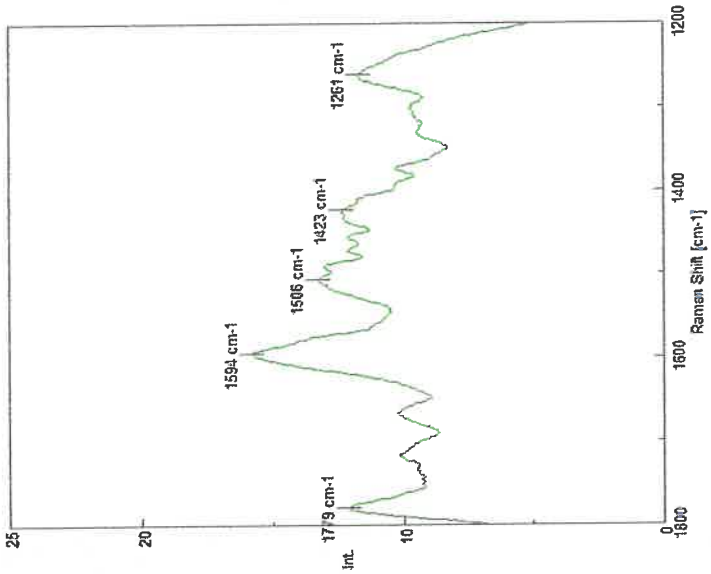
16. FIZER 2
WBR DOWN GO3

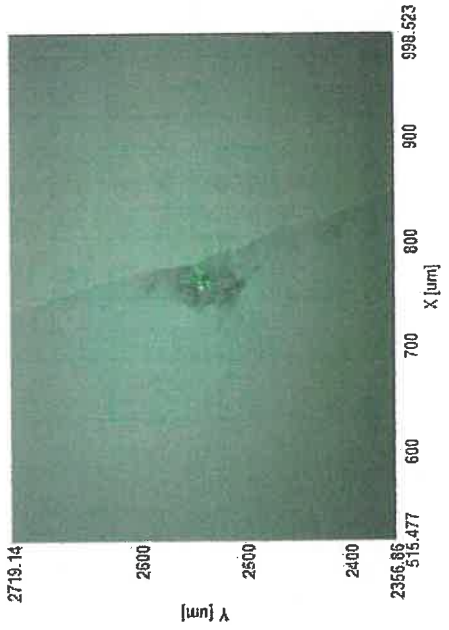




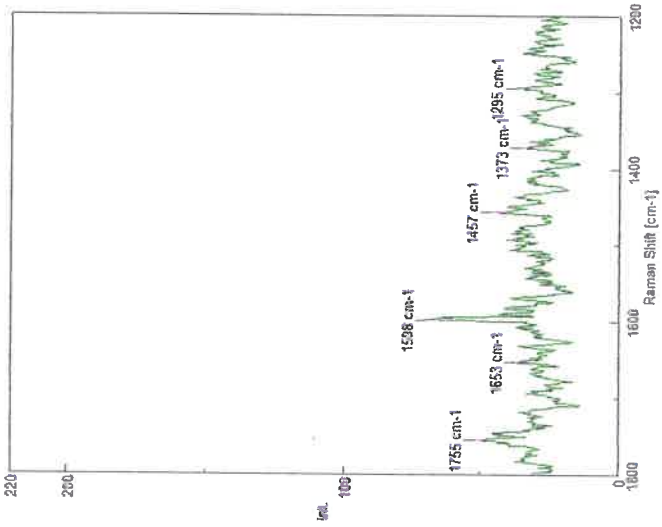
17. PFIZER 2
WBR DOWN GO5

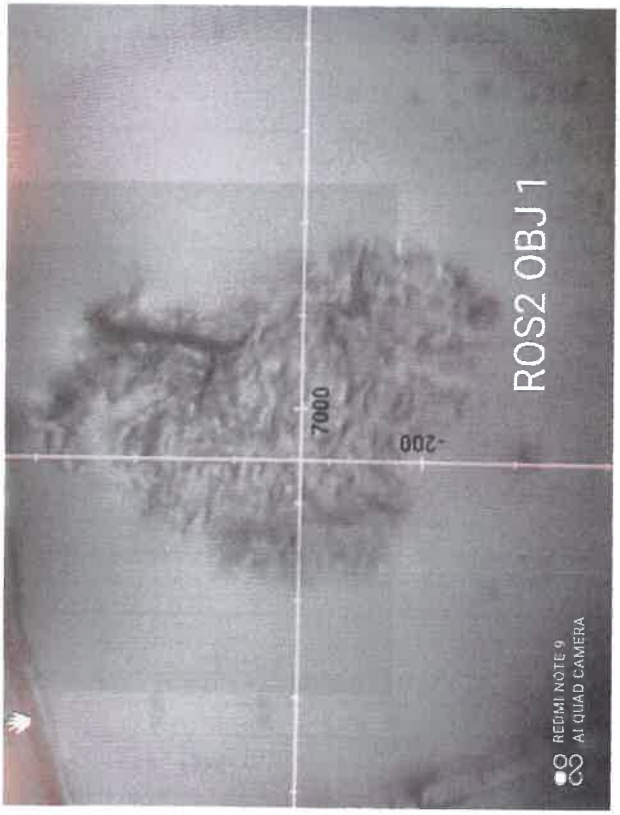
18. PFIZER 3
Ros OBJ 1

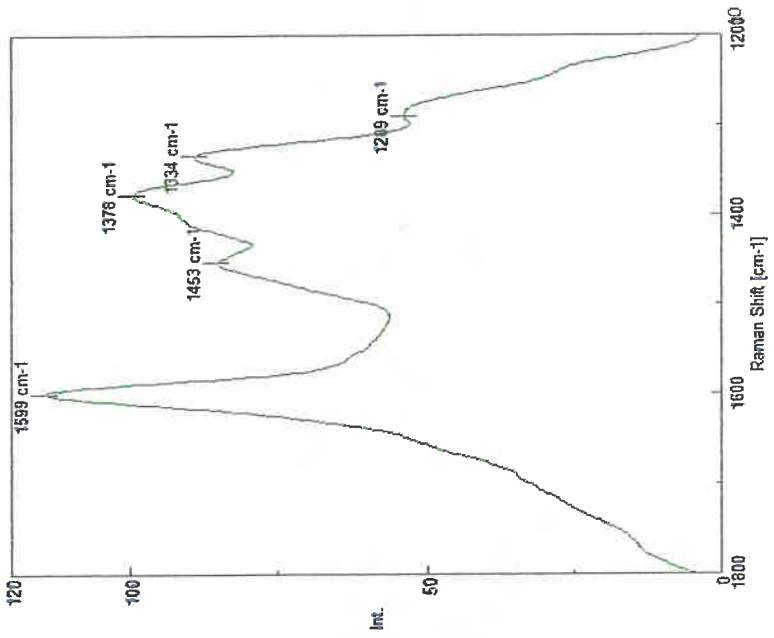




19. PFIZER 3
ROS 2 OBJ 1

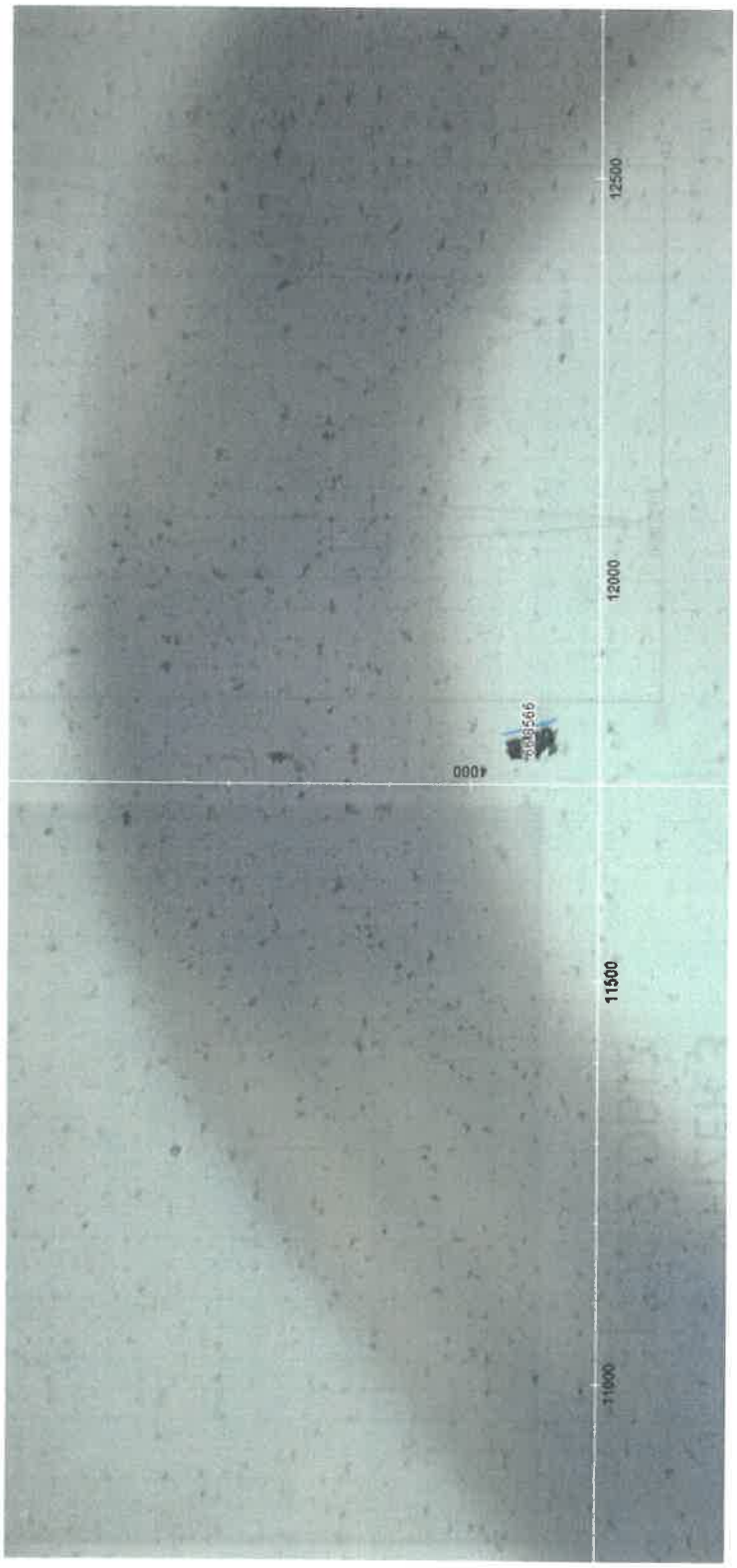


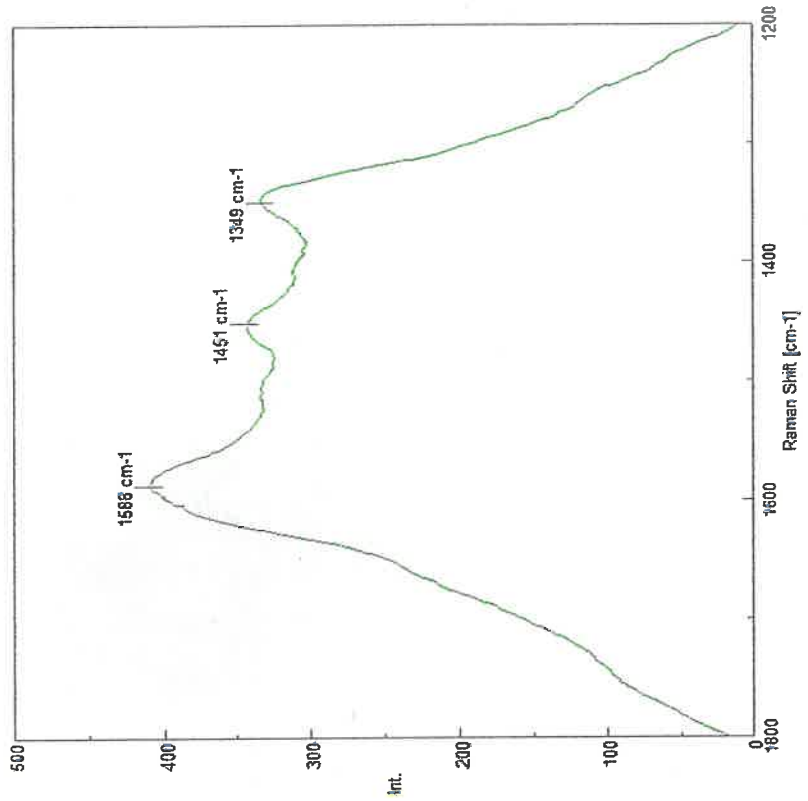




20. PFIZER 3
ROS 2 OBJ2

21. PFIZER 4: Pdown lump1

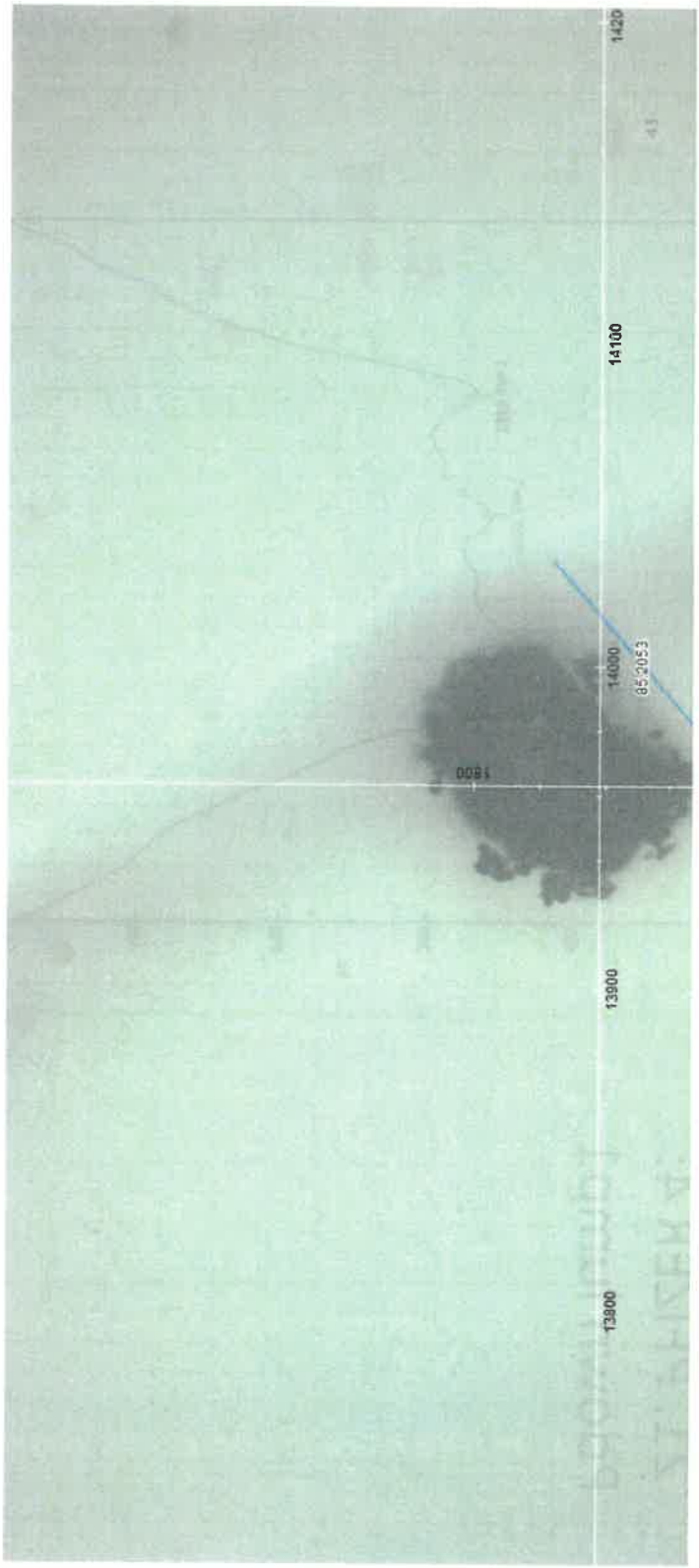


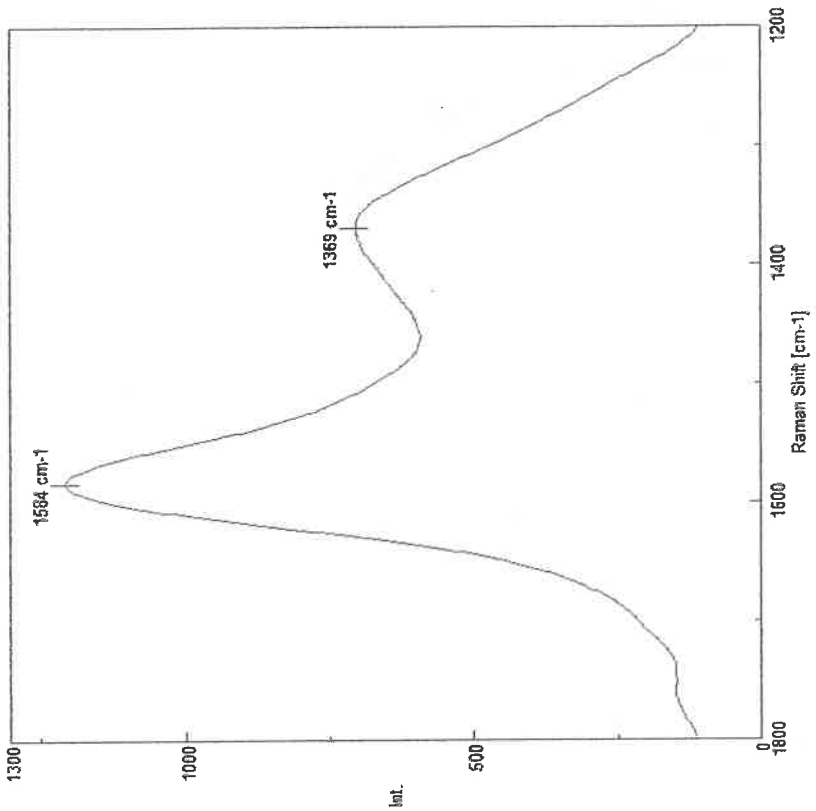


21. PFIZER 4:
Pdown lump1

22. PFIZER 4

Pdown lump2

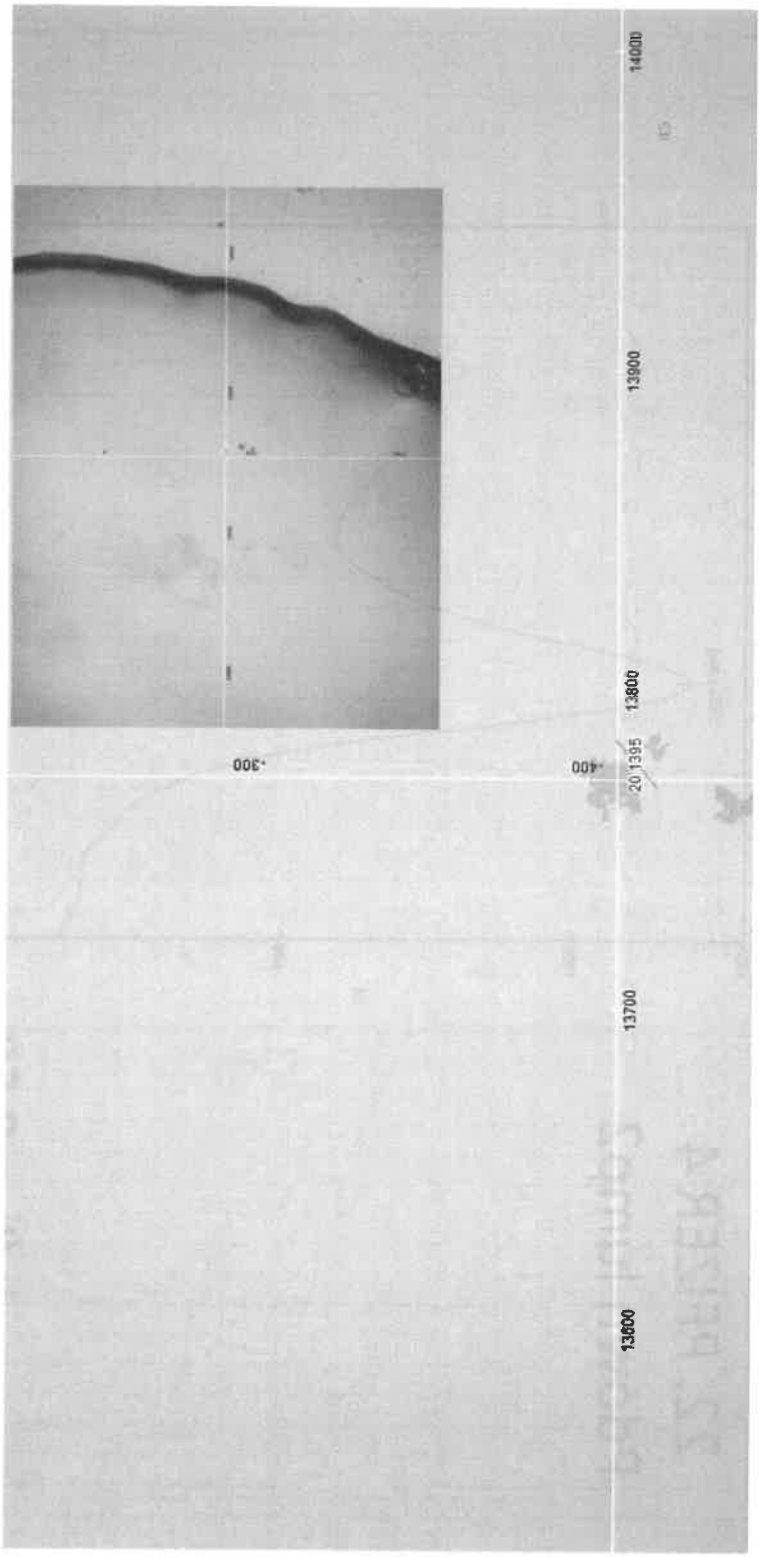


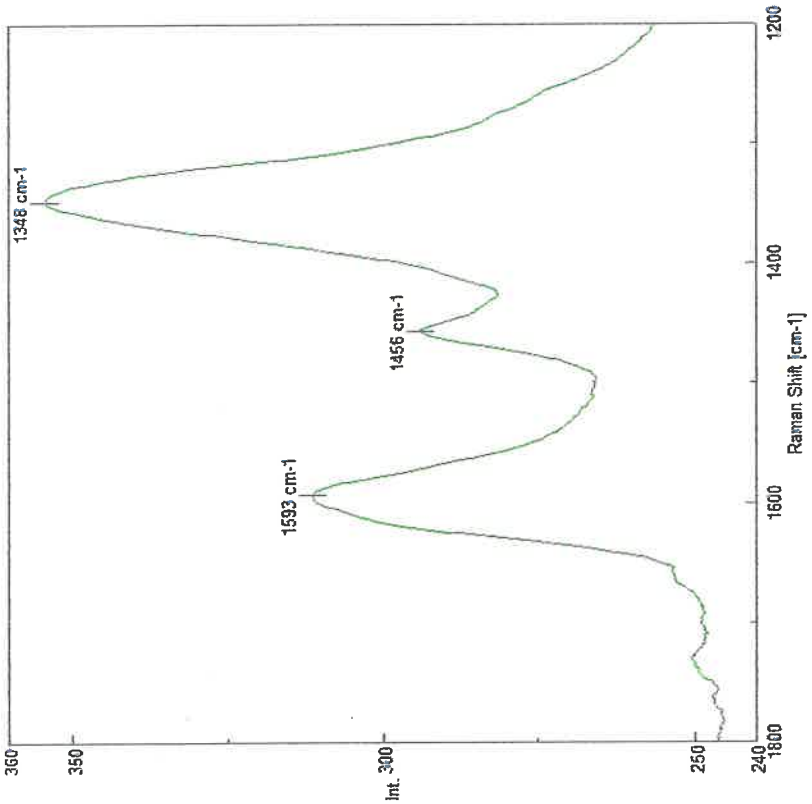


22. PFIZER 4
Pdown lump2

$I_D/I_G = 0.58$

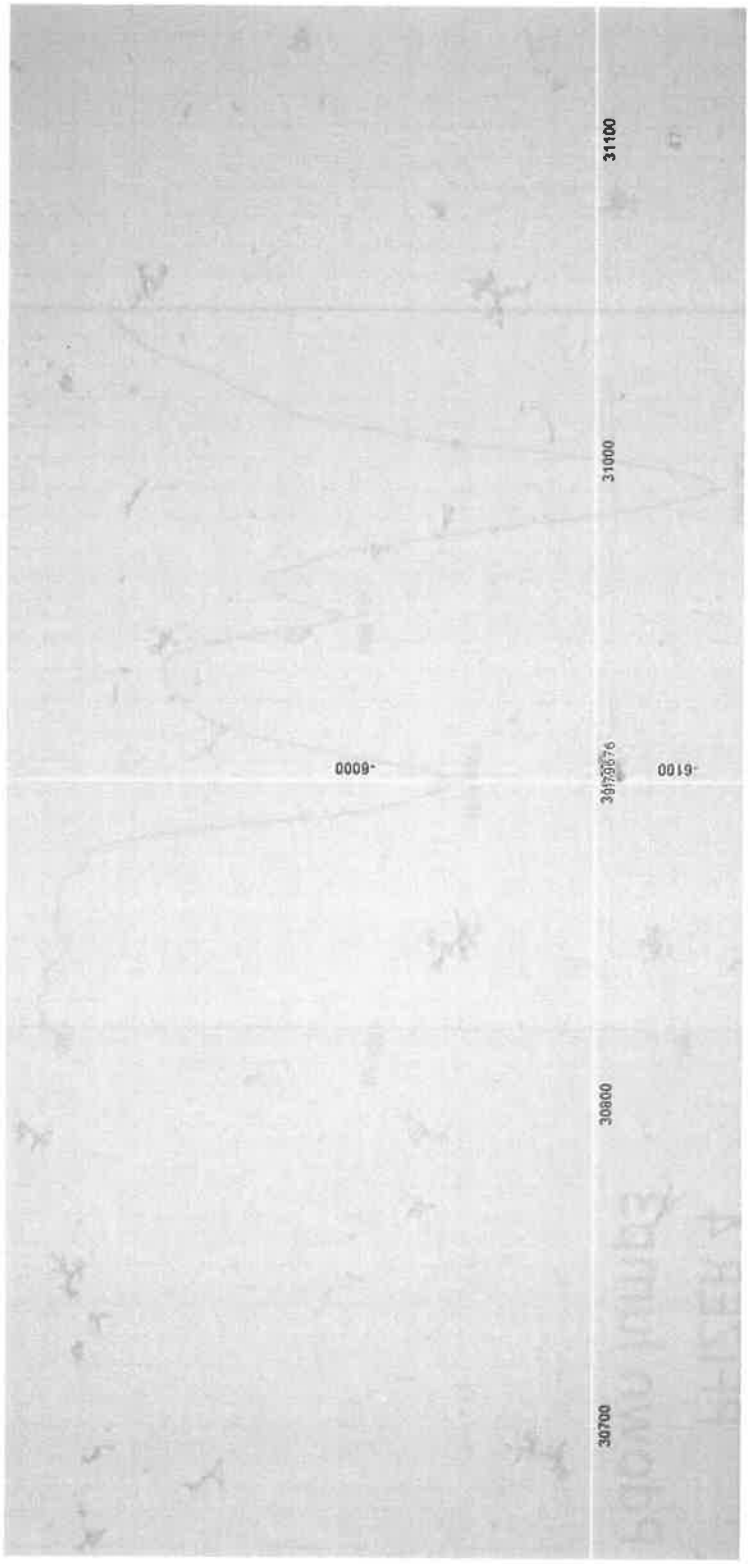
23. PFIZER 4
Pdown lump3



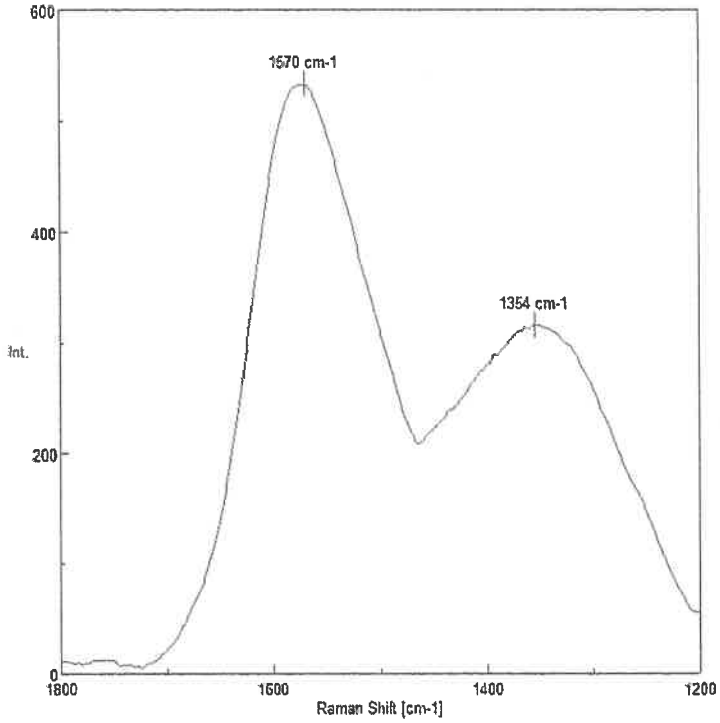


23. PFIZER 4
Pdown lump3

24. ASTRAZENECA AZ MIT UP CARB5

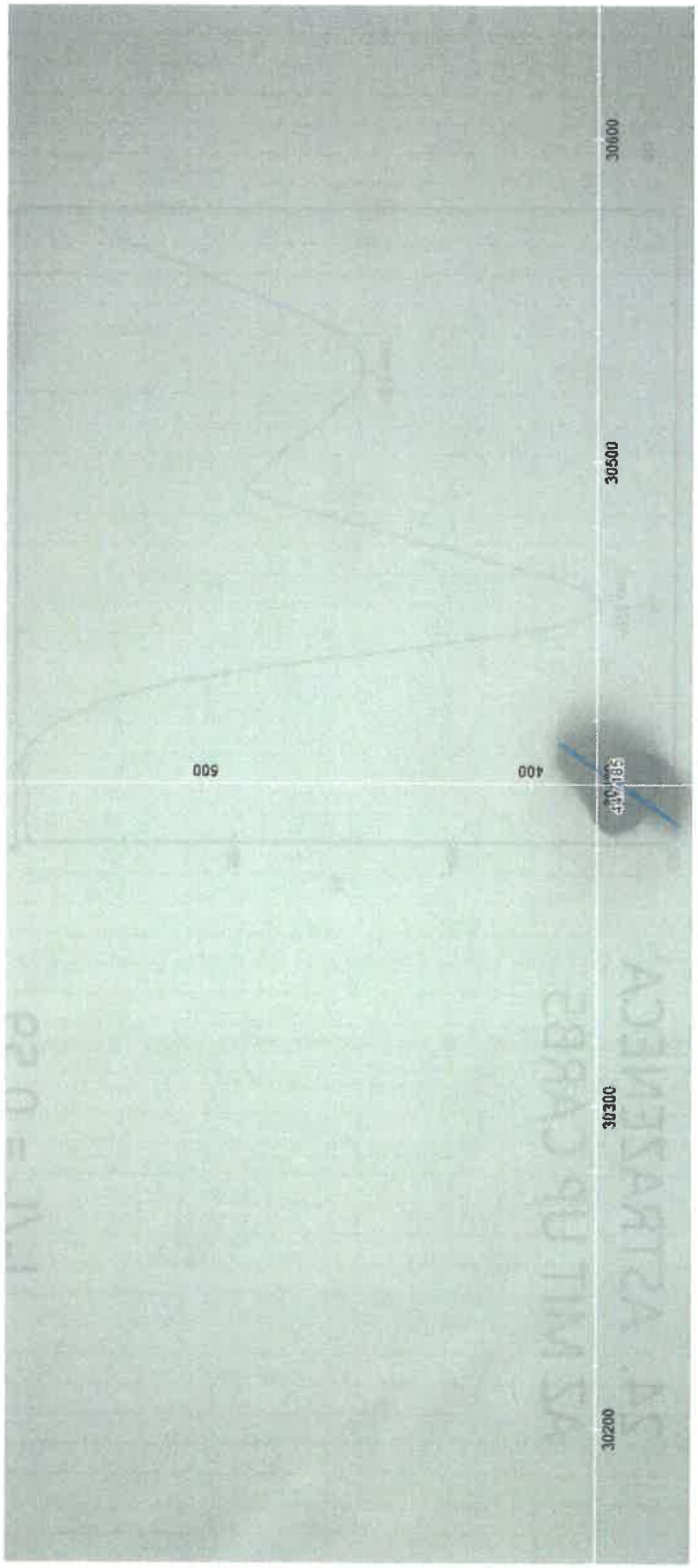


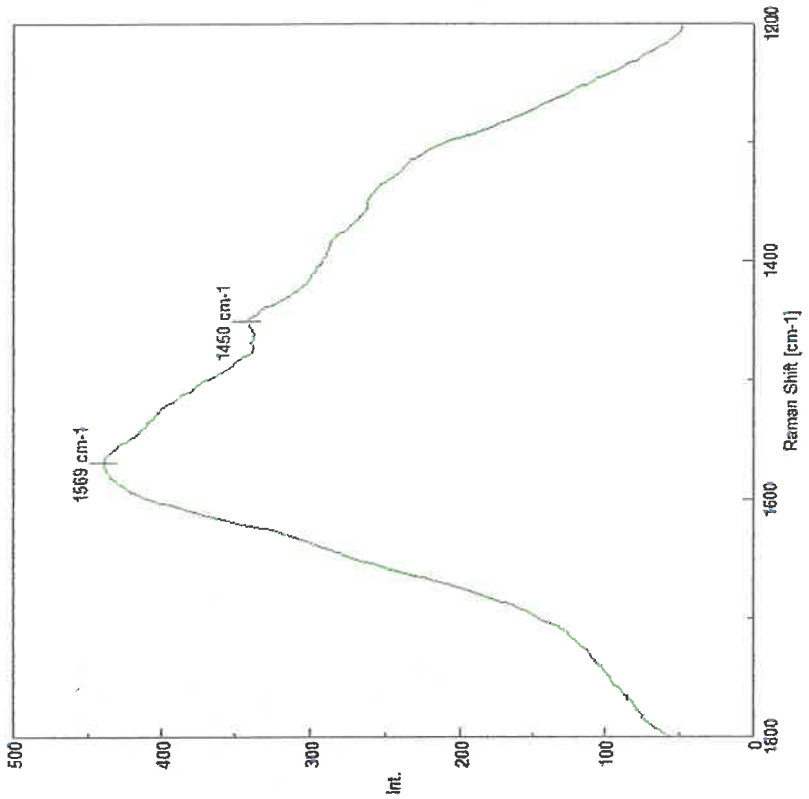
24. ASTRAZENECA AZ MIT UP CARB5



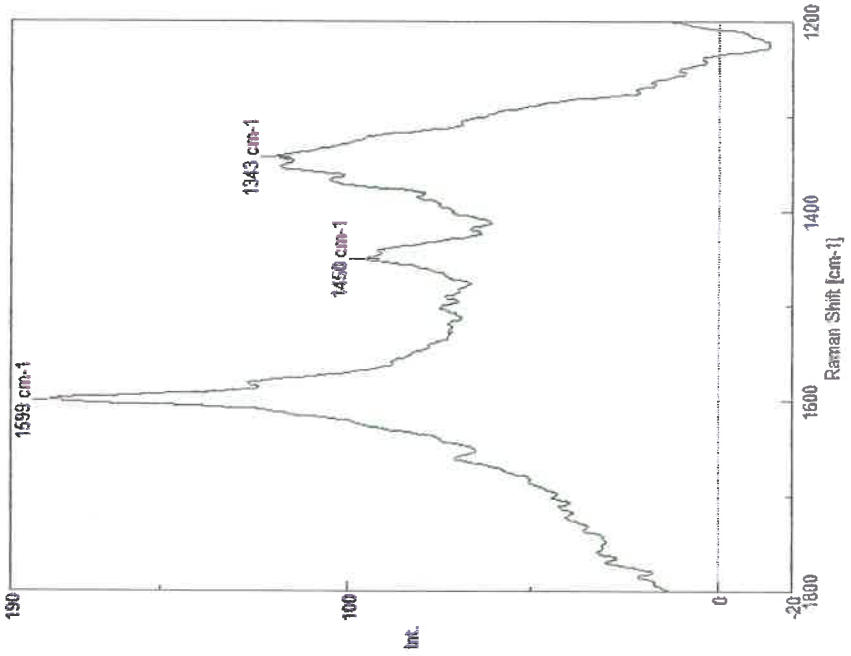
$I_D/I_G = 0.59$

25. ASTRAZENECA
AZ MIT UP CARB6

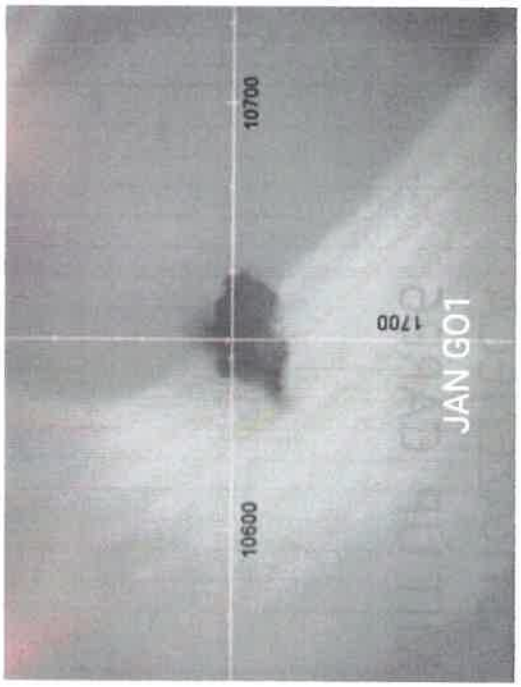


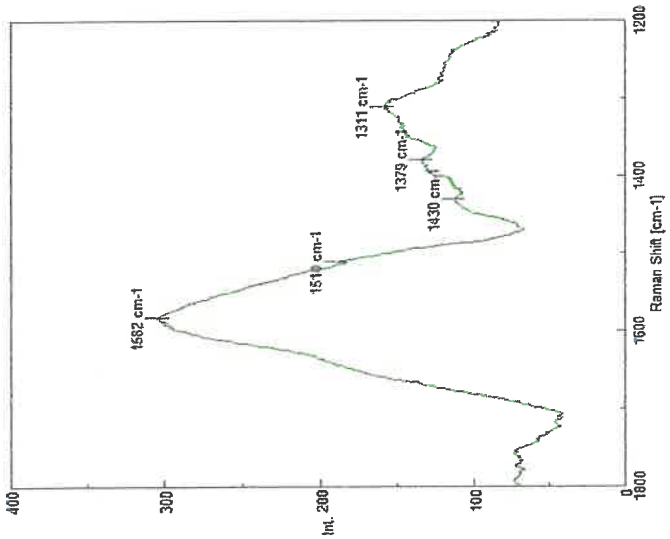


25. ASTRAZENECA
AZ MIT UP CARB6

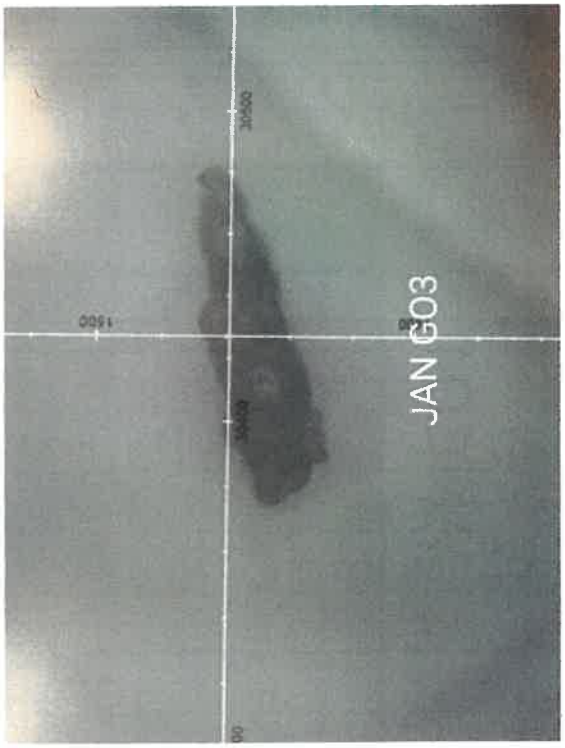


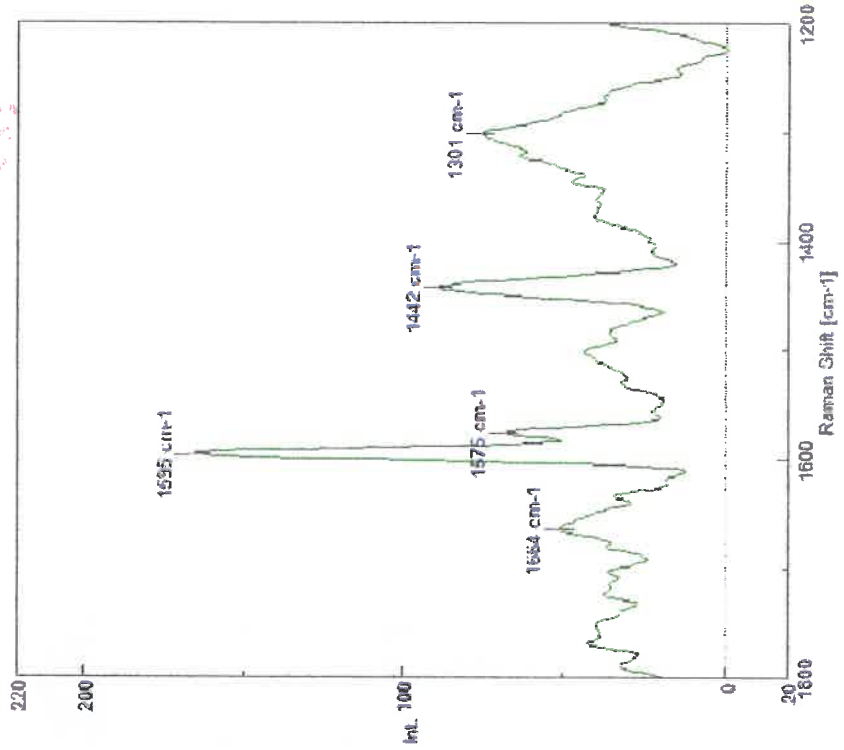
26. JANSSEN
JAN GO1





27. JANSSEN
JAN GO3





28. JANSSEN
JAN GO4

COVID-19 mRNA VACCINE

RISK MANAGEMENT PLAN (RMP)

For a summary of the RMP, please refer to PART VI.

COMIRNATY (COVID-19 mRNA VACCINE)

RISK MANAGEMENT PLAN

RMP Version number: 2.0

Data lock point for this RMP: See below

12-15 years of age	13 March 2021 (Pfizer Clinical Database)
	28 February 2021 (Pfizer Safety Database)
16 years and older	14 November 2020 (Pfizer Clinical Database)
	02 October 2020 (BioNTech Clinical Database)
	17 December 2020 (Pfizer Safety Database for Anaphylaxis safety concern)

Date of final sign off: 29 April 2021

Rationale for submitting an updated RMP: This Type II variation includes an updated Comirnaty EU-RMP, focusing data on paediatric individuals 12 and 15 years of age. Upon CHMP positive opinion received on 15 April 2021 for the type II variation EMEA/H/C/005735/II/0019, the 3 vaccine effectiveness studies (C4591014, WI235284 and WI255886) were added in Part A of Annex 3.

Summary of significant changes in this RMP:

RMP Part/Module	Major Change (s)
PART I. PRODUCT(S) OVERVIEW	Proposed indication updated to include individuals aged 12-15 years.
PART II. SAFETY SPECIFICATION	
Module SI. Epidemiology of the Indication(s) and Target Populations	Epidemiology data updated with the most recent data available including data on individuals aged 12-15 years.
Module SII. Non-Clinical Part of the Safety Specification	Editorials.
Module SIII. Clinical Trial Exposure	Exposure data for participants 12-15 years of age added.
Module SIV. Populations Not Studied in Clinical Trials	Text updated with data for participants 12-15 years of age.
Module SV. Post-Authorisation Experience	Post authorisation exposure data added.
Module SVI. Additional EU Requirements for the Safety Specification	Editorials.
Module SVII. Identified and Potential Risks	Data from the clinical trial database and safety database for participants 12-15 years of age added only for the Important Identified and Potential Risks.

RMP Part/Module	Major Change (s)
Module SVIII. Summary of the Safety Concerns	No changes made.
PART III. PHARMACOVIGILANCE PLAN (INCLUDING POST AUTHORISATION SAFETY STUDIES)	Editorials.
PART IV. PLANS FOR POST AUTHORISATION EFFICACY STUDIES	No changes made.
PART V. RISK MINIMISATION MEASURES (INCLUDING EVALUATION OF THE EFFECTIVENESS OF RISK MINIMISATION ACTIVITIES)	No changes made.
PART VI. SUMMARY OF THE RISK MANAGEMENT PLAN	Indication updated to include individuals aged 12-15 years.
PART VII. ANNEXES TO THE RISK MANAGEMENT PLAN	Annex 3: - C4591014, WI235284 and WI255886 added in Part A. Annex 8: - Changes respect version 1.1 added.

Other RMP versions under evaluation:

None

Details of the currently approved RMP

Version number: 1.1

Approved with procedure: EMEA/H/C/005735/II/0019

Date of approval (opinion date): 15 April 2021

QPPV name[1]: Barbara De Bernardi

QPPV oversight declaration: The content of this RMP has been reviewed and approved by the marketing authorisation applicant's QPPV. The electronic signature is available on file.

[1] QPPV name will not be redacted in case of an access to documents request; see HMA/EMA Guidance document on the identification of commercially confidential information and personal data within the structure of the marketing-authorisation application; available on EMA website http://www.ema.europa.eu

LIST OF ABBREVIATIONS

Abbreviation	Definition of Term
AE	adverse event
AESI	Adverse event of special interest
A:G	albumin:globulin
ARDS	acute respiratory distress syndrome
BALB/c	bagg albino
BC	Brighton Collaboration
BLA	biologics license application
BMI	body mass index
BP	blood pressure
CD4, CD8	cluster of differentiation-4, 8
CDC	Centers for Disease Control and Prevention
CI	confidence interval
COPD	chronic obstructive pulmonary disease
COVID-19	coronavirus disease 2019
CSR	clinical study report
CT	clinical trial
DART	developmental and reproductive toxicology
DCA	data capture aid
DLP	data-lock point
ECDC	European Center for Disease Control
EEA	European Economic Area
eGFR	estimated glomerular filtration rate
EHR	electronic health records
EMA	European Medicines Agency
EUA	emergency use authorisation
EU	European Union
FDA	(US) Food and Drug Administration
GLP	good laboratory practice
HbA1c	glycated haemoglobin
HBV	hepatitis b virus
HCV	hepatitis c virus
HIV	human immunodeficiency virus
IA	interim analysis
ICU	intensive care unit
IFN	interferon
IL-4	interleukin-4
IM	intramuscular(ly)
IMD	index of multiple deprivation
IND	investigational new drug
LNP	lipid nanoparticle
MAA	marketing authorisation applicant
MedDRA	Medical Dictionary for Regulatory Activities

Abbreviation	Definition of Term
MERS-CoV	middle east respiratory syndrome–coronavirus
MIS-C	multisystem inflammatory syndrome in children
mRNA	messenger ribonucleic acid
NDA	new drug application
NHP	nonhuman primate
NICE	National Institute for Health and Care Excellence
OCS	oral corticosteroids
PC	product complaint
PK	pharmacokinetic
PVP	pharmacovigilance plan
RA	rheumatoid arthritis
RBC	red blood cell
RMP	risk management plan
RNA	ribonucleic acid
RR	relative risk
SAE	serious adverse event
SARS	severe acute respiratory syndrome
SARS-CoV-1	severe acute respiratory syndrome coronavirus 1
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
siRNA	small-interfering RNA
SMQ	standardised MedDRA query
SmPC	summary of product characteristics
SPEAC	Safety Platform for Emergency vACcines
TESSy	The European Surveillance System
Th1	T helper cell type 1
Th2	T helper cell type 2
TME	targeted medical event
UK	United Kingdom
US	United States
V8	variant 8
V9	variant 9
VAC4EU	Vaccine monitoring Collaboration for Europe
VAED	vaccine-associated enhanced disease
VAERD	vaccine-associated enhanced respiratory disease
WBC	white blood cells
WHO	World Health Organisation
WOCBP	women of child-bearing potential

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PART I. PRODUCT(S) OVERVIEW

Active substance(s) (INN or common name)	COVID-19 mRNA Vaccine is single-stranded, 5'-capped messenger RNA (mRNA) produced using a cell-free *in vitro* transcription from the corresponding DNA templates, encoding the viral spike (S) protein of SARS-CoV-2.
Pharmacotherapeutic group(s) (ATC Code)	Not yet assigned
Marketing Authorisation Applicant	BioNTech Manufacturing GmbH
Medicinal products to which this RMP refers	1
Invented name(s) in the European Economic Area (EEA)	Comirnaty
Marketing authorisation procedure	Centralised
Brief description of the product:	Chemical class Nucleoside-modified messenger RNA is formulated in LNP
	Summary of mode of action The nucleoside-modified messenger RNA in Comirnaty is formulated in LNPs, which enable delivery of the non replicating RNA into host cells to direct transient expression of the SARS-CoV-2 S antigen. The vaccine elicits both neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.
	Important information about its composition The COVID-19 mRNA Vaccine: – is nucleoside-modified messenger RNA formulated in LNPs; – is a white to off-white frozen dispersion (pH:6.9 – 7.9). – Excipients: • ((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate) (ALC-0315) • 2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide (ALC-0159) • 1,2-Distearoyl-sn-glycero-3-phosphocholine (DSPC) • cholesterol, • potassium chloride, • potassium dihydrogen phosphate, • sodium chloride, • disodium phosphate dihydrate, • sucrose, • water for injections.
Hyperlink to the Product Information:	Please refer to Module 1.3.1 of this submission
Indication in the EEA	Proposed: Active immunisation to prevent COVID-19 caused by SARS-CoV-2 virus, in individuals 12 years of age and older.

Dosage in the EEA	Proposed: Administered intramuscularly after dilution as a course of 2 doses (0.3 mL each) at least 21 days apart.
Pharmaceutical form and strengths	Proposed: Concentrate dispersion for injection. After dilution each vial contains 6 doses of 0.3 mL
Is/will the product be subject to additional monitoring in the EU?	Yes

this document is abbreviated to the first and last pages.

Follow-up Questions

Please provide additional details on a separate page if needed and reference the question number.

1. Does the patient have a positive test for SARS-CoV2?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (and indicate if this is a new infection or a recurrence)*

Details: (Please specify date of test and type of test – e.g., nasal swab reverse transcription–polymerase chain reaction (RT-PCR) test or nucleic acid amplification–based test (NAAT) or antigen test)

2. Does the patient have SARS-CoV2 antibodies at diagnosis?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details: (Please specify date of test, whether IgM /IgG or both and the titer if available)

3. Was/Is the patient hospitalized?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (e.g., duration of hospitalization)*

Details:

4. Was/Is the patient admitted to an Intensive Care Unit?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (e.g., duration of hospitalization)*

Details:

5. Is the patient still hospitalized?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (e.g., duration of hospitalization)*

Details:

6. If discharged, did the patient have SARS-CoV2 antibodies at hospital discharge?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details: (Please specify date of test, whether IgM /IgG or both and the titer if available)

7. Did the patient display clinical signs at rest indicative of severe systemic illness?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (e.g., Fever, RR ≥30 breaths per minute, HR ≥125 beats per minute, use of vasopressors to maintain BP, SpO2 ≤93% on room air, PaO2/FiO2 <300 mm Hg)?)*

Details:

8. Did the patient require supplemental oxygen (including high flow or ECMO) or receive mechanical ventilation?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (e.g., oxygen requirements, pulse oximetry results)*

Details:

9. Please provide information on any new or worsened symptoms/signs during the COVID-19 illness experienced (including date of onset/worsening)

Multiorgan failure ☐ Unknown ☐ No ☐ Yes → *If Yes, please indicate which organ systems were affected and provide information on the applicable systems below*

☐ Respiratory ☐ Cardiovascular ☐ Gastrointestinal/Hepatic ☐ Vascular ☐ Renal ☐ Neurological ☐ Hematological ☐ Dermatological ☐ Other

Respiratory ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Dyspnea** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Tachypnea** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Hypoxemia** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **COVID-pneumonia** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Respiratory failure** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Acute Respiratory Distress Syndrome (ARDS)** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Other** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

Cardiovascular ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Heart failure** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Cardiogenic shock** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Acute myocardial infarction** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Arrhythmia** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Myocarditis** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Other** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

Gastrointestinal/Hepatic ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Vomiting** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Diarrhea** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Abdominal pain** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Jaundice** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Acute liver failure** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Other** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

Vascular ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Deep vein thrombosis** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Pulmonary embolism** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Limb ischemia** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Vasculitis** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Other (in particular any other thromboembolic events)** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

Renal ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Acute kidney injury** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Renal failure** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Other** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

Neurological ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
- **Altered consciousness** ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Convulsions/seizures ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Encephalopathy ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Meningitis ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Cerebrovascular accident ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details and indicate if ischemic or hemorrhagic*
Other ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Details:

Hematological ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Thrombocytopenia ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (see also Q14)*
Disseminated intravascular coagulation ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details (see also Q14)*
Other ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Details:

Dermatological ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Chillblains ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Erythema multiforme ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Other ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Details:

OTHER (e.g. multisystem inflammatory syndrome [MIS]) ☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*
Details:

10. Did the patient receive any additional therapies for COVID-19?

Therapy	Date Started (dd-Mmm-yyyy)	Date Stopped (dd-Mmm-yyyy)	Dose/Any additional information
☐ Remdesivir			
☐ Hydroxychloroquine/chloroquine			
☐ Azithromycin			
☐ Corticosteroids			
☐ Other (Please Specify)			

11. Did the event require the initiation of new medication or other treatment or procedure?
☐ Unknown ☐ No ☐ Yes → If Yes, please provide details
Details:

12. Patient's outcome with COVID-19:

☐ Recovering ☐ Recovered ☐ Not recovered ☐ Unknown ☐ Fatal, Date (dd-Mmm-yyyy): .....

If outcome is fatal, was an autopsy performed? ☐ Unknown ☐ No ☐ Yes → *If Yes, please* provide autopsy findings

Details:

13. How many days from the SARS-CoV2 diagnosis did it take before the SARS-CoV2 antigen test became negative?

14. Were any of the following laboratory tests or diagnostic studies performed? *Please specify laboratory data with units, date of test, and reference ranges; and please provide printouts and photographs if available:*

Laboratory Test or Diagnostic Studies	Date Performed (dd-Mmm-yyyy)	Results with units, if applicable	Reference Ranges, if applicable (or please state if abnormal or elevated/reduced)
☐ Test for SARS-CoV-2 by PCR, or other commercial or public health assay			
☐ Imaging for COVID-Pneumonia (e.g.CXR, CT)			
☐ Other radiological investigations (e.g. MRI, angiogram, V/Q scan)			
☐ Imaging for thrombo-embolic events (e.g. doppler or CT)			
☐ Hematology (e.g. leucocyte count [including neutrophil and lymphocyte counts], hemoglobin, platelet count, coagulation parameters [PT, PTT, D-Dimer, INR], fibrinogen, B and T cell function assays)			
☐ Clinical chemistry (e.g. serum creatinine, glomerular filtration rate [GFR], liver enzymes, bilirubin, albumin, B-type natriuretic peptide [BNP], troponin)			
☐ Inflammatory markers (e.g. CRP, ESR, procalcitonin, ferritin, LDH, cytokines [including IL-6])			
☐ Urinalysis			
☐ Evidence of hypoxemia (e.g. PaO_2/FiO_2 [P/F ratio], SpO_2/FiO_2 [S/F ratio]), hypercapnia ($PaCO_2$) or acidosis (pH)			
☐ Other relevant tests (please specify):_____			

Past Medical History Questions

Please provide additional details on a separate page if needed and reference the question number.

15. Does the patient have a history of any of the following?

- ☐ Hypertension
- ☐ Diabetes
- ☐ Heart Disease *(please specify)*
- ☐ Lung Disease *(please specify)*
- ☐ Liver disease *(please specify)*
- ☐ Kidney disease *(please specify)*
- ☐ Cancer *(please specify)*
- ☐ Immunosuppressive disorder *(please specify)*
- ☐ Obesity
- ☐ Other *(please specify)*

Details:

16. Is the patient a smoker/former smoker?

☐ Current Smoker ☐ Former smoker ☐ No

Details:

17. Was the patient taking any medications routinely prior to the event being reported?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

18. Have any pre-existing diseases worsened during the SARS-CoV2 infection (please specify)

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

19. Has the patient been treated with immunomodulating or immunosuppressing medications or received any other vaccines around the time of COVID-19 vaccination?

☐ Unknown ☐ No ☐ Yes → *If Yes, please provide details*

Details:

Revision History

Revision	Effective Date	Summary of Revisions
1.0	07-Dec-2020	New DCA

Refused for Cause

~~Confidential~~ Disclosure Agreement

In order to protect confidential information relating to research, development, business plans, and other technology, which may be disclosed between them, the Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"), and the "Collaborator" identified below (individually, a "Party"; collectively the "Parties"), intending to be legally bound as of the date of the last signature hereto ("Effective Date"), agree that:

1. A Party ("Disclosing Party") may disclose information to the other ("Receiving Party") for the purpose of assessing their interest in research collaboration (the "Purpose"). The Disclosing Parties are: **NIAID; Moderna Therapeutics, Inc. and its affiliates,** Proprietary Info (the "Collaborator").

2. The Parties' representatives for disclosing or receiving information (if known):

For NIAID: Barney Graham and other employees and contractors of NIAID as needed to fulfill the Purpose.

For Collaborator: Giuseppe Ciaramella,
Stephane Bancel,
Lee Cooper, and other employees of the Collaborator as needed to fulfill the Purpose

3. The information disclosed under this Agreement ("Confidential Information") includes any and all technical, business and financial information, including third party information, relating to the Disclosing Party, including but not limited to: (a) non-public patent applications; Proprietary Info and (c) other proprietary information, ideas, gene sequences, samples, chemical compounds, biological materials, techniques, works of authorship, non-public inventions, know-how and processes related to the current, future, and proposed products and/or services of the Disclosing Party or its partners, and including without limitation, information concerning research, experimental work, development, design details and specifications, engineering, financial information, procurement requirements, purchasing, manufacturing, customer lists, investors, employees, business and contractual relationships, business forecasts, analyst reports, marketing plans and any additional non-public information that the Disclosing Party provides.

The Confidential Information disclosed under this Agreement is described as:

For NIAID: NIAID's proprietary information and data relating to the development of vaccines for HIV, influenza, Ebola and MERS and development of broadly neutralizing monoclonal antibodies for preventative and therapeutic use.

For Collaborator: Moderna's proprietary and confidential information related to design and manufacture of a messenger RNA platform and messenger RNA constructs for treatment and prevention of disease.

4. The Receiving Party will not disclose the Confidential Information of the Disclosing Party to any person except its employees, consultants, contractors, directors, or professional advisors or authorized representatives to whom it is necessary to disclose the Confidential Information for the Purpose described above, and any such disclosures shall be under terms at least as restrictive as those specified herein. Any of the persons mentioned above who are given access to the Confidential Information shall be informed of this Agreement. The Receiving Party shall protect the Confidential Information by using the same degree

of care, but no less than a reasonable degree of care, as the Receiving Party uses to protect its own confidential information.

5. The Disclosing Party shall use reasonable efforts to (a) mark Confidential Information in any written document, memorandum, report, correspondence, drawing, or other tangible material, or computer software or program, developed or prepared by the Disclosing Party or any of its representatives as "Confidential" and (b) reduce oral disclosures to writing (this may be by summary email or other electronic communication) marked "Confidential" within thirty (30) days after disclosure. Notwithstanding the above, failure to mark information as "Confidential" will not disqualify that information from constituting "Confidential Information" under this Agreement if a reasonable person would consider such information to be confidential based on the nature of such information and the circumstances of disclosure.

6. Notwithstanding any other provision of this Agreement, Confidential Information shall not include any item of information, data, patent or idea that: (a) is within the public domain prior to the time of the disclosure by the Disclosing Party to the Receiving Party or thereafter becomes within the public domain other than as a result of disclosure by the Receiving Party or any of its representatives in violation of this Agreement; (b) was, on or before the date of disclosure in the possession of the Receiving Party as shown by contemporaneous written record; (c) is acquired by the Receiving Party from a third party not under an obligation of confidentiality; (d) is hereafter independently developed by the Receiving Party, without reference to the information received from the Disclosing Party; or (e) the Disclosing Party expressly authorizes in writing the Receiving Party to disclose.

7. At the request of the Disclosing Party, the Receiving Party agrees to return or certify the destruction of all Confidential Information received from the Disclosing Party except that the Receiving Party may retain in its confidential files one (1) copy of written Confidential Information for record purposes only.

8. If the Receiving Party, or anyone to whom it discloses the Confidential Information in accordance with Paragraph 4, becomes legally required to disclose any of the Confidential Information, the Receiving Party shall provide the Disclosing Party with timely notice and, to the extent practicable, consult with the Disclosing Party prior to any disclosure.

9. This Agreement constitutes the entire understanding between the Parties with respect to the subject matter hereof and merges any and all prior agreements, understandings and representations. The Agreement may not be superseded, amended or modified except by written agreement between the Parties. Any dispute under this Agreement shall be brought in the federal court located in the District of Columbia, and the Parties hereby consent to the personal jurisdiction and exclusive venue of that court. This Agreement is to be made under and shall be construed in accordance with New York and U.S. federal law as applied in the federal court of the District of Columbia. In case of conflict of laws, U.S. federal law as applied in the federal court of the District of Columbia shall prevail. Each Party acknowledges that its breach of this Agreement may cause irreparable damage and hereby agrees that the other Party may be entitled to seek injunctive relief under this Agreement for any actual or threatened breach, as well as such further relief as may be granted by a court of competent jurisdiction. If any provision of this Agreement is found by a proper authority to be unenforceable or invalid, such unenforceability or invalidity will not render this Agreement unenforceable or invalid as a whole, and such provision will be changed and interpreted so as to best accomplish the objectives of such unenforceable or invalid provision within the limits of applicable law or applicable court decisions.

10. This Agreement will control the disclosure of Confidential Information for a disclosure period beginning on the Effective Date and expiring twelve (12) months thereafter, and will otherwise remain in

effect for three (3) years from the Effective Date. Either Party may terminate this Agreement upon thirty (30) days written notice to the other Party, however, each Parties' obligation of maintaining confidentiality will survive termination for three (3) years after the Effective Date.

11. This Agreement may be executed in counterparts, each of which shall be deemed an original, and all of which, taken together, shall constitute one and the same instrument. A facsimile, scanned electronic signature or certified electronic signature shall be as effective as an original signature.

SIGNATURES BEGIN ON NEXT PAGE

Moderna Therapeutics, Inc.
320 Bent Street
Cambridge, MA 02141

Authorized Signature:

Name: Benjamin Enerson

Title: Corporate Counsel

Date: 11/6/2015

Vaccine Research Center, NIAID, NIH
c/o Technology Transfer & Intellectual Property Office
Suite 6D, MSC 9804
5601 Fishers Lane
Rockville, MD 20852

Authorized Signature:

Carol A. Salata -S

Carol Salata, Ph.D.
Senior Technology Transfer Advisor
Technology Transfer & Intellectual Property Office, NIAID

Date:

Acknowledged by VRC Representative(s)
Disclosing/Receiving Confidential Information:

Date: 1 NOV 2015

Barney Graham, M.D., Ph.D.

2015-33448-1

Amendment #01 to the Confidential Disclosure Agreement

THIS AMENDMENT #01 TO THE CONFIDENTIAL DISCLOSURE AGREEMENT (this "Amendment"), is entered into as of October 28, 2016 (the "Amendment Effective Date"), by and between ModernaTX, Inc. (formerly known as Moderna Therapeutics, Inc.) ("Moderna"), and the Vaccine Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"). Each of Moderna and NIAID may be referred to herein as a "Party" or together as the "Parties".

WHEREAS, Moderna and NIAID are parties to a Confidential Disclosure Agreement dated November 9, 2015 (the "Agreement");

WHEREAS, the Agreement expires on November 9, 2016; and

WHEREAS, Moderna and NIAID desire to continue the Agreement in accordance with and subject to the terms and conditions therein, as more fully described herein.

NOW THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby mutually acknowledged, NIAID and Moderna hereby agree as follows:

1. Definitions. All terms used in this Amendment and not otherwise defined herein shall have the same meanings ascribed to them in the Agreement.

2. Amendments.

(b) Section 3. The Confidential Information of NIAID to be disclosed under the Agreement is hereby amended to include the Zika virus and related vaccines and assays.

(c) Section 10. Section 10 of the Agreement is deleted in its entirety and is replaced with the following:

> 10. This Agreement will control the disclosure Confidential Information for a disclosure period beginning on the Effective Date and expiring twenty-four (24) months thereafter (i.e. November 9, 2017), and will otherwise remain in effect for four (4) years from the Effective Date. Either Party may terminate this Agreement upon thirty (30) days written notice to the other Party, however, each Parties' obligations of maintaining confidentiality will survive termination for a period of four (4) years after the Effective Date.

3. General Terms. Except with respect to the amendments as set forth in Section 2 above, the terms and conditions of the Agreement shall remain unchanged. This Amendment shall be construed in in accordance with and governed by the same laws that govern the Agreement.

[*Remainder of page intentionally left blank*]

IN WITNESS WHEREOF, NIAID and Moderna each has caused this Amendment to be executed by its duly authorized representative.

MODERNATX, INC.

By: _____
(Signature)

Name: Benjamin Enerson

Title: Corporate Counsel

VACCINE CENTER, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES, NATIONAL INSTITUTES OF HEALTH

By: _____
(Signature)

Name: Carol Salata, PhD

Title: Senior Advisor for Technology Transfer, TTIPO, NIAID

AMENDMENT NO. 2
TO
CONFIDENTIAL DISCLOSURE AGREEMENT

This Amendment No. 2 to Nondisclosure Agreement (NIAID Ref. No. 201-33448) is made as of the 18th day of November, 2016 by and between ModernaTX, Inc. ("Moderna") and the Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"). Each of Moderna and NIAID may be referred to herein as a "Party" or together as "Parties."

WHEREAS, Moderna and NIAID entered into a Confidential Disclosure Agreement, dated Novermber 9, 2015 (the "Agreement") and amended once effective on October 28, 2016; and

WHEREAS, the parties desire to amend the Agreement as set forth herein;

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. All terms used in this Amendment and not otherwise defined herein shall have the same meanings ascribed to them in the Agreement.

2. Amendments.
   (a) Section 3. The Confidential Information of NIAID to be disclosed under the Agreement is hereby amended to include information relating to the human parainfluenza virus ("hPIV") and related vaccines and assays.

3. All other terms and conditions of the Agreement shall remain unchanged.

SIGNATURES BEGIN ON NEXT PAGE

IN WITNESS WHEREOF, each party has caused this Amendment No. 1 to Nondisclosure Agreement to be executed by its authorized representative.

Authorized Signatures:

ModernaTX, Inc.	Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health
By: [signature]	By:
Name: Benjamin Enerson	Name: Carol Salata, Ph.D.
Title: Corporate Counsel	Title: Lead TTPS, TTIPO, NIAID, NIH
Date: 11/16/2016	Date:

AMENDMENT NO. 3
TO
CONFIDENTIAL DISCLOSURE AGREEMENT

This Amendment No. 3 to Nondisclosure Agreement (NIAID Ref. No. 2015-33448) is made as of the 17th day of August, 2017 by and between ModernaTX, Inc. ("Moderna") and the Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"). Each of Moderna and NIAID may be referred to herein as a "Party" or together as "Parties."

WHEREAS, Moderna and NIAID entered into a Confidential Disclosure Agreement, dated November 9, 2015 (the "Agreement") and amended twice effective on October 28, 2016 and November 18, 2016; and

WHEREAS, the Agreement expires on November 9, 2017; and

WHEREAS, the parties desire to amend the Agreement as set forth herein;

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. All terms used in this Amendment and not otherwise defined herein shall have the same meanings ascribed to them in the Agreement.

2. Amendments.
   (a) Section 3. The Confidential Information of NIAID to be disclosed under the Agreement is hereby amended to include information relating to the Nipah virus and related vaccines and assays.
   (b) Section 10. Section 10 of the Agreement is deleted in its entirety and is replaced with the following:

   10. This Agreement will control the disclosure Confidential Information for a disclosure period beginning on the Effective Date and expiring thirty-six (36) months from the Effective Date (i.e. November 9, 2018). Either Party may terminate this Agreement upon thirty (30) days written notice to the other Party, however, each Parties' obligations of maintaining confidentiality will survive the expiration or earlier termination of this Agreement for a period of five (5) years from the Effective Date.

3. All other terms and conditions of the Agreement shall remain unchanged.

SIGNATURES BEGIN ON NEXT PAGE

IN WITNESS WHEREOF, each party has caused this Amendment No. 3 to Nondisclosure Agreement to be executed by its authorized representative.

Authorized Signatures:

ModernaTX, Inc.	Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health
By: Daphne M. Van de Meerssche	By: CJS
Name: Daphne M. Van de Meerssche	Name: Carol Salata, Ph.D.
Title: Counsel, Transactions	Title: Lead TTPS, TTIPO, NIAID, NIH
Date: Aug. 31, 2017	Date: Sept. 1, 2017

AMENDMENT NO. 4
TO
CONFIDENTIAL DISCLOSURE AGREEMENT

This Amendment No. 4 to Confidential Disclosure Agreement (NIAID Ref. No. 2015-33448) ("Amendment No. 4") is made as of the date of the last authorized signature below ("Amendment No. 4 Effective Date"), by and between ModernaTX, Inc. ("Moderna") and the Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"). Each of Moderna and NIAID may be referred to herein as a "Party" or together as "Parties."

WHEREAS, Moderna and NIAID entered into a Confidential Disclosure Agreement, dated November 9, 2015 (the "Agreement") and amended thrice effective on October 28, 2016, November 18, 2016, and August 17, 2017; and

WHEREAS, the Agreement expires on November 9, 2018; and

WHEREAS, the parties desire to amend the Agreement as set forth herein.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. All terms used in this Amendment No. 4 and not otherwise defined herein shall have the same meanings ascribed to them in the Agreement.

2. Amendments:

Section 10. Section 10 of the Agreement is deleted in its entirety and is replaced with the following:

"10. This Agreement will control the disclosure Confidential Information for a disclosure period beginning on the Effective Date and expiring sixty (60) months from the Effective Date (i.e. November 9, 2020). Either Party may terminate this Agreement upon thirty (30) days written notice to the other Party, however, each Parties' obligations of maintaining confidentiality will survive the expiration or earlier termination of this Agreement for a period of Propnetary) years from the Effective Date."

3. All other terms and conditions of the Agreement shall remain unchanged.

SIGNATURES BEGIN ON NEXT PAGE

IN WITNESS WHEREOF, each party has caused this Amendment No. 4 to Confidential Disclosure Agreement to be executed by its authorized representative.

ACCEPTED AND AGREED TO:

FOR NIAID:

Amy F. Petrik -S Digitally signed by Amy F. Petrik -S Date: 2018.12.19 15:09:28 -05'00'

Amy Petrik, Ph.D. Date
Senior TTPS, TTIPO, NIAID, NIH

Mailing Address for Notices:
ATTN: CDA NIAID REF. NO. 2015-33448-4
TECHNOLOGY TRANSFER AND INTELLECTUAL PROPERTY OFFICE, NIAID
Suite 6D, MSC 9804, 5601 Fishers Lane
Rockville, MD 20852
Tel: 301-496-2644 / Fax: 240-627-3117

FOR ModernaTX, Inc. Daphne Van de Meerssche

Dec 19, 2018

NAME OF AUTHORIZED SIGNATORY Date

Daphne Van de Meerssche
Counsel, Transactions

Mailing Address for Notices:

ModernaTX, Inc.
Attn: General Counsel
200 Technology Square
Cambridge, MA 02139

AMENDMENT NO. 5
TO
CONFIDENTIAL DISCLOSURE AGREEMENT

This Amendment No. 5 to Confidential Disclosure Agreement (NIAID Ref. No. 2015-33448) ("Amendment No. 5") is made as of the date of the last authorized signature below ("Amendment No. 5 Effective Date"), by and between ModernaTX, Inc. ("Moderna") and the Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"). Each of Moderna and NIAID may be referred to herein as a "Party" or together as "Parties."

WHEREAS, Moderna and NIAID entered into a Confidential Disclosure Agreement, dated November 9, 2015 (the "Agreement") and amended four times, effective on October 28, 2016, November 18, 2016, August 17, 2017, and December 19, 2018; and

WHEREAS, the Agreement expires on November 9, 2020; and

WHEREAS, the parties desire to amend the Agreement as set forth herein.

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. All terms used in this Amendment No. 4 and not otherwise defined herein shall have the same meanings ascribed to them in the Agreement.

2. Amendments:

Section 3. Section 3 of the Agreement is deleted in its entirety and is replaced with the following:

"3. The information disclosed under this Agreement ("Confidential Information") includes any and all technical, business and financial information, including third party information, relating to the Disclosing Party, including but not limited to: (a) nonpublic patent applications; Proprietary Info and (c) other proprietary information, ideas, gene sequences, samples, chemical compounds, biological materials, techniques, works of authorship, non-public inventions, know-how and processes related to the current, future, and proposed products and/or services of the Disclosing Party or its partners, and including without limitation, information concerning research, experimental work, development, design details and specifications, engineering, financial information, procurement requirements, purchasing manufacturing, customer lists, investors, employees, business and contractual relationships, business forecasts, analyst reports, marketing plans and any additional non-public information that the Disclosing Party provides.

The Confidential Information disclosed under this Agreement is described as:

For NIAID: NIAID's proprietary information and data relating to the development of vaccines for HIV, influenza, Ebola, MERS, Nipah, hPIV, hMPV, measles, and mumps and development of broadly neutralizing monoclonal antibodies for prevention and therapeutic use.

For Collaborator: Moderna's proprietary and confidential information related to design and manufacture of a messenger RNA platform and messenger RNA constructs for treatment and prevention of disease."

3. All other terms and conditions of the Agreement shall remain unchanged.

SIGNATURES BEGIN ON NEXT PAGE

AMENDMENT NO. 6
TO
CONFIDENTIAL DISCLOSURE AGREEMENT

This Amendment No. 6 to Confidential Disclosure Agreement (NIAID Ref. No. 2015-33448) ("Amendment No. 6") is made as of the date of the last authorized signature below ("Amendment No. 6 Effective Date"), by and between ModernaTX, Inc. ("Moderna") and the Vaccine Research Center, National Institute of Allergy and Infectious Diseases, National Institutes of Health ("NIAID"). Each of Moderna and NIAID may be referred to herein as a "Party" or together as "Parties."

WHEREAS, Moderna and NIAID entered into a Confidential Disclosure Agreement, dated November 9, 2015 (the "Agreement") and amended five times, effective on October 28, 2016, November 18, 2016, August 17, 2017, December 19, 2018 and April 29, 2019; and

WHEREAS, the Agreement expires on November 9, 2020; and

WHEREAS, the parties desire to amend the Agreement as set forth herein.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound, the parties hereto agree as follows:

1. Definitions. All terms used in this Amendment No. 6 and not otherwise defined herein shall have the same meanings ascribed to them in the Agreement.

2. Amendments:

Section 3. Section 3 of the Agreement is deleted in its entirety and is replaced with the following:

"3. The information disclosed under this Agreement ("Confidential Information") includes any and all technical, business and financial information, including third party information, relating to the Disclosing Party, including but not limited to: (a) nonpublic patent applications; and (b) other proprietary information, ideas, gene sequences, samples, chemical compounds, biological materials, techniques, works of authorship, non-public inventions, know-how and processes related to the current, future, and proposed products and/or services of the Disclosing Party or its partners, and including without limitation, information concerning research, experimental work, development, design details and specifications, engineering, financial information, procurement requirements, purchasing manufacturing, customer lists, investors, employees, business and contractual relationships, business forecasts, analyst reports, marketing plans and any additional non-public information that the Disclosing Party provides.

The Confidential Information disclosed under this Agreement is described as:

IN WITNESS WHEREOF, each party has caused this Amendment No. 4 to Confidential Disclosure Agreement to be executed by its authorized representative.

ACCEPTED AND AGREED TO:

FOR NIAID:

Amy Petrik, Ph.D.
Senior TTPS, TTIPO, NIAID, NIH

Date

Mailing Address for Notices:
ATTN: CDA NIAID REF. NO. 2015-33448-4
TECHNOLOGY TRANSFER AND INTELLECTUAL PROPERTY OFFICE, NIAID
Suite 6D, MSC 9804, 5601 Fishers Lane
Rockville, MD 20852
Tel: 301-496-2644 / Fax: 240-627-3117

FOR ModernaTX, Inc.

Daphne Zn. Von de Ommende
NAME OF AUTHORIZED SIGNATORY

April 26, 2019
Date

Mailing Address for Notices:

ModernaTX, Inc.
Attn: General Counsel
200 Technology Square
Cambridge, MA 02139

IN WITNESS WHEREOF, each party has caused this Amendment No. 4 to Confidential Disclosure Agreement to be executed by its authorized representative.

ACCEPTED AND AGREED TO:

FOR NIAID:

Amy F. Petrik -S Digitally signed by Amy F. Petrik -S Date: 2020.01.22 08:06:55 -05'00'

Amy Petrik, Ph.D. Date
Senior TTPS, TTIPO, NIAID, NIH

Mailing Address for Notices:
ATTN: CDA NIAID REF. NO. 2015-33448-4
TECHNOLOGY TRANSFER AND INTELLECTUAL PROPERTY OFFICE, NIAID
Suite 6D, MSC 9804, 5601 Fishers Lane
Rockville, MD 20852
Tel: 301-496-2644 / Fax: 240-627-3117

FOR ModernaTX, Inc.

DocuSigned by: Kahlil Mitchell 2320B629F722453... Corporate Counsel 2/4/2020

NAME OF AUTHORIZED SIGNATORY Date

Mailing Address for Notices:

ModernaTX, Inc.
Attn: General Counsel
200 Technology Square
Cambridge, MA 02139

For NIAID: NIAID's proprietary information and data relating to the development of vaccines for HIV, influenza, Ebola, MERS, Nipah, hPIV, hMPV, measles, mumps and picornoviruses and development of broadly neutralizing monoclonal antibodies for prevention and therapeutic use.

For Collaborator: Moderna's proprietary and confidential information related to design and manufacture of a messenger RNA platform and messenger RNA constructs for treatment and prevention of disease, including without limitation, the design and manufacture of a messenger RNA platform and messenger RNA constructs related to the diseases referenced in this Section."

3. All other terms and conditions of the Agreement shall remain unchanged.

SIGNATURES BEGIN ON NEXT PAGE

PUBLIC HEALTH SERVICE

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT

This Agreement is based on the model Cooperative Research and Development Agreement ("CRADA") adopted by the U.S. Public Health Service ("PHS") Technology Transfer Policy Board for use by components of the National Institutes of Health ("NIH"), the Centers for Disease Control and Prevention ("CDC"), and the Food and Drug Administration ("FDA"), which are agencies of the PHS within the Department of Health and Human Services ("HHS").

This Cover Page identifies the Parties to this CRADA:

The U.S. Department of Health and Human Services, as represented by

National Institute of Allergy and Infectious Diseases ("NIAID")

an Institute or Center (hereinafter referred to as the "**IC**") of the

NIH

and

Moderna Therapeutics, Inc.
hereinafter referred to as the "**Collaborator**",
having offices at 320 Bent Street, Cambridge, MA 02141,
created and operating under the laws of the State of Delaware.

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT

Article 1. Introduction

This CRADA between IC and Collaborator will be effective when signed by the Parties, which are identified on both the Cover Page and the Signature Page. The official contacts for the Parties are identified on the Contacts Information Page. Publicly available information regarding this CRADA appears on the Summary Page. The research and development activities that will be undertaken by IC and Collaborator in the course of this CRADA are detailed in the Research Plan, attached as Appendix A. The staffing, funding, and materials contributions of the Parties are set forth in Appendix B. Any changes to the model CRADA are set forth in Appendix C.

Article 2. Definitions

The terms listed in this Article will carry the meanings indicated throughout the CRADA. To the extent a definition of a term as provided in this Article is inconsistent with a corresponding definition in the applicable sections of either the United States Code (U.S.C.) or the Code of Federal Regulations (C.F.R.), the definition in the U.S.C. or C.F.R. will control.

2.1 "**Affiliate**" means any corporation or other business entity controlled by, controlling, or under common control with Collaborator at any time during the term of the CRADA. For this purpose, "control" means direct or indirect beneficial ownership of at least fifty percent (50%) of the voting stock or at least fifty percent (50%) interest in the income of the corporation or other business entity.

2.2 "**Background Invention**" means an Invention conceived and first actually reduced to practice before the Effective Date or Proprietary Info Proprietary Info

2.3 "**Collaborator Materials**" means all tangible materials not first produced in the performance of the Research Plan that are owned or controlled by Collaborator and used in the performance of the Research Plan.

2.4 "**Confidential Information**" means confidential scientific, business, or financial information disclosed or made available by or on behalf of a Party or its Affiliates to the other Party or its Affiliates provided that the information does not include:

(a) information that is publicly known or that is available from public sources through no fault of the receiving Party;
(b) information that has been made publicly available by its owner;
(c) information that receiving Party can establish is already known by the receiving Party, or information that is independently created or compiled by the receiving Party without reference to or use of the provided information; or
(d) information that relates to potential hazards or cautionary warnings associated with the production, handling, or use of the subject matter of the Research Plan.

153 pages abbreviated

7. TERM, TERMINATION AND MODIFICATION OF RIGHTS

7.1 This **Agreement** is effective when signed by all parties, unless the provisions of Paragraph 8.8 are not fulfilled, and shall expire at the time specified in Appendix B, unless previously terminated under the terms of this Article 7.

7.2 In the event that the **Licensee** is in default in the performance of any material obligations under this **Agreement**, including but not limited to the obligations listed in Paragraph 7.3 and if the default has not been remedied within ninety (90) days after the date of notice in writing of the default, the **NIAID** may terminate this **Agreement** by written notice and pursue outstanding royalties owed through procedures provided by the Federal Debt Collection Act.

7.3 The **NIAID** shall specifically have the unilateral right to terminate this **Agreement** by written notice if the **Licensee**:

(a) has not demonstrated that it is executing the research plan submitted with its application for a license or that it has not taken or cannot be expected to take, within a reasonable time, effective steps to achieve the practical application of the **Licensed Patent Rights** or **Licensed Products** as contemplated by this **Agreement**; or

(b) has willfully made a false statement of or willfully omitted a material fact in its application for a license, in its representations made to **NIAID** in the course of establishing this **Agreement**, or in any report required by this **Agreement**.

7.4 The **NIAID** reserves the right according to 35 U.S.C. §209(d)(3) to terminate this **Agreement** if it is determined that this action is necessary to meet the requirements for public use specified by Federal regulations issued after the date of the license and these requirements are not reasonably satisfied by the **Licensee**.

7.5 The **Licensee** shall have a unilateral right to terminate this **Agreement** by giving the **NIAID** sixty (60) days written notice to that effect.

7.6 Within thirty (30) days of receipt of written notice of the **NIAID**'s unilateral decision to modify or terminate this **Agreement**, the **Licensee** may, consistent with the provisions of 37 C.F.R. §404.11, appeal the decision by written submission to the designated **NIAID** official. The decision of the designated **NIAID** official shall be the final agency decision. The **Licensee** may thereafter exercise any and all administrative or judicial remedies that may be accessible.

7.7 If either party desires a modification to this **Agreement**, the parties shall, upon reasonable notice of the proposed modification by the party desiring the change, confer in good faith to determine the desirability of the modification. No modification shall be effective until a written amendment is signed by the signatories to this **Agreement** or their designees.

7.8 The **NIAID** Material Transfer Agreement identified as 2018-0664 shall be terminated immediately and automatically upon expiration or termination of this **Agreement**.

153 pages abbreviated

7.9 This **Agreement** and **NIAID** Material Transfer Agreement identified as 2018-0664 shall be terminated immediately and automatically upon cancellation, revocation or termination of **BARDA** Contract No. HHSO100201600029C. The **Licensee** shall alert the **NIAID** to the cancellation, revocation or termination or termination of **BARDA** Contract No. HHSO100201600029C within five (5) days of such occurance.

7.10 Within ninety (90) days of expiration, termination or term extension of this **Agreement** under this Article 7, a final report shall be submitted by the **Licensee**. The **Licensee** shall send the report to the **NIAID** at the Mailing Address for **Agreement** notices indicated on the Signature Page.

(a) The report shall include, but not be limited to, progress on the research and development involving the **Licensed Patent Rights**, the **Licensed Products** or the **Licensed Processes**.

(b) Any royalty payments, including those incurred but not yet paid (such as the full minimum annual royalty) due to the **NIAID** shall become immediately due and payable upon termination or expiration

(c) If the term of the **Agreement** is extended at the **Licensee's** request, then the **NIAID** and the **Licensee** will negotiate in good faith regarding the schedule for reports regarding the information required in 7.10(a);

(d) If the term of this **Agreement** is longer than ten (10) years, then the **NIAID** may request a status update report after the fifth (5th) year of the **Agreement**; and

(e) The **Licensee** may not be granted additional **NIAID** licenses if this reporting requirement is not fulfilled.

7.11 Within thirty (30) days of termination or expiration of this **Agreement**, the **Licensee** shall destroy all materials associated with the **NIAID** Material Transfer Agreement identified as 2018-0664, all **Licensed Products** and all other materials included within the **Licensed Patent Rights**, and provide the **NIAID** with written certification of the destruction thereof. The **Licensee** may not be granted additional **NIAID** licenses if this reporting requirement is not fulfilled.

7.12 Paragraphs 4.3, 4.4, 5.4, 5.5, 6.1-6.5, 7.6, 7.8, 7.9, 7.10, 7.11 and 7.12 of this **Agreement** shall survive termination of this **Agreement**.

8. GENERAL PROVISIONS

8.1 This **Agreement** constitutes the entire agreement between the parties relating to the subject matter of the **Licensed Patent Rights** and **Licensed Products**, and all prior negotiations, representations, agreements, and understandings are merged into, extinguished by, and completely expressed by this **Agreement**.

8.2 The provisions of this **Agreement** are severable, and in the event that any provision of this **Agreement** shall be determined to be invalid or unenforceable under any controlling body of law, such determination shall not in any way affect the validity or enforceability of the remaining provisions of this **Agreement**.

8.3 The construction, validity, performance, and effect of this Agreement shall be governed by Federal law as applied by the Federal courts in the District of Columbia.

8.4 All Agreement notices required or permitted by this Agreement shall be given by prepaid, first class, registered or certified mail properly addressed to the other party at the address designated on the following Signature Page, or to another address as may be designated in writing by such other party, and shall be effective as of the date of the postmark of such notice.

8.5 This Agreement shall not be assigned or otherwise transferred (including any transfer by legal process or by operation of law, and any transfer in bankruptcy or insolvency, or in any other compulsory procedure or order of court) except to the Licensee's Affiliate(s) without the prior written consent of the NIAID. The parties agree that the identity of the parties is material to the formation of this Agreement and that the obligations under this Agreement are nondelegable.

8.6 The Licensee acknowledges that it is subject to and agrees to abide by the United States laws and regulations (including the Export Administration Act of 1979 and Arms Export Control Act) controlling the export of technical data, computer software, laboratory prototypes, biological materials and other commodities. The transfer of these items may require a license from the appropriate agency of the Government or written assurances by the Licensee that it shall not export these items to certain foreign countries without prior approval of the agency. The NIAID neither represents that a license is or is not required or that, if required, it shall be issued.

8.7 The parties agree to attempt to settle amicably any controversy or claim arising under this Agreement or a breach of this Agreement, except for appeals of modification or termination decisions provided for in Article 7. The Licensee agrees first to appeal any such unsettled claims or controversies to the designated NIAID official, or designee, whose decision shall be considered the final agency decision. Thereafter, the Licensee may exercise any administrative or judicial remedies that may be available.

8.8 The terms and conditions of this Agreement shall, at the NIAID's sole option, be considered by the NIAID to be withdrawn from the Licensee's consideration and the terms and conditions of this Agreement, and the Agreement itself to be null and void, unless this Agreement is executed by the Licensee and a fully executed original is received by the NIAID within sixty (60) days from the date of the NIAID signature found at the Signature Page.

SIGNATURES BEGIN ON NEXT PAGE

NON EXCLUSIVE PATENT LICENSE AGREEMENT
FOR INTERNAL RESEARCH USE
and
BIOLOGICAL MATERIALS LICENSE AGREEMENT - Internal Use

FOR NIAID:

by: Michael R. Mowatt 8 AUG 2018
Michael R. Mowatt, Ph.D. Date
Director
Technology Transfer and Intellectual Property Office
National Institute of Allergy and Infectious Diseases
National Institues of Health

Mailing Address or E-mail Address for Agreement notices and reports:

License Compliance and Administration
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Office of Technology Transfer
National Institutes of Health
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Rockville, Maryland 20852-3804 U.S.A.

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For the **Licensee** (Upon information and belief, the undersigned expressly certifies or affirms that the contents of any statements of the **Licensee** made or referred to in this document are truthful and accurate.):

Licensee

by: Daphne M. Van de Meerssche Aug. 31, 2018
Signature of Authorized Official Date

Daphne M. Van de Meerssche
Printed Name

Counsel
Title

I. **Official and Mailing Address for Agreement notices:**

Lori Henderson
Name

General Counsel
Title

Mailing Address

200 Technology Square, 6th floor

Cambridge, MA 02141

Email Address: legal@modernatx.com

Phone: 617-714-6500

Fax: 617-583-1998

II. **Official and Mailing Address for Financial notices (Licensee's contact person for royalty payments)**

III. **The NIAID will invoice the Licensee for all amounts due hereunder and will send all invoices to the attention of "Accounts Payable" at the following email address: moderna_invoice@concursolutions.com.**

Richard Wanstall
Name

Head of Audit & Finance Operations
Title

Mailing Address:

200 Technology Square, 4th floor

Cambridge, MA 02139

Email Address: rick.wanstall@modernatx.com

Phone: 617-209-5860

Fax: 617-225-7970

Any false or misleading statements made, presented, or submitted to the Government, including any relevant omissions, under this Agreement and during the course of negotiation of this Agreement are subject to all applicable civil and criminal statutes including Federal statutes 31 U.S.C. §§3801-3812 (civil liability) and 18 U.S.C. §1001 (criminal liability including fine(s) or imprisonment).

APPENDIX A – PATENT(S) OR PATENT APPLICATION(S)

Patent(s) or Patent Application(s):

I. U.S. Provisional Application 62/396,613 filed 09/19/2016 entitled "Zika Virus Vaccines" [HHS Ref. No. E-181-2016/0-US-01]

II. PCT Patent Application PCT/US2017/044468 filed 07/28/2017 entitled "Zika Virus Vaccines" [HHS Ref. No. E-181-2016/0-PCT-02]

APPENDIX B –TANGIBLE MATERIALS, LICENSED TERRITORY, LICENSED FIELD OF USE AND TERM

I. **Tangible Materials:**

(a) pZIKV-H/PF/2013-CprME; a DNA expression construct expressing C-prM-E structural genes of ZIKV strain H/PF2013

(b) pDENV1-WestPac-CprME; DNA expression construct expressing C-prM-E structural genes of DENV strain Western Pacific

(c) pDENV2-16681-CprME; a DNA expression construct expressing C-prM-E structural genes of DENV strain 16681

II. **Licensed Territory:**

Research facilities of **Licensee** located in the United States of America

III. **Licensed Field of Use:**

The use of the **Licensed Products, Licensed Processes,** and **Licensed Patent Rights** limited to the scope of **BARDA** Contract No. HHSO100201600029C as it pertains to Proprietary Info for further development of **Licensee's** proprietary mRNA vaccine(s) specifically directed against Zika viruses. For the sake of clarity, the **Licensed Field of Use** specifically excludes the use of **Licensed Products, Licensed Processes,** and **Licensed Patent Rights** in Proprietary Info non-Zika virus vaccines, as well as DNA-based Zika vaccines expressing virus-like particle antigens.

IV. **Term:**

(a) This **Agreement** shall expire August 27, 2020, the end of the period of performance for **BARDA** Contract No. HHSO100201600029C, unless previously terminated under Article 7.

APPENDIX C – ROYALTIES

Royalties:

1. The **Licensee** agrees that the **Licensed Products, Licensed Processes,** and **Licensed Patent Rights** represent a significant investment on the part of the **NIAID,** and that the **Licensed Products, Licensed Processes,** and **Licensed Patent Rights** are of substantial value. Notwithstanding the foregoing, the **NIAID** hereby grants to the **Licensee** a royalty-free, non-exclusive license, subject to the terms and conditions of this **Agreement,** due to the research support of **BARDA** Contract No. HHSO100201600029C.

APPENDIX D- ROYALTY PAYMENT OPTIONS

New Payment Options Effective March 2018

The License Number MUST appear on payments, reports and correspondence.

Credit and Debit Card Payments: Credit and debit card payments can be submitted for amounts up to $24,999. Submit your payment through the U.S. Treasury web site located at: **https://www.pay.gov/public/form/start/28680443.**

Automated Clearing House (ACH) for payments through U.S. banks only

The IC encourages its licensees to submit electronic funds transfer payments through the Automated Clearing House (ACH). Submit your ACH payment through the U.S. Treasury web site located at: https://www.pay.gov/public/form/startJ28680443. Please note that the IC "only" accepts ACH payments through this U.S. Treasury web site.

Electronic Funds Wire Transfers: The following account information is provided for wire payments. In order to process payment via Electronic Funds Wire Transfer sender MUST supply the following information within the transmission:

Drawn on a U.S. bank account via FEDWIRE:

Please provide the following instructions to your Financial Institution for the remittance of Fedwire payments to the **NIH ROYALTY FUND**.

Fedwire Field Tag	Fedwire Field Name	Required Information
{1510}	Type/Subtype	**1000**
{2000}	Amount	*(enter payment amount)*
{3400}	Receiver ABA routing number*	**021030004**
{3400}	Receiver ABA short name	**TREAS NYC**
{3600}	Business Function Code	**CTR** (*or CTP*)
{4200}	Beneficiary Identifier (account number)	*(enter 12 digit gateway account #)* **875080031006**
{4200}	Beneficiary Name	*(enter agency name associated with the Beneficiary Identifier)* **DHHS / NIH (75080031)**
{5000}	Originator	*(enter the name of the originator of the payment)* **COMPANY NAME**
{6000}	Originator to Beneficiary Information – Line 1	*(enter information to identify the purpose of the payment)* **ROYALTY**
{6000}	Originator to Beneficiary Information – Line 2	*(enter information to identify the purpose of the payment)* **LICENSE NUMBER**
{6000}	Originator to Beneficiary Information – Line 3	*(enter information to identify the purpose of the payment)* ***INVOICE NUMBER***

Fedwire Field Tag	Fedwire Field Name	Required Information
{6000}	Originator to Beneficiary Information – Line 4	*(enter information to identify the purpose of the payment)*
Notes: *The financial institution address for Treasury's routing number is 33 Liberty Street, New York, NY 10045.		

Agency Contacts: Office of Technology Transfer (OTT) (301) 496-7057 OTT-Royalties@mail.nih.gov

Drawn on a foreign bank account via FEDWIRE:

The following instructions pertain to the Fedwire Network. Deposits made in US Dollars (USD).

Should your remitter utilize a correspondent US domestic bank in transferring electronic funds, the following Fedwire instructions are applicable.

Fedwire Field Tag	Fedwire Field Name	Required Information
{1510}	Type/Subtype	**1000**
{2000}	Amount	*(enter payment amount)*
{3100}	Sender Bank ABA routing number	*(enter the US correspondent bank's ABA routing number)*
{3400}	Receiver ABA routing number*	**021030004**
{3400}	Receiver ABA short name	**TREAS NYC**
{3600}	Business Function Code	**CTR** (*or CTP*)
{4200}	Beneficiary Identifier (account number)**	*(enter 12 digit gateway account #)* **875080031006**
{4200}	Beneficiary Name	*(enter agency name associated with the Beneficiary Identifier)* **DHHS / NIH (75080031)**
{5000}	Originator	*(enter the name of the originator of the payment)* **COMPANY'S NAME**
{6000}	Originator to Beneficiary Information – Line 1	*(enter information to identify the purpose of the payment)* **ROYALTY**
{6000}	Originator to Beneficiary Information – Line 2	*(enter information to identify the purpose of the payment)* **LICENSE NUMBER**
{6000}	Originator to Beneficiary Information – Line 3	*(enter information to identify the purpose of the payment)* ***INVOICE NUMBER***
{6000}	Originator to Beneficiary Information – Line 4	*(enter information to identify the purpose of the payment)*
Notes: *The financial institution address for Treasury's routing number is 33 Liberty Street, New York, NY 10045. **Anything other than the 12 digit gateway account # will cause the Fedwire to be returned – **SWIFT CODE: FRNYUS33**		

Agency Contacts:

Office of Technology Transfer (OTT) (301) 496-7057 OTT-Royalties@mail.nih.gov

Checks

All checks should be made payable to "NIH Patent Licensing"

Checks drawn on a U.S. bank account and sent by US Postal Service should be sent directly to the following address:

National Institutes of Health
P.O. Box 979071
St. Louis, MO 63197-9000

Checks drawn on a U.S. bank account and sent by overnight or courier should be sent to the following address:

US Bank
Government Lockbox SL-MO-C2GL
1005 Convention Plaza
St. Louis, MO 63101
Phone: 314-418-4087

Checks drawn on a foreign bank account should be sent directly to the following address:

National Institutes of Health
Office of Technology Transfer
License Compliance and Administration
Royalty Administration
6011 Executive Boulevard
Suite 325, MSC 7660
Rockville, Maryland 20852

TABLE OF CONTENTS

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Refusal for Cause

Ridiculous Expectation!

Terms and abbreviations used in this section

Terms and abbreviations not omitted or defined	ALC-0159 Added to this drug PEG lipid
ALC-0315.	Aminoolipids added to this drug
[3h] -the	RadioLabeled [Cholesteryl-1,2-3H (N)] -Cholestryl Hexadecyl Ether: Radioactive Signs [Cholester Lil -1, 2-3H (N)] Hexadecyl ether
DSPC	1,2-Distearoyl-Sn-Glycero-3-Phosphocholine: 1,2-Jistealoyl-Sn-Glycero-3-Phosphoco Rin
GLP	Good Laboratory Practice: Standard of implementation of non-clinical trials on drug safety
LNP	Lipid-nanoparticle: Lipid nanoparticles
modrna	Nucleoside-Modified mRNA: Modified nucleoside mRNA
mRNA	Messenger RNA: Messenger RNA
m/z	M / Z (M Over Z): Give the weight of ions by unified atomic mass unit (= Dalton) A dimensionless amount obtained by dividing the amount of the number of ions by the absolute value of the number of ions.
PEG	Polyethylene Glycol: Polyethylene glycol
PK	Pharmacokinetics: Pharmacokinetics
Rna	Ribonucleic Acid: ribonucleic acid
There	Supernatant fraction obtained from liver homogenate by centrifuging at 9000 g[redacted] To A supernatant dispatched with 9000 g centrifuged
WHO	World Health Organization: World Health Organization

1. Summary

BNT162B2 (BionTech Code Number: BNT162, PFIZER Code Number: PF-07302048) is a heavy acute call
Susing syndrome coronavirus 2 (SARS-COV-2) spike glycoprotein (S protein) total length
Code modified nucleoside MRNA (MODRNA) and for infectious diseases with SARS-COV-2
Development has been developed as the essence of mRNA vaccines.In formulation of BNT162B2, two
Functional lipid ALC-0315 (amino lipid) and ALC-0159 (PEG lipid) and two structural lipids
As By mixing with DSPC (1,2-Distearoyl-Sn-Glycero-3-Phosphocholine) and cholesterol
Lipid nanoparticles (LNP) which encapsulate BNT162B2 are formed (hereinafter, "BNT162B2 encapsulated LNP").

ALC-0315 contained in LNP and ALC-0315 and
In vivo and in vitro tests and BNT162B2 to evaluate ALC-0159 absorption (PK), metabolism and excretion
In-vivo distribution test using luciferase or radiolabeled lipid as an alternative reporter
Conducted.

Based on the development of vaccines for the prevention of infections, based on the need to evaluate systemic exposure
(WHO, 2005; Infectious disease prevention vaccine non-clinical trial guidelines) 1, 2, BNT162B2 Encapsulated LNP muscles
By admission PK test did not conduct.Also, the other he contained in this drug is two lipids (cholester
Roll and DSPC is a naturally occurring lipid, and is considered to be metabolism as well as endogenous lipids.
available.in addition, BNT162B2 is degraded by ribonuclease in captured cells and nucleic acid
Thank you, S-protein derived from BNT162B2 is expected to be subject to proteolysis.From the above,
It was thought that no need to evaluate metabolism and excretion of these components.

LNP enclosed RNA encoding luciferase as an alternative reporter of BNT162B2 (Lucife
Laze RNA is enclosed in LNP with the same lipid configuration as BNT162B2 encapsulated LNP: Since then, "Lucifer
Zeres In the PK test, which was administered intravenously to Wistar Han rats), plasma, urine, feces and
Collect liver samples over time and in each sample ALC-0315 and ALC-0159 concentrations were measured.That
fruit, ALC-0315 and ALC-0159 have been shown to be promptly distributed from blood to the liver.Also,
ALC-0315 and ALC-0159 excreted about 1% and about 50% of doses as unchanged
In urine, all were less than the detection limit.

In vivo distribution test, luciferase RNA encapsulated LNP was intramuscularly administered to BALB / C mice.That
As a result, the expression of luciferase was found at the site of administration, and the expression level was low in the liver.
Also recognized.Expression at the administration site of luciferase is after administration It is recognized from 6 hours, and after administration 9 days
Was disappeared.After administration of the liver expression It was observed for 6 hours and disappeared by 48 hours after administration.Also,
Luciferase RNA encapsulated LNP radiolabeled body is intramuscularly administered into rats to quantitatively in vivo distribution.
When evaluated, the radioactivity concentration was the highest at the site of administration.The liver is the highest outside the administration site
It was (maximum of dose 18%).

Metabolism of ALC-0315 and ALC-0159 CD-1 / ICR mouse, Wistar Han or Sprague Dawley rats,
Cynomolgus monkeys or human blood, liver microsomes, liver In vitro using S9 fractions and hepatocytes
evaluated.Also, the above-mentioned rat intravenous administration For plasma, urine, feces and liver samples collected in PK test
In IN VIVO metabolism was also examined.From these in vitro and in vivo tests, ALC-0315 and
ALC-0159 is an ester bond and an amide bond hydration, respectively, in any animal species of testing
It has been shown to be slowly metabolized by solution.

From the above non-clinical pharmacokinetic evaluation, the circulating blood was reached LNP was shown to be distributed in the liver.
Also, Metabolism and feces excretion is involved in the disappearance of ALC-0315 and ALC-0159, respectively.
It was suggested.

2. Analysis Method

Report number: PF-07302048_06 [redacted]_072424

ALC-0315 and ALC-0315, which is a LNP constituent lipid in rat intravenous administration PK test (M2.6.4.3) of GLP non-application
ALC-0159 Developed LC / MS method with appropriate performance to quantify concentrations.That is, 20 μl
Plasma, liver homogenate (liver A homogenate is prepared using sections collected from three places.
Suitable for pooling, dilute with blank matrix), urine and feces homogenate (as appropriate, Blanc
Cumatrix diluted) Samples Internal standards (Removed by acetonitrile containing PEG-2000)
After protein, centrifuge and the supernatant We subjected to LC-MS / MS measurement.

3. Absorption

Report number: PF-07302048_06 [redacted]_ 072424, Overview Table: 2.6.5.3

Luciferase RNA encapsulated LNP is male to consider the in-vibration condition of ALC-0315 and ALC-0159
Wistar Han rats are administered in a single intravenous administration at a dose of 1 mg RNA / kg, with time (before administration, 0.1, 0.25,
Sparse plasma and liver on 0.5, 1, 3, 6 and 24 hours and 2, 4, 8 and 14 days after administration.
Collected by sampling Three / time pointed).ALC-0315 and ALC-0159 in plasma and liver
Measure the concentration, PK parameters were calculated (Table 1).Blood ALC-0315 and ALC-0159
After giving Slightly distributed to the liver by 24 hours.Also, 24 hours plasma concentration after administration is in the highest plasma
Density It was less than 1% (Figure 1).Close-end phase disappearance half-life (T2) is in plasma and in liver
The same level, ALC-0315 was 6 to 8 days, and ALC-0159 was 2-3 days.From the results of this test, the liver is in blood
from It was suggested that it is one of the major organizations that take ALC-0315 and ALC-0159.

Conducted in this study On the examination results of Urinary and feces concentration of ALC-0315 and ALC-0159
It is Section M2.6.4.6.

Table 1 luciferase RNA encapsulated LNP in Wistar Han rats at a dose of 1 mg RNA / kg

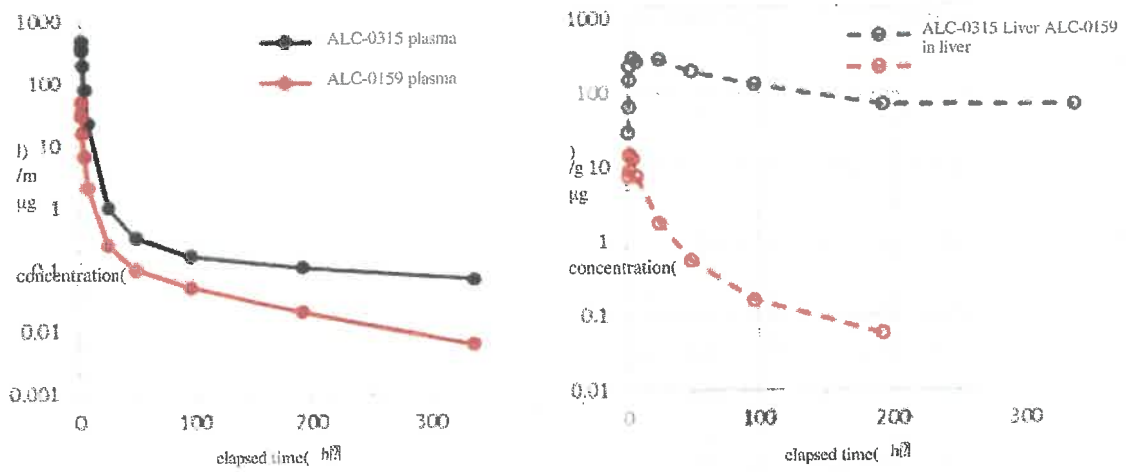
When given Pharmacokinetics of ALC-0315 and ALC-0159

Analyte	Analyze dose (mg/kg)	sex/Nt½[illegible]h[illegible]		AUCinf (μg•h/mL)	AUClast (μg•h/mL[illegible]	To the liver Distribution rate(%)a
ALC-0315.	15.3	Male 3b	139	1030	1020	60
ALC-0159.	1.96	Male 3b	72.7	99.2	98.6	20

a. Calculated as the highest liver distribution amount (μg) / [dose (μg)].b. Each
time point.Sparse sampling.

Figure 1 luciferase RNA encapsulated LNP in Wistar Han rats at a dose of 1 mg RNA / kg

When given Plasma and liver concentrations of ALC-0315 and ALC-0159

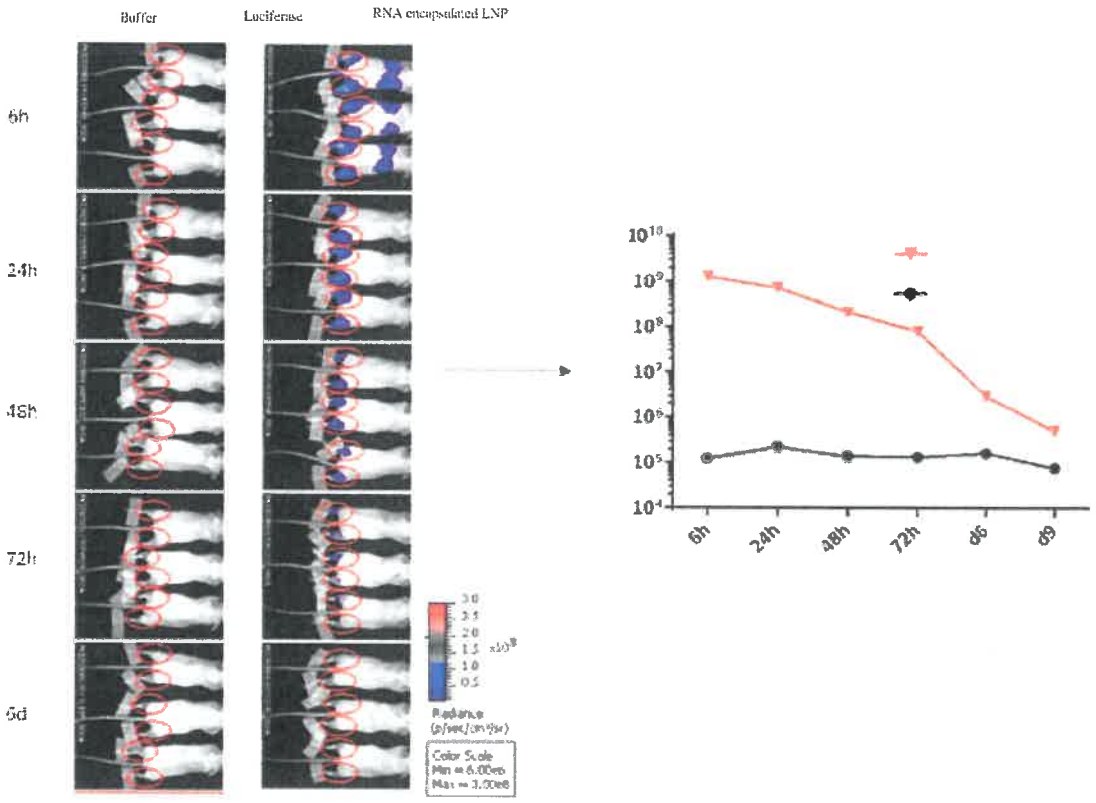


4. Distribution

Report number: R-[redacted]72, 185350, Overview Table: 2.6.5.5a, 2.6.5.5b

female Administer luciferase RNA encapsulated LNP to BALB / C mice (3 animals) and luciferase emission
As an alternative marker The vivo distribution of BNT162B2 was examined.That is, luciferase RNA encapsulation
LNP was administered intramuscularly at a dose of 1 μg RNA (total 2 μg RNA) in the left and right hindlimbs of mice.Then
Cypherase emission detection Luciferin, which is a light emitting substrate 5 minutes ago, is administered intraperitoneally, isoflurane hemp
Downward 6 and 24 hours after administration using Xenogen IVIS Spectrum in vivo, 6 and 24 hours and 2,
By measuring it on 3, 6 and 9 days, it is recommended with time with the same individual of luciferase protein
I was evaluated.As a result, expression at the site of administration of luciferase is administered Recognized from 6 hours,
After giving It disappeared on the 9th.Liver expression was also from 6 hours after administration, and disappeared by 48 hours after administration
I was.Distribution to the liver is a luciferase where topically administered Some of the RNA encapsulated LNP reaches circulating blood and liver
It was considered to indicate that it was incorporated in the needs. As detailed in M2.6.4.3, rats are
Laze When RNA encapsulated LNP is administered intravenously, the liver is the main of ALC-0315 and ALC-0159
It is suggested that it is a distributed organ, this is the finding of the test results that were intramuscularly administered to mice
The mixture was.In addition, a toxic finding finding of liver disorder is recognized in rat repeated dose toxicity test
Absent(M2.6.6.3).

Figure 2 Luciferase RNA encapsulated LNP in vivo luminescence in BALB / C mice administered intramuscularly



male and female Wistar Han rats, LNP labeled with [3H] -colesteryl hexadecyl ether ([3H] -CHE)

Luciferase using The RNA encapsulated LNP is intramuscularly administered at a dose of 50 μg RNA and 15 minutes after administration

Atmosphere Help plasma and tissues from 3 males and 3 males at each time of 1, 2, 4, 8, 24 and 48 hours

By measuring the radioactivity concentration by liquid scintillation counting method Review the vivo distribution of LNP

It was reported.Both male and female, the radioactivity concentration was the highest dosing site at any measurement.

After administration of radioactivity concentration in plasma The highest value was shown for 1 to 4 hours.In addition, liver, spleen, adrenal and

Distribution to the ovary was observed, and after administration that the radioactivity was the highest in these tissues 8 to 48

It was time.Total radiation recovery rate for doses other than the site of administration is the highest in the liver (maximum 18%)

spleen(1.0% or less), adrenal (less than 0.11%) and ovary (0.095% or less) significantly lower than the liver

won.In addition, the average concentration and tissue distribution pattern of radioactivity were roughly similar to male and female.

It is believed that the in vivo expression distribution of the antigen encoded by BNT162B2 depends on the LNP distribution.For this test

Luciferase Is the lipid configuration of RNA encapsulated LNP be identical to the application formulation of BNT162B2

The results of this test It is believed that the distribution of BNT162B2 encapsulated LNP is shown.

5. Metabolism

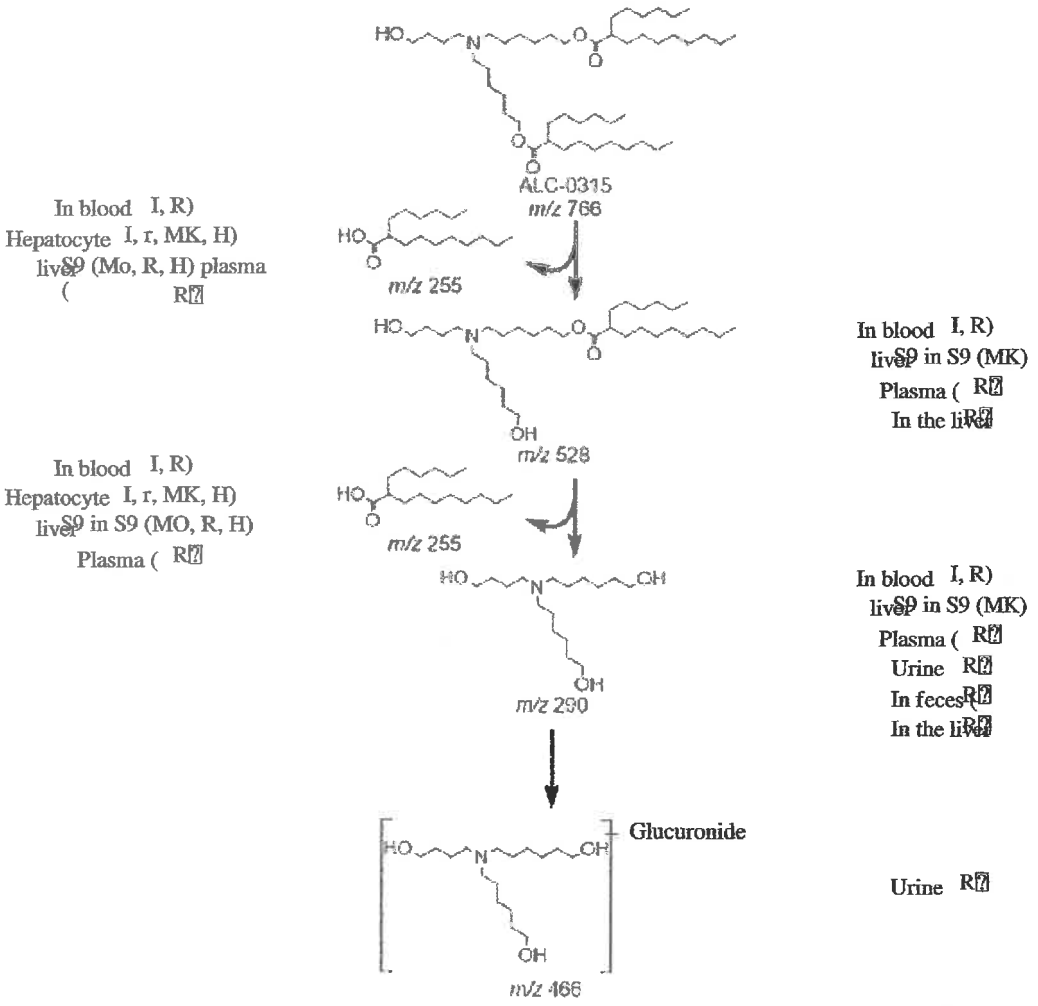
Report number: 01049-[redacted]49-01049-020,[redacted]49-021,01049-[redacted]2, [redacted] [redacted] [redacted]
PF-07302048_05 [redacted]_043725, Overview Table: 2.6.5.10a, 2.6.5.10b, 2.6.5.10c, 2.6.5.10d

CD-1 / ICR mouse, Wistar Han or Sprague Dawley rats, cynomolgus monkeys and humans

Chrome, liver In vitro metabolic stability of ALC-0315 and ALC-0159 using S9 fractions and hepatocytes
The sex was evaluated. ALC-0315 or ALC-0159 for each animal species Microsomer or liver S9 fraction (120)
Intercarding incubation) or hepatocytes (Add to 240 minutes incubation)
The proportion of unconstructed unaccurations after bath was measured.resulting in, ALC-0315 and ALC-0159
It is metabolically stable in animal species and test systems, and the ultimate percentage of unaccurate is More than 82%.

further Metabolic pathways of ALC-0315 and ALC-0159 were evaluated in vitro and in vivo.this
In the test, CD-1 mouse, Wistar Han rats, cynomolgus monkey and human blood, liver S9 fraction
And using hepatocytes IN Vitro metabolism was evaluated.In addition, plasma, urine, feces collected in rat PK test
And liver samples, IN VIVO metabolism was evaluated (M2.6.4.3).From the test results, ALC-0315
When Metabolism of ALC-0159 is all slowly slow, and hydrolysis of ester bonds and amide bonds, respectively
It became clear that it is metabolized by. Metabolism by hydrolysis shown in Figure 3 and Figure 4
Was found in all animal species evaluated.

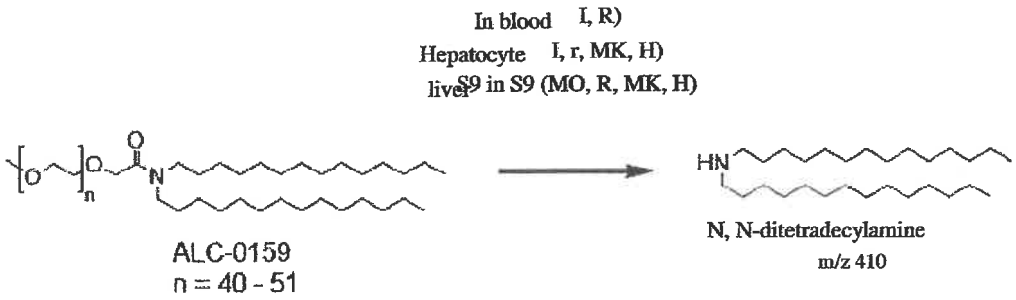
Figure 3 Estimated in vivo metabolic pathway of ALC-0315 in various animal species



H: Human, MK: Monkey, MO: Mouse, R: Rat

ALC-0315 is metabolized by receiving ester hydrolysis twice in succession.This two hydrolysis
By first, monoester metabolites (M / Z 528), then a dual-dose esterification metabolite (M / z 290) is formed
It is done.This double-dose esterification metabolite is further metabolized and glucuronic acid conjugate (M / Z 466)
However, this glucuronic acid conjugate is rats PK test was only detected in urine.In addition, two hydrolysis
Any acidic product of It was also confirmed that 6-hexyl decanoic acid (m / z 255).

Figure 4 Estimated in vivo metabolism pathway of ALC-0159 in various animal species



H: Human, MK: Monkey, MO: Mouse, R: Rat

ALC-0159 produces N, N-ditetradecylamine (M / Z 410) by hydrolysis of amide bonds

The pathway was the main metabolic pathway.This metabolite is blood and mice rats of mouse rats.

Sal-human hepatocytes and liver It was detected in the S9 fraction.Metabolites of ALC-0159 from in vivo samples

It was not confirmed.

6. Excretion

Luciferase PK test with intravenous administered intravenously to rats at a dose of 1 mg RNA / kg of RNA encapsulated LNP

(M2.6.4.3, ALC-0315 and ALC-0159 in urine and feces collected over time were measured.

None of the unchangeable bodies of ALC-0315 and ALC-0159 were not detected in urine.On the other hand, in the feces

ALC-0315 and ALC-0159 unchanged substances are detected, and the percentage per dose is about 1% and

about It was 50%.Also, as shown in Figure 3, the metabolites of ALC-0315 were detected in urine.

7. Pharmacokinetic drug interaction

The pharmacokinetic drug interaction test of this vaccine has not been conducted.

8. Other pharmacokinetic tests

Other pharmacokinetic tests of this vaccine have not been conducted.

9. Consideration and conclusion

Rats In the PK test, the concentration of ALC-0315 in plasma and liver is the highest concentration for 2 weeks after administration.

Every Decreased to 1/7000 and about 1/2-sq, and the ALC-0159 concentration is about 8000 minutes, respectively.

And about It decreased to one of 250 minutes.T-13 is the same in plasma and liver, ALC-0315, he is 6 to 8 days,

ALC-0159 was 2-3 days.Plasma T-13 values are distributed in tissues as LNP, each lipid.

It is then considered to indicate that it has been redistributed in plasma during the disappearance process.

Although the unchangeable body of ALC-0315 was hardly detected in any of urine and feces, rat PK test

Monomeric metabolites and dual esterification metabolites from feces and plasma samples collected 6-Hexy

Radecanoic acid detected glucuronic acid conjugate of dual-dose-esterified metabolites from urine.This metabolism

Process Although it is considered as the main loss mechanism of ALC-0315, quantitative data to verify this hypothesis is obtained

Absent.on the other hand, ALC-0159 was excreted in feces as an unchangeable body of dose.In vitro metabolic experiment

In the hydrolysis of the amide bond, it was slowly metabolized.

Because the in-vivo expression distribution of the antigen encoded by BNT162B2 is considered to depend on the LNP distribution,

BALB / C mice are intramuscularly administered luciferase RNA encapsulated LNP and alternative reporter protein

In-vivo distribution was examined.As a result, expression of luciferase is found at the site of administration,

The expression level was also observed in the liver but was also observed.Expression at the site of administration of luciferase was observed from 6 hours after administration and disappeared on 9 days after administration.The expression in the liver is observed from 6 hours after administration.
After giving It disappeared by 48 hours.Distribution to the liver is a circular luciferase RNA encapsulated LNP

It was considered to indicate that it was reached and taken up in the liver.Also, Lucifer in rats

Zeros When the radiolabel of RNA encapsulated LNP was administered intramuscularly, the radioactivity concentration is the highest value at the dosing site.
Indicated.Other than the site of administration, the liver was the highest and then detected in the spleen, adrenal and ovaries,

Total radioactivity recovery for dosages in these tissues was significantly lower than the liver.This result is

In-mouse biological distribution tests were encoded by luciferase expression in liver.In addition,

No toxic findings were observed showing liver injury in rat repeated dose toxicity tests (M2.6.6.3).

From the above non-clinical pharmacokinetic evaluation, the circulating blood was reached LNP was shown to be distributed in the liver.

Also, Metabolism and feces excretion is involved in the disappearance of ALC-0315 and ALC-0159, respectively.

It was suggested.

10. Charts

The chart is shown in the text and outline table.

references

1 World Health Organization. Annex 1. Guidelines on the nonclinical evaluation of vaccines. In: WHO Technical Report Series No. 927, Geneva, Switzerland. World Health Organization; 2005:31-63.

2 Non-clinical trial guidelines for infection prevention vaccine (Medicine dike examination 0527 1, May 27, 2010)

2.6.5.1. PHARMACOKINETICS OVERVIEW

Test Article: BNT162b2

Type of Study	Test System	Test item	Method of Administration	Testing Facility	Report Number
Single Dose Pharmacokinetics					
Single Dose Pharmacokinetics and Excretion in Urine and Feces of ALC-0159 and ALC-0315	Rat (Wistar Han)	modRNA encoding luciferase formulated in LNP comparable to BNT162b2	IV bolus	Pfizer yet	PF-07302048_06 [redacted]_072424
Distribution					
In Vivo Distribution	Mice BALB/c	modRNA encoding luciferase formulated in LNP comparable to BNT162b2	IM Injection	[redacted]b	R-[redacted]072
In Vivo Distribution	Rat (Wistar Han)	modRNA encoding luciferase formulated in LNP comparable to BNT162b2 with trace amounts of [3H]-CHE as non- diffusible label	IM Injection	[redacted]c	185350
Metabolism In Vitro and In Vivo Metabolism					
In Vitro Metabolic Stability of ALC-0315 in Liver Microsomes	Mouse (CD-1/ICR), rat (Sprague Dawley and Wistar Han), monkey (Cynomolgus), and human liver microsomes	ALC-0315.	In vitro	[redacted]d	01049-0[redacted]
In Vitro Metabolic Stability of ALC-0315 in Liver S9	Mouse (CD-1/ICR), rat (Sprague Dawley), monkey (Cynomolgus), and human S9 liver fractions	ALC-0315.	In vitro	[redacted]d	01049-0[redacted]

2.6.5.1. PHARMACOKINETICS OVERVIEW

Test Article: BNT162b2

Type of Study	Test System	Test item	Method of Administration	Testing Facility	Report Number
In Vitro Metabolic Stability of ALC-0315 in Hepatocytes	Mouse (CD-1/ICR), rat (Sprague Dawley and Wistar Han), monkey (Cynomolgus), and human hepatocytes	ALC-0315.	In vitro	[redacted]	01049-[redacted]
In Vitro Metabolic Stability of ALC-0159 in Liver Microsomes	Mouse (CD-1/ICR), rat (Sprague Dawley and Wistar Han), monkey (Cynomolgus), and human liver microsomes	ALC-0159.	In vitro	[redacted]	01049-[redacted]
In Vitro Metabolic Stability of ALC-0159 in Liver S9	Mouse (CD-1/ICR), rat (Sprague Dawley), monkey (Cynomolgus), and human S9 fractions	ALC-0159.	In vitro	[redacted]	01049-[redacted]
In Vitro Metabolic Stability of ALC-0159 in Hepatocytes	Mouse (CD-1/ICR), rat (Sprague Dawley and Wistar Han), monkey (Cynomolgus), and human hepatocytes	ALC-0159.	In vitro	[redacted]	01049-[redacted]
Biotransformation of ALC-0159 and ALC-0315 In Vitro and In Vivo in Rats	In vitro: CD-1 mouse, Wistar Han rat, cynomolgus monkey, and human blood, liver S9 fractions and hepatocytes In vivo: male Wistar Han rats	ALC-0315 and ALC-0159	In vitro or IV (in vivo in rats)	Pfizer thin	PF-07302048_05 [redacted]_043725

2.6.5.1. PHARMACOKINETICS OVERVIEW

Test Article: BNT162b2

Type of Study	Test System	Test item	Method of Administration	Testing Facility	Report Number

ALC-0159 = 2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide), a proprietary polyethylene glycol-lipid included as an excipient in the LNP formulation used in BNT162b2; ALC-0315 = (4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), a proprietary aminolipid included as an excipient in the LNP formulation used in BNT162b2; IM = Intramuscular; IV = Intravenous; LNP = lipid nanoparticles; S9 = Supernatant fraction obtained from liver homogenate by centrifuging at 9000
g. a. La Jolla, California.
b. . Germany.
c. [redacted]
, U
Ch[redacted]ton, Connecticut.

2.6.5.3. PHARMACOKINETICS:

PHARMACOKINETICS AFTER A SINGLE DOSE

Test Article: modRNA encoding luciferase in LNP Report Number: PF-07302048_06 _072424 [redacted]

Species (Strain)	Rat (Wistar Han)	
Sex/Number of Animals	Male/ 3 animals per timepointa	
Feeding Condition	Fasted	
Method of Administration	IV	
Dose modRNA (mg/kg)	1	
How to LC-0159 (MG / KG)	1.96	
How do you have LC-0315 (MG / KG)	15.3	
Sample Matrix	Plasma, liver, urine and feces	
Sampling Time Points (h post dose):	Predose, 0.1, 0.25, 0.5, 1, 3, 6, 24, 48, 96, 192, 336	
Analyte	ALC-0315.	ALC-0159.
PK Parameters:	Meanb	Meanb
AUCinf (µg•h/mL)c	1030	99.2
Aaclast (µg • h / ml)	1020	98.6
Initial t½ (h)d	1.62	1.74
Terminal elimination t½ (h)e	139	72.7
Estimated fraction of dose distributed to liver (%)f	59.5	20.3
Dose in Urine (%)	Ncg	Ncg
Dose in Feces (%)h	1.05	47.2

ALC-0159 = 2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide), a proprietary polyethylene glycol-lipid included as an excipient in the LNP formulation used in BNT162b2; ALC-0315 = (4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), a proprietary aminolipid included as an excipient in the LNP formulation used in BNT162b2; AUCinf = Area under the plasma drug concentration-time curve from 0 to infinite time; AUClast = Area under the plasma drug concentration-time curve from 0 to the last quantifiable time point; BLQ = Below the limit of quantitation; LNP = Lipid nanoparticle; modRNA = Nucleoside modified messenger RNA; PK = Pharmacokinetics; t½ = Half-life.

a. Non-serial sampling, 36 animals total.
b. Only mean PK parameters are reported due to non-serial sampling.
c. Calculated using the terminal log-linear phase (determined using 48, 96, 192, and 336 h for regression calculation).
d. ln(2)/initial elimination rate constant (determined using 1, 3, and 6 h for regression calculation).
e. ln(2)/terminal elimination rate constant (determined using 48, 96, 192, and 336 h for regression calculation).
f. Calculated as follows: highest mean amount in the liver (µg)/total mean dose (µg) of ALC-0315 or ALC-0159. g. Not calculated due to BLQ data. h. Fecal excretion, calculated as: (mean µg of analyte in feces/ mean µg of analyte administered) × 100

2.6.5.5A. PHARMACOKINETICS: ORGAN DISTRIBUTION

Test Article: modRNA encoding luciferase in LNP Report Number: R- -0072

Species (Strain):	Mice (BALB/c)
Sex/Number of Animals:	Female/3 per group
Feeding Condition:	Fed adlibitum
Vehicle/Formulation:	Phosphate-buffered saline
Method of Administration:	Intramuscular injection
Dose (mg/kg):	1 µg/hind leg in gastrocnemius muscle (2 µg total)
Number of Doses:	1
Detection:	Bioluminescence measurement
Sampling Time (hour):	6, 24, 48, 72 hours; 6 and 9 days post-injection

Time point	Total Mean Bioluminescence signal (photons/second)		Mean Bioluminescence signal in the liver (photons/second)
	Buffer control	modRNALuciferase in LNP	modRNALuciferase in LNP
6 hours	1.28 x 105	1.26 × 10 9	4.94 × 107
24 hours	2.28 x 105	7.31 × 10 8	2.4 × 10 6
48 hours	1.40 × 10 5	2.10 × 10 8	Below detectiona
72 hours	1.33 × 10 5	7.87 × 107	Below detectiona
6 days	1.62 × 105	2.92 × 10 6	Below detectiona
9 days	7.66 × 10 4	5.09 x 105	Below detectiona

LNP = Lipid nanoparticle; modRNA = Nucleoside modified messenger RNA.
a. At or below the background level of the buffer control.

2.6.5.5B. PHARMACOKINETICS: ORGAN DISTRIBUTION CONTINUED

Test Article: [3H]-Labelled LNP-mRNA formulation containing ALC-0315 and ALC-0159

Report Number: 185350

Species (Strain):	Rat (Wistar Han)
Sex/Number of Animals:	Male and female/3 animals/sex/timepoint (21 animals/sex total for the 50 µg dose)
Feeding Condition:	Fed adlibitum
Method of Administration:	Intramuscular injection
Please:	50 µg [3H]-08-A01-C0 (lot # NC-0552-1)
Number of Doses:	1
Detection:	Radioactivity quantitation using liquid scintillation counting
Sampling Time (hour):	0.25, 1, 2, 4, 8, 24, and 48 hours post-injection

Sample	Mean total lipid concentration (µg lipid equivalent/g (or mL) (males and females combined)							% of administered dose (males and females combined)						
	0.25 h	1 h	2 h	4 h	8 h	24 h	48 h	0.25 h	1 h	2 h	4 h	8 h	24 h	48 h
Adipose tissue	0.057	0.100	0.126	0.128	0.093	0.084	0.181	-	-	-	-	-	-	-
Adrenal glands	0.271	1.48	2.72	2.89	6.80	13.8	18.2	0.001	0.007	0.010	0.015	0.035	0.066	0.106
Bladder	0.041	0.130	0.146	0.167	0.148	0.247	0.365	0.000	0.001	0.001	0.001	0.001	0.002	0.002
Bone (femur)	0.091	0.195	0.266	0.276	0.340	0.342	0.687	-	-	-	-	-	-	-
Bone marrow (femur)	0.479	0.960	1.24	1.24	1.84	2.49	3.77	-	-	-	-	-	-	-
Brain	0.045	0.100	0.138	0.115	0.073	0.069	0.068	0.007	0.013	0.020	0.016	0.011	0.010	0.009
Eyes	0.010	0.035	0.052	0.067	0.059	0.091	0.112	0.000	0.001	0.001	0.002	0.002	0.002	0.003
Heart	0.282	1.03	1.40	0.987	0.790	0.451	0.546	0.018	0.056	0.084	0.060	0.042	0.027	0.030
Injection site	128	394	311	338	213	195	165	19.9	52.6	31.6	28.4	21.9	29.1	24.6
Kidneys	0.391	1.16	2.05	0.924	0.590	0.426	0.425	0.050	0.124	0.211	0.109	0.075	0.054	0.057
Large intestine	0.013	0.048	0.093	0.287	0.649	1.10	1.34	0.008	0.025	0.065	0.192	0.405	0.692	0.762
Liver	0.737	4.63	11.0	16.5	26.5	19.2	24.3	0.602	2.87	7.33	11.9	18.1	15.4	16.2
Lung	0.492	1.21	1.83	1.50	1.15	1.04	1.09	0.052	0.101	0.178	0.169	0.122	0.101	0.101

2.6.5.5B. PHARMACOKINETICS: ORGAN DISTRIBUTION CONTINUED

Test Article: [3H]-Labelled LNP-mRNA formulation containing ALC-0315 and ALC-0159 Report Number: 185350

Sample	Total Lipid concentration (µg lipid equivalent/g [or mL]) (males and females combined)							% of Administered Dose (males and females combined)						
	0.25 h	1 h	2 h	4 h	8 h	24 h	48 h	0.25 h	1 h	2 h	4 h	8 h	24 h	48 h
Lymph (mandibular)	0.064	0.189	0.290	0.408	0.534	0.554	0.727	-	-	-	-	-	-	-
Lymph node (mesenteric)	0.050	0.146	0.530	0.489	0.689	0.985	1.37	-	-	-	-	-	-	-
Muscle	0.021	0.061	0.084	0.103	0.096	0.095	0.192	-	-	-	-	-	-	-
Ovaries (females)	0.104	1.34	1.64	2.34	3.09	5.24	12.3	0.001	0.009	0.008	0.016	0.025	0.037	0.095
Pancreas	0.081	0.207	0.414	0.380	0.294	0.358	0.599	0.003	0.007	0.014	0.015	0.015	0.011	0.019
Pituitary gland	0.339	0.645	0.868	0.854	0.405	0.478	0.694	0.000	0.001	0.001	0.001	0.000	0.000	0.001
Prostate (males)	0.061	0.091	0.128	0.157	0.150	0.183	0.170	0.001	0.001	0.002	0.003	0.003	0.004	0.003
Salivary glands	0.084	0.193	0.255	0.220	0.135	0.170	0.264	0.003	0.007	0.008	0.008	0.005	0.006	0.009
Skin	0.013	0.208	0.159	0.145	0.119	0.157	0.253	-	-	-	-	-	-	-
Small intestine	0.030	0.221	0.476	0.879	1.28	1.30	1.47	0.024	0.130	0.319	0.543	0.776	0.906	0.835
Spinal cord	0.043	0.097	0.169	0.250	0.106	0.085	0.112	0.001	0.002	0.002	0.003	0.001	0.001	0.001
Spleen	0.334	2.47	7.73	10.3	22.1	20.1	23.4	0.013	0.093	0.325	0.385	0.982	0.821	1.03
Stomach	0.017	0.065	0.115	0.144	0.268	0.152	0.215	0.006	0.019	0.034	0.030	0.040	0.037	0.039
Tests (Males)	0.031	0.042	0.079	0.129	0.146	0.304	0.320	0.007	0.010	0.017	0.030	0.034	0.074	0.074
Thymus	0.088	0.243	0.340	0.335	0.196	0.207	0.331	0.004	0.007	0.010	0.012	0.008	0.007	0.008
Thyroid	0.155	0.536	0.842	0.851	0.544	0.578	1.00	0.000	0.001	0.001	0.001	0.001	0.001	0.001
Uterus (females)	0.043	0.203	0.305	0.140	0.287	0.289	0.456	0.002	0.011	0.015	0.008	0.016	0.018	0.022
Whole blood	1.97	4.37	5.40	3.05	1.31	0.909	0.420	-	-	-	-	-	-	-
Plasma	3.97	8.13	8.90	6.50	2.36	1.78	0.805	-	-	-	-	-	-	-
Blood: plasma ratio	0.815	0.515	0.550	0.510	0.555	0.530	0.540	-	-	-	-	-	-	-

2.6.5.5B. PHARMACOKINETICS: ORGAN DISTRIBUTION CONTINUED

Test Article: [3H]-Labelled LNP-mRNA formulation containing ALC-0315 and ALC-0159 Report Number: 185350

– = Not applicable, partial tissue taken; [3H]-08-A01-C0 = An aqueous dispersion of LNPs, including ALC-0315, ALC-0159, distearoylphosphatidylcholine, cholesterol, mRNA encoding luciferase and trace amounts of radiolabeled [Cholesteryl-1,2-3H(N)]-Cholesteryl Hexadecyl Ether, a nonexchangeable, non-metabolizable lipid marker used to monitor the disposition of the LNPs; ALC-0159 = 2-[(polyethylene glycol)-2000]-N,N–ditetradecylacetamide), a proprietary polyethylene glycol-lipid included as an excipient in the LNP formulation used in BNT162b2; ALC-0315 = (4–hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), a proprietary aminolipid included as an excipient in the LNP formulation used in BNT162b2; LNP = Lipid nanoparticle; mRNA = messenger RNA.
a. The mean male and female blood:plasma values were first calculated separately and this value represents the mean of the two values.

2.6.5.9. PHARMACOKINETICS: METABOLISM IN VIVO, RAT

Test Article: modRNA encoding luciferase in LNP Report Number: PF-07302048_05 _043725 [redacted]

Species (Strain):	Rat (Wistar Han)
Sex/ Number of animals	Male/ 36 animals total for plasma and liver, 3 animals for urine and feces
Method of Administration:	Intravenous
Dose (mg/kg):	1
Test System:	Plasma, Urine, Feces, Liver
Analysis Method:	Ultrahigh performance liquid chromatography/ mass spectrometry

Biotransformation	m/z	Metabolites of ALC-0315 Detected			
		Plasma	Urine	Feces	Liver
N-dealkylation, oxidation	102.0561a	ND	ND	ND	ND
N-Dealkylation, oxidation	104.0706 b	ND	ND	ND	ND
N-dealkylation, oxidation	130.0874	ND	ND	ND	ND
N-Dealkylation, oxidation	132.1019b	ND	ND	ND	ND
N-dealkylation, hydrolysis, oxidation	145.0506a	ND	ND	ND	ND
Hydrolysis (acid)	Brother .2330	+	ND	ND	ND
Hydrolysis, hydroxylation	271. Investing	ND	ND	ND	ND
Bis-Hydrolysis (Amine)	290.2690 b	+	+	+	+
Hydrolysis, glucuronidation	431.2650a	ND	ND	ND	ND
Bis-hydrolysis (amines), glucuronidation	464.2865a	ND	ND	ND	ND
Bis-hydrolysis (amines), glucuronidation	466.3011b	ND	+	ND	ND
Hydrolysis (amine)	528.4986 b	+	ND	ND	+
Hydrolysis (amine), Glucuronidation	704.5307 b	ND	ND	ND	ND
Otachi and Ashi D	778.6930a	ND	ND	ND	ND
Otachi and Ashi D	780.7076 b	ND	ND	ND	ND
Hydroxylation	Achieve.	ND	ND	ND	ND
Sulfation	844.6706	ND	ND	ND	ND
Sulfation	846.6851b	ND	ND	ND	ND
Glucuronidation	940.7458	ND	ND	ND	ND
Glucuronidation	942.7604 b	ND	ND	ND	ND

Note: Both theoretical and observed metabolites are included.
m/z = mass to charge ratio; ND = Not detected; + = minor metabolite as assessed by ultraviolet detection.
a. Negative ion mode.
b. Positive ion mode.

2.6.5.10A. PHARMACOKINETICS: METABOLISM IN VITRO

Test article: alc-0315
Report Numbers: 01049- 008
01049-00
01049-01

Type of Study:	Stability of ALC-0315 In Vitro		
Study System:	Liver Microsomes + NADPH	S9 Fraction + NADPH, UDPGA, and alamethicin	Hepatocytes
ALC-0315 Concentration:	1 µM	1 µM	1 µM
Duration of Incubation (min):	120 min	120 min	240 min
Analysis Method:	Ultra-high performance liquid chromatography-tandem mass spectrometry		

Incubation time (min)	Percent ALC-0315 remaining													
	Liver Microsomes					Liver Said Frazy				Hepatocytes				
	Mouse (CD-1/ICR)	Rat (SD)	Rat (WH)	Monkey (Cyno)	Human	Mouse (CD-1 / ICR)	Rat (SD)	Monkey (Cyno)	Human	Mouse (CD-1 / ICR)	Rat (SD)	Rat (WH)	Monkey (Cyno)	Human
0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
15	98.77	94.39	96.34	97.96	100.24	97.69	98.85	99.57	95.99	-	-	-	-	-
30	97.78	96.26	97.32	96.18	99.76	97.22	99.62	96.96	97.32	101.15	97.75	102.70	96.36	100.72
60	100.49	99.73	98.54	100.00	101.45	98.61	99.62	99.13	94.98	100.77	98.50	102.32	9.82	101.44
90	97.78	98.66	94.15	97.96	100.48	98.15	98.85	98.70	98.33	101.92	99.25	103.09	100.0	100.36
120	96.54	95.99	93.66	97.71	98.31	96.76	98.46	99.57	99.33	98.85	97.38	99.61	96.36	100.72
180	-	-	-	-	-	-	-	-	-	101.15	98.88	103.47	95.64	98.92
240	-	-	-	-	-	-	-	-	-	99.62	101.12	100.00	93.82	99.64
t½ (min)	> 120	> 120	> 120	> 120	> 120	> 120	> 120	> 120	> 120	> 240	> 240	> 240	> 240	> 240

– = Data not available; ALC-0315 = (4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate), a proprietary aminolipid included as an excipient in the lipid nanoparticle formulation used in BNT162b2; Cyno = Cynomolgus; NADPH = Reduced form of nicotinamide adenine dinucleotide phosphate; NC = not calculated; SD = Sprague Dawley; t½ = half-life; WH = Wistar-Han; UDPGA= uridine-diphosphate-glucuronic acid trisodium salt.

2.6.5.10B. PHARMACOKINETICS: METABOLISM IN VITRO
CONTINUED

Test article: alc-0159
Report Numbers: 01049- 020 01049-[redacted]21
01049-0[redacted]

Type of Study:	Stability of ALC-0159 In Vitro		
Study System:	Liver Microsomes + NADPH	S9 Fraction + NADPH, UDPGA, and alamethicin	Hepatocytes
ALC-0159 Concentration:	1 µM	1 µM	1 µM
Duration of Incubation (min):	120 min	120 min	240 min
Analysis Method:	Ultra-high performance liquid chromatography-tandem mass spectrometry		

Incubation time (min)	Percent ALC-0159 remaining													
	Liver Microsomes					Liver Said Frazy				Hepatocytes				
	Mouse (CD-1/ICR)	Rat (SD)	Rat (WH)	Monkey (Cyno)	Human	Mouse (CD-1 / ICR)	(SD)	Monkey (Cyno)	Human	Mouse (CD-1 / ICR)	(SD)	Rat (WH)	Monkey (Cyno)	Human
0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		
15	82.27	101.24	112.11	100.83	99.59	98.93	84.38	91.30	106.73	-	-	-	-	-
30	86.40	93.78	102.69	85.12	92.28	91.10	90.87	97.96	107.60	100.85	93.37	113.04	90.23	106.34
60	85.54	98.34	105.38	86.36	95.53	102.85	97.97	105.56	104.97	94.92	91.81	105.07	92.93	101.58
90	85.41	95.44	100.90	94.63	97.97	90.75	93.51	108.33	109.36	94.28	90.25	112.80	94.59	92.67
120	95.87	97.10	108.97	93.39	93.09	106.76	92.70	105.74	119.59	87.08	89.47	104.11	97.51	96.04
180	-	-	-	-	-	-	-	-	-	94.92	93.96	102.90	89.81	93.66
240	-	-	-	-	-	-	-	-	-	102.75	94.93	98.79	92.93	102.57
$t_{1/2}$ (min)	> 120	> 120	> 120	> 120	> 120	> 120	> 120	> 120	> 120	> 240	> 240	> 240	> 240	> 240

-- = Data not available; ALC-0159 = 2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide), a proprietary polyethylene glycol-lipid included as an excipient in the lipid nanoparticle formulation used in BNT162b2; Cyno = Cynomolgus; NADPH = Reduced form of nicotinamide adenine dinucleotide phosphate; NC = not calculated; SD = Sprague Dawley; WH = Wistar-Han; UDPGA= uridine-diphosphate-glucuronic acid trisodium salt.

2.6.5.10C. PHARMACOKINETICS: METABOLISM IN VITRO CONTINUED

Test article: alc-0315

Report Number: OF-07302048_05 [redacted]_043725

Type of study	Metabolism of ALC-0315 In Vitro											
Study system	Blood				Hepatocytes				Liver Said Frazy			
ALC-0315 concentration	10 µM				10 µM				10 µM			
Duration of incubation	24 h				4 h				24 h			
Analysis Method:	Ultrahigh performance liquid chromatography/ mass spectrometry											
Biotransformation	m/z	Blood				Hepatocytes				Liver Said Frazy			
		Mouse	Rat	Monkey	Human	Mouse	Rat	Monkey	Human	Mouse	Rat	Monkey	Human
N-dealkylation, oxidation	102.0561a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Dealkylation, oxidation	104.0706 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dealkylation, oxidation	130.0874	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Dealkylation, oxidation	132.1019b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-dealkylation, hydrolysis, oxidation	145.0506a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydrolysis (acid)	Brother .2330	+	+	ND	ND	+	+	+	+	+	+	ND	+
Hydrolysis, hydroxylation	271. Investing	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis-Hydrolysis (Amine)	290.2690 b	+	+	ND	ND	ND	ND	ND	ND	ND	ND	+	ND
Hydrolysis, glucuronidation	431.2650a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis-hydrolysis (amines), glucuronidation	464.2865a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis-hydrolysis (amines), glucuronidation	466.3011b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydrolysis (amine)	528.4986 b	ND	+	ND	ND	ND	ND	ND	ND	ND	ND	+	ND
Hydrolysis (amine), glucuronidation	704.5307 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Otachi and Ashi D	778.6930a	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Otachi and Ashi D	780.7076 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydroxylation	Achieve.	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sulfation	844.6706	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sulfation	846.6851b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glucuronidation	940.7458	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Glucuronidation	942.7604 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Both theoretical and observed metabolites are included.
m/z = mass to charge ratio; ND = Not detected; + = metabolite present.
a. Negative ion mode.
b. Positive ion mode.

2.6.5.10D. PHARMACOKINETICS: METABOLISM IN VITRO CONTINUED

Test article: alc-0159

Report Number: OF-07302048_05 [redacted]_043725

Type of study	Metabolism of ALC-0159 In Vitro		
Study system	Blood	Hepatocytes	Liver Said Frazy
ALC-0159 concentration	10 µM	10 µM	10 µM
Duration of incubation	24 h	4 h	24 h
Analysis Method:	Ultrahigh performance liquid chromatography/ mass spectrometry		

Biotransformation	m/z	Blood				Hepatocytes				Liver Said Frazy			
		Mouse	Rat	Monkey	Human	Mouse	Rat	Monkey	Human	Mouse	Rat	Monkey	Human
Oh, it's THY ACON, LKY	107.0703 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oh, it's THY ACON, LKY	151.0965b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oh, it's THY ACON, LKY	195.1227 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydrolysis, N-Dealkylation	214. Stere	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Dealkylation, oxidation	227.2017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydrolysis (amine)	410.4720b	+	+	ND	ND	+	+	+	+	+	+	+	+
N, Lky	531.5849 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Dealkylation	580. Step	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oh, THY AICO, OY	629. Greatness	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydroxylation	633.6931 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ω-Hydroxylation, Oxidation	637.1880b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hydrolysis (acid)	708.7721 b	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: Both theoretical and observed metabolites are included.
m/z = mass to charge ratio; ND = Not detected; + = metabolite present.
a. Negative ion mode.
b. Positive ion mode.

5.3.6 CUMULATIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS OF PF-07302048 (BNT162B2) RECEIVED THROUGH 28-FEB-2021

Report Prepared by:

Worldwide Safety

Pfizer

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5.3.6 CUMULATIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS OF PF-07302048 (BNT162B2) RECEIVED THROUGH 28-FEB-2021

Report Prepared by:

Worldwide Safety

Pfizer

Ridiculous expectation!

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LIST OF ABBREVIATIONS

Acronym	Term
AE	adverse event
AESI	adverse event of special interest
BC	Brighton Collaboration
CDC	Centers for Disease Control and Prevention
COVID-19	coronavirus disease 2019
DLP	data lock point
EUA	emergency use authorisation
HLGT	(MedDRA) High Group Level Term
HLT	(MedDRA) High Level Term
MAH	marketing authorisation holder
MedDRA	medical dictionary for regulatory activities
MHRA	Medicines and Healthcare products Regulatory Agency
PCR	Polymerase Chain Reaction
PT	(MedDRA) Preferred Term
PVP	pharmacovigilance plan
RT-PCR	Reverse Transcription-Polymerase Chain Reaction
RSI	reference safety information
TME	targeted medically event
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
SMQ	standardised MedDRA query
SOC	(MedDRA) System Organ Class
UK	United Kingdom
US	United States
VAED	vaccine-associated enhanced disease
VAERD	vaccine-associated enhanced respiratory disease
VAERS	vaccine adverse event reporting system

1. INTRODUCTION

Reference is made to the Request for Comments and Advice submitted 04 February 2021 regarding Pfizer/BioNTech's proposal for the clinical and post-authorization safety data package for the Biologics License Application (BLA) for our investigational COVID-19 Vaccine (BNT162b2). Further reference is made to the Agency's 09 March 2021 response to this request, and specifically, the following request from the Agency.

"Monthly safety reports primarily focus on events that occurred during the reporting interval and include information not relevant to a BLA submission such as line lists of adverse events by country. We are most interested in a cumulative analysis of post-authorization safety data to support your future BLA submission. Please submit an integrated analysis of your cumulative post-authorization safety data, including U.S. and foreign post-authorization experience, in your upcoming BLA submission. Please include a cumulative analysis of the Important Identified Risks, Important Potential Risks, and areas of Important Missing Information identified in your Pharmacovigilance Plan, as well as adverse events of special interest and vaccine administration errors (whether or not associated with an adverse event). Please also include distribution data and an analysis of the most common adverse events. In addition, please submit your updated Pharmacovigilance Plan with your BLA submission."

This document provides an integrated analysis of the cumulative post-authorization safety data, including U.S. and foreign post-authorization adverse event reports received through 28 February 2021.

2. METHODOLOGY

Pfizer is responsible for the management post-authorization safety data on behalf of the MAH BioNTech according to the Pharmacovigilance Agreement in place. Data from BioNTech are included in the report when applicable.

Pfizer's safety database contains cases of AEs reported spontaneously to Pfizer, cases reported by the health authorities, cases published in the medical literature, cases from Pfizer-sponsored marketing programs, non-interventional studies, and cases of serious AEs reported from clinical studies regardless of causality assessment.

The limitations of post-marketing adverse drug event reporting should be considered when interpreting these data:

- Reports are submitted voluntarily, and the magnitude of underreporting is unknown. Some of the factors that may influence whether an event is reported include: length of time since marketing, market share of the drug, publicity about a drug or an AE, seriousness of the reaction, regulatory actions, awareness by health professionals and consumers of adverse drug event reporting, and litigation.

- Because many external factors influence whether or not an AE is reported, the spontaneous reporting system yields reporting proportions not incidence rates. As a result, it is generally not appropriate to make between-drug comparisons using these

proportions; the spontaneous reporting system should be used for signal detection rather than hypothesis testing.

- In some reports, clinical information (such as medical history, validation of diagnosis, time from drug use to onset of illness, dose, and use of concomitant drugs) is missing or incomplete, and follow-up information may not be available.

- An accumulation of adverse event reports (AERs) does not necessarily indicate that a particular AE was caused by the drug; rather, the event may be due to an underlying disease or some other factor(s) such as past medical history or concomitant medication.

- Among adverse event reports received into the Pfizer safety database during the cumulative period, only those having a complete workflow cycle in the safety database (meaning they progressed to Distribution or Closed workflow status) are included in the monthly SMSR. This approach prevents the inclusion of cases that are not fully processed hence not accurately reflecting final information. Due to the large numbers of spontaneous adverse event reports received for the product, the MAH has prioritised the processing of serious cases, in order to meet expedited regulatory reporting timelines and ensure these reports are available for signal detection and evaluation activity. The increased volume of reports has not impacted case processing for serious reports, and compliance metrics continue to be monitored weekly with prompt action taken as needed to maintain compliance with expedited reporting obligations. Non-serious cases are entered into the safety database no later than 4 calendar days from receipt. Entrance into the database includes the coding of all adverse events; this allow for a manual review of events being received but may not include immediate case processing to completion. Non-serious cases are processed as soon as possible and no later than 90 days from receipt. Pfizer has also taken a multiple actions to help alleviate the large increase of adverse event reports. This includes significant technology enhancements, and process and workflow solutions, as well as increasing the number of data entry and case processing colleagues. To date, Pfizer has onboarded approximately (b) (4) additional full-time employees (FTEs). More are joining each month with an expected total of more than (b) (4) additional resources by the end of June 2021.

3. RESULTS

3.1. Safety Database

3.1.1. General Overview

It is estimated that approximately (b) (4) doses of BNT162b2 were shipped worldwide from the receipt of the first temporary authorisation for emergency supply on 01 December 2020 through 28 February 2021.

Cumulatively, through 28 February 2021, there was a total of 42,086 case reports (25,379 medically confirmed and 16,707 non-medically confirmed) containing 158,893 events. Most cases (34,762) were received from United States (13,739), United Kingdom (13,404) Italy (2,578), Germany (1913), France (1506), Portugal (866) and Spain (756); the remaining 7,324 were distributed among 56 other countries.

Table 1 below presents the main characteristics of the overall cases.

Table 1. General Overview: Selected Characteristics of All Cases Received During the Reporting Interval

Characteristics		Relevant cases (N=42086)
Gender:	Female	29914
	Male	9182
	No Data	2990
Age range (years): 0.01 -107 years Mean = 50.9 years n = 34952	≤ 17 18-30 31-50 51-64 65-74 ≥ 75 Unknown	175[a] 4953 13886 7884 3098 5214 6876
Case outcome:	Recovered/Recovering	19582
	Recovered with sequelae	520
	Not recovered at the time of report	11361
	Fatal	1223
	Unknown	9400

a. in 46 cases reported age was <16-year-old and in 34 cases <12-year-old.

As shown in Figure 1, the System Organ Classes (SOCs) that contained the greatest number (≥2%) of events, in the overall dataset, were General disorders and administration site conditions (51,335 AEs), Nervous system disorders (25,957), Musculoskeletal and connective tissue disorders (17,283), Gastrointestinal disorders (14,096), Skin and subcutaneous tissue disorders (8,476), Respiratory, thoracic and mediastinal disorders (8,848), Infections and infestations (4,610), Injury, poisoning and procedural complications (5,590), and Investigations (3,693).

Figure 1. Total Number of BNT162b2 AEs by System Organ Classes and Event Seriousness

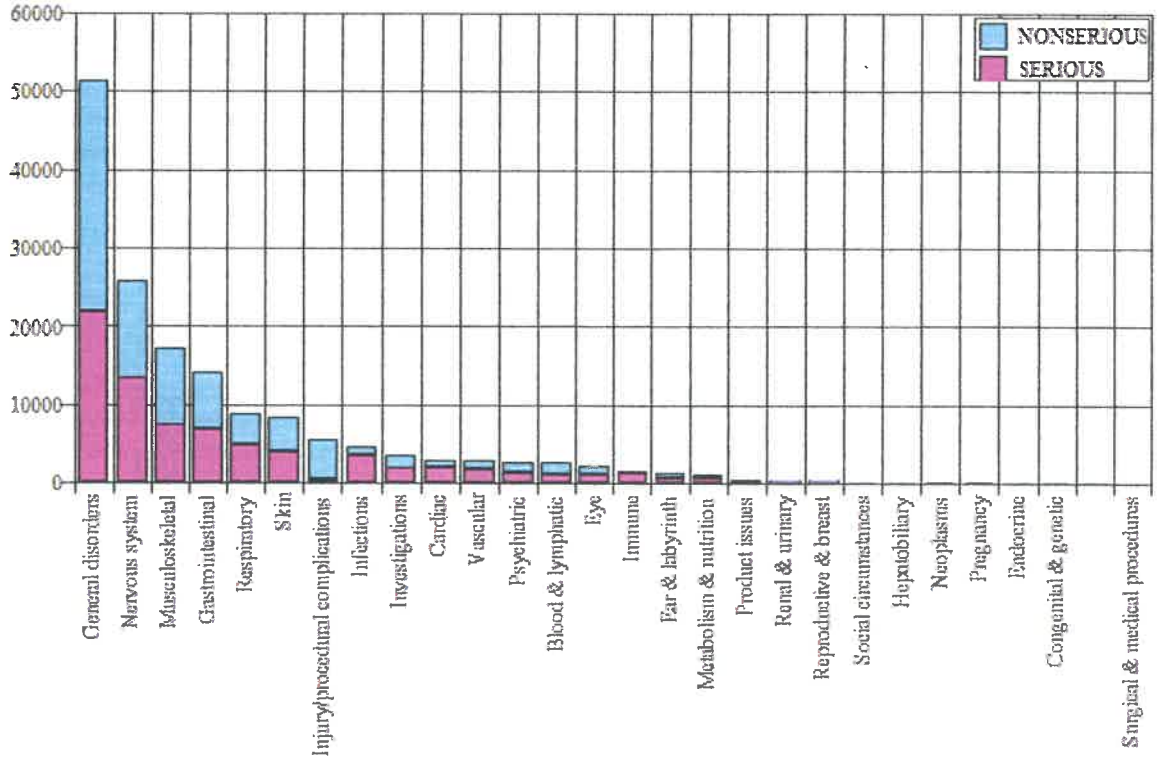

Table 2 shows the most commonly (≥2%) reported MedDRA (v. 23.1) PTs in the overall dataset (through 28 February 2021),

Table 2. Events Reported in ≥2% Cases

MedDRA SOC	MedDRA PT	Cumulatively Through 28 February 2021 AEs (AERP%) N = 42086
Blood and lymphatic system disorders		
	Lymphadenopathy	1972 (4.7%)
Cardiac disorders		
	Tachycardia	1098 (2.6%)
Gastrointestinal disorders		
	Nausea	5182 (12.3%)
	Diarrhoea	1880 (4.5%)
	Vomiting	1698 (4.0%)
General disorders and administration site conditions		
	Pyrexia	7666 (18.2%)
	Fatigue	7338 (17.4%)
	Chills	5514 (13.1%)
	Vaccination site pain	5181 (12.3%)

Table 2. Events Reported in ≥2% Cases

		Cumulatively Through 28 February 2021
MedDRA SOC	**MedDRA PT**	**AEs (AERP%) N = 42086**
	Pain	3691 (8.8%)
	Malaise	2897 (6.9%)
	Asthenia	2285 (5.4%)
	Drug ineffective	2201 (5.2%)
	Vaccination site erythema	930 (2.2%)
	Vaccination site swelling	913 (2.2%)
	Influenza like illness	835 (2%)
Infections and infestations		
	COVID-19	1927 (4.6%)
Injury, poisoning and procedural complications		
	Off label use	880 (2.1%)
	Product use issue	828 (2.0%)
Musculoskeletal and connective tissue disorders		
	Myalgia	4915 (11.7%)
	Pain in extremity	3959 (9.4%)
	Arthralgia	3525 (8.4%)
Nervous system disorders		
	Headache	10131 (24.1%)
	Dizziness	3720 (8.8%)
	Paraesthesia	1500 (3.6%)
	Hypoaesthesia	999 (2.4%)
Respiratory, thoracic and mediastinal disorders		
	Dyspnoea	2057 (4.9%)
	Cough	1146 (2.7%)
	Oropharyngeal pain	948 (2.3%)
Skin and subcutaneous tissue disorders		
	Pruritus	1447 (3.4%)
	Rash	1404 (3.3%)
	Erythema	1044 (2.5%)
	Hyperhidrosis	900 (2.1%)
	Urticaria	862 (2.1%)
Total number of events		**93473**

3.1.2. Summary of Safety Concerns in the US Pharmacovigilance Plan

Table 3. Safety concerns

Important identified risks	Anaphylaxis
Important potential risks	Vaccine-Associated Enhanced Disease (VAED), Including Vaccine-associated Enhanced Respiratory Disease (VAERD)
Missing information	Use in Pregnancy and lactation Use in Paediatric Individuals <12 Years of Age Vaccine Effectiveness

Table 4. Important Identified Risk

<table>
<tr><th>Topic</th><th>Description</th></tr>
<tr><td>Important Identified Risk</td><td>Post Authorization Cases Evaluation (cumulative to 28 Feb 2021)
Total Number of Cases in the Reporting Period (N=42086)</td></tr>
<tr><td>Anaphylaxis</td><td>Since the first temporary authorization for emergency supply under Regulation 174 in the UK (01 December 2020) and through 28 February 2021, 1833 potentially relevant cases were retrieved from the Anaphylactic reaction SMQ (Narrow and Broad) search strategy, applying the MedDRA algorithm. These cases were individually reviewed and assessed according to Brighton Collaboration (BC) definition and level of diagnostic certainty as shown in the Table below:

<table>
<tr><td>Brighton Collaboration Level</td><td>Number of cases</td></tr>
<tr><td>BC 1</td><td>290</td></tr>
<tr><td>BC 2</td><td>311</td></tr>
<tr><td>BC 3</td><td>10</td></tr>
<tr><td>BC 4</td><td>391</td></tr>
<tr><td>BC 5</td><td>831</td></tr>
<tr><td>Total</td><td>1833</td></tr>
</table>
Level 1 indicates a case with the highest level of diagnostic certainty of anaphylaxis, whereas the diagnostic certainty is lowest for Level 3. Level 4 is defined as "reported event of anaphylaxis with insufficient evidence to meet the case definition" and Level 5 as not a case of anaphylaxis.

There were 1002 cases (54.0% of the potentially relevant cases retrieved), 2958 potentially relevant events, from the Anaphylactic reaction SMQ (Broad and Narrow) search strategy, meeting BC Level 1 to 4:

Country of incidence: UK (261), US (184), Mexico (99), Italy (82), Germany (67), Spain (38), France (36), Portugal (22), Denmark (20), Finland, Greece (19 each), Sweden (17), Czech Republic , Netherlands (16 each), Belgium, Ireland (13 each), Poland (12), Austria (11); the remaining 57 cases originated from 15 different countries.
Relevant event seriousness: Serious (2341), Non-Serious (617);
Gender: Females (876), Males (106), Unknown (20);
Age (n=961) ranged from 16 to 98 years (mean = 54.8 years, median = 42.5 years);
Relevant even outcome[a]: fatal (9)[b], resolved/resolving (1922), not resolved (229), resolved with sequelae (48), unknown (754);
Most frequently reported relevant PTs (≥2%), from the Anaphylactic reaction SMQ (Broad and Narrow) search strategy: Anaphylactic reaction (435), Dyspnoea (356), Rash (190), Pruritus (175), Erythema (159), Urticaria (133), Cough (115), Respiratory distress, Throat tightness (97 each), Swollen tongue (93), Anaphylactic shock (80), Hypotension (72), Chest discomfort (71), Swelling face (70), Pharyngeal swelling (68), and Lip swelling (64).

Conclusion: Evaluation of BC cases Level 1 - 4 did not reveal any significant new safety information. Anaphylaxis is appropriately described in the product labeling as are non-anaphylactic hypersensitivity events. Surveillance will continue.</td></tr>
</table>

a Different clinical outcome may be reported for an event that occurred more than once to the same individual.
b There were 4 individuals in the anaphylaxis evaluation who died on the same day they were vaccinated. Although these patients experienced adverse events (9) that are potential symptoms of anaphylaxis, they all had serious underlying medical conditions, and one individual appeared to also have COVID-19 pneumonia, that likely contributed to their deaths

Table 5. Important Potential Risk

Topic	Description
Important Potential Risk	**Post Authorization Cases Evaluation (cumulative to 28 Feb 2021) Total Number of Cases in the Reporting Period (N=42086)**
Vaccine-Associated Enhanced Disease (VAED), including Vaccine-Associated Enhanced Respiratory Disease (VAERD)	No post-authorized AE reports have been identified as cases of VAED/VAERD, therefore, there is no observed data at this time. An expected rate of VAED is difficult to establish so a meaningful observed/expected analysis cannot be conducted at this point based on available data. The feasibility of conducting such an analysis will be re-evaluated on an ongoing basis as data on the virus grows and the vaccine safety data continues to accrue. The search criteria utilised to identify potential cases of VAED for this report includes PTs indicating a lack of effect of the vaccine and PTs potentially indicative of severe or atypical COVID-19[a]. Since the first temporary authorization for emergency supply under Regulation 174 in the UK (01 December 2020) and through 28 February 2021, 138 cases [0.33% of the total PM dataset], reporting 317 potentially relevant events were retrieved: Country of incidence: UK (71), US (25), Germany (14), France, Italy, Mexico, Spain, (4 each), Denmark (3); the remaining 9 cases originated from 9 different countries; Cases Seriousness: 138; Seriousness criteria for the total 138 cases: Medically significant (71, of which 8 also serious for disability), Hospitalization required (non-fatal/non-life threatening) (16, of which 1 also serious for disability), Life threatening (13, of which 7 were also serious for hospitalization), Death (38). Gender: Females (73), Males (57), Unknown (8); Age (n=132) ranged from 21 to 100 years (mean = 57.2 years, median = 59.5); Case outcome: fatal (38), resolved/resolving (26), not resolved (65), resolved with sequelae (1), unknown (8); Of the 317 relevant events, the most frequently reported PTs (≥2%) were: Drug ineffective (135), Dyspnoea (53), Diarrhoea (30), COVID-19 pneumonia (23), Vomiting (20), Respiratory failure (8), and Seizure (7). Conclusion: VAED may present as severe or unusual clinical manifestations of COVID-19. Overall, there were 37 subjects with suspected COVID-19 and 101 subjects with confirmed COVID-19 following one or both doses of the vaccine; 75 of the 101 cases were severe, resulting in hospitalisation, disability, life-threatening consequences or death. None of the 75 cases could be definitively considered as VAED/VAERD. In this review of subjects with COVID-19 following vaccination, based on the current evidence, VAED/VAERD remains a theoretical risk for the vaccine. Surveillance will continue.

a. Search criteria: Standard Decreased Therapeutic Response Search AND PTs Dyspnoea; Tachypnoea; Hypoxia; COVID 19 pneumonia; Respiratory Failure; Acute Respiratory Distress Syndrome; Cardiac Failure; Cardiogenic shock; Acute myocardial infarction; Arrhythmia; Myocarditis; Vomiting; Diarrhoea; Abdominal pain; Jaundice; Acute hepatic failure; Deep vein thrombosis; Pulmonary embolism; Peripheral Ischaemia; Vasculitis; Shock; Acute kidney injury; Renal failure; Altered state of consciousness; Seizure; Encephalopathy; Meningitis; Cerebrovascular accident; Thrombocytopenia; Disseminated intravascular coagulation; Chilblains; Erythema multiforme; Multiple organ dysfunction syndrome; Multisystem inflammatory syndrome in children.

Table 6. Description of Missing Information

Topic	Description
Missing Information	**Post Authorization Cases Evaluation (cumulative to 28 Feb 2021) Total Number of Cases in the Reporting Period (N=42086)**
Use in Pregnancy and lactation	• Number of cases: 413[a] (0.98% of the total PM dataset); 84 serious and 329 non-serious; • Country of incidence: US (205), UK (64), Canada (31), Germany (30), Poland (13), Israel (11); Italy (9), Portugal (8), Mexico (6), Estonia, Hungary and Ireland, (5 each), Romania (4), Spain (3), Czech Republic and France (2 each), the remaining 10 cases were distributed among 10 other countries. Pregnancy cases: 274 cases including: • 270 mother cases and 4 foetus/baby cases representing 270 unique pregnancies (the 4 foetus/baby cases were linked to 3 mother cases; 1 mother case involved twins). • Pregnancy outcomes for the 270 pregnancies were reported as spontaneous abortion (23), outcome pending (5), premature birth with neonatal death, spontaneous abortion with intrauterine death (2 each), spontaneous abortion with neonatal death, and normal outcome (1 each). No outcome was provided for 238 pregnancies (note that 2 different outcomes were reported for each twin, and both were counted). • 146 non-serious mother cases reported exposure to vaccine in utero without the occurrence of any clinical adverse event. The exposure PTs coded to the PTs Maternal exposure during pregnancy (111), Exposure during pregnancy (29) and Maternal exposure timing unspecified (6). Trimester of exposure was reported in 21 of these cases: 1st trimester (15 cases), 2nd trimester (7), and 3rd trimester (2). • 124 mother cases, 49 non-serious and 75 serious, reported clinical events, which occurred in the vaccinated mothers. Pregnancy related events reported in these cases coded to the PTs Abortion spontaneous (25), Uterine contraction during pregnancy, Premature rupture of membranes, Abortion, Abortion missed, and Foetal death (1 each). Other clinical events which occurred in more than 5 cases coded to the PTs Headache (33), Vaccination site pain (24), Pain in extremity and Fatigue (22 each), Myalgia and Pyrexia (16 each), Chills (13) Nausea (12), Pain (11), Arthralgia (9), Lymphadenopathy and Drug ineffective (7 each), Chest pain, Dizziness and Asthenia (6 each), Malaise and COVID-19 (5 each). Trimester of exposure was reported in 22 of these cases: 1st trimester (19 cases), 2nd trimester (1 case), 3rd trimester (2 cases). • 4 serious foetus/baby cases reported the PTs Exposure during pregnancy, Foetal growth restriction, Maternal exposure during pregnancy, Premature baby (2 each), and Death neonatal (1). Trimester of exposure was reported for 2 cases (twins) as occurring during the 1st trimester. Breast feeding baby cases: 133, of which: • 116 cases reported exposure to vaccine during breastfeeding (PT Exposure via breast milk) without the occurrence of any clinical adverse events; • 17 cases, 3 serious and 14 non-serious, reported the following clinical events that occurred in the infant/child exposed to vaccine via breastfeeding: Pyrexia (5), Rash (4), Infant irritability (3), Infantile vomiting, Diarrhoea, Insomnia, and Illness (2 each), Poor feeding infant, Lethargy, Abdominal discomfort, Vomiting, Allergy to vaccine, Increased appetite, Anxiety, Crying, Poor quality sleep, Eructation, Agitation, Pain and Urticaria (1 each). Breast feeding mother cases (6): • 1 serious case reported 3 clinical events that occurred in a mother during breast feeding (PT Maternal exposure during breast feeding); these events coded to the PTs Chills, Malaise, and Pyrexia • 1 non-serious case reported with very limited information and without associated AEs.

Table 6. Description of Missing Information

Topic	Description
Missing Information	**Post Authorization Cases Evaluation (cumulative to 28 Feb 2021)** **Total Number of Cases in the Reporting Period (N=42086)**
	• In 4 cases (3 non-serious; 1 serious) Suppressed lactation occurred in a breast feeding women with the following co-reported events: Pyrexia (2), Paresis, Headache, Chills, Vomiting, Pain in extremity, Arthralgia, Breast pain, Scar pain, Nausea, Migraine, Myalgia, Fatigue and Breast milk discolouration (1 each). Conclusion: There were no safety signals that emerged from the review of these cases of use in pregnancy and while breast feeding.
Use in Paediatric Individuals <12 Years of Age	Paediatric individuals <12 years of age • Number of cases: 34[d] (0.1% of the total PM dataset), indicative of administration in paediatric subjects <12 years of age; • Country of incidence: UK (29), US (3), Germany and Andorra (1 each); • Cases Seriousness: Serious (24), Non-Serious (10); • Gender: Females (25), Males (7), Unknown (2); • Age (n=34) ranged from 2 months to 9 years, mean = 3.7 years, median = 4.0; • Case outcome: resolved/resolving (16), not resolved (13), and unknown (5). • Of the 132 reported events, those reported more than once were as follows: Product administered to patient of inappropriate age (27, see Medication Error), Off label use (11), Pyrexia (6), Product use issue (5), Fatigue, Headache and Nausea (4 each), Vaccination site pain (3), Abdominal pain upper, COVID-19, Facial paralysis, Lymphadenopathy, Malaise, Pruritus and Swelling (2 each). Conclusion: No new significant safety information was identified based on a review of these cases compared with the non-paediatric population.
Vaccine Effectiveness	Company conventions for coding cases indicative of lack of efficacy: The coding conventions for lack of efficacy in the context of administration of the COVID-19 vaccine were revised on 15 February 2021, as shown below: • PT "Vaccination failure" is coded when ALL of the following criteria are met: o The subject has received the series of two doses per the dosing regimen in local labeling. o At least 7 days have elapsed since the second dose of vaccine has been administered. o The subject experiences SARS-CoV-2 infection (confirmed laboratory tests). • PT "Drug ineffective" is coded when either of the following applies: o The infection is not confirmed as SARS-CoV-2 through laboratory tests (irrespective of the vaccination schedule). This includes scenarios where LOE is stated or implied, e.g., "the vaccine did not work", "I got COVID-19". o It is unknown: ▪ Whether the subject has received the series of two doses per the dosing regimen in local labeling; ▪ How many days have passed since the first dose (including unspecified number of days like" a few days", "some days", etc.); ▪ If 7 days have passed since the second dose; o The subject experiences a vaccine preventable illness 14 days after receiving the first dose up to and through 6 days after receipt of the second dose. Note: after the immune system as had sufficient time (14 days) to respond to the vaccine, a report of COVID-19 is considered a potential lack of efficacy even if the vaccination course is not complete. Summary of the coding conventions for onset of vaccine preventable disease versus the vaccination date:

Table 6. Description of Missing Information

Topic	Description
Missing Information	**Post Authorization Cases Evaluation (cumulative to 28 Feb 2021)** **Total Number of Cases in the Reporting Period (N=42086)**

1st dose (day 1-13)	From day 14 post 1st dose to day 6 post 2nd dose	Day 7 post 2nd dose
Code only the events describing the SARS-CoV-2 infection	Code "Drug ineffective"	Code "Vaccination failure"
Scenario Not considered LOE	Scenario considered LOE as "Drug ineffective"	Scenario considered LOE as "Vaccination failure"

Lack of efficacy cases

- Number of cases: 1665[b] (3.9 % of the total PM dataset) of which 1100 were medically confirmed and 565 non medically confirmed;
- Number of lack of efficacy events: 1665 [PT: Drug ineffective (1646) and Vaccination failure (19)[f]].
- Country of incidence: US (665), UK (405), Germany (181), France (85), Italy (58), Romania (47), Belgium (33), Israel (30), Poland (28), Spain (21), Austria (18), Portugal (17), Greece (15), Mexico (13), Denmark (8), Canada (7), Hungary, Sweden and United Arab Emirates (5 each), Czech Republic (4), Switzerland (3); the remaining 12 cases originated from 9 different countries.
- COVID-19 infection was suspected in 155 cases, confirmed in 228 cases, in 1 case it was reported that the first dose was not effective (no other information).
- COVID-19 infection (suspected or confirmed) outcome was reported as resolved/resolving (165), not resolved (205) or unknown (1230) at the time of the reporting; there were 65 cases where a fatal outcome was reported.

Drug ineffective cases (1649)

- Drug ineffective event seriousness: serious (1625), non-serious (21)[e];
- Lack of efficacy term was reported:
  - after the 1st dose in 788 cases
  - after the 2nd dose in 139 cases
  - in 722 cases it was unknown after which dose the lack of efficacy occurred.
- Latency of lack of efficacy term reported after the first dose was known for 176 cases:
  - Within 9 days: 2 subjects;
  - Within 14 and 21 days: 154 subjects;
  - Within 22 and 50 days: 20 subjects;
- Latency of lack of efficacy term reported after the second dose was known for 69 cases:
  - Within 0 and 7 days: 42 subjects;
  - Within 8 and 21 days: 22 subjects;
  - Within 23 and 36 days: 5 subjects.
- Latency of lack of efficacy term reported in cases where the number of doses administered was not provided, was known in 409 cases:
  - Within 0 and 7 days after vaccination: 281 subjects.
  - Within 8 and 14 days after vaccination: 89 subjects.
  - Within 15 and 44 days after vaccination: 39 subjects.

According to the RSI, individuals may not be fully protected until 7 days after their second dose of vaccine, therefore for the above 1649 cases where lack of efficacy was reported after the 1st dose or the

Table 6. Description of Missing Information

Topic	Description
Missing Information	**Post Authorization Cases Evaluation (cumulative to 28 Feb 2021)** **Total Number of Cases in the Reporting Period (N=42086)**
	2nd dose, the reported events may represent signs and symptoms of intercurrent or undiagnosed COVID-19 infection or infection in an individual who was not fully vaccinated, rather than vaccine ineffectiveness. ***Vaccination failure cases (16)*** • Vaccination failure seriousness: all serious; • Lack of efficacy term was reported in all cases after the 2nd dose: • Latency of lack of efficacy was known for 14 cases: o Within 7 and 13 days: 8 subjects; o Within 15 and 29 days: 6 subjects. COVID-19 (10) and Asymptomatic COVID-19 (6) were the reported vaccine preventable infections that occurred in these 16 cases. Conclusion: No new safety signals of vaccine lack of efficacy have emerged based on a review of these cases.

a. From a total of 417 cases, 4 cases were excluded from the analysis. In 3 cases, the MAH was informed that a 33-year-old and two unspecified age pregnant female patients were scheduled to receive bnt162b2 (PT reported Off label use and Product use issue in 2 cases; Circumstance or information capable of leading to medication error in one case). One case reported the PT Morning sickness; however, pregnancy was not confirmed in this case.
b. 558 additional cases retrieved in this dataset were excluded from the analysis; upon review, 546 cases cannot be considered true lack of efficacy cases because the PT Drug ineffective was coded but the subjects developed SARS-CoV-2 infection during the early days from the first dose (days 1 – 13); the vaccine has not had sufficient time to stimulate the immune system and, consequently, the development of a vaccine preventable disease during this time is not considered a potential lack of effect of the vaccine; in 5 cases the PT Drug ineffective was removed after data lock point (DLP) because the subjects did not develop COVID-19 infection; in 1 case, reporting Treatment failure and Transient ischaemic attack, the Lack of efficacy PT did not refer to BNT162b2 vaccine; 5 cases have been invalidated in the safety database after DLP; 1 case has been deleted from the discussion because the PTs reported Pathogen resistance and Product preparation issue were not indicative of a lack of efficacy. to be eliminated.
c. Upon review, 31 additional cases were excluded from the analysis as the data reported (e.g. clinical details, height, weight, etc.) were not consistent with paediatric subjects
d. Upon review, 28 additional cases were excluded from the analysis as the data reported (e.g. clinical details, height, weight, etc.) were not consistent with paediatric subjects.
e. Different clinical outcomes may be reported for an event that occurred more than once to the same individual
f. In 2 cases the PT Vaccination failure was replaced with Drug ineffective after DLP. Another case was not included in the discussion of the Vaccination failure cases because correct scheduling (21 days apart between the first and second dose) cannot be confirmed.

3.1.3. Review of Adverse Events of Special Interest (AESIs)

Please refer to Appendix 1 for the list of the company's AESIs for BNT162b2.

The company's AESI list takes into consideration the lists of AESIs from the following expert groups and regulatory authorities: Brighton Collaboration (SPEAC), ACCESS protocol, US CDC (preliminary list of AESI for VAERS surveillance), MHRA (unpublished guideline).

The AESI terms are incorporated into a TME list and include events of interest due to their association with severe COVID-19 and events of interest for vaccines in general.

The AESI list is comprised of MedDRA PTs, HLTs, HLGTs or MedDRA SMQs and can be changed as appropriate based on the evolving safety profile of the vaccine.

Table 7 provides a summary review of cumulative cases within AESI categories in the Pfizer safety database. This is distinct from safety signal evaluations which are conducted and included, as appropriate, in the Summary Monthly Safety Reports submitted regularly to the FDA and other Health Authorities.

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] **Category**	**Post-Marketing Cases Evaluation**[b] **Total Number of Cases (N=42086)**
Anaphylactic Reactions *Search criteria: Anaphylactic reaction SMQ (Narrow and Broad, with the algorithm applied), selecting relevant cases according to BC criteria*	Please refer to the Risk 'Anaphylaxis' included above in Table 4.
Cardiovascular AESIs *Search criteria: PTs Acute myocardial infarction; Arrhythmia; Cardiac failure; Cardiac failure acute; Cardiogenic shock; Coronary artery disease; Myocardial infarction; Postural orthostatic tachycardia syndrome; Stress cardiomyopathy; Tachycardia*	• Number of cases: 1403 (3.3% of the total PM dataset), of which 241 are medically confirmed and 1162 are non-medically confirmed; • Country of incidence: UK (268), US (233), Mexico (196), Italy (141), France (128), Germany (102), Spain (46), Greece (45), Portugal (37), Sweden (20), Ireland (17), Poland (16), Israel (13), Austria, Romania and Finland (12 each), Netherlands (11), Belgium and Norway (10 each), Czech Republic (9), Hungary and Canada (8 each), Croatia and Denmark (7 each), Iceland (5); the remaining 30 cases were distributed among 13 other countries; • Subjects' gender: female (1076), male (291) and unknown (36); • Subjects' age group (n = 1346): Adult[c] (1078), Elderly[d] (266) Child[e] and Adolescent[f] (1 each); • Number of relevant events: 1441, of which 946 serious, 495 non-serious; in the cases reporting relevant serious events; • Reported relevant PTs: Tachycardia (1098), Arrhythmia (102), Myocardial infarction (89), Cardiac failure (80), Acute myocardial infarction (41), Cardiac failure acute (11), Cardiogenic shock and Postural orthostatic tachycardia syndrome (7 each) and Coronary artery disease (6); • Relevant event onset latency (n = 1209): Range from <24 hours to 21 days, median <24 hours;

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
	• Relevant event outcome[g]: fatal (136), resolved/resolving (767), resolved with sequelae (21), not resolved (140) and unknown (380); Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
COVID-19 AESIs *Search criteria: Covid-19 SMQ (Narrow and Broad) OR PTs Ageusia; Anosmia*	• Number of cases: 3067 (7.3% of the total PM dataset), of which 1013 are medically confirmed and 2054 are non-medically confirmed; • Country of incidence: US (1272), UK (609), Germany (360), France (161), Italy (94), Spain (69), Romania (62), Portugal (51), Poland (50), Mexico (43), Belgium (42), Israel (41), Sweden (30), Austria (27), Greece (24), Denmark (18), Czech Republic and Hungary (17 each), Canada (12), Ireland (11), Slovakia (9), Latvia and United Arab Emirates (6 each); the remaining 36 cases were distributed among 16 other different countries; • Subjects' gender: female (1650), male (844) and unknown (573); • Subjects' age group (n= 1880): Adult (1315), Elderly (560), Infant[h] and Adolescent (2 each), Child (1); • Number of relevant events: 3359, of which 2585 serious, 774 non-serious; • Most frequently reported relevant PTs (>1 occurrence): COVID-19 (1927), SARS-CoV-2 test positive (415), Suspected COVID-19 (270), Ageusia (228), Anosmia (194), SARS-CoV-2 antibody test negative (83), Exposure to SARS-CoV-2 (62), SARS-CoV-2 antibody test positive (53), COVID-19 pneumonia (51), Asymptomatic COVID-19 (31), Coronavirus infection (13), Occupational exposure to SARS-CoV-2 (11), SARS-CoV-2 test false positive (7), Coronavirus test positive (6), SARS-CoV-2 test negative (3) SARS-CoV-2 antibody test (2); • Relevant event onset latency (n = 2070): Range from <24 hours to 374 days, median 5 days; • Relevant event outcome: fatal (136), not resolved (547), resolved/resolving (558), resolved with sequelae (9) and unknown (2110). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
Dermatological AESIs *Search criteria: PT Chillblains; Erythema multiforme*	• Number of cases: 20 cases (0.05% of the total PM dataset), of which 15 are medically confirmed and 5 are non-medically confirmed; • Country of incidence: UK (8), France and Poland (2 each), and the remaining 8 cases were distributed among 8 other different countries; • Subjects' gender: female (17) male and unknown (1 each); • Subjects' age group (n=19): Adult (18), Elderly (1); • Number of relevant events: 20 events, 16 serious, 4 non-serious

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
	• Reported relevant PTs: Erythema multiforme (13) and Chillblains (7) • Relevant event onset latency (n = 18): Range from <24 hours to 17 days, median 3 days; • Relevant event outcome: resolved/resolving (7), not resolved (8) and unknown (6). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue.
Haematological AESIs *Search criteria: Leukopenias NEC (HLT) (Primary Path) OR Neutropenias (HLT) (Primary Path) OR PTs Immune thrombocytopenia, Thrombocytopenia OR SMQ Haemorrhage terms (excl laboratory terms*	• Number of cases: 932 (2.2 % of the total PM dataset), of which 524 medically confirmed and 408 non-medically confirmed; • Country of incidence: UK (343), US (308), France (50), Germany (43), Italy (37), Spain (27), Mexico and Poland (13 each), Sweden (10), Israel (9), Netherlands (8), Denmark, Finland, Portugal and Ireland (7 each), Austria and Norway (6 each), Croatia (4), Greece, Belgium, Hungary and Switzerland (3 each), Cyprus, Latvia and Serbia (2 each); the remaining 9 cases originated from 9 different countries; • Subjects' gender (n=898): female (676) and male (222); • Subjects' age group (n=837): Adult (543), Elderly (293), Infant (1); • Number of relevant events: 1080, of which 681 serious, 399 non-serious; • Most frequently reported relevant PTs (≥15 occurrences) include: Epistaxis (127), Contusion (112), Vaccination site bruising (96), Vaccination site haemorrhage (51), Petechiae (50), Haemorrhage (42), Haematochezia (34), Thrombocytopenia (33), Vaccination site haematoma (32), Conjunctival haemorrhage and Vaginal haemorrhage (29 each), Haematoma, Haemoptysis and Menorrhagia (27 each), Haematemesis (25), Eye haemorrhage (23), Rectal haemorrhage (22), Immune thrombocytopenia (20), Blood urine present (19), Haematuria, Neutropenia and Purpura (16 each) Diarrhoea haemorrhagic (15); • Relevant event onset latency (n = 787): Range from <24 hours to 33 days, median = 1 day; • Relevant event outcome: fatal (34), resolved/resolving (393), resolved with sequelae (17), not resolved (267) and unknown (371). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
Hepatic AESIs *Search criteria: Liver related investigations, signs and symptoms (SMQ) (Narrow and Broad) OR PT Liver injury*	• Number of cases: 70 cases (0.2% of the total PM dataset), of which 54 medically confirmed and 16 non-medically confirmed; • Country of incidence: UK (19), US (14), France (7), Italy (5), Germany (4), Belgium, Mexico and Spain (3 each), Austria, and Iceland (2 each); the remaining 8 cases originated from 8 different countries; • Subjects' gender: female (43), male (26) and unknown (1); • Subjects' age group (n=64): Adult (37), Elderly (27);

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
	• Number of relevant events: 94, of which 53 serious, 41 non-serious; • Most frequently reported relevant PTs (≥3 occurrences) include: Alanine aminotransferase increased (16), Transaminases increased and Hepatic pain (9 each), Liver function test increased (8), Aspartate aminotransferase increased and Liver function test abnormal (7 each), Gamma-glutamyltransferase increased and Hepatic enzyme increased (6 each), Blood alkaline phosphatase increased and Liver injury (5 each), Ascites, Blood bilirubin increased and Hypertransaminasaemia (3 each); • Relevant event onset latency (n = 57): Range from <24 hours to 20 days, median 3 days; • Relevant event outcome: fatal (5), resolved/resolving (27), resolved with sequelae (1), not resolved (14) and unknown (47). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
Facial Paralysis *Search criteria: PTs Facial paralysis, Facial paresis*	• Number of cases: 449[j] (1.07% of the total PM dataset), 314 medically confirmed and 135 non-medically confirmed; • Country of incidence: US (124), UK (119), Italy (40), France (27), Israel (20), Spain (18), Germany (13), Sweden (11), Ireland (9), Cyprus (8), Austria (7), Finland and Portugal (6 each), Hungary and Romania (5 each), Croatia and Mexico (4 each), Canada (3),Czech Republic, Malta, Netherlands, Norway, Poland and Puerto Rico (2 each); the remaining 8 cases originated from 8 different countries; • Subjects' gender: female (295), male (133), unknown (21); • Subjects' age group (n=411): Adult (313), Elderly (96), Infant and Child (1 each); • Number of relevant events[k]: 453, of which 399 serious, 54 non-serious; • Reported relevant PTs: Facial paralysis (401), Facial paresis (64); • Relevant event onset latency (n = 404): Range from <24 hours to 46 days, median 2 days; • Relevant event outcome: resolved/resolving (184), resolved with sequelae (3), not resolved (183) and unknown (97); Overall Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue. Causality assessment will be further evaluated following availability of additional unblinded data from the clinical study C4591001, which will be unblinded for final analysis approximately mid-April 2021. Additionally, non-interventional post-authorisation safety studies, C4591011 and C4591012 are expected to capture data on a sufficiently large vaccinated population to detect an increased risk of Bell's palsy in vaccinated individuals. The timeline for conducting these analyses will be established based on the size of the vaccinated population captured in the study data sources by the first interim reports (due 30 June

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
	2021). Study C4591021, pending protocol endorsement by EMA, is also intended to inform this risk.
Immune-Mediated/Autoimmune AESIs *Search criteria: Immune-mediated/autoimmune disorders (SMQ) (Broad and Narrow) OR Autoimmune disorders HLGT (Primary Path) OR PTs Cytokine release syndrome; Cytokine storm; Hypersensitivity*	• Number of cases: 1050 (2.5 % of the total PM dataset), of which 760 medically confirmed and 290 non-medically confirmed; • Country of incidence (>10 cases): UK (267), US (257), Italy (70), France and Germany (69 each), Mexico (36), Sweden (35), Spain (32), Greece (31), Israel (21), Denmark (18), Portugal (17), Austria and Czech Republic (16 each), Canada (12), Finland (10). The remaining 74 cases were from 24 different countries. • Subjects' gender (n=682): female (526), male (156). • Subjects' age group (n=944): Adult (746), Elderly (196), Adolescent (2). • Number of relevant events: 1077, of which 780 serious, 297 non-serious. • Most frequently reported relevant PTs (>10 occurrences): Hypersensitivity (596), Neuropathy peripheral (49), Pericarditis (32), Myocarditis (25), Dermatitis (24), Diabetes mellitus and Encephalitis (16 each), Psoriasis (14), Dermatitis Bullous (13), Autoimmune disorder and Raynaud's phenomenon (11 each); • Relevant event onset latency (n = 807): Range from <24 hours to 30 days, median <24 hours. • Relevant event outcome[l]: resolved/resolving (517), not resolved (215), fatal (12), resolved with sequelae (22) and unknown (312). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
Musculoskeletal AESIs *Search criteria: PTs Arthralgia; Arthritis; Arthritis bacterial[m]; Chronic fatigue syndrome; Polyarthritis; Polyneuropathy; Post viral fatigue syndrome; Rheumatoid arthritis*	• Number of cases: 3600 (8.5% of the total PM dataset), of which 2045 medically confirmed and 1555 non-medically confirmed; • Country of incidence: UK (1406), US (1004), Italy (285), Mexico (236), Germany (72), Portugal (70), France (48), Greece and Poland (46), Latvia (33), Czech Republic (32), Israel and Spain (26), Sweden (25), Romania (24), Denmark (23), Finland and Ireland (19 each), Austria and Belgium (18 each), Canada (16), Netherlands (14), Bulgaria (12), Croatia and Serbia (9 each), Cyprus and Hungary (8 each), Norway (7), Estonia and Puerto Rico (6 each), Iceland and Lithuania (4 each); the remaining 21 cases originated from 11 different countries; • Subjects' gender (n=3471): female (2760), male (711); • Subjects' age group (n=3372): Adult (2850), Elderly (515), Child (4), Adolescent (2), Infant (1); • Number of relevant events: 3640, of which 1614 serious, 2026 non-serious; • Reported relevant PTs: Arthralgia (3525), Arthritis (70), Rheumatoid arthritis (26), Polyarthritis (5), Polyneuropathy, Post viral fatigue syndrome, Chronic fatigue syndrome (4 each), Arthritis bacterial (1); • Relevant event onset latency (n = 2968): Range from <24 hours to 32 days, median 1 day;

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
	• Relevant event outcome: resolved/resolving (1801), not resolved (959), resolved with sequelae (49), and unknown (853). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue.
Neurological AESIs (including demyelination) *Search criteria: Convulsions (SMQ) (Broad and Narrow) OR Demyelination (SMQ) (Broad and Narrow) OR PTs Ataxia; Cataplexy; Encephalopathy; Fibromyalgia; Intracranial pressure increased; Meningitis; Meningitis aseptic; Narcolepsy*	• Number of cases: 501 (1.2% of the total PM dataset), of which 365 medically confirmed and 136 non-medically confirmed. • Country of incidence (≥9 cases): UK (157), US (68), Germany (49), Mexico (35), Italy (31), France (25), Spain (18), Poland (17), Netherlands and Israel (15 each), Sweden (9). The remaining 71 cases were from 22 different countries. • Subjects' gender (n=478): female (328), male (150). • Subjects' age group (n=478): Adult (329), Elderly (149); • Number of relevant events: 542, of which 515 serious, 27 non-serious. • Most frequently reported relevant PTs (>2 occurrences) included: Seizure (204), Epilepsy (83), Generalised tonic-clonic seizure (33), Guillain-Barre syndrome (24), Fibromyalgia and Trigeminal neuralgia (17 each), Febrile convulsion, (15), Status epilepticus (12), Aura and Myelitis transverse (11 each), Multiple sclerosis relapse and Optic neuritis (10 each), Petit mal epilepsy and Tonic convulsion (9 each), Ataxia (8), Encephalopathy and Tonic clonic movements (7 each), Foaming at mouth (5), Multiple sclerosis, Narcolepsy and Partial seizures (4 each), Bad sensation, Demyelination, Meningitis, Postictal state, Seizure like phenomena and Tongue biting (3 each); • Relevant event onset latency (n = 423): Range from <24 hours to 48 days, median 1 day; • Relevant events outcome: fatal (16), resolved/resolving (265), resolved with sequelae (13), not resolved (89) and unknown (161); Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
Other AESIs *Search criteria: Herpes viral infections (HLT) (Primary Path) OR PTs Adverse event following immunisation; Inflammation; Manufacturing laboratory analytical testing issue; Manufacturing materials issue; Manufacturing production issue; MERS-CoV test; MERS-CoV test negative; MERS-CoV test positive; Middle East respiratory syndrome; Multiple organ dysfunction syndrome; Occupational exposure to communicable disease; Patient*	• Number of cases: 8152 (19.4% of the total PM dataset), of which 4977 were medically confirmed and 3175 non-medically confirmed; • Country of incidence (> 20 occurrences): UK (2715), US (2421), Italy (710), Mexico (223), Portugal (210), Germany (207), France (186), Spain (183), Sweden (133), Denmark (127), Poland (120), Greece (95), Israel (79), Czech Republic (76), Romania (57), Hungary (53), Finland (52), Norway (51), Latvia (49), Austria (47), Croatia (42), Belgium (41), Canada (39), Ireland (34), Serbia (28), Iceland (25), Netherlands (22). The remaining 127 cases were from 21 different countries; • Subjects' gender (n=7829): female (5969), male (1860); • Subjects' age group (n=7479): Adult (6330), Elderly (1125), Adolescent, Child (9 each), Infant (6);

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
isolation; Product availability issue; Product distribution issue; Product supply issue; Pyrexia; Quarantine; SARS-CoV-1 test; SARS-CoV-1 test negative; SARS-CoV-1 test positive	• Number of relevant events: 8241, of which 3674 serious, 4568 non-serious; • Most frequently reported relevant PTs (≥6 occurrences) included: Pyrexia (7666), Herpes zoster (259), Inflammation (132), Oral herpes (80), Multiple organ dysfunction syndrome (18), Herpes virus infection (17), Herpes simplex (13), Ophthalmic herpes zoster (10), Herpes ophthalmic and Herpes zoster reactivation (6 each); • Relevant event onset latency (n =6836): Range from <24 hours to 61 days, median 1 day; • Relevant events outcome: fatal (96), resolved/resolving (5008), resolved with sequelae (84), not resolved (1429) and unknown (1685). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue
Pregnancy Related AESIs *Search criteria: PTs Amniotic cavity infection; Caesarean section; Congenital anomaly; Death neonatal; Eclampsia; Foetal distress syndrome; Low birth weight baby; Maternal exposure during pregnancy; Placenta praevia; Pre-eclampsia; Premature labour; Stillbirth; Uterine rupture; Vasa praevia*	For relevant cases, please refer to Table 6, Description of Missing Information, *Use in Pregnancy and While Breast Feeding*
Renal AESIs *Search criteria: PTs Acute kidney injury; Renal failure.*	• Number of cases: 69 cases (0.17% of the total PM dataset), of which 57 medically confirmed, 12 non-medically confirmed; • Country of incidence: Germany (17), France and UK (13 each), US (6), Belgium, Italy and Spain (4 each), Sweden (2), Austria, Canada, Denmark, Finland, Luxembourg and Norway (1 each); • Subjects' gender: female (46), male (23); • Subjects' age group (n=68): Adult (7), Elderly (60), Infant (1); • Number of relevant events: 70, all serious; • Reported relevant PTs: Acute kidney injury (40) and Renal failure (30); • Relevant event onset latency (n = 42): Range from <24 hours to 15 days, median 4 days; • Relevant event outcome: fatal (23), resolved/resolving (10), not resolved (15) and unknown (22). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue.
Respiratory AESIs *Search criteria: Lower respiratory tract infections NEC (HLT)*	• Number of cases: 130 cases (0.3% of the total PM dataset), of which 107 medically confirmed;

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
(Primary Path) OR Respiratory failures (excl neonatal) (HLT) (Primary Path) OR Viral lower respiratory tract infections (HLT) (Primary Path) OR PTs: Acute respiratory distress syndrome; Endotracheal intubation; Hypoxia; Pulmonary haemorrhage; Respiratory disorder; Severe acute respiratory syndrome	• Countries of incidence: United Kingdom (20), France (18), United States (16), Germany (14), Spain (13), Belgium and Italy (9), Denmark (8), Norway (5), Czech Republic, Iceland (3 each); the remaining 12 cases originated from 8 different countries. • Subjects' gender (n=130): female (72), male (58). • Subjects's age group (n=126): Elderly (78), Adult (47), Adolescent (1). • Number of relevant events: 137, of which 126 serious, 11 non-serious; • Reported relevant PTs: Respiratory failure (44), Hypoxia (42), Respiratory disorder (36), Acute respiratory distress syndrome (10), Chronic respiratory syndrome (3), Severe acute respiratory syndrome (2). • Relevant event onset latency (n=102): range from < 24 hours to 18 days, median 1 day; • Relevant events outcome: fatal (41), Resolved/resolving (47), not recovered (18) and unknown (31). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue.
Thromboembolic Events *Search criteria: Embolism and thrombosis (HLGT) (Primary Path), excluding PTs reviewed as Stroke AESIs, OR PTs Deep vein thrombosis; Disseminated intravascular coagulation; Embolism; Embolism venous; Pulmonary embolism*	• Number of cases: 151 (0.3% of the total PM dataset), of which 111 medically confirmed and 40 non-medically confirmed; • Country of incidence: UK (34), US (31), France (20), Germany (15), Italy and Spain (6 each), Denmark and Sweden (5 each), Austria, Belgium and Israel (3 each), Canada, Cyprus, Netherlands and Portugal (2 each); the remaining 12 cases originated from 12 different countries; • Subjects' gender (n= 144): female (89), male (55); • Subjects' age group (n=136): Adult (66), Elderly (70); • Number of relevant events: 168, of which 165 serious, 3 non-serious; • Most frequently reported relevant PTs (>1 occurrence) included: Pulmonary embolism (60), Thrombosis (39), Deep vein thrombosis (35), Thrombophlebitis superficial (6), Venous thrombosis limb (4), Embolism, Microembolism, Thrombophlebitis and Venous thrombosis (3 each) Blue toe syndrome (2); • Relevant event onset latency (n = 124): Range from <24 hours to 28 days, median 4 days; • Relevant event outcome: fatal (18), resolved/resolving (54), resolved with sequelae (6), not resolved (49) and unknown (42). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue.
Stroke *Search criteria: HLT Central nervous system haemorrhages and cerebrovascular accidents*	• Number of cases: 275 (0.6% of the total PM dataset), of which 180 medically confirmed and 95 non-medically confirmed; • Country of incidence: UK (81), US (66), France (32), Germany (21), Norway (14), Netherlands and Spain (11 each), Sweden (9),

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)
(Primary Path) OR HLT Cerebrovascular venous and sinus thrombosis (Primary Path)	Israel (6), Italy (5), Belgium (3), Denmark, Finland, Poland and Switzerland (2 each); the remaining 8 cases originated from 8 different countries; • Subjects' gender (n= 273): female (182), male (91); • Subjects' age group (n=265): Adult (59), Elderly (205), Child[m] (1); • Number of relevant events: 300, all serious; • Most frequently reported relevant PTs (>1 occurrence) included: o PTs indicative of Ischaemic stroke: Cerebrovascular accident (160), Ischaemic stroke (41), Cerebral infarction (15), Cerebral ischaemia, Cerebral thrombosis, Cerebral venous sinus thrombosis, Ischaemic cerebral infarction and Lacunal infarction (3 each) Basal ganglia stroke, Cerebellar infarction and Thrombotic stroke (2 each); o PTs indicative of Haemorrhagic stroke: Cerebral haemorrhage (26), Haemorrhagic stroke (11), Haemorrhage intracranical and Subarachnoid haemorrhage (5 each), Cerebral haematoma (4), Basal ganglia haemorrhage and Cerebellar haemorrhage (2 each); • Relevant event onset latency (n = 241): Range from <24 hours to 41 days, median 2 days; • Relevant event outcome: fatal and resolved/resolving (61 each), resolved with sequelae (10), not resolved (85) and unknown (83). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue.
Vasculitic Events *Search criteria: Vasculitides HLT*	• Number of cases: 32 cases (0.08% of the total PM dataset), of which 26 medically confirmed and 6 non-medically confirmed; • Country of incidence: UK (13), France (4), Portugal, US and Spain (3 each), Cyprus, Germany, Hungary, Italy and Slovakia and Costa rica (1 each); • Subjects' gender: female (26), male (6); • Subjects' age group (n=31): Adult (15), Elderly (16); • Number of relevant events: 34, of which 25 serious, 9 non-serious; • Reported relevant PTs: Vasculitis (14), Cutaneous vasculitis and Vasculitic rash (4 each), (3), Giant cell arteritis and Peripheral ischaemia (3 each), Behcet's syndrome and Hypersensitivity vasculitis (2 each) Palpable purpura, and Takayasu's arteritis (1 each); • Relevant event onset latency (n = 25): Range from <24 hours to 19 days, median 3 days; • Relevant event outcome: fatal (1), resolved/resolving (13), not resolved (12) and unknown (8). Conclusion: This cumulative case review does not raise new safety issues. Surveillance will continue

Table 7. AESIs Evaluation for BNT162b2

AESIs[a] Category	Post-Marketing Cases Evaluation[b] Total Number of Cases (N=42086)

a. For the complete list of the AESIs, please refer to Appendix 5;
b. Please note that this corresponds to evidence from post-EUA/conditional marketing authorisation approval data sources;
c. Subjects with age ranged between 18 and 64 years;
d. Subjects with age equal to or above 65 years;
e. Subjects with age ranged between 2 and 11 years;
f. Subjects with age ranged between 12 and less than 18 years;
g. Multiple episodes of the same PT event were reported with a different clinical outcome within some cases hence the sum of the events outcome exceeds the total number of PT events;
h. Subjects with age ranged between 1 (28 days) and 23 months;
i. Twenty-four additional cases were excluded from the analysis as they were not cases of peripheral facial nerve palsy because they described other disorders (stroke, cerebral haemorrhage or transient ischaemic attack); 1 case was excluded from the analysis because it was invalid due to an unidentifiable reporter;
j. This UK case report received from the UK MHRA described a 1-year-old subject who received the vaccine, and had left postauricular ear pain that progressed to left-sided Bell's palsy 1 day following vaccination that had not resolved at the time of the report;
k. If a case included both PT Facial paresis and PT Facial paralysis, only the PT Facial paralysis was considered in the descriptions of the events as it is most clinically important;
l. Multiple episodes of the same PT event were reported with a different clinical outcome within some cases hence the sum of the events outcome exceeds the total number of PT events
m. This UK case report received from the UK MHRA described a 7-year-old female subject who received the vaccine and had stroke (unknown outcome); no follow-up is possible for clarification.
n. This PT not included in the AESIs/TME list was included in the review as relevant for ACCESS protocol criteria;

3.1.4. Medication error

Cases potentially indicative of medication errors[1] that cumulatively occurred are summarized below.

- Number of relevant medication error cases: 2056[2] (4.9%) of which 1569 (3.7%) are medically confirmed.
- Number of relevant events: 2792
- Top 10 countries of incidence:
  - US (1201), France (171), UK (138), Germany (88), Czech Republic (87), Sweden (49), Israel (45), Italy (42), Canada (35), Romania (33), Finland (21), Portugal (20), Norway (14), Puerto Rico (13), Poland (12), Austria and Spain (10 each).

Medication error case outcomes:

- Fatal (7)[3],
- Recovered/recovering (354, of which 4 are serious),
- Recovered with sequelae (8, of which 3 serious)

[1] MedDRA (version 23.1) Higher Level Terms: Accidental exposures to product; Product administration errors and issues; Product confusion errors and issues; Product dispensing errors and issues; Product label issues; Product monitoring errors and issues; Product preparation errors and issues; Product selection errors and issues; Product storage errors and issues in the product use system; Product transcribing errors and communication issues, OR Preferred Terms: Accidental poisoning; Circumstance or information capable of leading to device use error; Circumstance or information capable of leading to medication error; Contraindicated device used; Deprescribing error; Device use error; Dose calculation error; Drug titration error; Expired device used; Exposure via direct contact; Exposure via eye contact; Exposure via mucosa; Exposure via skin contact; Failure of child resistant product closure; Inadequate aseptic technique in use of product; Incorrect disposal of product; Intercepted medication error; Intercepted product prescribing error; Medication error; Multiple use of single-use product; Product advertising issue; Product distribution issue; Product prescribing error; Product prescribing issue; Product substitution error; Product temperature excursion issue; Product use in unapproved therapeutic environment; Radiation underdose; Underdose; Unintentional medical device removal; Unintentional use for unapproved indication; Vaccination error; Wrong device used; Wrong dosage form; Wrong dosage formulation; Wrong dose; Wrong drug; Wrong patient; Wrong product procured; Wrong product stored; Wrong rate; Wrong route; Wrong schedule; Wrong strength; Wrong technique in device usage process; Wrong technique in product usage process.

[2] Thirty-five (35) cases were exclude from the analysis because describing medication errors occurring in an unspecified number of individuals or describing medication errors occurring with co suspects were determined to be non-contributory.

[3] All the medication errors reported in these cases were assessed as non-serious occurrences with an unknown outcome; based on the available information including the causes of death, the relationship between the medication error and the death is weak. .

- Not recovered (189, of which 84 are serious),
- Unknown (1498, of which 33 are serious).

1371 cases reported only MEs without any associated clinical adverse event. The PTs most frequently reported (≥12 occurrences) were: Poor quality product administered (539), Product temperature excursion issue (253), Inappropriate schedule of product administration (225), Product preparation error (206), Underdose (202), Circumstance or information capable of leading to medication error (120), Product preparation issue (119), Wrong technique in product usage process (76), Incorrect route of product administration (66), Accidental overdose (33), Product administered at inappropriate site (27), Incorrect dose administered and Accidental exposure to the product (25 each), Exposure via skin contact (22), Wrong product administered (17), Incomplete course of vaccination, and Product administration error (14 each) Product administered to patient of inappropriate age (12).

In 685 cases, there were co-reported AEs. The most frequently co- associated AEs (> 40 occurrences) were: Headache (187), Pyrexia (161), Fatigue (135), Chills (127), Pain (107), Vaccination site pain (100), Nausea (89), Myalgia (88), Pain in extremity (85) Arthralgia (68), Off label use (57), Dizziness (52), Lymphadenopathy (47), Asthenia (46) and Malaise (41). These cases are summarized in Table 8.

Table 8. ME PTs by seriousness with or without harm co-association (Through 28 February 2021)

	Serious		Non-Serious	
ME PTs	**With Harm**	**Without Harm**	**With Harm**	**Without Harm**
Accidental exposure to product	0	0	0	5
Accidental overdose	4	1	9	6
Booster dose missed	0	0	0	1
Circumstance or information capable of leading to medication error	0	0	5	11
Contraindicated product administered	1	0	0	2
Expired product administered	0	0	0	2
Exposure via skin contact	0	0	0	5
Inappropriate schedule of product administration	0	2	8	264
Incorrect dose administered	1	1	0	0

Table 8. ME PTs by seriousness with or without harm co-association (Through 28 February 2021)

	Serious		Non-Serious	
ME PTs	**With Harm**	**Without Harm**	**With Harm**	**Without Harm**
Incorrect route of product administration	2	6	16	127
Lack of vaccination site rotation	1	0	0	0
Medication error	0	0	0	1
Poor quality product administered	1	0	0	34
Product administered at inappropriate site	2	1	13	29
Product administered to patient of inappropriate age	0	4	0	40
Product administration error	1	0	0	3
Product dose omission issue	0	1	0	3
Product preparation error	1	0	4	11
Product preparation issue	1	1	0	14

Overall, there were 68 cases with co-reported AEs reporting Harm and 599 cases with co-reported AEs without harm. Additionally, Intercepted medication errors was reported in 1 case (PTs Malaise, clinical outcome unknow) and Potential medication errors were reported in 17 cases.

4. DISCUSSION

Pfizer performs frequent and rigorous signal detection on BNT162b2 cases. The findings of these signal detection analyses are consistent with the known safety profile of the vaccine. This cumulative analysis to support the Biologics License Application for BNT162b2, is an integrated analysis of post-authorization safety data, from U.S. and foreign experience, focused on Important Identified Risks, Important Potential Risks, and areas of Important Missing Information identified in the Pharmacovigilance Plan, as well as adverse events of special interest and vaccine administration errors (whether or not associated with an adverse event). The data do not reveal any novel safety concerns or risks requiring label changes and support a favorable benefit risk profile of to the BNT162b2 vaccine.

5. SUMMARY AND CONCLUSION

Review of the available data for this cumulative PM experience, confirms a favorable benefit: risk balance for BNT162b2.

Pfizer will continue routine pharmacovigilance activities on behalf of BioNTech according to the Pharmacovigilance Agreement in place, in order to assure patient safety and will inform the Agency if an evaluation of the safety data yields significant new information for BNT162b2.

APPENDIX 1. LIST OF ADVERSE EVENTS OF SPECIAL INTEREST

1p36 deletion syndrome;2-Hydroxyglutaric aciduria;5'nucleotidase increased;Acoustic neuritis;Acquired C1 inhibitor deficiency;Acquired epidermolysis bullosa;Acquired epileptic aphasia;Acute cutaneous lupus erythematosus;Acute disseminated encephalomyelitis;Acute encephalitis with refractory, repetitive partial seizures;Acute febrile neutrophilic dermatosis;Acute flaccid myelitis;Acute haemorrhagic leukoencephalitis;Acute haemorrhagic oedema of infancy;Acute kidney injury;Acute macular outer retinopathy;Acute motor axonal neuropathy;Acute motor-sensory axonal neuropathy;Acute myocardial infarction;Acute respiratory distress syndrome;Acute respiratory failure;Addison's disease;Administration site thrombosis;Administration site vasculitis;Adrenal thrombosis;Adverse event following immunisation;Ageusia;Agranulocytosis;Air embolism;Alanine aminotransferase abnormal;Alanine aminotransferase increased;Alcoholic seizure;Allergic bronchopulmonary mycosis;Allergic oedema;Alloimmune hepatitis;Alopecia areata;Alpers disease;Alveolar proteinosis;Ammonia abnormal;Ammonia increased;Amniotic cavity infection;Amygdalohippocampectomy;Amyloid arthropathy;Amyloidosis;Amyloidosis senile;Anaphylactic reaction;Anaphylactic shock;Anaphylactic transfusion reaction;Anaphylactoid reaction;Anaphylactoid shock;Anaphylactoid syndrome of pregnancy;Angioedema;Angiopathic neuropathy;Ankylosing spondylitis;Anosmia;Antiacetylcholine receptor antibody positive;Anti-actin antibody positive;Anti-aquaporin-4 antibody positive;Anti-basal ganglia antibody positive;Anti-cyclic citrullinated peptide antibody positive;Anti-epithelial antibody positive;Anti-erythrocyte antibody positive;Anti-exosome complex antibody positive;Anti-GAD antibody negative;Anti-GAD antibody positive;Anti-ganglioside antibody positive;Antigliadin antibody positive;Anti-glomerular basement membrane antibody positive;Anti-glomerular basement membrane disease;Anti-glycyl-tRNA synthetase antibody positive;Anti-HLA antibody test positive;Anti-IA2 antibody positive;Anti-insulin antibody increased;Anti-insulin antibody positive;Anti-insulin receptor antibody increased;Anti-insulin receptor antibody positive;Anti-interferon antibody negative;Anti-interferon antibody positive;Anti-islet cell antibody positive;Antimitochondrial antibody positive;Anti-muscle specific kinase antibody positive;Anti-myelin-associated glycoprotein antibodies positive;Anti-myelin-associated glycoprotein associated polyneuropathy;Antimyocardial antibody positive;Anti-neuronal antibody positive;Antineutrophil cytoplasmic antibody increased;Antineutrophil cytoplasmic antibody positive;Anti-neutrophil cytoplasmic antibody positive vasculitis;Anti-NMDA antibody positive;Antinuclear antibody increased;Antinuclear antibody positive;Antiphospholipid antibodies positive;Antiphospholipid syndrome;Anti-platelet antibody positive;Anti-prothrombin antibody positive;Antiribosomal P antibody positive;Anti-RNA polymerase III antibody positive;Anti-saccharomyces cerevisiae antibody test positive;Anti-sperm antibody positive;Anti-SRP antibody positive;Antisynthetase syndrome;Anti-thyroid antibody positive;Anti-transglutaminase antibody increased;Anti-VGCC antibody positive;Anti-VGKC antibody positive;Anti-vimentin antibody positive;Antiviral prophylaxis;Antiviral treatment;Anti-zinc transporter 8 antibody positive;Aortic embolus;Aortic thrombosis;Aortitis;Aplasia pure red cell;Aplastic anaemia;Application site thrombosis;Application site vasculitis;Arrhythmia;Arterial bypass occlusion;Arterial bypass thrombosis;Arterial thrombosis;Arteriovenous fistula thrombosis;Arteriovenous graft site stenosis;Arteriovenous graft thrombosis;Arteritis;Arteritis

coronary;Arthralgia;Arthritis;Arthritis enteropathic;Ascites;Aseptic cavernous sinus thrombosis;Aspartate aminotransferase abnormal;Aspartate aminotransferase increased;Aspartate-glutamate-transporter deficiency;AST to platelet ratio index increased;AST/ALT ratio abnormal;Asthma;Asymptomatic COVID-19;Ataxia;Atheroembolism;Atonic seizures;Atrial thrombosis;Atrophic thyroiditis;Atypical benign partial epilepsy;Atypical pneumonia;Aura;Autoantibody positive;Autoimmune anaemia;Autoimmune aplastic anaemia;Autoimmune arthritis;Autoimmune blistering disease;Autoimmune cholangitis;Autoimmune colitis;Autoimmune demyelinating disease;Autoimmune dermatitis;Autoimmune disorder;Autoimmune encephalopathy;Autoimmune endocrine disorder;Autoimmune enteropathy;Autoimmune eye disorder;Autoimmune haemolytic anaemia;Autoimmune heparin-induced thrombocytopenia;Autoimmune hepatitis;Autoimmune hyperlipidaemia;Autoimmune hypothyroidism;Autoimmune inner ear disease;Autoimmune lung disease;Autoimmune lymphoproliferative syndrome;Autoimmune myocarditis;Autoimmune myositis;Autoimmune nephritis;Autoimmune neuropathy;Autoimmune neutropenia;Autoimmune pancreatitis;Autoimmune pancytopenia;Autoimmune pericarditis;Autoimmune retinopathy;Autoimmune thyroid disorder;Autoimmune thyroiditis;Autoimmune uveitis;Autoinflammation with infantile enterocolitis;Autoinflammatory disease;Automatism epileptic;Autonomic nervous system imbalance;Autonomic seizure;Axial spondyloarthritis;Axillary vein thrombosis;Axonal and demyelinating polyneuropathy;Axonal neuropathy;Bacterascites;Baltic myoclonic epilepsy;Band sensation;Basedow's disease;Basilar artery thrombosis;Basophilopenia;B-cell aplasia;Behcet's syndrome;Benign ethnic neutropenia;Benign familial neonatal convulsions;Benign familial pemphigus;Benign rolandic epilepsy;Beta-2 glycoprotein antibody positive;Bickerstaff's encephalitis;Bile output abnormal;Bile output decreased;Biliary ascites;Bilirubin conjugated abnormal;Bilirubin conjugated increased;Bilirubin urine present;Biopsy liver abnormal;Biotinidase deficiency;Birdshot chorioretinopathy;Blood alkaline phosphatase abnormal;Blood alkaline phosphatase increased;Blood bilirubin abnormal;Blood bilirubin increased;Blood bilirubin unconjugated increased;Blood cholinesterase abnormal;Blood cholinesterase decreased;Blood pressure decreased;Blood pressure diastolic decreased;Blood pressure systolic decreased;Blue toe syndrome;Brachiocephalic vein thrombosis;Brain stem embolism;Brain stem thrombosis;Bromosulphthalein test abnormal;Bronchial oedema;Bronchitis;Bronchitis mycoplasmal;Bronchitis viral;Bronchopulmonary aspergillosis allergic;Bronchospasm;Budd-Chiari syndrome;Bulbar palsy;Butterfly rash;C1q nephropathy;Caesarean section;Calcium embolism;Capillaritis;Caplan's syndrome;Cardiac amyloidosis;Cardiac arrest;Cardiac failure;Cardiac failure acute;Cardiac sarcoidosis;Cardiac ventricular thrombosis;Cardiogenic shock;Cardiolipin antibody positive;Cardiopulmonary failure;Cardio-respiratory arrest;Cardio-respiratory distress;Cardiovascular insufficiency;Carotid arterial embolus;Carotid artery thrombosis;Cataplexy;Catheter site thrombosis;Catheter site vasculitis;Cavernous sinus thrombosis;CDKL5 deficiency disorder;CEC syndrome;Cement embolism;Central nervous system lupus;Central nervous system vasculitis;Cerebellar artery thrombosis;Cerebellar embolism;Cerebral amyloid angiopathy;Cerebral arteritis;Cerebral artery embolism;Cerebral artery thrombosis;Cerebral gas embolism;Cerebral microembolism;Cerebral septic infarct;Cerebral thrombosis;Cerebral venous sinus thrombosis;Cerebral venous thrombosis;Cerebrospinal thrombotic

tamponade;Cerebrovascular accident;Change in seizure presentation;Chest discomfort;Child-Pugh-Turcotte score abnormal;Child-Pugh-Turcotte score increased;Chillblains;Choking;Choking sensation;Cholangitis sclerosing;Chronic autoimmune glomerulonephritis;Chronic cutaneous lupus erythematosus;Chronic fatigue syndrome;Chronic gastritis;Chronic inflammatory demyelinating polyradiculoneuropathy;Chronic lymphocytic inflammation with pontine perivascular enhancement responsive to steroids;Chronic recurrent multifocal osteomyelitis;Chronic respiratory failure;Chronic spontaneous urticaria;Circulatory collapse;Circumoral oedema;Circumoral swelling;Clinically isolated syndrome;Clonic convulsion;Coeliac disease;Cogan's syndrome;Cold agglutinins positive;Cold type haemolytic anaemia;Colitis;Colitis erosive;Colitis herpes;Colitis microscopic;Colitis ulcerative;Collagen disorder;Collagen-vascular disease;Complement factor abnormal;Complement factor C1 decreased;Complement factor C2 decreased;Complement factor C3 decreased;Complement factor C4 decreased;Complement factor decreased;Computerised tomogram liver abnormal;Concentric sclerosis;Congenital anomaly;Congenital bilateral perisylvian syndrome;Congenital herpes simplex infection;Congenital myasthenic syndrome;Congenital varicella infection;Congestive hepatopathy;Convulsion in childhood;Convulsions local;Convulsive threshold lowered;Coombs positive haemolytic anaemia;Coronary artery disease;Coronary artery embolism;Coronary artery thrombosis;Coronary bypass thrombosis;Coronavirus infection;Coronavirus test;Coronavirus test negative;Coronavirus test positive;Corpus callosotomy;Cough;Cough variant asthma;COVID-19;COVID-19 immunisation;COVID-19 pneumonia;COVID-19 prophylaxis;COVID-19 treatment;Cranial nerve disorder;Cranial nerve palsies multiple;Cranial nerve paralysis;CREST syndrome;Crohn's disease;Cryofibrinogenaemia;Cryoglobulinaemia;CSF oligoclonal band present;CSWS syndrome;Cutaneous amyloidosis;Cutaneous lupus erythematosus;Cutaneous sarcoidosis;Cutaneous vasculitis;Cyanosis;Cyclic neutropenia;Cystitis interstitial;Cytokine release syndrome;Cytokine storm;De novo purine synthesis inhibitors associated acute inflammatory syndrome;Death neonatal;Deep vein thrombosis;Deep vein thrombosis postoperative;Deficiency of bile secretion;Deja vu;Demyelinating polyneuropathy;Demyelination;Dermatitis;Dermatitis bullous;Dermatitis herpetiformis;Dermatomyositis;Device embolisation;Device related thrombosis;Diabetes mellitus;Diabetic ketoacidosis;Diabetic mastopathy;Dialysis amyloidosis;Dialysis membrane reaction;Diastolic hypotension;Diffuse vasculitis;Digital pitting scar;Disseminated intravascular coagulation;Disseminated intravascular coagulation in newborn;Disseminated neonatal herpes simplex;Disseminated varicella;Disseminated varicella zoster vaccine virus infection;Disseminated varicella zoster virus infection;DNA antibody positive;Double cortex syndrome;Double stranded DNA antibody positive;Dreamy state;Dressler's syndrome;Drop attacks;Drug withdrawal convulsions;Dyspnoea;Early infantile epileptic encephalopathy with burst-suppression;Eclampsia;Eczema herpeticum;Embolia cutis medicamentosa;Embolic cerebellar infarction;Embolic cerebral infarction;Embolic pneumonia;Embolic stroke;Embolism;Embolism arterial;Embolism venous;Encephalitis;Encephalitis allergic;Encephalitis autoimmune;Encephalitis brain stem;Encephalitis haemorrhagic;Encephalitis periaxialis diffusa;Encephalitis post immunisation;Encephalomyelitis;Encephalopathy;Endocrine disorder;Endocrine ophthalmopathy;Endotracheal intubation;Enteritis;Enteritis leukopenic;Enterobacter pneumonia;Enterocolitis;Enteropathic spondylitis;Eosinopenia;Eosinophilic

fasciitis;Eosinophilic granulomatosis with polyangiitis;Eosinophilic oesophagitis;Epidermolysis;Epilepsy;Epilepsy surgery;Epilepsy with myoclonic-atonic seizures;Epileptic aura;Epileptic psychosis;Erythema;Erythema induratum;Erythema multiforme;Erythema nodosum;Evans syndrome;Exanthema subitum;Expanded disability status scale score decreased;Expanded disability status scale score increased;Exposure to communicable disease;Exposure to SARS-CoV-2;Eye oedema;Eye pruritus;Eye swelling;Eyelid oedema;Face oedema;Facial paralysis;Facial paresis;Faciobrachial dystonic seizure;Fat embolism;Febrile convulsion;Febrile infection-related epilepsy syndrome;Febrile neutropenia;Felty's syndrome;Femoral artery embolism;Fibrillary glomerulonephritis;Fibromyalgia;Flushing;Foaming at mouth;Focal cortical resection;Focal dyscognitive seizures;Foetal distress syndrome;Foetal placental thrombosis;Foetor hepaticus;Foreign body embolism;Frontal lobe epilepsy;Fulminant type 1 diabetes mellitus;Galactose elimination capacity test abnormal;Galactose elimination capacity test decreased;Gamma-glutamyltransferase abnormal;Gamma-glutamyltransferase increased;Gastritis herpes;Gastrointestinal amyloidosis;Gelastic seizure;Generalised onset non-motor seizure;Generalised tonic-clonic seizure;Genital herpes;Genital herpes simplex;Genital herpes zoster;Giant cell arteritis;Glomerulonephritis;Glomerulonephritis membranoproliferative;Glomerulonephritis membranous;Glomerulonephritis rapidly progressive;Glossopharyngeal nerve paralysis;Glucose transporter type 1 deficiency syndrome;Glutamate dehydrogenase increased;Glycocholic acid increased;GM2 gangliosidosis;Goodpasture's syndrome;Graft thrombosis;Granulocytopenia;Granulocytopenia neonatal;Granulomatosis with polyangiitis;Granulomatous dermatitis;Grey matter heterotopia;Guanase increased;Guillain-Barre syndrome;Haemolytic anaemia;Haemophagocytic lymphohistiocytosis;Haemorrhage;Haemorrhagic ascites;Haemorrhagic disorder;Haemorrhagic pneumonia;Haemorrhagic varicella syndrome;Haemorrhagic vasculitis;Hantavirus pulmonary infection;Hashimoto's encephalopathy;Hashitoxicosis;Hemimegalencephaly;Henoch-Schonlein purpura;Henoch-Schonlein purpura nephritis;Hepaplastin abnormal;Hepaplastin decreased;Heparin-induced thrombocytopenia;Hepatic amyloidosis;Hepatic artery embolism;Hepatic artery flow decreased;Hepatic artery thrombosis;Hepatic enzyme abnormal;Hepatic enzyme decreased;Hepatic enzyme increased;Hepatic fibrosis marker abnormal;Hepatic fibrosis marker increased;Hepatic function abnormal;Hepatic hydrothorax;Hepatic hypertrophy;Hepatic hypoperfusion;Hepatic lymphocytic infiltration;Hepatic mass;Hepatic pain;Hepatic sequestration;Hepatic vascular resistance increased;Hepatic vascular thrombosis;Hepatic vein embolism;Hepatic vein thrombosis;Hepatic venous pressure gradient abnormal;Hepatic venous pressure gradient increased;Hepatitis;Hepatobiliary scan abnormal;Hepatomegaly;Hepatosplenomegaly;Hereditary angioedema with C1 esterase inhibitor deficiency;Herpes dermatitis;Herpes gestationis;Herpes oesophagitis;Herpes ophthalmic;Herpes pharyngitis;Herpes sepsis;Herpes simplex;Herpes simplex cervicitis;Herpes simplex colitis;Herpes simplex encephalitis;Herpes simplex gastritis;Herpes simplex hepatitis;Herpes simplex meningitis;Herpes simplex meningoencephalitis;Herpes simplex meningomyelitis;Herpes simplex necrotising retinopathy;Herpes simplex oesophagitis;Herpes simplex otitis externa;Herpes simplex pharyngitis;Herpes simplex pneumonia;Herpes simplex reactivation;Herpes simplex sepsis;Herpes simplex viraemia;Herpes simplex virus conjunctivitis neonatal;Herpes simplex visceral;Herpes virus

infection;Herpes zoster;Herpes zoster cutaneous disseminated;Herpes zoster infection neurological;Herpes zoster meningitis;Herpes zoster meningoencephalitis;Herpes zoster meningomyelitis;Herpes zoster meningoradiculitis;Herpes zoster necrotising retinopathy;Herpes zoster oticus;Herpes zoster pharyngitis;Herpes zoster reactivation;Herpetic radiculopathy;Histone antibody positive;Hoigne's syndrome;Human herpesvirus 6 encephalitis;Human herpesvirus 6 infection;Human herpesvirus 6 infection reactivation;Human herpesvirus 7 infection;Human herpesvirus 8 infection;Hyperammonaemia;Hyperbilirubinaemia;Hypercholia;Hypergammaglobulinaemia benign monoclonal;Hyperglycaemic seizure;Hypersensitivity;Hypersensitivity vasculitis;Hyperthyroidism;Hypertransaminasaemia;Hyperventilation;Hypoalbuminaemia;Hypocalcaemic seizure;Hypogammaglobulinaemia;Hypoglossal nerve paralysis;Hypoglossal nerve paresis;Hypoglycaemic seizure;Hyponatraemic seizure;Hypotension;Hypotensive crisis;Hypothenar hammer syndrome;Hypothyroidism;Hypoxia;Idiopathic CD4 lymphocytopenia;Idiopathic generalised epilepsy;Idiopathic interstitial pneumonia;Idiopathic neutropenia;Idiopathic pulmonary fibrosis;IgA nephropathy;IgM nephropathy;IIIrd nerve paralysis;IIIrd nerve paresis;Iliac artery embolism;Immune thrombocytopenia;Immune-mediated adverse reaction;Immune-mediated cholangitis;Immune-mediated cholestasis;Immune-mediated cytopenia;Immune-mediated encephalitis;Immune-mediated encephalopathy;Immune-mediated endocrinopathy;Immune-mediated enterocolitis;Immune-mediated gastritis;Immune-mediated hepatic disorder;Immune-mediated hepatitis;Immune-mediated hyperthyroidism;Immune-mediated hypothyroidism;Immune-mediated myocarditis;Immune-mediated myositis;Immune-mediated nephritis;Immune-mediated neuropathy;Immune-mediated pancreatitis;Immune-mediated pneumonitis;Immune-mediated renal disorder;Immune-mediated thyroiditis;Immune-mediated uveitis;Immunoglobulin G4 related disease;Immunoglobulins abnormal;Implant site thrombosis;Inclusion body myositis;Infantile genetic agranulocytosis;Infantile spasms;Infected vasculitis;Infective thrombosis;Inflammation;Inflammatory bowel disease;Infusion site thrombosis;Infusion site vasculitis;Injection site thrombosis;Injection site urticaria;Injection site vasculitis;Instillation site thrombosis;Insulin autoimmune syndrome;Interstitial granulomatous dermatitis;Interstitial lung disease;Intracardiac mass;Intracardiac thrombus;Intracranial pressure increased;Intrapericardial thrombosis;Intrinsic factor antibody abnormal;Intrinsic factor antibody positive;IPEX syndrome;Irregular breathing;IRVAN syndrome;IVth nerve paralysis;IVth nerve paresis;JC polyomavirus test positive;JC virus CSF test positive;Jeavons syndrome;Jugular vein embolism;Jugular vein thrombosis;Juvenile idiopathic arthritis;Juvenile myoclonic epilepsy;Juvenile polymyositis;Juvenile psoriatic arthritis;Juvenile spondyloarthritis;Kaposi sarcoma inflammatory cytokine syndrome;Kawasaki's disease;Kayser-Fleischer ring;Keratoderma blenorrhagica;Ketosis-prone diabetes mellitus;Kounis syndrome;Lafora's myoclonic epilepsy;Lambl's excrescences;Laryngeal dyspnoea;Laryngeal oedema;Laryngeal rheumatoid arthritis;Laryngospasm;Laryngotracheal oedema;Latent autoimmune diabetes in adults;LE cells present;Lemierre syndrome;Lennox-Gastaut syndrome;Leucine aminopeptidase increased;Leukoencephalomyelitis;Leukoencephalopathy;Leukopenia;Leukopenia neonatal;Lewis-Sumner syndrome;Lhermitte's sign;Lichen planopilaris;Lichen planus;Lichen sclerosus;Limbic encephalitis;Linear IgA disease;Lip oedema;Lip swelling;Liver function test abnormal;Liver function test decreased;Liver function test increased;Liver induration;Liver injury;Liver iron concentration abnormal;Liver iron concentration

increased;Liver opacity;Liver palpable;Liver sarcoidosis;Liver scan abnormal;Liver tenderness;Low birth weight baby;Lower respiratory tract herpes infection;Lower respiratory tract infection;Lower respiratory tract infection viral;Lung abscess;Lupoid hepatic cirrhosis;Lupus cystitis;Lupus encephalitis;Lupus endocarditis;Lupus enteritis;Lupus hepatitis;Lupus myocarditis;Lupus myositis;Lupus nephritis;Lupus pancreatitis;Lupus pleurisy;Lupus pneumonitis;Lupus vasculitis;Lupus-like syndrome;Lymphocytic hypophysitis;Lymphocytopenia neonatal;Lymphopenia;MAGIC syndrome;Magnetic resonance imaging liver abnormal;Magnetic resonance proton density fat fraction measurement;Mahler sign;Manufacturing laboratory analytical testing issue;Manufacturing materials issue;Manufacturing production issue;Marburg's variant multiple sclerosis;Marchiafava-Bignami disease;Marine Lenhart syndrome;Mastocytic enterocolitis;Maternal exposure during pregnancy;Medical device site thrombosis;Medical device site vasculitis;MELAS syndrome;Meningitis;Meningitis aseptic;Meningitis herpes;Meningoencephalitis herpes simplex neonatal;Meningoencephalitis herpetic;Meningomyelitis herpes;MERS-CoV test;MERS-CoV test negative;MERS-CoV test positive;Mesangioproliferative glomerulonephritis;Mesenteric artery embolism;Mesenteric artery thrombosis;Mesenteric vein thrombosis;Metapneumovirus infection;Metastatic cutaneous Crohn's disease;Metastatic pulmonary embolism;Microangiopathy;Microembolism;Microscopic polyangiitis;Middle East respiratory syndrome;Migraine-triggered seizure;Miliary pneumonia;Miller Fisher syndrome;Mitochondrial aspartate aminotransferase increased;Mixed connective tissue disease;Model for end stage liver disease score abnormal;Model for end stage liver disease score increased;Molar ratio of total branched-chain amino acid to tyrosine;Molybdenum cofactor deficiency;Monocytopenia;Mononeuritis;Mononeuropathy multiplex;Morphoea;Morvan syndrome;Mouth swelling;Moyamoya disease;Multifocal motor neuropathy;Multiple organ dysfunction syndrome;Multiple sclerosis;Multiple sclerosis relapse;Multiple sclerosis relapse prophylaxis;Multiple subpial transection;Multisystem inflammatory syndrome in children;Muscular sarcoidosis;Myasthenia gravis;Myasthenia gravis crisis;Myasthenia gravis neonatal;Myasthenic syndrome;Myelitis;Myelitis transverse;Myocardial infarction;Myocarditis;Myocarditis post infection;Myoclonic epilepsy;Myoclonic epilepsy and ragged-red fibres;Myokymia;Myositis;Narcolepsy;Nasal herpes;Nasal obstruction;Necrotising herpetic retinopathy;Neonatal Crohn's disease;Neonatal epileptic seizure;Neonatal lupus erythematosus;Neonatal mucocutaneous herpes simplex;Neonatal pneumonia;Neonatal seizure;Nephritis;Nephrogenic systemic fibrosis;Neuralgic amyotrophy;Neuritis;Neuritis cranial;Neuromyelitis optica pseudo relapse;Neuromyelitis optica spectrum disorder;Neuromyotonia;Neuronal neuropathy;Neuropathy peripheral;Neuropathy, ataxia, retinitis pigmentosa syndrome;Neuropsychiatric lupus;Neurosarcoidosis;Neutropenia;Neutropenia neonatal;Neutropenic colitis;Neutropenic infection;Neutropenic sepsis;Nodular rash;Nodular vasculitis;Noninfectious myelitis;Noninfective encephalitis;Noninfective encephalomyelitis;Noninfective oophoritis;Obstetrical pulmonary embolism;Occupational exposure to communicable disease;Occupational exposure to SARS-CoV-2;Ocular hyperaemia;Ocular myasthenia;Ocular pemphigoid;Ocular sarcoidosis;Ocular vasculitis;Oculofacial paralysis;Oedema;Oedema blister;Oedema due to hepatic disease;Oedema mouth;Oesophageal achalasia;Ophthalmic artery thrombosis;Ophthalmic herpes simplex;Ophthalmic herpes zoster;Ophthalmic vein thrombosis;Optic neuritis;Optic

neuropathy;Optic perineuritis;Oral herpes;Oral lichen planus;Oropharyngeal oedema;Oropharyngeal spasm;Oropharyngeal swelling;Osmotic demyelination syndrome;Ovarian vein thrombosis;Overlap syndrome;Paediatric autoimmune neuropsychiatric disorders associated with streptococcal infection;Paget-Schroetter syndrome;Palindromic rheumatism;Palisaded neutrophilic granulomatous dermatitis;Palmoplantar keratoderma;Palpable purpura;Pancreatitis;Panencephalitis;Papillophlebitis;Paracancerous pneumonia;Paradoxical embolism;Parainfluenzae viral laryngotracheobronchitis;Paraneoplastic dermatomyositis;Paraneoplastic pemphigus;Paraneoplastic thrombosis;Paresis cranial nerve;Parietal cell antibody positive;Paroxysmal nocturnal haemoglobinuria;Partial seizures;Partial seizures with secondary generalisation;Patient isolation;Pelvic venous thrombosis;Pemphigoid;Pemphigus;Penile vein thrombosis;Pericarditis;Pericarditis lupus;Perihepatic discomfort;Periorbital oedema;Periorbital swelling;Peripheral artery thrombosis;Peripheral embolism;Peripheral ischaemia;Peripheral vein thrombus extension;Periportal oedema;Peritoneal fluid protein abnormal;Peritoneal fluid protein decreased;Peritoneal fluid protein increased;Peritonitis lupus;Pernicious anaemia;Petit mal epilepsy;Pharyngeal oedema;Pharyngeal swelling;Pityriasis lichenoides et varioliformis acuta;Placenta praevia;Pleuroparenchymal fibroelastosis;Pneumobilia;Pneumonia;Pneumonia adenoviral;Pneumonia cytomegaloviral;Pneumonia herpes viral;Pneumonia influenzal;Pneumonia measles;Pneumonia mycoplasmal;Pneumonia necrotising;Pneumonia parainfluenzae viral;Pneumonia respiratory syncytial viral;Pneumonia viral;POEMS syndrome;Polyarteritis nodosa;Polyarthritis;Polychondritis;Polyglandular autoimmune syndrome type I;Polyglandular autoimmune syndrome type II;Polyglandular autoimmune syndrome type III;Polyglandular disorder;Polymicrogyria;Polymyalgia rheumatica;Polymyositis;Polyneuropathy;Polyneuropathy idiopathic progressive;Portal pyaemia;Portal vein embolism;Portal vein flow decreased;Portal vein pressure increased;Portal vein thrombosis;Portosplenomesenteric venous thrombosis;Post procedural hypotension;Post procedural pneumonia;Post procedural pulmonary embolism;Post stroke epilepsy;Post stroke seizure;Post thrombotic retinopathy;Post thrombotic syndrome;Post viral fatigue syndrome;Postictal headache;Postictal paralysis;Postictal psychosis;Postictal state;Postoperative respiratory distress;Postoperative respiratory failure;Postoperative thrombosis;Postpartum thrombosis;Postpartum venous thrombosis;Postpericardiotomy syndrome;Post-traumatic epilepsy;Postural orthostatic tachycardia syndrome;Precerebral artery thrombosis;Pre-eclampsia;Preictal state;Premature labour;Premature menopause;Primary amyloidosis;Primary biliary cholangitis;Primary progressive multiple sclerosis;Procedural shock;Proctitis herpes;Proctitis ulcerative;Product availability issue;Product distribution issue;Product supply issue;Progressive facial hemiatrophy;Progressive multifocal leukoencephalopathy;Progressive multiple sclerosis;Progressive relapsing multiple sclerosis;Prosthetic cardiac valve thrombosis;Pruritus;Pruritus allergic;Pseudovasculitis;Psoriasis;Psoriatic arthropathy;Pulmonary amyloidosis;Pulmonary artery thrombosis;Pulmonary embolism;Pulmonary fibrosis;Pulmonary haemorrhage;Pulmonary microemboli;Pulmonary oil microembolism;Pulmonary renal syndrome;Pulmonary sarcoidosis;Pulmonary sepsis;Pulmonary thrombosis;Pulmonary tumour thrombotic microangiopathy;Pulmonary vasculitis;Pulmonary veno-occlusive disease;Pulmonary venous thrombosis;Pyoderma gangrenosum;Pyostomatitis vegetans;Pyrexia;Quarantine;Radiation leukopenia;Radiculitis

brachial;Radiologically isolated syndrome;Rash;Rash erythematous;Rash pruritic;Rasmussen encephalitis;Raynaud's phenomenon;Reactive capillary endothelial proliferation;Relapsing multiple sclerosis;Relapsing-remitting multiple sclerosis;Renal amyloidosis;Renal arteritis;Renal artery thrombosis;Renal embolism;Renal failure;Renal vascular thrombosis;Renal vasculitis;Renal vein embolism;Renal vein thrombosis;Respiratory arrest;Respiratory disorder;Respiratory distress;Respiratory failure;Respiratory paralysis;Respiratory syncytial virus bronchiolitis;Respiratory syncytial virus bronchitis;Retinal artery embolism;Retinal artery occlusion;Retinal artery thrombosis;Retinal vascular thrombosis;Retinal vasculitis;Retinal vein occlusion;Retinal vein thrombosis;Retinol binding protein decreased;Retinopathy;Retrograde portal vein flow;Retroperitoneal fibrosis;Reversible airways obstruction;Reynold's syndrome;Rheumatic brain disease;Rheumatic disorder;Rheumatoid arthritis;Rheumatoid factor increased;Rheumatoid factor positive;Rheumatoid factor quantitative increased;Rheumatoid lung;Rheumatoid neutrophilic dermatosis;Rheumatoid nodule;Rheumatoid nodule removal;Rheumatoid scleritis;Rheumatoid vasculitis;Saccadic eye movement;SAPHO syndrome;Sarcoidosis;SARS-CoV-1 test;SARS-CoV-1 test negative;SARS-CoV-1 test positive;SARS-CoV-2 antibody test;SARS-CoV-2 antibody test negative;SARS-CoV-2 antibody test positive;SARS-CoV-2 carrier;SARS-CoV-2 sepsis;SARS-CoV-2 test;SARS-CoV-2 test false negative;SARS-CoV-2 test false positive;SARS-CoV-2 test negative;SARS-CoV-2 test positive;SARS-CoV-2 viraemia;Satoyoshi syndrome;Schizencephaly;Scleritis;Sclerodactylia;Scleroderma;Scleroderma associated digital ulcer;Scleroderma renal crisis;Scleroderma-like reaction;Secondary amyloidosis;Secondary cerebellar degeneration;Secondary progressive multiple sclerosis;Segmented hyalinising vasculitis;Seizure;Seizure anoxic;Seizure cluster;Seizure like phenomena;Seizure prophylaxis;Sensation of foreign body;Septic embolus;Septic pulmonary embolism;Severe acute respiratory syndrome;Severe myoclonic epilepsy of infancy;Shock;Shock symptom;Shrinking lung syndrome;Shunt thrombosis;Silent thyroiditis;Simple partial seizures;Sjogren's syndrome;Skin swelling;SLE arthritis;Smooth muscle antibody positive;Sneezing;Spinal artery embolism;Spinal artery thrombosis;Splenic artery thrombosis;Splenic embolism;Splenic thrombosis;Splenic vein thrombosis;Spondylitis;Spondyloarthropathy;Spontaneous heparin-induced thrombocytopenia syndrome;Status epilepticus;Stevens-Johnson syndrome;Stiff leg syndrome;Stiff person syndrome;Stillbirth;Still's disease;Stoma site thrombosis;Stoma site vasculitis;Stress cardiomyopathy;Stridor;Subacute cutaneous lupus erythematosus;Subacute endocarditis;Subacute inflammatory demyelinating polyneuropathy;Subclavian artery embolism;Subclavian artery thrombosis;Subclavian vein thrombosis;Sudden unexplained death in epilepsy;Superior sagittal sinus thrombosis;Susac's syndrome;Suspected COVID-19;Swelling;Swelling face;Swelling of eyelid;Swollen tongue;Sympathetic ophthalmia;Systemic lupus erythematosus;Systemic lupus erythematosus disease activity index abnormal;Systemic lupus erythematosus disease activity index decreased;Systemic lupus erythematosus disease activity index increased;Systemic lupus erythematosus rash;Systemic scleroderma;Systemic sclerosis pulmonary;Tachycardia;Tachypnoea;Takayasu's arteritis;Temporal lobe epilepsy;Terminal ileitis;Testicular autoimmunity;Throat tightness;Thromboangiitis obliterans;Thrombocytopenia;Thrombocytopenic purpura;Thrombophlebitis;Thrombophlebitis migrans;Thrombophlebitis

neonatal;Thrombophlebitis septic;Thrombophlebitis superficial;Thromboplastin antibody positive;Thrombosis;Thrombosis corpora cavernosa;Thrombosis in device;Thrombosis mesenteric vessel;Thrombotic cerebral infarction;Thrombotic microangiopathy;Thrombotic stroke;Thrombotic thrombocytopenic purpura;Thyroid disorder;Thyroid stimulating immunoglobulin increased;Thyroiditis;Tongue amyloidosis;Tongue biting;Tongue oedema;Tonic clonic movements;Tonic convulsion;Tonic posturing;Topectomy;Total bile acids increased;Toxic epidermal necrolysis;Toxic leukoencephalopathy;Toxic oil syndrome;Tracheal obstruction;Tracheal oedema;Tracheobronchitis;Tracheobronchitis mycoplasmal;Tracheobronchitis viral;Transaminases abnormal;Transaminases increased;Transfusion-related alloimmune neutropenia;Transient epileptic amnesia;Transverse sinus thrombosis;Trigeminal nerve paresis;Trigeminal neuralgia;Trigeminal palsy;Truncus coeliacus thrombosis;Tuberous sclerosis complex;Tubulointerstitial nephritis and uveitis syndrome;Tumefactive multiple sclerosis;Tumour embolism;Tumour thrombosis;Type 1 diabetes mellitus;Type I hypersensitivity;Type III immune complex mediated reaction;Uhthoff's phenomenon;Ulcerative keratitis;Ultrasound liver abnormal;Umbilical cord thrombosis;Uncinate fits;Undifferentiated connective tissue disease;Upper airway obstruction;Urine bilirubin increased;Urobilinogen urine decreased;Urobilinogen urine increased;Urticaria;Urticaria papular;Urticarial vasculitis;Uterine rupture;Uveitis;Vaccination site thrombosis;Vaccination site vasculitis;Vagus nerve paralysis;Varicella;Varicella keratitis;Varicella post vaccine;Varicella zoster gastritis;Varicella zoster oesophagitis;Varicella zoster pneumonia;Varicella zoster sepsis;Varicella zoster virus infection;Vasa praevia;Vascular graft thrombosis;Vascular pseudoaneurysm thrombosis;Vascular purpura;Vascular stent thrombosis;Vasculitic rash;Vasculitic ulcer;Vasculitis;Vasculitis gastrointestinal;Vasculitis necrotising;Vena cava embolism;Vena cava thrombosis;Venous intravasation;Venous recanalisation;Venous thrombosis;Venous thrombosis in pregnancy;Venous thrombosis limb;Venous thrombosis neonatal;Vertebral artery thrombosis;Vessel puncture site thrombosis;Visceral venous thrombosis;VIth nerve paralysis;VIth nerve paresis;Vitiligo;Vocal cord paralysis;Vocal cord paresis;Vogt-Koyanagi-Harada disease;Warm type haemolytic anaemia;Wheezing;White nipple sign;XIth nerve paralysis;X-ray hepatobiliary abnormal;Young's syndrome;Zika virus associated Guillain Barre syndrome.

29th November 2021 www.worldcouncilforhealth.org

World Council For Health

DECLARATION, CEASE AND DESIST AND NOTICE OF LIABILITY

WORLD COUNCIL FOR HEALTH CALLS FOR

AN IMMEDIATE STOP TO THE COVID-19 EXPERIMENTAL "VACCINES"

A. CONSENSUS OF WORLD'S FOREMOST EXPERTS

Globally renowned experts, including Dr. Paul Alexander, Dr. Byram Bridle, Dr. Geert Vanden Bossche, Prof. Dolores Cahill, and Drs. Sucharit Bhakdi, Ryan Cole, Richard Fleming, Robert W. Malone, Peter McCullough, Mark Trozzi, Michael Yeadon, Wolfgang Wodarg, and Vladimir Zelenko, among many others, consistently warn the world about the adverse effects resulting from Covid-19 experimental injections; they also warn about their long-term effects, which cannot be known at this time since most clinical trials will be not completed until 2023, and some as late as 2025.

In June 2021, Dr. Tess Lawrie, co-founder of the World Council for Health and member of the Council's Steering Committee, courageously described the global crisis and called for urgent action: *"There is now more than enough evidence on the [UK] Yellow Card system to declare the COVID-19 vaccines unsafe for use in humans. Preparation should be made to scale up humanitarian efforts to assist those harmed by the COVID-19 vaccines and to anticipate and ameliorate medium to longer term effects."*

B. DECLARATION

The World Council for Health declares that it is time to put an end to this humanitarian crisis. Further, the Council also declares that any direct or indirect involvement in the manufacturing, distribution, administration and promotion of these injections violates basic principles of common law, constitutional law and natural justice, as well as the Nuremberg Code, the Helsinki Declaration, and other international treaties.

C. UNCENSORED FACTS

We now know that children are over one hundred times more likely to die from these experimental injections than Covid-19. Injected athletes, globally, are collapsing before our very eyes. In spite of the fact that reporting systems are limited and passive, millions of adverse effects have been recorded, which include death, paralysis, blood clots, strokes,

myocarditis, pericarditis, heart attacks, spontaneous miscarriage, chronic fatigue and extreme depression.

See: https://coronavirus-yellowcard.mhra.gov.uk/

See: https://vaers.hhs.gov/

See: https://www.ema.europa.eu/en/human-regulatory/research-development/pharmacovigilance/eudravigilance

See: http://www.vigiaccess.org/ (search covid-19 vaccine)

D. VICTIM TESTIMONIES

The World Council for Health acknowledges and respects the experiences and testimony of the victims of this worldwide medical experiment. We also declare and confirm that safe, effective and affordable treatments for Covid-19 exist and should be made available to all who need them.

See: https://www.wewanttobeheard.com/

See: https://nomoresilence.world/

See: https://www.vaxtestimonies.org/en/

E. NOT SAFE, NOT EFFECTIVE

Recent studies confirm the risks associated with Covid-19 experimental injections. Emerging research establishes that the injections are neither safe nor effective, and, in fact, are toxic. While some of the known ingredients of the injections cause biological harm, it is even more concerning that the unknown and undisclosed ingredients may present an even greater threat to human health.

F. CEASE AND DESIST

The World Council for Health is ethically and lawfully bound to issue this Declaration, demanding that governments and corporations cease and desist from direct or indirect participation in the manufacturing, distribution, administration or promotion of Covid-19 experimental injections.

The Council declares that every living man and woman has a moral and legal duty to take immediate and decisive action to halt this unprecedented medical experiment, which continues to cause unnecessary and immeasurable harm.

29th November 2021 www.worldcouncilforhealth.org

G. NOTICE OF LIABILITY

The right of bodily integrity and the right to informed consent are inalienable and universal human rights, which have been trampled by government mandates and corporate imperatives. Thus, the World Council for Health declares that any person or organization directly or indirectly participating in the manufacturing, distribution, administration or promotion of Covid-19 experimental biologics will be held liable for the violation of principles of justice grounded in civil, criminal, constitutional and natural law, as well as international treaties.

Signed:

Charles Kovess — DocuSigned by: Charles Kovess D8A916FA81614AC...

Dr. Jennifer Hibberd — DocuSigned by: A20BBB97878B4DA...

Dr. Mark Trozzi — DocuSigned by: A2446313F57A4EA...

Dr. Naseeba Kathrada — DocuSigned by: 2F87AC848A0F4FB...

Dr. Robert J McLeod — DocuSigned by: AA3E8497DE4B434...

Dr. Tess Lawrie — DocuSigned by: Dr. Tess Lawrie 1E6A84D734574A3...

Dr. Vince Vicente — DocuSigned by: 523DFFB4CFA446E...

Karen McKenna, MBA — DocuSigned by: karen McKenna, MB D45032D3EDDE486...

Maria Hubmer Mogg — DocuSigned by: C5083D558A6343A...

Michael Alexander — DocuSigned by: 619B2F88B43F47A...

Rob Verkerk PhD — DocuSigned by: 4ACCA37A59A7420...

Shabnam Palesa Mohamed — DocuSigned by: Mohamed

Tracy Chandler — DocuSigned by: 4D6A6657E80C41E...

Zac Cox — DocuSigned by: Zac Cox 83D95065BF8945D...

Stephan Becker — DocuSigned by: FF43F6108418408...

Steering Committee, Law Committee, Scientific and Medical Committee - **World Council for Health**

SERVED TO: USDC N. Alabama 21-cv-702

DATE: January 19, 2022

WITNESS: Melvin Cahoon

FILED
2021 Nov-12 PM 03:59
U.S. DISTRICT COURT
N.D. OF ALABAMA

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA

AMERICA'S FRONTLINE DOCTORS, et al,	)	**Summons**
Plaintiffs,	)	**(Issued pursuant to Rule 4 of the Federal Rules of Civil Procedure or other appropriate law.)**
v.	)	
XAVIER BECERRA, et al,	)	**CIVIL ACTION CASE NUMBER: 2:21-cv-702-CLM**
Defendants.	)	

Summons in a Civil Action

To:

Joseph R. Biden, President
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

A lawsuit has been filed against the following federal agencies and officers: THE UNITED STATES, JOSEPH BIDEN, President, XAVIER BECERRA, Secretary of the U.S. Department of Health and Human Services, in his official capacity, DR. ANTHONY FAUCI, Director of the National Institute of Allergies and Infectious Diseases, in his official capacity, DR. JANET WOODCOCK, Acting Commissioner of the Food and Drug Administration, in her official capacity, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, the FOOD AND DRUG ADMINISTRATION, the CENTER FOR DISEASE CONTROL AND PREVENTION, and NATIONAL INSTITUTE OF HEALTH, NATIONAL INSTITUTE OF ALLERGIES AND INFECTIOUS DISEASES.

Within 60 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, whose name and address is Lowell H. Becraft, Jr., 403-C Andrew Jackson Way, Huntsville, AL 35801.

If you fail to do so, judgment by default may be entered against the defendants for the relief demanded in the complaint. You also must file your answer or motion with the court.

DATE: 11/10/2021

SHARON N. HARRIS, CLERK

By: _____
Deputy Clerk

SEE REVERSE SIDE FOR RETURN

(SEAL OF COURT)

NORTHERN DISTRICT OF ALABAMA
1729 5th Avenue North
Birmingham, Alabama 35203

UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA

	No. 2:21-cv-702-CLM
AMERICA'S FRONTLINE DOCTORS, ET AL,	Return of Service: **SUMMONS; COVID-19 MRNA VACCINE; RISK MANAGEMENT PLAN; SARS-COVID-2 MRNA VACCINE OVERVIEW PHARMACOKINETIC TEST; BNT162B2 5.3.6 CUMALTIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS; The Trigger; US PATENT #11,999,999 was included but not on the Certificates.**
Plaintiff/Petitioner	
vs	
XAVIER BECERRA, ET AL,	
Defendant/Respondent	

The undersigned hereby declares under penalty of perjury under the laws of the State of Washington, that the following is true and correct: I am now, and at all times herein mentioned, a citizen of the United States and a resident of the State of Washington, over the age of eighteen years, not a party to or have an interest in the above entitled action and competent to be a witness.

Personal Service:
On the date of **DECEMBER 21, 2021** before **7:00PM**, at the address of **4001 SOUTH PINE STREET,** city of **TACOMA** state of **WASHINGTON, 98413,** I duly delivered the above described documents to **JOE R. BIDEN** by then and there delivering by agreed email **ONE** true and correct copy thereof and leaving same with **US POST OFFICE TO BE DELIVERED BY CERTIFIED MAIL to: THE WHITE HOUSE 1600 PENNSYLVANIA AVENUE NW, WASHINGTON, D.C. 20500. - $100.00 BILL LB35408992L – CHECK NO. 7831 WRITTEN IN ITS PLACE FOR $100.00.**

Subsequent important documents are included with the Return to the Court(s):

DETECTION OF GRAPHENE IN COVID19 VACCINES; WORLD COUNCIL FOR HEALTH CALLS FOR AN IMMEDIATE STOP TO THE COVID-19 EXPERIMENTAL VACCINES;

DATE: DECEMBER 21, 2021

By: Melvin Cahoon
MELVIN CAHOON PC 9188
TACOMA, WA
PIERCE COUNTY

PPORT INC

TACOMA, WA 98418

7831

34/8322-3251

25

12-21-2021

Date

FRAUDARMOR+

Pay to the Order of Joseph R. Biden

One hundred dollars & NO/100

$ 100 NO/100

Dollars

Photo Safe Deposit® Details on back

Fo: 2:21-vc-702-CLM

Melissa F. Laboon SR

MP

⑈ 518322⑈ ⑆102884846⑈ 07831

FILED

2021 Nov-12 PM 03:59

U.S. DISTRICT COURT

N.D. OF ALABAMA

v.

XAVIER BECERRA, et al,

Defendants.

CIVIL ACTION CASE NUMBER:
2:21-cv-702-CLM

Summons in a Civil Action

To:

Joseph R. Biden, President
The White House
1600 Pennsylvania Avenue NW
Washington, D.C. 20500

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If you fail to do so, judgment by default may be entered against the defendants for the relief demanded in the complaint. You also must file your answer or motion with the court.

DATE: 11/10/2021

SHARON N. HARRIS, CLERK

By: Deputy Clerk

REVERSE SIDE FOR RETURN

(SEAL OF COURT)

NORTHERN DISTRICT OF ALABAMA
1729 5th Avenue North
Birmingham, Alabama 35203

TRUST
CASTLE
CHURCH
Redeemed Lawful Money
Pursuant to 12 USC §411
www.law.cornell.edu/uscode
2015
SEAL

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA

AMERICA'S FRONTLINE DOCTORS, et al,	)	**Summons**
Plaintiffs,	)	**(Issued pursuant to Rule 4 of the Federal Rules of Civil Procedure or other appropriate law.)**
v.	)	
XAVIER BECERRA, et al,	)	**CIVIL ACTION CASE NUMBER: 2:21-cv-702-CLM**
Defendants.	)	

Summons in a Civil Action

To:

United States Attorney (for Defendant United States)
Northern District of Alabama
1801 Fourth Avenue North
Birmingham, Alabama 35203

A lawsuit has been filed against the following federal agencies and officers: THE UNITED STATES, JOSEPH BIDEN, President, XAVIER BECERRA, Secretary of the U.S. Department of Health and Human Services, in his official capacity, DR. ANTHONY FAUCI, Director of the National Institute of Allergies and Infectious Diseases, in his official capacity, DR. JANET WOODCOCK, Acting Commissioner of the Food and Drug Administration, in her official capacity, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, the FOOD AND DRUG ADMINISTRATION, the CENTER FOR DISEASE CONTROL AND PREVENTION, and NATIONAL INSTITUTE OF HEALTH, NATIONAL INSTITUTE OF ALLERGIES AND INFECTIOUS DISEASES.

Within 60 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, whose name and address is Lowell H. Becraft, Jr., 403-C Andrew Jackson Way, Huntsville, AL 35801.

If you fail to do so, judgment by default may be entered against the defendants for the relief demanded in the complaint. You also must file your answer or motion with the court.

DATE: 11/10/2021

SHARON N. HARRIS, CLERK

By: _____
Deputy Clerk

(SEAL OF COURT)

SEE REVERSE SIDE FOR RETURN

NORTHERN DISTRICT OF ALABAMA
1729 5th Avenue North
Birmingham, Alabama 35203

UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA

AMERICA'S FRONTLINE DOCTORS, ET AL,	**No. 2:21-cv-702-CLM**
Plaintiff/Petitioner	Return of Service: **SUMMONS; COVID-19 MRNA VACCINE; RISK MANAGEMENT PLAN; SARS-COVID-2 MRNA VACCINE OVERVIEW PHARMACOKINETIC TEST; BNT162B2 5.3.6 CUMALTIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS; The Trigger; US PATENT #11,999,999 was included but not on the Certificates.**
vs	
XAVIER BECERRA, ET AL,	
Defendant/Respondent	

The undersigned hereby declares under penalty of perjury under the laws of the State of Washington, that the following is true and correct: I am now, and at all times herein mentioned, a citizen of the United States and a resident of the State of Washington, over the age of eighteen years, not a party to or have an interest in the above entitled action and competent to be a witness.

Personal Service:
On the date of **DECEMBER 21, 2021** before **7:00PM**, at the address of **4001 SOUTH PINE STREET,** city of **TACOMA** state of **WASHINGTON, 98413,** I duly delivered the above described documents to **US ATTORNEY, NW DISTRICT OF ALABAMA** by then and there delivering by agreed email **ONE** true and correct copy thereof and leaving same with **US POST OFFICE TO BE DELIVERED BY CERTIFIED MAIL to: US ATTORNEY NW DISTRICT OF ALABAMA, 1801 FORUTH AVE. NO. BIRMINGHAM, ALABAMA 35203**

Subsequent important documents are included with the Return to the Court(s):

DETECTION OF GRAPHENE IN COVID19 VACCINES; WORLD COUNCIL FOR HEALTH CALLS FOR AN IMMEDIATE STOP TO THE COVID-19 EXPERIMENTAL VACCINES;

DATE: DECEMBER 21, 2021

By: Melvin Cahoon
MELVIN CAHOON PC 9188
TACOMA, WA
PIERCE COUNTY

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ALABAMA

AMERICA'S FRONTLINE DOCTORS, et al,	)	**Summons**
Plaintiffs,	)	**(Issued pursuant to Rule 4 of the Federal Rules of Civil Procedure or other appropriate law.)**
v.	)	
XAVIER BECERRA, et al,	)	**CIVIL ACTION CASE NUMBER: 2:21-cv-702-CLM**
Defendants.	)	

Summons in a Civil Action

To:

Attorney General Merrick B. Garland (for Defendant United States)
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Washington, DC 20530-0001

A lawsuit has been filed against the following federal agencies and officers: THE UNITED STATES, JOSEPH BIDEN, President, XAVIER BECERRA, Secretary of the U.S. Department of Health and Human Services, in his official capacity, DR. ANTHONY FAUCI, Director of the National Institute of Allergies and Infectious Diseases, in his official capacity, DR. JANET WOODCOCK, Acting Commissioner of the Food and Drug Administration, in her official capacity, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, the FOOD AND DRUG ADMINISTRATION, the CENTER FOR DISEASE CONTROL AND PREVENTION, and NATIONAL INSTITUTE OF HEALTH, NATIONAL INSTITUTE OF ALLERGIES AND INFECTIOUS DISEASES.

Within 60 days after service of this summons on you (not counting the day you received it), you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff's attorney, whose name and address is Lowell H. Becraft, Jr., 403-C Andrew Jackson Way, Huntsville, AL 35801.

If you fail to do so, judgment by default may be entered against the defendants for the relief demanded in the complaint. You also must file your answer or motion with the court.

DATE: 11/10/2021

SHARON N. HARRIS, CLERK

By: [signature] Deputy Clerk

SEE REVERSE SIDE FOR RETURN

(SEAL OF COURT)

NORTHERN DISTRICT OF ALABAMA
1729 5th Avenue North
Birmingham, Alabama 35203

UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA

No. 2:21-cv-702-CLM

AMERICA'S FRONTLINE DOCTORS, ET AL,

Plaintiff/Petitioner

vs

XAVIER BECERRA, ET AL,

Defendant/Respondent

Return of Service:
SUMMONS;
COVID-19 MRNA VACCINE;
RISK MANAGEMENT PLAN;
SARS-COVID-2 MRNA VACCINE OVERVIEW
PHARMACOKINETIC TEST;
BNT162B2 5.3.6 CUMALTIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS;
The Trigger; US PATENT #11,999,999 was included but not on the Certificates.

The undersigned hereby declares under penalty of perjury under the laws of the State of Washington, that the following is true and correct: I am now, and at all times herein mentioned, a citizen of the United States and a resident of the State of Washington, over the age of eighteen years, not a party to or have an interest in the above entitled action and competent to be a witness.

Personal Service:
On the date of **DECEMBER 21, 2021** before **7:00PM**, at the address of **4001 SOUTH PINE STREET,** city of **TACOMA** state of **WASHINGTON, 98413,** I duly delivered the above described documents to **ATTORNEY GENERAL MERRICK B. GARLAND** by then and there delivering by agreed email **ONE** true and correct copy thereof and leaving same with **US POST OFFICE TO BE DELIVERED BY CERTIFIED MAIL to: ATTORNEY GENERAL MERRICK B. GARLAND – U.S. DEPARTMANE OF JUSTICE – 950 PENNSYLVANIA AVENUE, NW, WASHINGTON, DC – 20530-0001**

Subsequent important documents are included with the Return to the Court(s):

DETECTION OF GRAPHENE IN COVID19 VACCINES;
WORLD COUNCIL FOR HEALTH CALLS FOR AN IMMEDIATE STOP TO THE COVID-19 EXPERIMENTAL VACCINES;

DATE: DECEMBER 21, 2021

By: Melvin Cahoon
MELVIN CAHOON PC 9188
TACOMA, WA
PIERCE COUNTY

ROCK SOLID LEGAL SUPPORT, INC

4329 TACOMA AVE. SOUTH
TACOMA, WA. 98418

Invoice

Date	Invoice #
12/22/2021	40196

Bill To	Ship To
DAVID MERRILL 720 N. 10TH STREET SUITE A RENTON. WASHINGTON 98057	

P.O. No.	Terms	Rep	Account #	Ship Date	Ship Via	FOB
	PAID	MC		12/22/2021		

Quantity	Description	Rate	Serviced	Amount
3	CERTIFIED MAILINGS MAILINGS 15.50 EACH 100.00 CHECK TO JOE BIDEN PICKUP. PRINTING AND DELIVERY TO POST OFFICE. DECLARATIONS OF DELIVERY OF EACH.	100.00	12/21/2021	300.00

WE APPRECIATE YOUR BUSINESS!

Total	$300.00
Payments/Credits	-$300.00
Balance Due	$0.00

Phone #
(253) 682-1230

President

28 Dec 2021 03:38	Delivered. Your item was delivered at 3:38 am on December 28, 2021 in WASHINGTON, DC 20500. WASHINGTON, DC	USPS
23 Dec 2021 10:52	Available for Pickup WASHINGTON, DC	USPS
23 Dec 2021 10:44	Arrived at Post Office WASHINGTON, DC	USPS
23 Dec 2021 03:38	Arrived at USPS Regional Destination Facility WASHINGTON DC DISTRIBUTION CENTER	USPS
22 Dec 2021 00:00	In Transit to Next Facility	USPS
21 Dec 2021 22:08	Arrived at USPS Origin Facility KENT, WA	USPS
21 Dec 2021 19:25	Departed Post Office TACOMA, WA	USPS
21 Dec 2021 18:27	USPS in possession of item TACOMA, WA	USPS

Tracking number	7018 3090 0001 2788 1447
From	WA, 98413
Destination	United States
Found in	USPS
Tracked with couriers	USPS
Postal Product	Priority Mail
Feature	Certified Mail
Feature	Up to $50 insurance included
Days in transit	6

Tracking link

https://parcelsapp.com/en/tracking/7018 3090

Bookmark this page to track parcels faster!

Share to WhatsApp

Share to Viber

Share to Telegram

Track with official websites

US Alabama

27 Dec 2021 15:51	Delivered, Front Desk/Reception/Mail Room. Your item was delivered to the front desk, reception area, or mail room at 3:51 pm on December 27, 2021 in BIRMINGHAM, AL 35203. BIRMINGHAM, AL	USPS
24 Dec 2021 14:53	Delivery Attempted - No Access to Delivery Location BIRMINGHAM, AL	USPS
24 Dec 2021 06:10	Out for Delivery BIRMINGHAM, AL	USPS
24 Dec 2021 04:20	Arrived at Post Office BIRMINGHAM, AL	USPS
23 Dec 2021 00:00	In Transit to Next Facility	USPS
21 Dec 2021 19:25	Departed Post Office TACOMA, WA	USPS
21 Dec 2021 18:27	USPS in possession of item TACOMA, WA	USPS

Tracking number	7018 3090 0001 2788 9467
From	WA, 98413
Destination	United States
Found in	USPS
Tracked with couriers	USPS
Postal Product	Priority Mail
Feature	Certified Mail
Feature	Up to $50 insurance included
Days in transit	5

Tracking link

https://parcelsapp.com/en/tracking/7018 3090

Bookmark this page to track parcels faster!

Share to WhatsApp

Share to Viber

Share to Telegram

AG

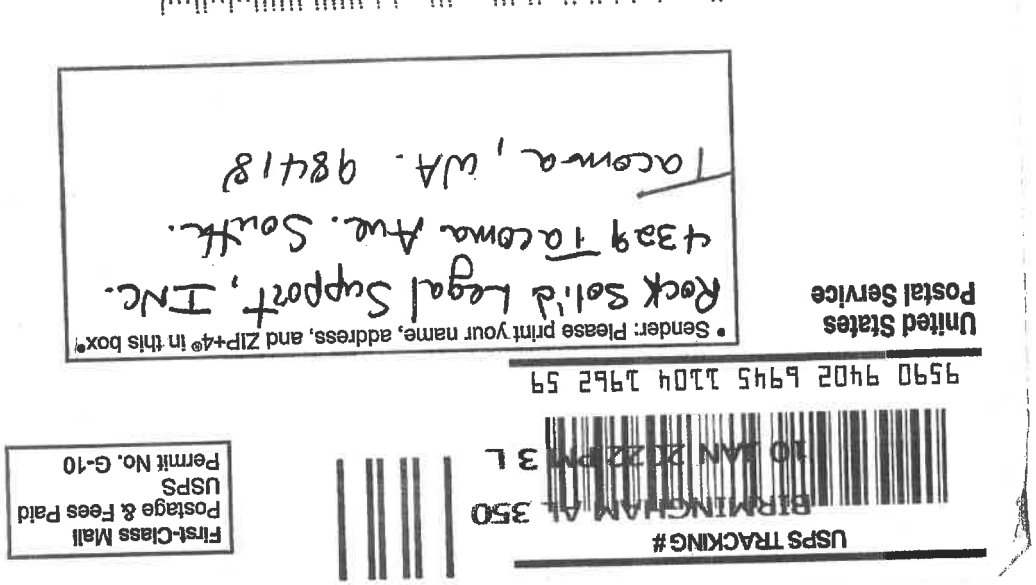
27 Dec 2021 04:40	USPS	Delivered. Your item was delivered at 4:40 am on December 27, 2021 in WASHINGTON, DC 20530. WASHINGTON, DC
23 Dec 2021 10:54	USPS	Available for Pickup WASHINGTON, DC
23 Dec 2021 09:37	USPS	Arrived at Post Office WASHINGTON, DC
23 Dec 2021 03:32	USPS	Arrived at USPS Regional Destination Facility WASHINGTON DC DISTRIBUTION CENTER
22 Dec 2021 00:00	USPS	In Transit to Next Facility

Tracking number	7018 3090 0001 2788 9474
From	WA, 98413
Destination	United States
Tracked with couriers	USPS
Postal Product	Priority Mail
Feature	Certified Mail
Feature	Up to $50 insurance included
Days in transit	5

Tracking link

https://parcelsapp.com/en/tracking/7018 3090

Bookmark this page to track parcels faster!



SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Northern District of Alabama
1729 5th Avenue North
Birmingham, Alabama
35203

9590 9402 6945 1104 1962 59

2. Article Number (Transfer from service label)
7018 3090 0001 2788 9481

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X S. Williams ☐ Agent ☐ Addressee

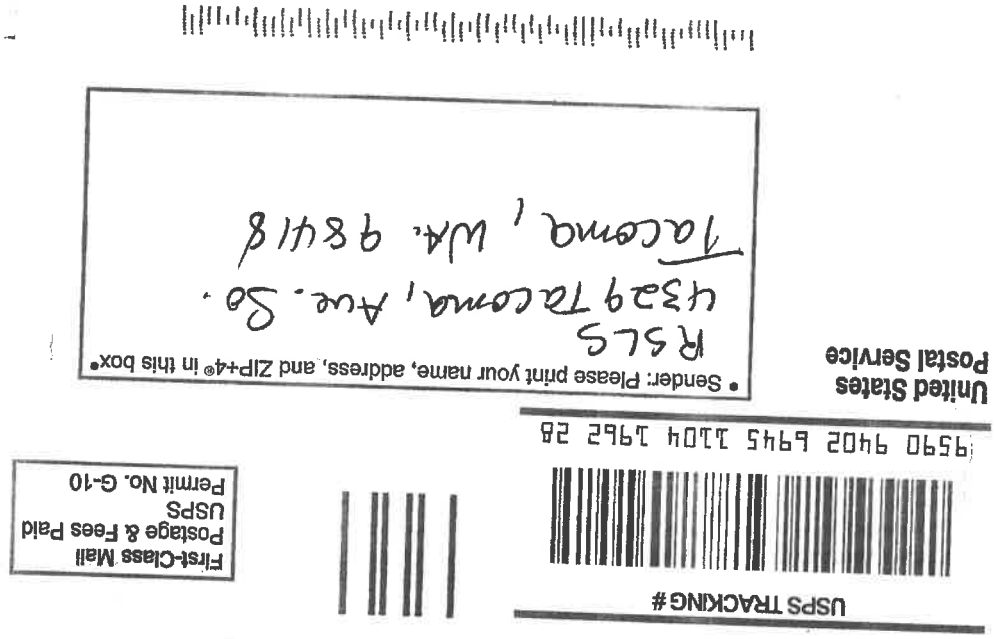
B. Received by (Printed Name)
S. Williams

C. Date of Delivery
1-10-22

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- Insured Mail
- Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt



SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Attorney General
Merrick B. Garland
U.S. Department of Justice
950 Pennsylvania Ave NW
Washington D.C. 20530-0001

9590 9402 6945 1104 1962 28

7018 3090 0001 2788 9474

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X ☐ Agent ☐ Addressee

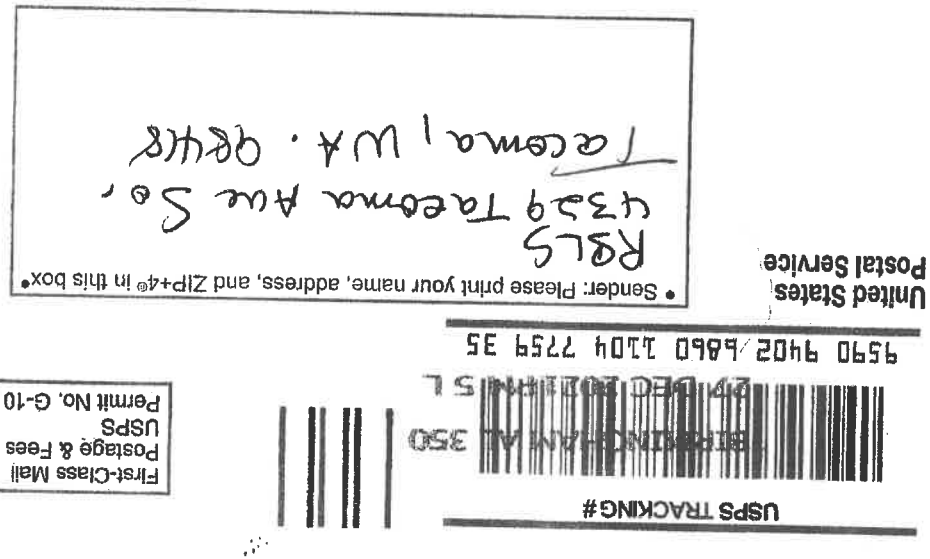
B. Received by *(Printed Name)* C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

DEC 27 2021

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ ied Mail
- ☐ ied Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt



SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

U.S. Attorney
NW District of Alabama
1801 Fourth Ave No.
Birmingham, Alabama
35203

9590 9402 6860 1104 7759 35

Article Number *(Transfer from service label)*
7018 3090 0001 2788 9467

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Mary A Lavender ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* Mary A-Lavender
C. Date of Delivery 12-27-21

D. Is delivery address different from Item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Adult Signature
☐ Adult Signature Restricted Delivery
☑ Certified Mail®
☐ Certified Mail Restricted Delivery
☐ Collect on Delivery
☐ Collect on Delivery Restricted Delivery
☐ Priority Mail Express®
☐ Registered Mail™
☐ Registered Mail Restricted Delivery
☐ Signature Confirmation™
☑ Signature Confirmation Restricted Delivery

Domestic Return

ROCK SOLID LEGAL SUPPORT, INC

4329 TACOMA AVE. SOUTH
TACOMA, WA. 98418

Invoice

Date	Invoice #
1/19/2022	40243

Bill To	Ship To
DAVID MERRILL 720 N. 10TH STREET SUITE A RENTON, WASHINGTON 98057	

P.O. No.	Terms	Rep	Account #	Ship Date	Ship Via	FOB
	PAID	MC		1/17/2022		

Quantity	Description	Rate	Serviced	Amount
	SPECIAL SERVICES PROCESS AND MAILING	100.00	1/7/2022	100.00

WE APPRECIATE YOUR BUSINESS!

Total	$100.00
Payments/Credits	-$100.00
Balance Due	$0.00

Phone #
(253) 682-1230

UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF ALABAMA

	No. 2:21-cv-702-CLM
AMERICA'S FRONTLINE DOCTORS, ET AL,	Return of Service: **SUMMONS; COVID-19 MRNA VACCINE; RISK MANAGEMENT PLAN; SARS-COVID-2 MRNA VACCINE OVERVIEW PHARMACOKINETIC TEST; BNT162B2 5.3.6 CUMALTIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORTS;**
Plaintiff/Petitioner	
vs	
XAVIER BECERRA, ET AL,	
Defendant/Respondent	

The undersigned hereby declares under penalty of perjury under the laws of the State of Washington, that the following is true and correct: I am now, and at all times herein mentioned, a citizen of the United States and a resident of the State of Washington, over the age of eighteen years, not a party to or have an interest in the above entitled action and competent to be a witness.

Personal Service:
On the date of **DECEMBER 21, 2021** before **7:00PM**, at the address of **4001 SOUTH PINE STREET**, city of **TACOMA** state of **WASHINGTON, 98413**, I duly delivered the above described documents to **JOE R. BIDEN** by then and there delivering by agreed email **ONE** true and correct copy thereof and leaving same with **US POST OFFICE TO BE DELIVERED BY CERTIFIED MAIL to: THE WHITE HOUSE 1600 PENNSYLVANIA AVENUE NW, WASHINGTON, D.C. 20500. - $100.00 BILL LB35408992L – CHECK NO. 7831 WRITTEN IN ITS PLACE FOR $100.00.**

DATE: DECEMBER 21, 2021

By: _____
MELVIN CAHOON PC 9188
TACOMA, WA
PIERCE COUNTY

UNITED STATES DISTRICT COURT IN THE WESTERN DISTRICT OF WASHINGTON
TACOMA WASHINGTON

AMERICA'S FRONTLINE DOCTORS, ET AL,	No. 16-cv-5520
	Return of Service:
Plaintiff	**NOTICE OF UNITED STATES PATENT # 11,999,999;**
and	**SUMMONS;**
	COVID-19 MRNA VACCINE RISK MANAGEMENT PLAN;
XAVIER BECERRA, ET AL,	**SARS-COVID-2 MRNA VACCINE OVERVIEW PHARMACOKINETIC TEST;**
	BNT162B2 5.3.6 CUMALTIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORT;
	CHECK NO. 7831 FOR 100.00;
Defendant/Respondent	

The undersigned hereby declares under penalty of perjury under the laws of the State of Washington, that the following is true and correct: I am now, and at all times herein mentioned, a citizen of the United States and a resident of the State of Washington, over the age of eighteen years, not a party to or have an interest in the above entitled action and competent to be a witness.

Personal Service
On the date **DECEMBER 21, 2021** at **7:00PM**, at the address of **2001 SOUTH PINE STREET**, City of **TACOMA, WASHINGTON 98413**, I duly served the above described documents upon **JOE R. BIDEN** by then and there personally delivering **ONE** true and correct copy thereof and leaving same according to the tracking statement that the delivery was made on December 28th 2021 in Washington DC at 3:38 but the signature green card receipt was never returned nor has the check 7831 been cashed.

Date: JANUARY 19, 2022

By: Melvin Cahoon
MELVIN CAHOON PC #9188
TACOMA, WA
PIERCE COUNTY

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Northern District of Alabama
1729 5th Avenue North
Birmingham, Alabama
35203

9590 9402 6945 1104 1962 59

2. Article Number (Transfer from service label)
7018 3090 0001 2788 9481

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X S. Williams ☐ Agent ☐ Addressee

B. Received by (Printed Name) S. Williams
C. Date of Delivery 1-10-22

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Adult Signature
☐ Adult Signature Restricted Delivery
☐ Certified Mail®
☐ Certified Mail Restricted Delivery
☐ Collect on Delivery
☐ Collect on Delivery Restricted Delivery
☐ Insured Mail
☐ Insured Mail Restricted Delivery (over $500)
☐ Priority Mail Express®
☐ Registered Mail™
☐ Registered Mail Restricted Delivery
☐ Signature Confirmation™
☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Attorney General
Merrick B. Garland
U.S. Department of Justice
950 Pennsylvania Ave NW
Washington D.C. 20530-0001

9590 9402 6945 1104 1962 28

2. Article Number (Transfer from service label)
7018 3090 0001 2788 9474

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name)
C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

DEC 27 2021

3. Service Type
☐ Adult Signature
☐ Adult Signature Restricted Delivery
☐ Certified Mail®
☐ Certified Mail Restricted Delivery
☐ Collect on Delivery
☐ Collect on Delivery Restricted Delivery
☐ Insured Mail
☐ Insured Mail Restricted Delivery (over $500)
☐ Priority Mail Express®
☐ Registered Mail™
☐ Registered Mail Restricted Delivery
☐ Signature Confirmation™
☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

U.S. Attorney
NW District of Alabama
1801 Fourth Ave No.
Birmingham, Alabama
35203

9590 9402 6860 1104 7759 35

2. Article Number (Transfer from service label)
7018 3090 0001 2788 9467

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Mary A Lavender ☐ Agent ☐ Addressee

B. Received by (Printed Name) Mary A-Lavender
C. Date of Delivery 12-27-21

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Adult Signature
☐ Adult Signature Restricted Delivery
☑ Certified Mail®
☐ Certified Mail Restricted Delivery
☐ Collect on Delivery
☐ Collect on Delivery Restricted Delivery
☐ Priority Mail Express®
☐ Registered Mail™
☐ Registered Mail Restricted Delivery
☐ Signature Confirmation™
☑ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

UNITED STATES DISTRICT COURT IN THE WESTERN DISTRICT OF WASHINGTON
TACOMA WASHINGTON

David Merrill of the VAN PELT family	No. 16-cv-5520
	Return of Service:
Plaintiff	**NOTICE OF UNITED STATES PATENT # 11,999,999;**
and	**SUMMONS;**
THE UNITED STATES OF AMERICA,	**COVID-19 MRNA VACCINE RISK MANAGEMENT PLAN;** **SARS-COVID-2 MRNA VACCINE OVERVIEW PHARMACOKINETIC TEST;** **BNT162B2 5.3.6 CUMALTIVE ANALYSIS OF POST-AUTHORIZATION ADVERSE EVENT REPORT;** **INVOICES;** **DECLARATIONS;** **RETURN RECEIPTS;**
Defendant/Respondent	

The undersigned hereby declares under penalty of perjury under the laws of the State of Washington, that the following is true and correct: I am now, and at all times herein mentioned, a citizen of the United States and a resident of the State of Washington, over the age of eighteen years, not a party to or have an interest in the above entitled action and competent to be a witness.

Personal Service
On the date **JANUARY 19, 2022**, at the address of **1717 PACIFIC AVENUE, ROOM 3100**, City of **TACOMA**, **WASHINGTON 98402**, I duly served the above described documents upon **JOE R. BIDEN** by then and there personally delivering **ONE** true and correct copy thereof and filing in the UNITED STATES DISTRICT COURT with the court clerk.

Date: JANUARY 19, 2022

By: Melvin Cahoon
MELVIN CAHOON PC #9188
TACOMA, WA
PIERCE COUNTY

Rock Solid Legal Support
(253) 682-1230