

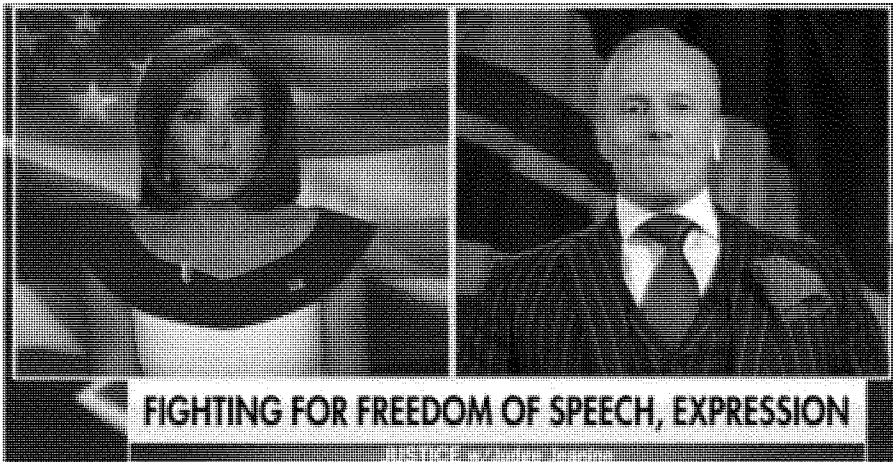
From: (b)(6)
Sent: 9/1/2020 5:42:11 AM
To: Judge Judy [Jeanine.Pirro@FOXNEWS.COM]
CC: Susan Michie [s.michie@ucl.ac.uk]; Professor Sir David Clary [david.clary@magd.ox.ac.uk]; John Penrose [beauperrec@parliament.uk]; Diana Mary Harding. [contactholmember@parliament.uk]; Susan Diane Wojcicki [SGWEG@slac.stanford.edu]; adrienne.bankert@abc.com; tkoyama@us.ibm.com; Julian.Reichelt@bild.de; dolorescahill@gmail.com.; pressoffice@ruptly.tv; andreas.geisel@spd.parlament-berlin.de; Nancy.Harmeyer@foxnews.com; marianna.spring@bbc.co.uk; mark.woolhouse@ed.ac.uk; brian.rose@londonreal.tv; Dana Kozlov [dakozlov@cbs.com]; Brad Edwards [baedwards@cbs.com]; John Bel Edwards [govpress@la.gov]; David Edwards Raw Story [david@rawstory.com]; Richard M Novak MD [rmnovak@uic.edu]; Brett P. Giroir [ASH@hhs.gov]; Alex Azar II [secretary@hhs.gov]; Azar, Alex (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4db7abd56a7e478883f5cd8e2e8a18d3-HHS-Alex.Az]; Giroir, Brett (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ee4c4234d3834c77a4a1a7b1a7c176a2-HHS-Brett.G]; Trey.Gowdy@nelsonmullins.com; trey.gowdy@foxnews.com; Harris Kimberly Faulkner [harris.faulkner@foxnews.com]; JMUSTIAN@ap.org; theodore.long@hms.harvard.edu; theodore.long@yale.edu; ted.long@nychealthandhospitals.org; neil.vora@cdc.gov; neil.vora@nychealthandhospitals.org; Kamala Devi Harris [Kamala_Harris@harris.senate.gov]; Kamala Devl Harris [chris_harris@harris.senate.gov]; mediainquiries@cision.com; dharris@stanford.edu; alex.hogan@foxnews.com; BMcCloskey@chathamhouse.org; dheyman@chathamhouse.org.uk; michael.edelstein@doctors.org.uk; LDonaldson@chathamhouse.org; cclift@chathamhouse.org.uk; ranshba@chathamhouse.org; CMunozParry@chathamhouse.org; iain.begg@lse.ac.uk; john.major@chathamhouse.org; jmajor@chathamhouse.org; nicholas.burns@chathamhouse.org; nburns@chathamhouse.org; vchu@chathamhouse.org; victor.chu@chathamhouse.org; Eliza.Manningham-Buller@chathamhouse.org; emanninghambuller@chathamhouse.org; fiona.watt@kcl.ac.uk; fiona.watt@mrc.ukri.org; Elvira.Nabiullina@rdif.ru; Sergei.Ivanov@rdif.ru; Andrey.Belousov@rdif.ru; Maksim.Oreshkin@rdif.ru; Dominique.Strauss-Kahn@rdif.ru; Vladimir.Dmitriev@rdif.ru; Kirill.Dmitriev@rdif.ru; Kirill.Dmitriev@weforum.org; sputnikvaccine@rdif.ru; gintsburg@gamaleya.org; pronin@gamaleya.org; Michelle.Tuzee@abc7.com; marc.brown@abc7.com; lisa.booth@foxnews.com; smilligan@usnews.com; HGodman@usnews.com; Gordon.Robertson@cbn.com; lori.johnson@cbn.com; KGO-TV.Programming@abc.com; press@rosminzdrav.ru; info@rosminzdrav.ru; Kimberly.Hunt@10news.com; leon.clark@10news.com; Doris.Lewis@10news.com; bbloom@hsph.harvard.edu; florian.krammer@mssm.edu; Bai.Yansong@cctv.com; Edward.Law@cctv.com; Savannah Clark Guthrie [Savannah.guthrie@nbcuni.com]; Hoda Kotb [Hoda.Kotb@nbcuni.com]; Craig Melvin [Craig.Melvin@nbcuni.com]; Joel Scott Osteen [press@siriusxm.com]; Victoria L Iloff [advertising@siriusxm.com]; joel@lakewoodchurch.com; Lloyd E Campbell [lcampbell@spencerstuart.com]; Charles Philip Arthur George [fma@weforum.org]; Muriel Elizabeth Bowser [eom@dc.gov]; margaret.satterthwaite@nyu.edu; Andrew Mark Cuomo SJ [Press.Office@exec.ny.gov]; tara.brown@nine.com.au; 60Minutes@nine.com.au; naomi.shivaraman@nine.com.au; tdikeos@nine.com.au; Scott Gottlieb illuminati [info@illumina.com]; Scott.Gottlieb@aei.org; Scott Gottlieb [Brendan.Rascius@aei.org]; steve@apiject.com; jay@apiject.com; Clarisse Mason [masonc@who.int]; David Malpass [DMalpass@ifc.org]; David Wilson [dwilson@worldbank.org]; Mamadi Yilla [yillam2@state.gov]; staff@the-asci.org; grotenfelt.nora@gmail.com; nathalie.macdermott@kcl.ac.uk; producersgroup@rttv.ru; RT-US@rttv.ru; rick.sanchez@rttv.ru; justin@propublica.org; lsullivan@npr.org; prothma1@jhmi.edu; gail.mcGovern@redcross.org; david.meltzer@redcross.org; gail.mcGovern@dteenergy.com; gail.mcGovern@paypal.com; eliot_cohen@jhu.edu; david.rubenstein@jhu.edu; gail.mcGovern@jhu.edu; Mercedes.Lopez-Blanco@archny.org; Timothy.Dolan@archny.org; Robert.t.Ritche@archny.org; Ed.Dougherty@archny.org; Donald.Haggerty@archny.org; Wolf Isaac Blitzer [wolf.blitzer@turner.com]; Alison.Morris@nbcuni.com; contact@unwomenforpeace.org; Conchita.Sarnoff@conchitasarnoff.com; Emily.Maitlis@bbc.co.uk; David.Grossman@bbc.co.uk; Imenninger@hmflaw.com; mcohen@cohengresser.com; Susanna.Reid@itv.com; piers.morgan@itv.com; Thomas J Kavalier [tkavalier@cahill.com]; news@highlandscurrent.org; jmeisner@tribune.com; eva.pilgrim@abc.com; jc2287@cumc.columbia.edu; mblabate@cicu.org; Kadlec, Robert P (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=70539a2f88924cc8913781ea74278b12-HHS-Robert.]; Azar, Alex (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4db7abd56a7e478883f5cd8e2e8a18d3-HHS-Alex.Az]; Stanley.Erick@novavax.com; ir@novavax.com; umihighereducation@jesuits.org; Ellison.Barber@nbcuni.com; emily.badger@nytimes.com; Vernon Coleman [press@vernoncoleman.com]; boris.johnson@weforum.org; Anthony Charles Lynton Blair [info@institute.global]; tony.blair@weforum.org; melanie.walker@weforum.org;

mwalker@gatesfoundation.org; BNikolic@gatesfoundation.org; David.Malpass@worldbank.org; Melanie.Walker@ama-assn.org; rachel.scott@abc.com; c.whitty@nhs.net; Andrew.Witty@uhg.com; patrick.vallance@number10.gov.uk; Sir Patrick Vallance [info@acmedsci.ac.uk]; David_S_Wichmann@uhc.com; Ken.Ehlert@uhc.com; Dirk_McMahon@uhc.com; mediacontact@questdiagnostics.com; Hinton, Denise [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=85feca0be0694803be6030e97c7b4adb-HINTOND]; Stephen.Hemsley@uhg.com; hemsleyc@fordhamprep.org; tribe@law.harvard.edu; triversr@gmail.com; dersh@law.harvard.edu; lawrence_summers@hks.harvard.edu; lindsay_jones@hks.harvard.edu; enew@fas.harvard.edu; elisa.new@poetryinamerica.org; Boris.Nikolic@twistbioscience.com; customersupport@twistbioscience.com; Boris.Nikolic@editasmed.com; info@editasmed.com; boris.nikolic@biomaticscapital.com; Julie.Sunderland@biomaticscapital.com; info@biomaticscapital.com; Andrew.Pollard@ovg.ox.ac.uk; dale.woods@nbcuni.com; deedeemyers@warnerbros.com; Jeremy.Farrar@cepi.net; Joachim.Klein@cepi.net; Bryant, Paula R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eb42f9318014bbb8c14d39ef311d8f9-HHS-paula.b]; Idro.Seferi@dw.com; sarah.mabrouk@dw.com; pisarna@tanja-fajon.eu; maja.kezunovickrasek@tanja-fajon.eu; Tanja.Fajon@ep.europa.eu; jure.tanko@ep.europa.eu; Sasa.Dragojlo@balkaninsight.com; Aleksandar.Vucic@weforum.org; tanja.fajon@europarl.europa.eu; Michelle Powers Net NY TV [michelle.powers@netny.tv]; Stanley.Plotkin@pennmedicine.upenn.edu; Lisa.Bellini@pennmedicine.upenn.edu; Leonard.Hayflick@ucsf.edu; Marie.Bernard@nih.gov; Gruber, Marion [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=019cd2669c7048f7a116d72b7682de44-gruber]; Jim.Sciutto@turner.com; andrewkaufmanmd@gmail.com; Jenny Anne Durkan [jenny.durkan@seattle.gov]; Sean Patrick Hannity [sean.hannity@foxnews.com]; kevin.corke@foxnews.com; dan.springer@foxnews.com; VladimirDuthiers [DuthiersV@cbsnews.com]; 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Subject:

Jeanine:- re Zoom Chats & Conspiracy Realists - Exposing the Behavioral Psychologists behind Covid-19 - ID2020 & 'Quantum Dot 'Tattoos' & "They (Order of Jesuits) Live" We Sleep -



to HHJ Pirro, c/o Fox News New York, City, USA
<https://twitter.com/JudgeJeanine>

Morning Your Honor,

re:- <https://twitter.com/brianbrose?lang=en>

Zoom Chats & Conspiracy Realists - Exposing the Behavioral Psychologists behind Covid-19 - ID2020 & 'Quantum Dot 'Tattoos' & "They (Order of Jesuits) Live" We Sleep -
<https://freedomplatform.tv/rose-icke-v-the-answer/>

Saw you interviewing Brian Rose which got me interested in the video you were talking about and I found out that it was the one where he interviewed David Icke here via this

link <https://freedomplatform.tv/rose-icke-v-the-answer/> which gives that interview in the entire length. It is well worth listening to, no wonder it got so many views and no wonder Susan had it taken down from Google.

I have to compliment you on your healthy/fit looks , as always they are immaculate. As you are quite an in depth reporter, I will take the liberty of attaching some useful, interesting links which you and your team may wish to investigate further and expand upon. Thanks very much Jeanine. Wishing you a great day there and rest of week.

Warm Regards, (b)(6) Say hello to Geraldo for me pls.



Swamp drainer Trump & DEMORAT Russian/Jewish born Diane Feinstein <https://www.nndb.com/people/535/000023466/>

- R -on the Same Side- Don't let them BS You-

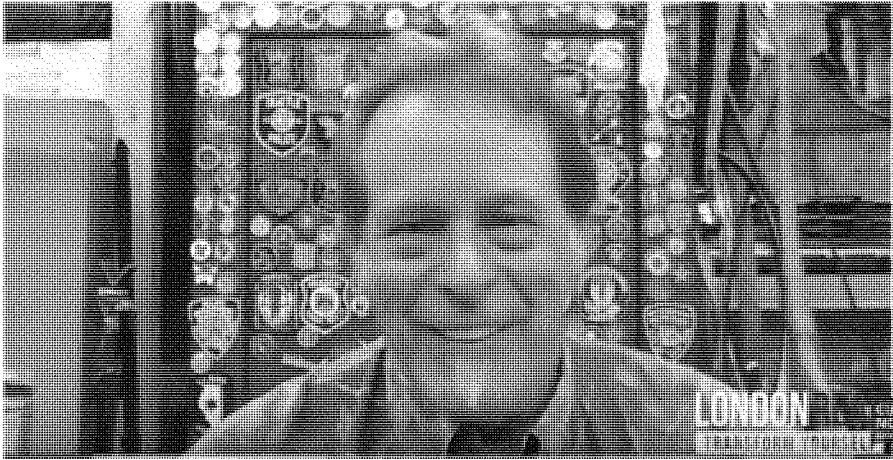
They both want your guns, in fact Trump says here in this clip:- Take the guns first, then go to court..



<https://www.bitchute.com/video/TiC1pWWVa3rO/>

all with the backing of Romney backer and Now Trump backer - bankrupt, 5 times draft dodger - Roman Catholic Ted (I trust president Trump) Nugent - aka Theodore Anthony Nugent , <https://www.nndb.com/people/068/000022999/>

as a teenager Nugent attended Saint Viator High School, a Roman Catholic school in Arlington Heights , Illinois [https://en.wikipedia.org/wiki/St. Viator High School](https://en.wikipedia.org/wiki/St._Viator_High_School)
Ted (I Trust President Trump- & Police Badge Collector) Nugent exposed -



<https://www.bitchute.com/video/TiC1pWWVa3rO/>

Ted Nugent "DONALD TRUMP WAS SENT HERE BY God (to take your guns, dumb you down and vaccinate & chip you,



<https://youtu.be/VriSAS1DHZA>

real fast via the U.S. military to disburse COVID-19 vaccines when they are ready.

<https://thehill.com/policy/defense/497863-trump-says-hes-mobilizing-military-to-distribute-potential-coronavirus-vaccine>

<https://www.nndb.com/films/014/000033912/>

John Carpenter's They Live -

https://en.wikipedia.org/wiki/They_Live

In light of Event 201 being the coronavirus outbreak simulation, let us not overlook that They Live begins with a graffiti mural, that has a vaccine right in the middle...



If you have not seen the film, the 'THEY' group says they will have complete control over the world by 2025. From 1988 to 2025, is a span of 38 years, and 'They Live' equates to 38, along with 'Gematria' and 'English'.

"Pandemic" = 38 (Full Reduction)

Jesuit Order - = 38 (in numerology reduction)

They Live (1988) the Jesuit Order event 201 & the 2020 coronavirus outbreak

<https://gematriaeffect.news/they-live-1988-was-a-warning-about-the-jesuit-order-and-possibly-foreshadowed-event-201-the-coronavirus-outbreak/>



UK lockdown was a 'monumental mistake' and must not happen again – Boris scientist says (Image: Getty)

THE UK LOCKDOWN will come to be seen as a "monumental mistake on a global scale" and must never happen again, a scientist who advises the Government on infectious diseases says.

The professor asserts that the impact of the response to coronavirus will be worse than the virus itself.

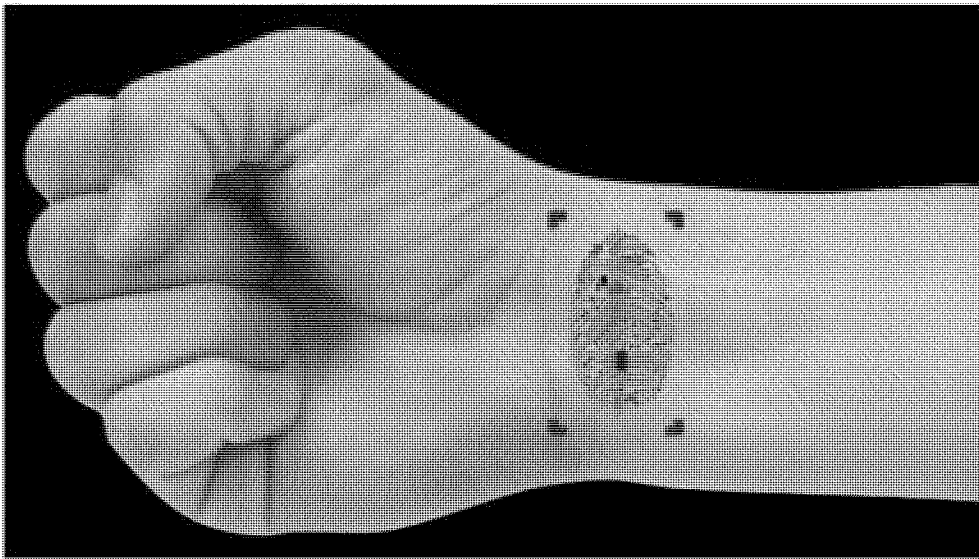
"I believe the harm lockdown is doing to our education, health care access, and broader aspects of our economy and society will turn out to be at least as great as the harm done by COVID-19," said Woolhouse. it is a crude measure that takes no accounts of the risk levels to different individuals, the University of Edinburgh professor said, meaning that back in March the nation was "concentrating on schools when we should have been concentrating on care homes".

The Lockdown caused 16,000 DEATHS due to missed medical care

<https://www.express.co.uk/life-style/health/1320428/Coronavirus-news-lockdown-mistake-second-wave-Boris-Johnson>

Mark Edward John Woolhouse FRSE FMedSci OBE (born 1959) is professor of infectious disease epidemiology at the Usher Institute in the College of Medicine and Veterinary Medicine, University of Edinburgh. https://en.wikipedia.org/wiki/Mark_Woolhouse

Could the introduction of tracing applications and the ID2020 immunisation program all just be pieces of a larger system to come?



We must track you for your security! Photo: MCK

QUANTUM DOT TATTOOS

Quantum Tatoos

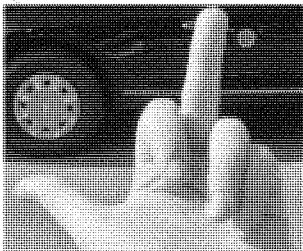
An Invisible Quantum Dot 'Tattoo' Could Be Used to ID Vaccinated Kids The invisible "tattoo" accompanying the vaccine is a pattern made up of minuscule quantum dots - tiny semiconducting crystals that reflect light - that glows under infrared light. The pattern - and vaccine - gets delivered into the skin using hi-tech dissolvable microneedles made of a mixture of polymers and sugar.

<https://tottnews.com/2020/05/14/immunity-passports-vaccine-tracking/>

The Bill and Melinda Gates Foundation funded the team's research, which was published in the journal Science Translational Medicine on

Wednesday.

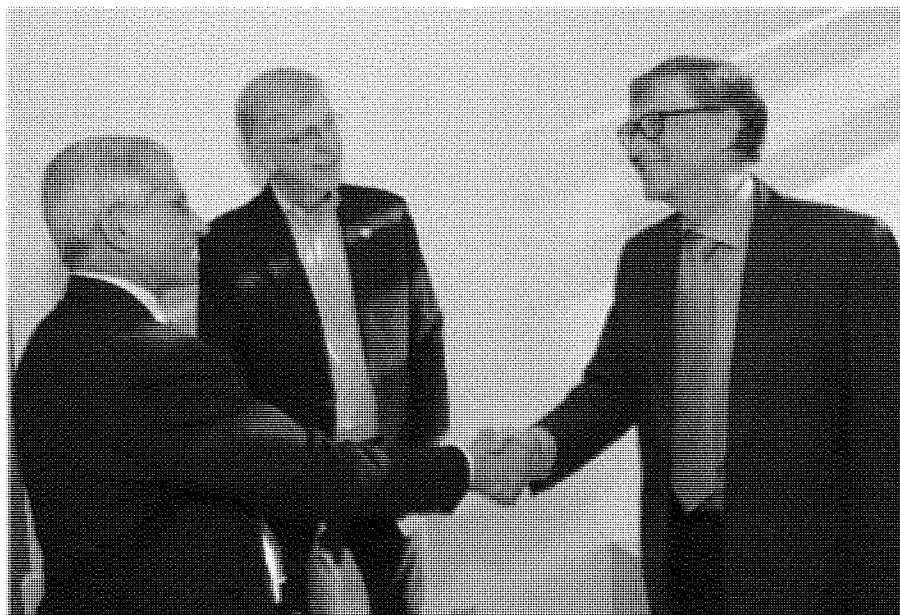
<https://www.sciencealert.com/an-invisible-quantum-dot-tattoo-is-being-suggested-to-id-vaccinated-kids>



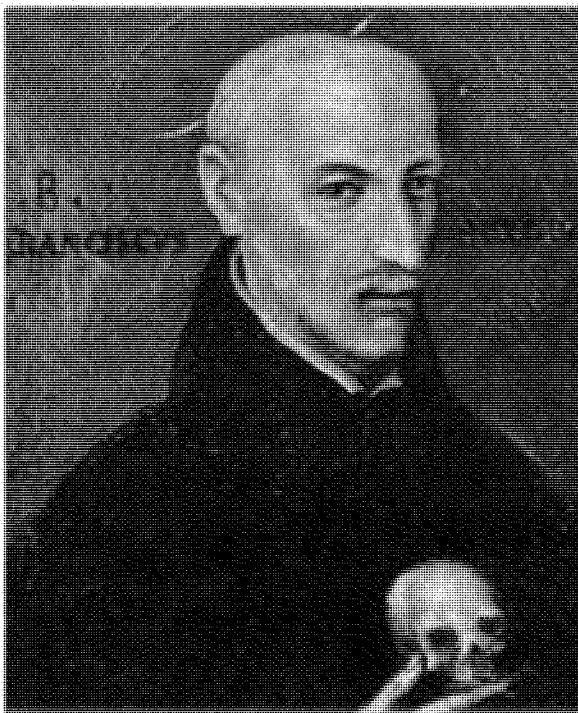
HELL IS EMPTY
AND
ALL THE DEVILS
ARE HERE

WILLIAM SHAKESPEARE









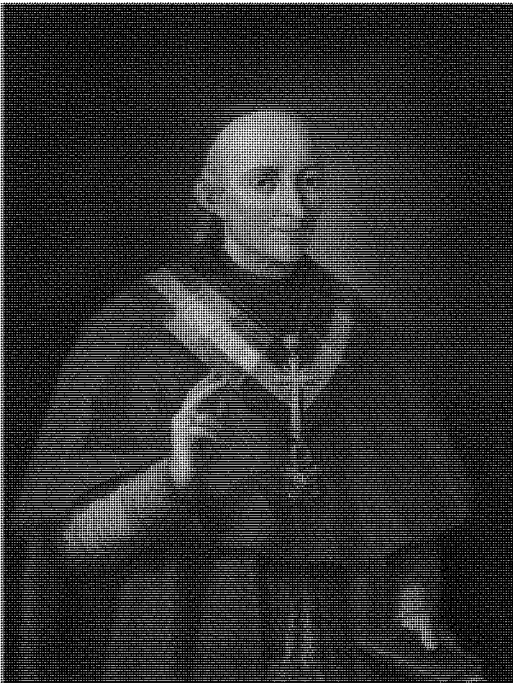
Portrait of a Jesuit Saint: San Francisco de Borja, 1726



The merited odium which has overtaken the Inquisition, usually officered by Dominicans, has induced the Jesuits, whose own controversial method has for the most part been different, to disclaim all connection with that tribunal, and to represent their society as free from complicity in its acts. But, in truth, it was Ignatius Loyola himself who procured its erection in Portugal in 1545-6, and F. Nithard, one of the very few cardinals of the society, was inquisitor-general of that kingdom in 1633.

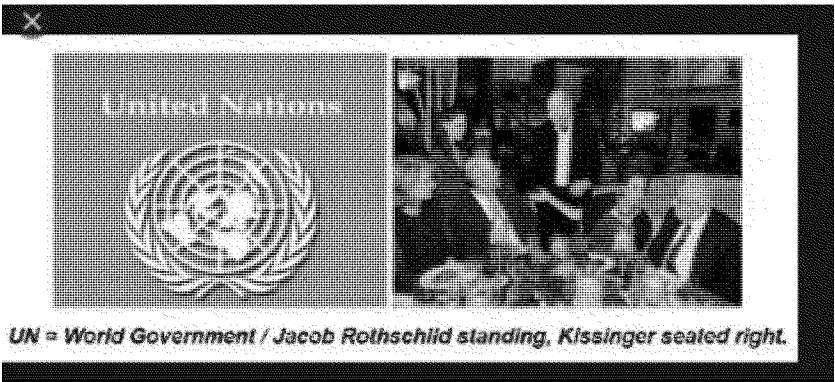
The Founder of the Society of Jesus (Jesuit) Ignatius de Loyola himself procured its [the inquisition] erection in Portugal in 1545-6 (The Encyclopaedia Britannica: A Dictionary of Arts, Sciences, Volume 13)

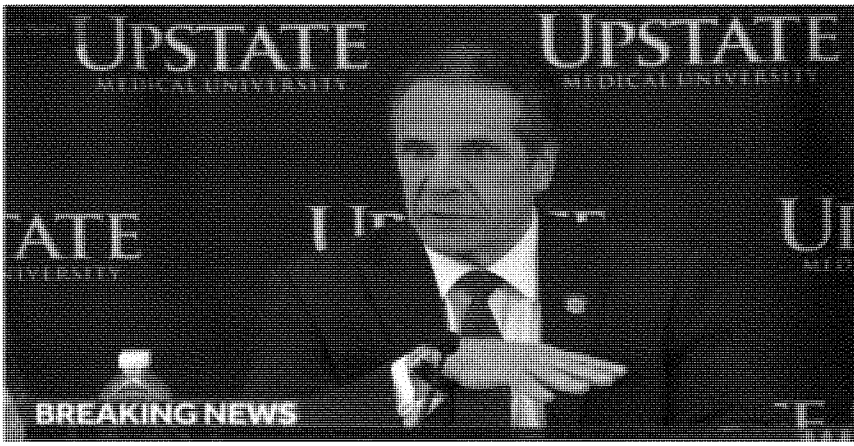
Photo:- Jesuit Francisco Antonio de Lorenzana, Grand Inquisitor of Spain (1794–1797) - https://en.wikipedia.org/wiki/Francisco_Antonio_de_Lorenzana



Pope Francis the Jesuit Pope & promoter of the World Lockdown in 2020 with UN Chief **António Manuel de Oliveira Guterres** .

Remarks by His Holiness The Jesuit Pope Francis and fellow Roman Catholic , United Nations Secretary-General António Guterres - <https://www.youtube.com/watch?v=CePSM3QMkEQ>





Jesuit Coadjutor, Andrew Mark Cuomo flattening the curve ,
<https://www.youtube.com/watch?v=m8nCjNk3djc>

Andrew Mark Cuomo born December 6, 1957)

Roman Catholic

<https://www.nndb.com/lists/758/000094476/>

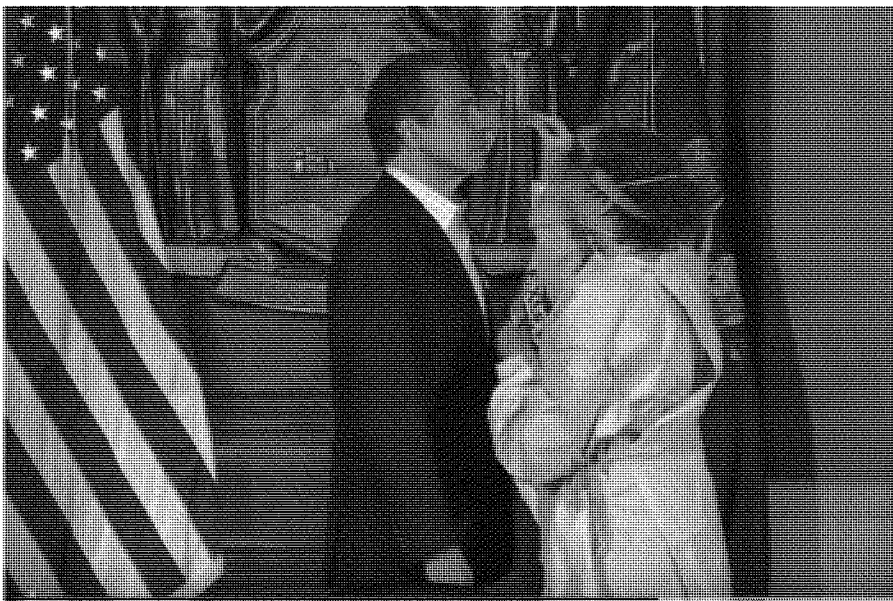
Executive Summary:- Corona Virus Hoaxer

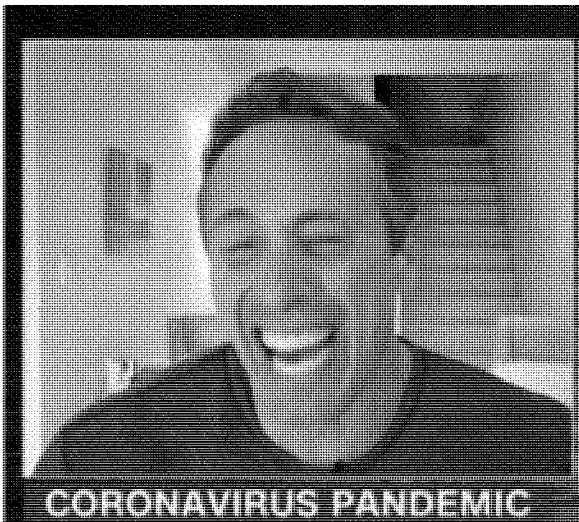
During his governorship, Cuomo oversaw the passage of a law legalizing same-sex marriage in New York; creation of the United States Climate Alliance, a group of states committed to fighting climate change by following the terms of the Paris Climate Accords; passage of the strictest gun control law in the U.S.; His parents were both of Italian descent; his paternal grandparents were from Nocera Inferiore and Tramonti in southern Italy, while his maternal grandparents were from Sicily His younger brother, Chris Cuomo, is a CNN journalist.

Andrew graduated from Roman Catholic St. Gerard Majella's School in 1971 a private Roman Catholic elementary school <https://www.privateschoolreview.com/st-gerard.../11423>

and Archbishop Molloy High School in 1975 in Brooklyn NY

https://en.wikipedia.org/wiki/Archbishop_Molloy_High_School He received a B.A. from Jesuit Fordham University in 1979, https://en.wikipedia.org/wiki/Fordham_University Cuomo will not release state death lists, nor did he order autopsies in this public health emergency as required!





Chris Cuomo

Jesuit Coadjutor, Chris Cuomo

AKA Christopher Charles Cuomo

Born: 9-Aug-1970

Birthplace: Queens, NY

Gender: Male

Religion: Roman Catholic

Race or Ethnicity: White

Sexual orientation: Straight

Occupation: Journalist

Nationality: United States

Executive summary: Co-Host, CNN New Day (Corona Virus Hoaxer)

Father: Mario Cuomo (Governor of New York, b. 15-Jun-1932, d. 1-Jan-2015)

Mother: Matilda Raffa

Sister: Margaret I. Cuomo

Brother: Andrew Cuomo (Governor of New York, b. 6-Dec-1957)

Sister: Maria Cuomo (m. Kenneth Cole)

Sister: Madeline Cuomo

Wife: Cristina Greeven (m. 24-Nov-2001, two daughters, one son)

Daughter: Bella

Daughter: Carolina Regina (b. 2011)

Son: Mario (b. 2005)

High School: The Albany Academy

University: BA, Yale University

Law School: JD, Fordham University (1995) (jesuit)



(b)(6)



This email has been checked for viruses by Avast antivirus software.
www.avast.com

From: (b)(6)
Sent: 9/29/2020 6:27:42 AM
To: Fox Around The World [foxaroundtheworld@foxbusiness.com]; Fox Around The World [foxaroundtheworld@foxbusiness.com]
CC: Sir Andrew Witty [andrew.witty@optum.in]; newsroom@optum.com; info_global@optum.com; Patrick John Thompson Vallance [info@acmedsci.ac.uk]; patrick.vallance@number10.gov.uk; Prof Christopher Whitty [c.whitty@nhs.net]; Christopher.Whitty@lshtm.ac.uk; Andy.Mullins@londonlive.co.uk; Christian.Broughton@independent.co.uk; Susan Michie [s.michie@ucl.ac.uk]; Professor Sir David Clary [david.clary@magd.ox.ac.uk]; John Penrose [beauperec@parliament.uk]; Diana Mary Harding [contactholmember@parliament.uk]; Susan Diane Wojcicki [SGWEG@slac.stanford.edu]; adrienne.bankert@abc.com; tkoyama@us.ibm.com; Julian.Reichelt@bild.de; dolorescahill@gmail.com.; pressoffice@ruptly.tv; andreas.geisel@spd.parlament-berlin.de; Nancy.Harmeyer@foxnews.com; marianna.spring@bbc.co.uk; mark.woolhouse@ed.ac.uk; brian.rose@londonreal.tv; Dana Kozlov [dakozlov@cbs.com]; Brad Edwards [baedwards@cbs.com]; John Bel Edwards [govpress@la.gov]; David Edwards Raw Story [david@rawstory.com]; Richard M Novak MD [rmnovak@uic.edu]; Brett P. 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Ward, Jackie M (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group
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Subject:

Fwd: Tom & Dave:- Pushing Jesuit agenda- Corona Hoax 2020 & Protocol 10 (19) -(ABC News & Protocol 2 (5) Gold
Dust Press) &re Fears of a Second Wave & the occult no 33 & pumping the poison (vaccine) in the dumb masses -



To David Muir and Tom Llamas c/o ABC News

Hi Dave & Tom,

Was watching this recent update on your show(s)

At least 33 states, PR report an increase in COVID-19 infections

<https://www.facebook.com/.../at-least-33.../933390907186492/>

Just a quickie for you both , attaching a few interesting links for your teams to research and expand upon if you deem them worthy. Especially my most recent video **(Get Read for the Second Wave)** uploaded to compliment your above video link.

Thanks to you both. Regards, (b)(6)

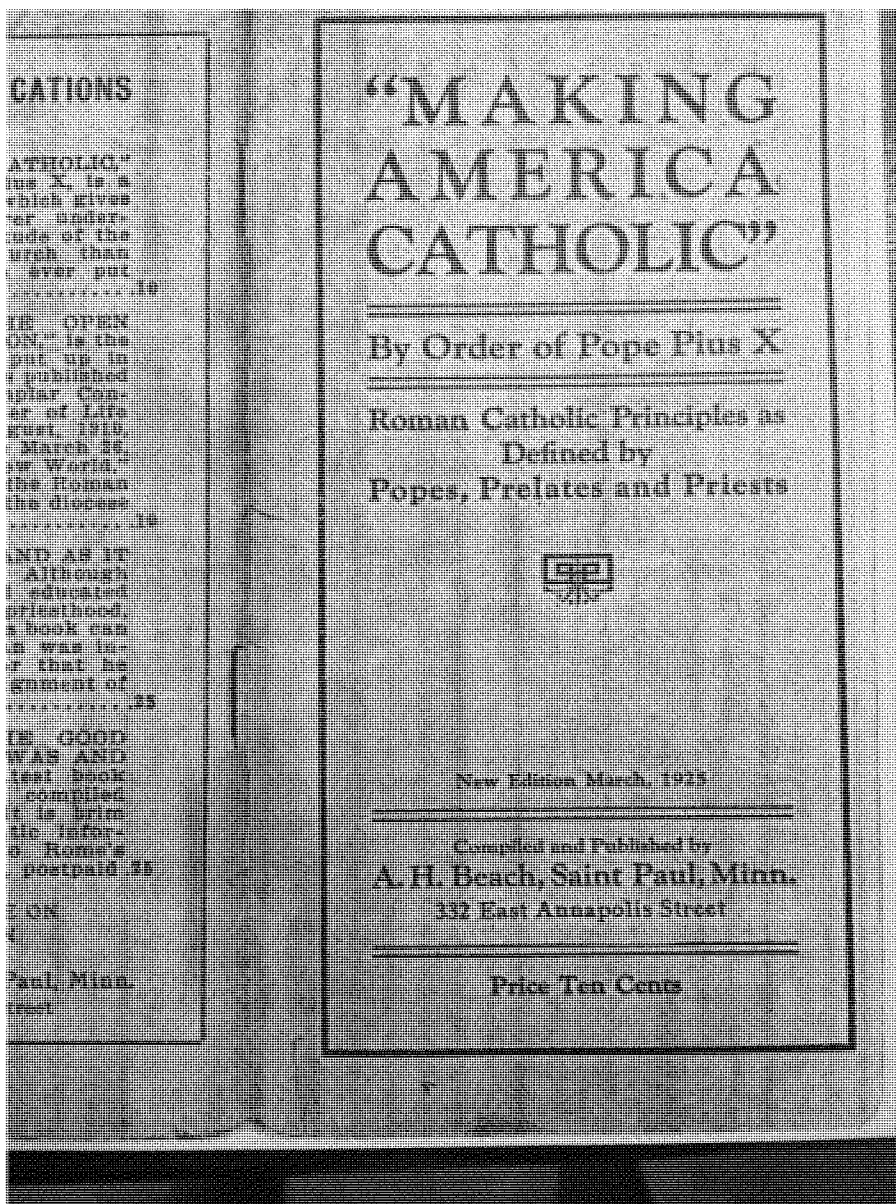
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(b)(6)

GET READY FOR THE SECOND WAVE OF CORONAVIRUS THIS WINTER

<https://www.youtube.com/watch?v=y90dGwWUj4E>

--Spain, Cuba , Mexico, Argentina (Pope Francis) - Making America Catholic -
Making America Catholic, by order of Pope Pius X: Roman Catholic principles as defined by Popes, prelates
and priests Unknown Binding – January 1, 1917 by A. H Beach (Author)



Protocol 2 (5)

--Through the Press we have gained the power to influence while remaining ourselves in the shade; thanks to the Press we have got the GOLD in our hands,

<http://www.holocaustresearchproject.org/.../protocols.html>

--Protocol No. 10 - (19) - We are Despots - <https://www.biblebelievers.org.au/przion4.htm>

---ABC News is the news division of Walt Disney, America's No 1 News serving American Broadcasting Company (ABC) broadcast network. Its flagship program is the daily evening newscast ABC World News Tonight with David Muir;

https://en.wikipedia.org/wiki/ABC_News

---It is currently the most watched network newscast in the United States, with an average of 2 million more than its nearest rival, NBC Nightly News.

---ABC News & Roman Catholic Jesuit trained Tom Llamas pushes the Corona Virus 2020 Jesuit Agenda along with David Muir, also Roman Catholic -

---Tom Edward Lamas

https://en.wikipedia.org/wiki/Tom_Llamas

Llamas was born in Miami, Florida, on July 2, 1979, to Cuban immigrants who had fled the island as political refugees. He attended The Belen Jesuit Preparatory School
https://en.wikipedia.org/.../Belen_Jesuit_Preparatory_School
in Miami.

https://en.wikipedia.org/wiki/Belen_Jesuit_Preparatory_School?fbclid=IwAR2uFs58az4kdBqkxU5VN4HU88KOVI1Ja5f2pSfvDyI2EwugQ0scCHtrXg

He is also a graduate of Jesuit Loyola University in New Orleans, Louisiana -

https://en.wikipedia.org/wiki/Loyola_University_New_Orleans

List of Loyola University New Orleans people

https://en.wikipedia.org/wiki/List_of_Loyola_University_New_Orleans_people?fbclid=IwAR3tWUSejABqeFGJIRY61MGSxzmU_dNav-p8G_5tMhyJ6yMR8SW4tmDBPHI

---David Jason Muir (born November 8, 1973) was born to a Roman Catholic family in Syracuse, New York, grew up in Onondaga Hill, and is fluent in Spanish.

https://en.wikipedia.org/wiki/David_Muir

---No newspapers in the United States will accept any news that reflects unfavorably on the Catholic Church or its propaganda in this country, while news unfavorable to Protestants is printed.

"What then is the principle obligation of the heads of states?

"Their principle obligation is to practice the Catholic religion themselves, and, as they are in power, to protect and defend it.

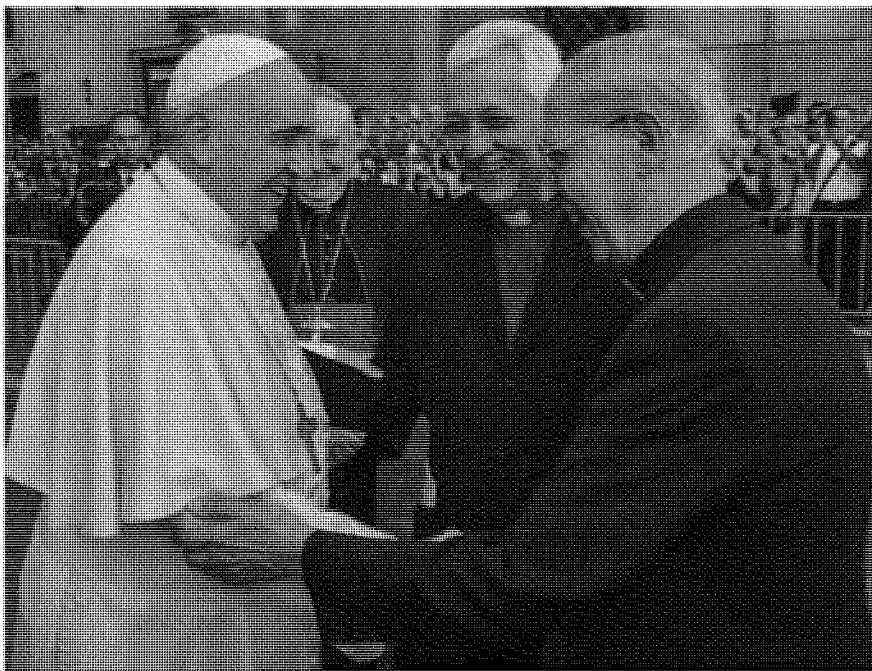
https://www.sundaylaw.net/books/other/edwardson/facts/fof25.htm?fbclid=IwAR3ukx9la4owqhIj0vAbb5Ls_YxihKx0ONbZtfi8mCn3zH_n7p_DeCz_70g

---The Power And Secret Of The Jesuits by - Rene Fulop Miller

<https://archive.org/details/in.ernet.dli.2015.217152>



"They are called the Society or Company of Jesus, the latter designation expressing more correctly the military idea of the founder, which was to establish, as it were, a new battalion in the spiritual army of the Catholic Church."—The Encyclopedia Americana, art. "Jesuits."



Adolfo Nicholas SJ (right) with Pope Francis

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<https://www.sundaylaw.net/books/other/edwardson/facts/fof27.htm?fbclid=IwAR19VkIVokpkkSnqIOTvzGdy8HxWWPc8ZqZNB0a1EZxsZ0jjxmqlrqjK7o>

A global coup is unfolding before our very eyes

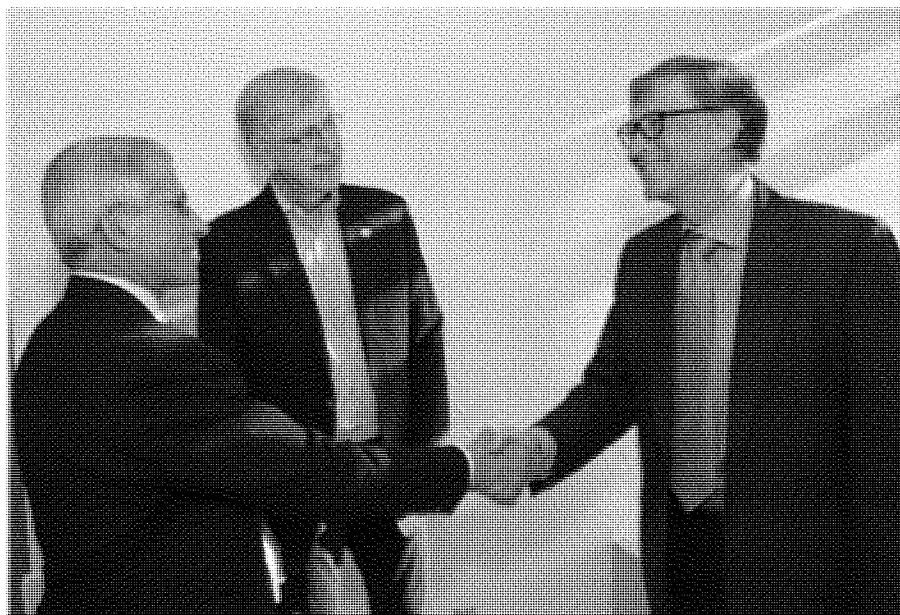
<https://www.cowichanvalleycitizen.com/opinion/will-2020-be-the-year-the-tin-foil-hats-are-vindicated/>



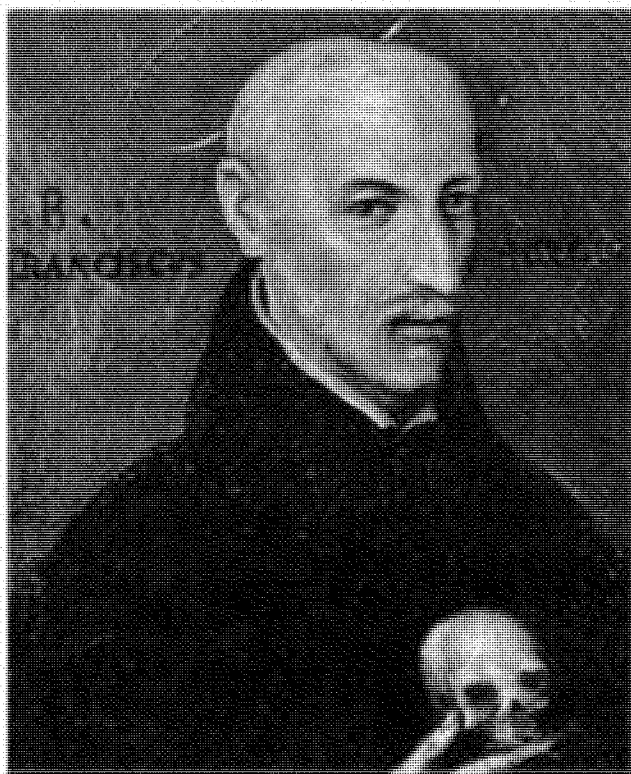
HELL IS EMPTY
AND
ALL THE DEVILS
ARE HERE

WILLIAM SHAKESPEARE









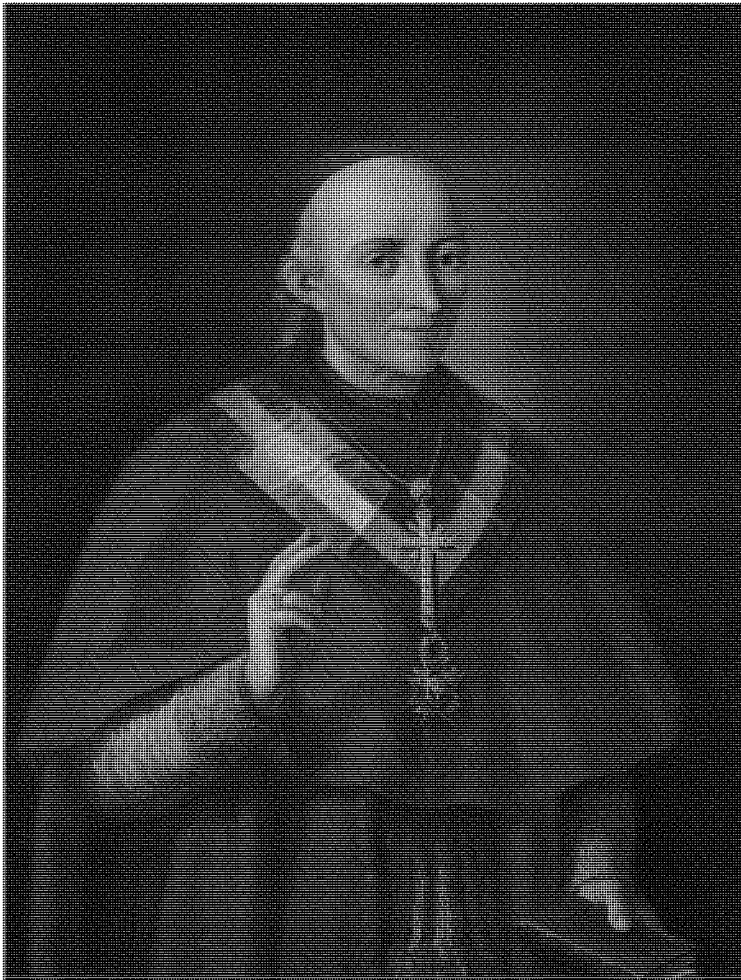
Portrait of a Jesuit Saint: San Francisco de Borja, 1726



The merited odium which has overtaken the Inquisition, usually officered by Dominicans, has induced the Jesuits, whose own controversial method has for the most part been different, to disclaim all connection with that tribunal, and to represent their society as free from complicity in its acts. But, in truth, it was Ignatius Loyola himself who procured its erection in Portugal in 1545-6, and F. Nithard, one of the very few cardinals of the society, was inquisitor-general of that kingdom in 1633.

The Founder of the Society of Jesus (Jesuit) Ignatius de Loyola himself procured its [the inquisition] erection in Portugal in 1545-6 (The Encyclopaedia Britannica: A Dictionary of Arts, Sciences, Volume 13)

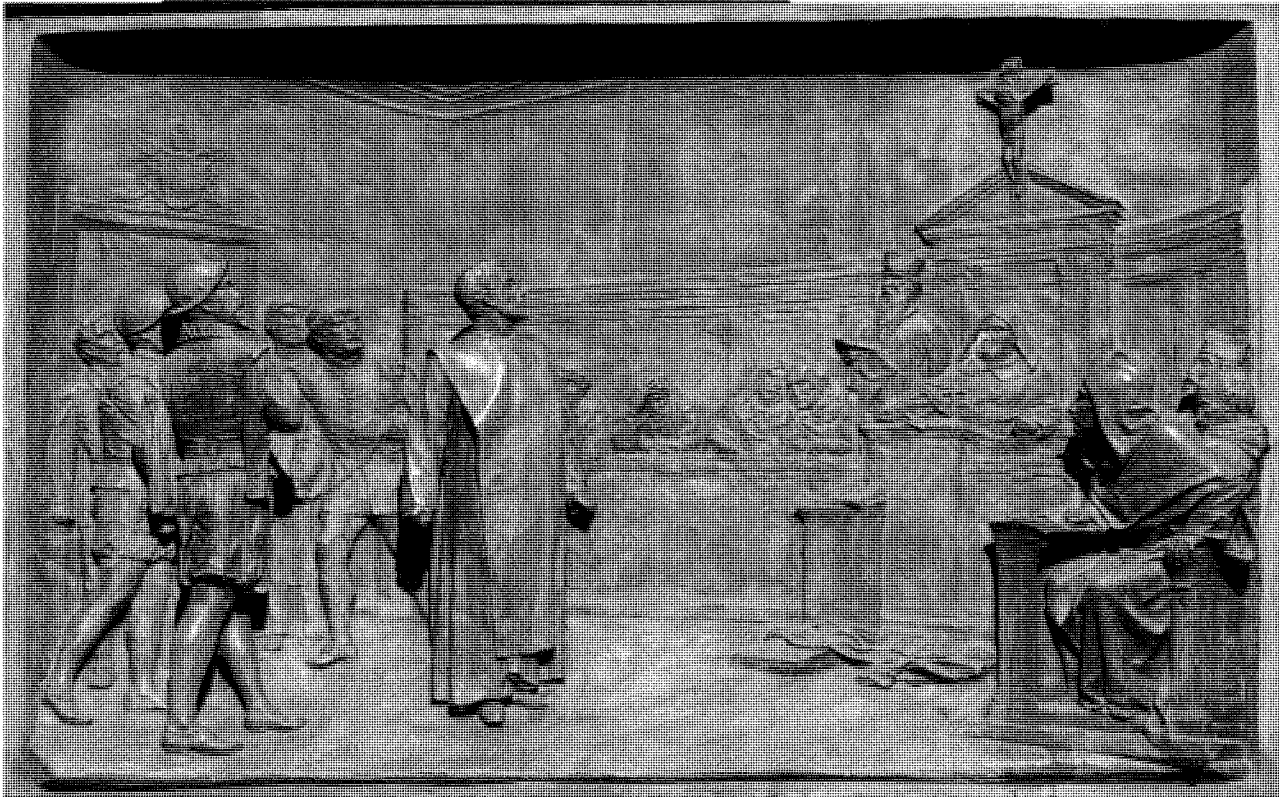
Photo:- Jesuit Francisco Antonio de Lorenzana, Grand Inquisitor of Spain (1794–1797) - https://en.wikipedia.org/wiki/Francisco_Antonio_de_Lorenzana





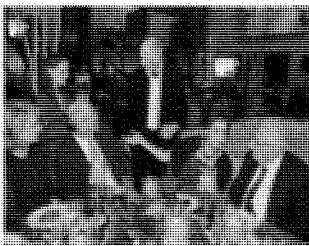
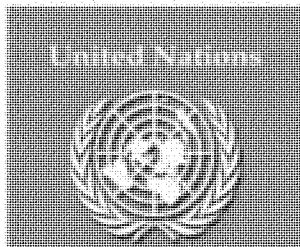
Pope Clement made him a Cardinal Inquisitor, in which capacity he served as one of the judges at the trial of Giordano Bruno, [https://en.wikipedia.org/wiki/Giordano Bruno](https://en.wikipedia.org/wiki/Giordano_Bruno) and concurred in the decision which condemned Bruno to be burned at the stake as a

heretic. <https://www.nndb.com/people/665/000029578/>

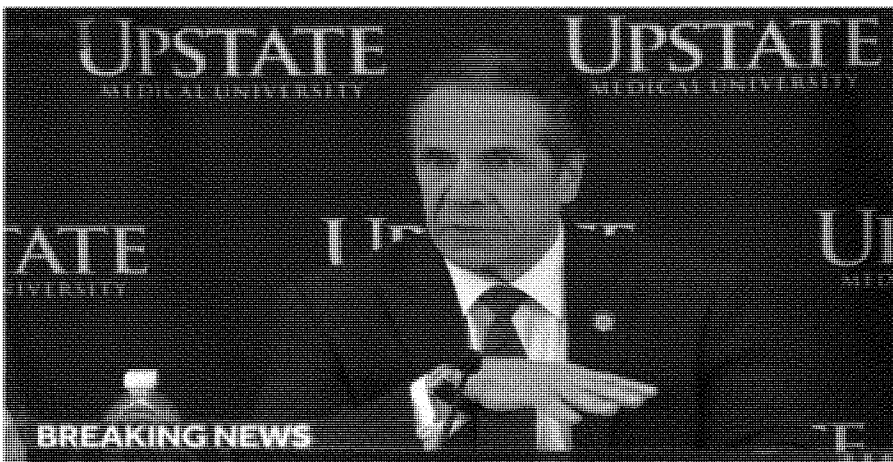


Pope Francis the Jesuit Pope & promoter of the World Lockdown in 2020 with UN Chief António Manuel de Oliveira Guterres .

Remarks by His Holiness The Jesuit Pope Francis and fellow Roman Catholic , United Nations Secretary-General António Guterres - <https://www.youtube.com/watch?v=CePSM3QMkEQ>



UN = World Government / Jacob Rothschild standing, Kissinger seated right.



Jesuit Coadjutor, Andrew Mark Cuomo flattening the curve ,
<https://www.youtube.com/watch?v=m8nCjNk3djc>

Andrew Mark Cuomo born December 6, 1957)
 Roman Catholic

<https://www.nndb.com/lists/758/000094476/>

Executive Summary:- Corona Virus Hoaxer

During his governorship, Cuomo oversaw the passage of a law legalizing same-sex marriage in New York; creation of the United States Climate Alliance, a group of states committed to fighting climate change by following the terms of the Paris Climate Accords; passage of the strictest gun control law in the U.S.; His parents were both of Italian descent; his paternal grandparents were from Nocera Inferiore and Tramonti in southern Italy, while his maternal grandparents were from Sicily His younger brother, Chris Cuomo, is a CNN journalist.

Andrew graduated from Roman Catholic St. Gerard Majella's School in 1971 a private Roman Catholic elementary school <https://www.privateschoolreview.com/st-gerard.../11423> and Archbishop Molloy High School in 1975 in Brooklyn NY https://en.wikipedia.org/wiki/Archbishop_Molloy_High_School He received a B.A. from Jesuit Fordham University in 1979, https://en.wikipedia.org/wiki/Fordham_University Cuomo will not release state death lists, nor did he order autopsies in this public health emergency as required!



Chris Cuomo

Jesuit Coadjutor, Chris Cuomo

AKA Christopher Charles Cuomo

Born: 9-Aug-1970

Birthplace: Queens, NY

Gender: Male

Religion: Roman Catholic

Race or Ethnicity: White

Sexual orientation: Straight

Occupation: Journalist

Nationality: United States

Executive summary: Co-Host, CNN New Day (Corona Virus Hoaxer)

Father: Mario Cuomo (Governor of New York, b. 15-Jun-1932, d. 1-Jan-2015)

Mother: Matilda Raffa

Sister: Margaret I. Cuomo

Brother: Andrew Cuomo (Governor of New York, b. 6-Dec-1957)

Sister: Maria Cuomo (m. Kenneth Cole)

Sister: Madeline Cuomo

Wife: Cristina Greeven (m. 24-Nov-2001, two daughters, one son)

Daughter: Bella

Daughter: Carolina Regina (b. 2011)

Son: Mario (b. 2005)

High School: The Albany Academy

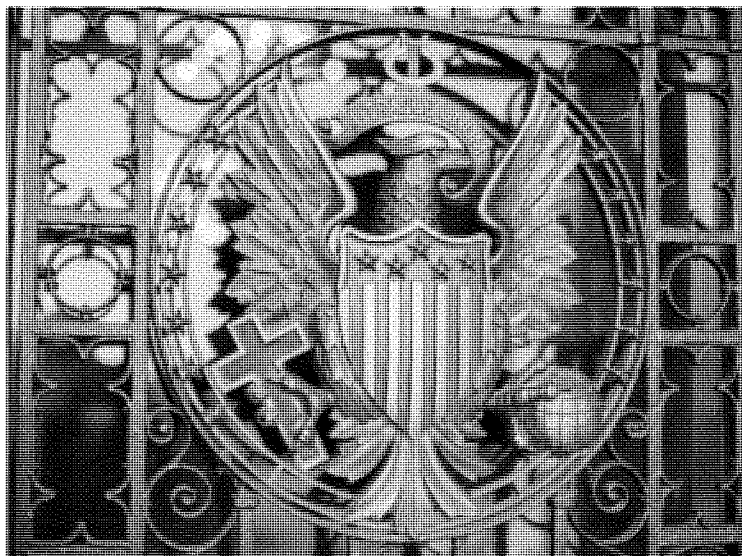
University: BA, Yale University

Law School: JD, Fordham University (1995) (jesuit)



The Dark Side of Andrew Cuomo finally exposed

<https://www.bitchute.com/video/EnV06Fabkq6Z/>



This email has been checked for viruses by Avast
antivirus software.
www.avast.com

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From: Linman Li [Linmanli@gvn.org]
Sent: 9/24/2020 4:37:36 PM
To: Gruber, Marion [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=019cd2669c7048f7a116d72b7682de44-gruber]
CC: Christian Brechot [cbrechot@gvn.org]; Kevin Kishpaugh [ktkishpaugh@gvn.org]
Subject: Thank you from the GVN Team!
Attachments: Marion Gruber.pdf

Dear Dr. Gruber,

On behalf of Dr. Christian Brechot and the team, I would like to express our sincere appreciation for your participation in the 2020 GVN Special Annual Meeting. Please find the attached thank you letter. In addition, we would like to request your approval to share the meeting content. This will be limited to the GVN members who participated in the workshop. Thank you.

Warm Regards,

Linman

Linman Li, MBA, MPH, PMP, CPH
Vice President, Global Virus Network



September 24, 2020

Dr. Marion F. Gruber
Director, Office of Vaccines Research and Review (OVRR)
Center for Biologics Evaluation & Research, US Food & Drug Administration, USA
GVN Center of Excellence

Dear Dr. Gruber,

On behalf of everyone at the Global Virus Network, I want to extend our sincere gratitude for your participation in the 2020 GVN Special Annual Meeting.

While we wish we could convene and speak face to face, your involvement helped make this virtual meeting a great success. All participants gained valuable knowledge and insights thanks to the sharing of your expertise and research. Our diverse group facilitates conversations and collaborations that may not otherwise occur. The GVN is built upon this global collaboration, and I want to personally thank you for helping us further that mission. During such challenging times, as we face the current pandemic, this work has never been more important.

With your permission, we are also interested in sharing your excellent presentation. This would be exclusively with other GVN Members. Please let us know if you feel comfortable with us sharing your presentation in such a manner.

Many thanks again for your commitment to the GVN, and stay safe.

Thank you,



Christian Bréchet, MD, PhD
President Global Virus Network, Baltimore, USA

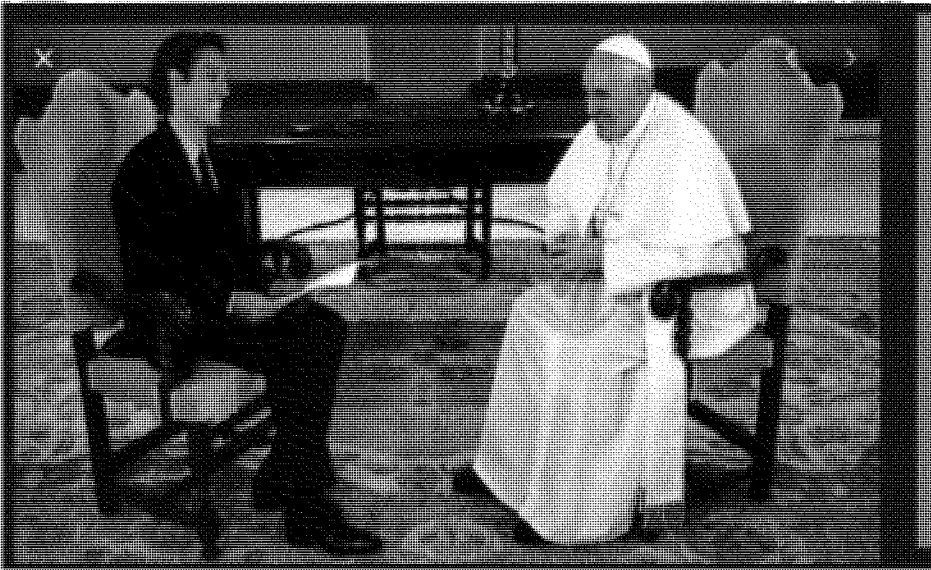
From: (b)(6)
Sent: 9/29/2020 5:52:07 AM
To: Thomas Edward Llamas [Tom.Llamas@abc.com]; tom.llamas@abcnews.com; David.Muir@abcnews.com; David Jason Muir [David.Muir@abc.com]
CC: Cecilia.Vega@abcnews.com; Stephanie.Ramos@abcnews.com; brian.stelter@turner.com; Brian.Rose@londonreal.tv; Kilmeade, Brian [Brian.Kilmeade@foxnews.com]; brian.jones@foxnews.com; Brian.Bennett@latimes.com; Guy.Benson@townhall.com; Jonathan.Garthwaite@townhall.com; Katie.Pavlich@townhall.com; Judge Judy [Jeanine.Pirro@FOXNEWS.COM]; Susan Michie [s.michie@ucl.ac.uk]; Professor Sir David Clary [david.clary@magd.ox.ac.uk]; John Penrose [beauperec@parliament.uk]; Diana Mary Harding. 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lawrence_summers@hks.harvard.edu; lindsay_jones@hks.harvard.edu; enew@fas.harvard.edu; elisa.new@poetryinamerica.org; Boris.Nikolic@twistbioscience.com; customersupport@twistbioscience.com; Boris.Nikolic@editasmed.com; info@editasmed.com; boris.nikolic@biomaticscapital.com; Julie.Sunderland@biomaticscapital.com; info@biomaticscapital.com; Andrew.Pollard@ovg.ox.ac.uk; dale.woods@nbcuni.com; deedeemyers@warnerbros.com; Jeremy.Farrar@cepi.net; Joachim.Klein@cepi.net; Bryant, Paula R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eb42f9318014bbb8c14d39ef311d8f9-HHS-paula.b]; Idro.Seferi@dw.com; sarah.mabrouk@dw.com; pisarna@tanja-fajon.eu; maja.kezunovickrasek@tanja-fajon.eu; Tanja.Fajon@ep.europa.eu; jure.tanko@ep.europa.eu; Sasa.Dragojlo@balkaninsight.com; Aleksandar.Vucic@weforum.org; tanja.fajon@europarl.europa.eu; Michelle Powers Net NY TV [michelle.powers@netny.tv]; Stanley.Plotkin@pennmedicine.upenn.edu; Lisa.Bellini@pennmedicine.upenn.edu; Leonard.Hayflick@ucsf.edu; Marie.Bernard@nih.gov; Gruber, Marion [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=019cd2669c7048f7a116d72b7682de44-gruber]; Jim.Sciutto@turner.com; andrewkaufmanmd@gmail.com; Jenny Anne Durkan [jenny.durkan@seattle.gov]; Sean Patrick Hannity [sean.hannity@foxnews.com]; kevin.corke@foxnews.com; dan.springer@foxnews.com; VladimirDuthiers [DuthiersV@cbsnews.com]; Vladimir Putin [pr@nm-g.ru]; Vlad [accredit@gov.ru]; Narendra.Modi@pmindia.gov.in; Eric Frederick Trump [etrump@trumporg.com]; Savannah Clark Guthrie [Savannah.guthrie@nbcuni.com]; Hoda Kotb [Hoda.Kotb@nbcuni.com]; Craig Melvin [Craig.Melvin@nbcuni.com]; jfair@tamu.edu; mwelsh@tamu.edu; Ellen.DeGeneres@nbcuni.com; Subha Nagalakshmi Munchetty-Chendriah [Naga.Munchetty@bbc.co.uk]; William Jefferson Blythe III [press@clintonfoundation.org]; Chancellor Hillary Diane Rodham Clinton [comms.office@qub.ac.uk]; Hillary Diane Rodham Clinton [philippe.reines@bgsdc.com]; Joseph Robinette Biden Jr [jbash@bgsdc.com]; Kate.Bedingfield@joebiden.com; Katherine Anne Couric [Katie.Couric@turner.com]; Katherine Jean "Kate" Bolduan [Kate.Bolduan@turner.com]; Linsey.Davis@abc.com; Tom.Llamas@abc.com; Steve Aduato [Mary.Gamba@steveadubato.org]; Heiko Maas [Heiko.Maas@auswaertiges-amt.de]; Matt Hancock UK Health Secretary [matt.hancock@weforum.org]; John J DeGioia SJ [cfc@carnegie.org]; John.DeGioia@georgetown.edu; John.DeGioia@weforum.org; Tania.Tetlow@loyno.edu; julia.macfarlane@abc.com; emma.gormley@itv.com; thismorning@itv.com; The Rt Hon Boris Johnson MP [press@number10.gov.uk]; Alexander Boris de Pfeffel Johnson [boris.johnson.mp@parliament.uk]; Alisyn.Camerota@turner.com; Alison.Morris@nbcuni.com; Ron DeSantis [media@eog.myflorida.com]; Sadiq Khan [admin@revolving-doors.org.uk]; His Worship S Khan [dexter@dexterhenry.co.uk]; His Eminence Timothy Cardinal Dolan [maryellen.oconnor@archny.org]; Craig Melvin [Craig.Melvin@nbcuni.com]; Shannon Cake [scake@wptv.com]; NHogensen@scripps.com; Gregory Wayne Abbott [Press@GregAbbott.com]; 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matt.murray@wsj.com; Michael.Wueller@wsj.com

Subject:

Tom & Dave:- Pushing Jesuit agenda- Corona Hoax 2020 & Protocol 10 (19) -(ABC News & Protocol 2 (5) Gold Dust Press) &re Fears of a Second Wave & the occult no 33 & pumping the poison (vaccine) in the dumb masses -



To David Muir and Tom Llamas c/o ABC News

Hi Dave & Tom,

Was watching this recent update on your show(s)

At least 33 states, PR report an increase in COVID-19 infections

<https://www.facebook.com/.../at-least-33.../933390907186492/>

Just a quickie for you both , attaching a few interesting links for your teams to research and expand upon if you deem them worthy. Especially my most recent video **(Get Read for the Second Wave)** uploaded to compliment your above video link.

Thanks to you both. (b)(6)

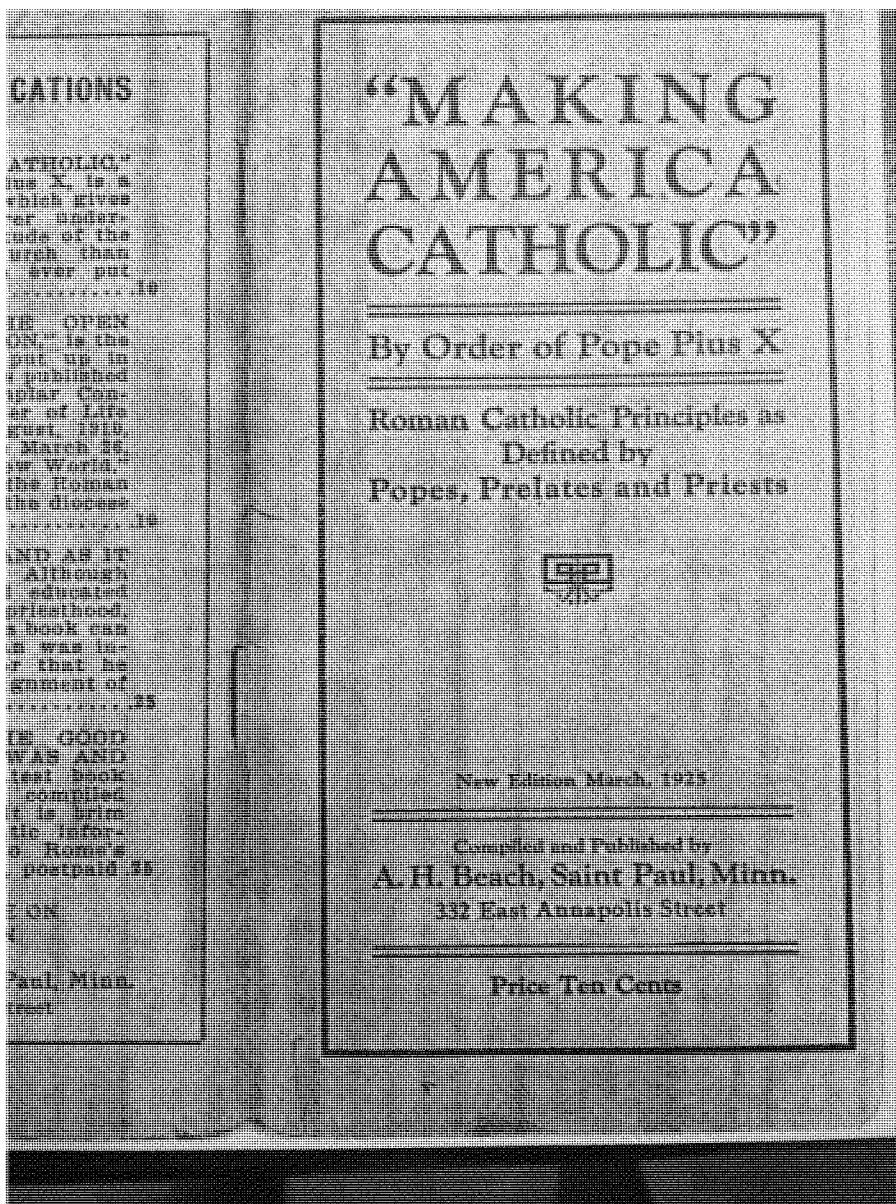
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(b)(6)

GET READY FOR THE SECOND WAVE OF CORONAVIRUS THIS WINTER

<https://www.youtube.com/watch?v=y90dGwWUj4E>

--Spain, Cuba , Mexico, Argentina (Pope Francis) - Making America Catholic -
Making America Catholic, by order of Pope Pius X: Roman Catholic principles as defined by Popes, prelates
and priests Unknown Binding – January 1, 1917 by A. H Beach (Author)



Protocol 2 (5)

--Through the Press we have gained the power to influence while remaining ourselves in the shade; thanks to the Press we have got the GOLD in our hands,

<http://www.holocaustresearchproject.org/.../protocols.html>

--Protocol No. 10 - (19) - We are Despots - <https://www.biblebelievers.org.au/przion4.htm>

---ABC News is the news division of Walt Disney, America's No 1 News serving American Broadcasting Company (ABC) broadcast network. Its flagship program is the daily evening newscast ABC World News Tonight with David Muir;

https://en.wikipedia.org/wiki/ABC_News

---It is currently the most watched network newscast in the United States, with an average of 2 million more than its nearest rival, NBC Nightly News.

---ABC News & Roman Catholic Jesuit trained Tom Llamas pushes the Corona Virus 2020 Jesuit Agenda along with David Muir, also Roman Catholic -

---Tom Edward Lamas

https://en.wikipedia.org/wiki/Tom_Llamas

Llamas was born in Miami, Florida, on July 2, 1979, to Cuban immigrants who had fled the island as political refugees. He attended The Belen Jesuit Preparatory School
https://en.wikipedia.org/.../Belen_Jesuit_Preparatory_School
in Miami.

https://en.wikipedia.org/wiki/Belen_Jesuit_Preparatory_School?fbclid=IwAR2uFs58az4kdBqkxU5VN4HU88KOVI1Ja5f2pSfvDyI2EwugQ0scCHtrXg

He is also a graduate of Jesuit Loyola University in New Orleans, Louisiana -

https://en.wikipedia.org/wiki/Loyola_University_New_Orleans

List of Loyola University New Orleans people

https://en.wikipedia.org/wiki/List_of_Loyola_University_New_Orleans_people?fbclid=IwAR3tWUSejABqeFGJIRY61MGSxzmU_dNav-p8G_5tMhyJ6yMR8SW4tmDBPHI

---David Jason Muir (born November 8, 1973) was born to a Roman Catholic family in Syracuse, New York, grew up in Onondaga Hill, and is fluent in Spanish.

https://en.wikipedia.org/wiki/David_Muir

---No newspapers in the United States will accept any news that reflects unfavorably on the Catholic Church or its propaganda in this country, while news unfavorable to Protestants is printed.

"What then is the principle obligation of the heads of states?

"Their principle obligation is to practice the Catholic religion themselves, and, as they are in power, to protect and defend it.

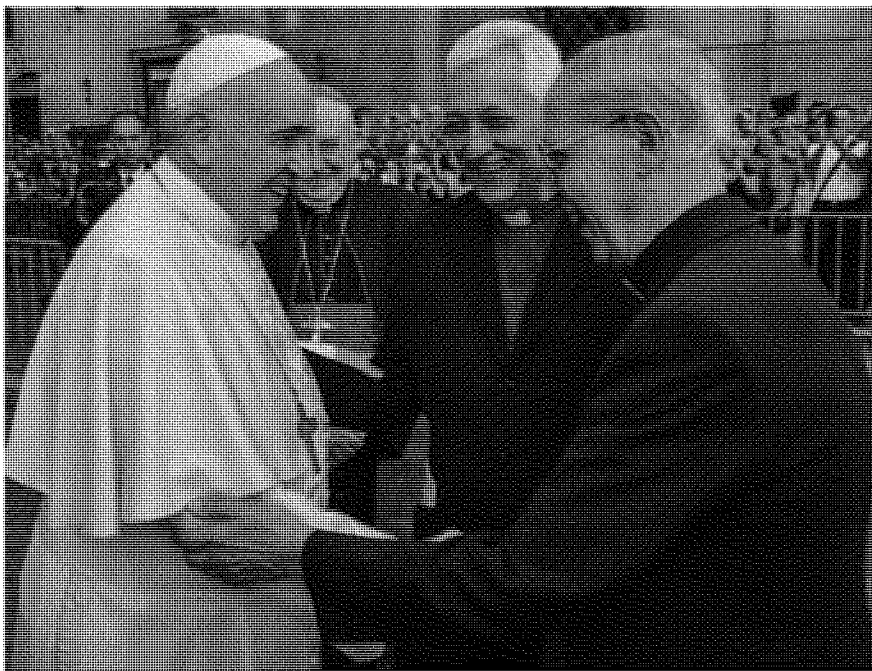
https://www.sundaylaw.net/books/other/edwardson/facts/fof25.htm?fbclid=IwAR3ukx9la4owqhIj0vAbb5Ls_YxihKx0ONbZtfi8mCn3zH_n7p_DeCz_70g

---The Power And Secret Of The Jesuits by - Rene Fulop Miller

<https://archive.org/details/in.ernet.dli.2015.217152>

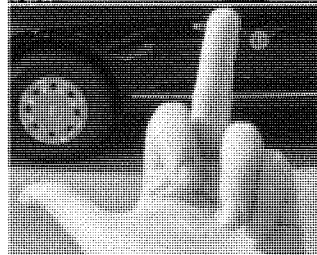
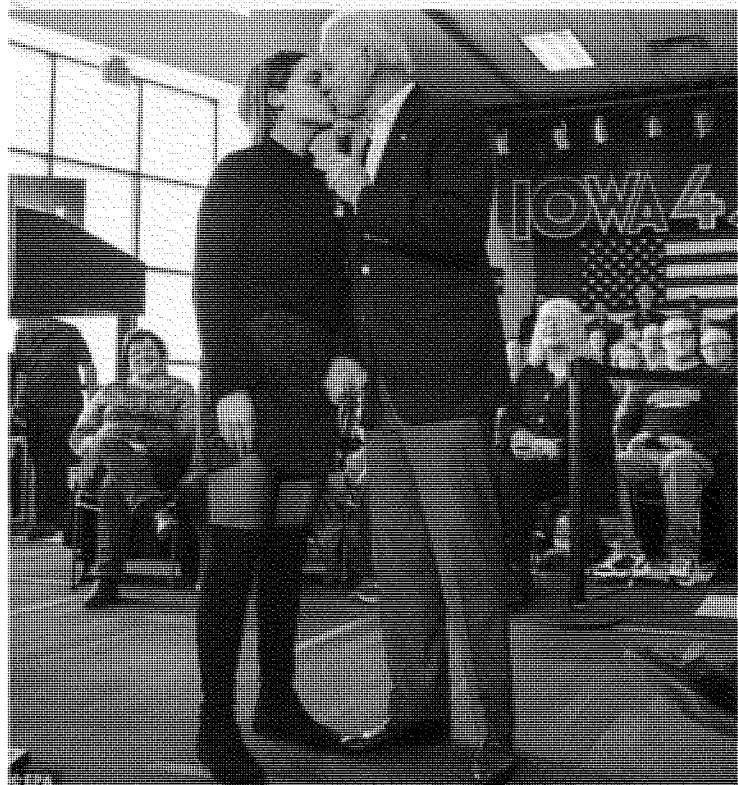


"They are called the Society or Company of Jesus, the latter designation expressing more correctly the military idea of the founder, which was to establish, as it were, a new battalion in the spiritual army of the Catholic Church."—The Encyclopedia Americana, art. "Jesuits."



Adolfo Nicholas SJ (right) with Pope Francis

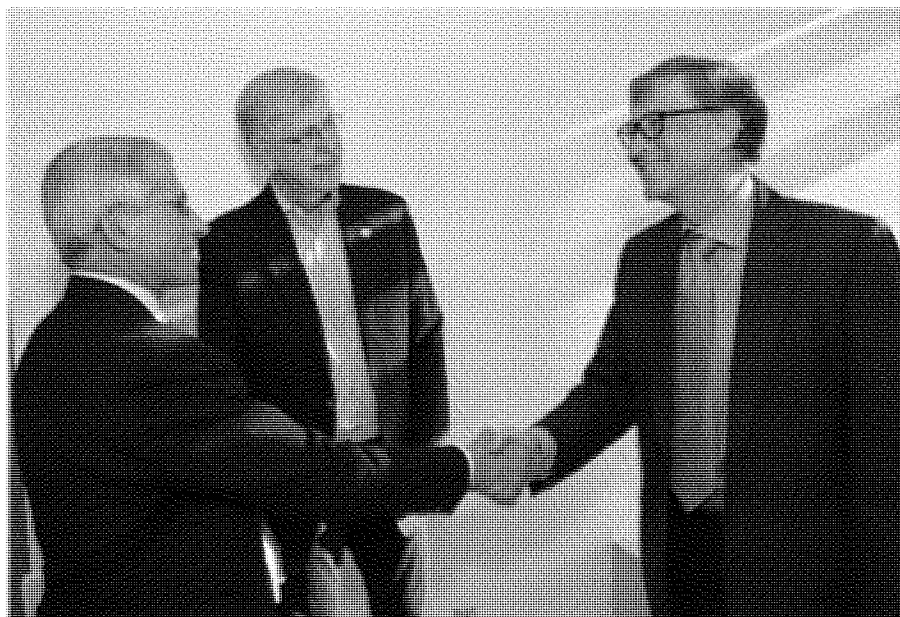
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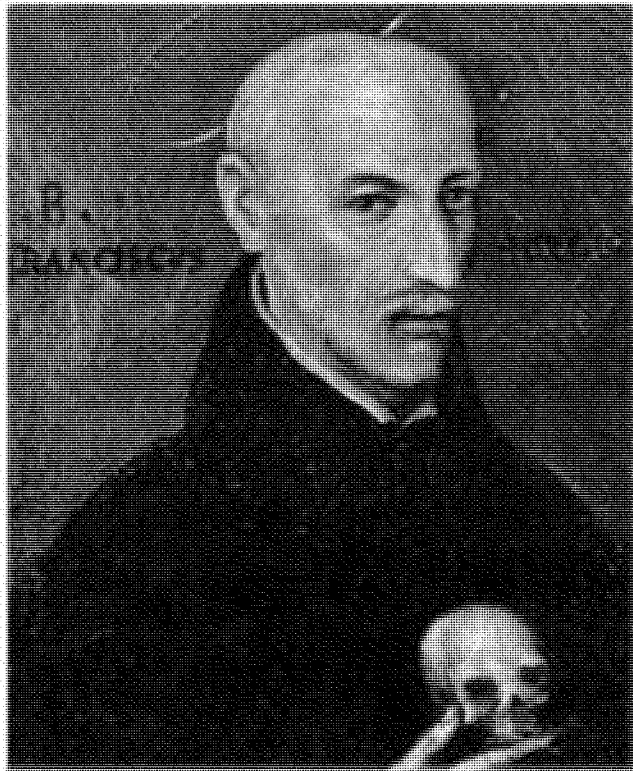
HELL IS EMPTY
AND
ALL THE DEVILS
ARE HERE

WILLIAM SHAKESPEARE









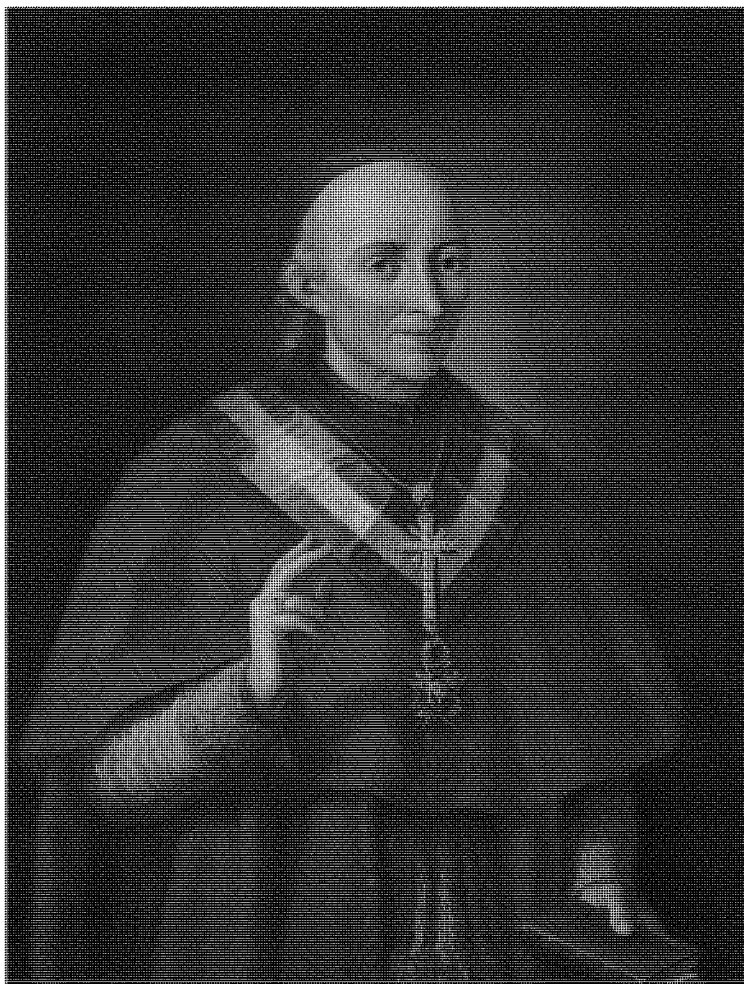
Portrait of a Jesuit Saint: San Francisco de Borja, 1726



The merited odium which has overtaken the Inquisition, usually officered by Dominicans, has induced the Jesuits, whose own controversial method has for the most part been different, to disclaim all connection with that tribunal, and to represent their society as free from complicity in its acts. But, in truth, it was Ignatius Loyola himself who procured its erection in Portugal in 1545-6, and F. Nithard, one of the very few cardinals of the society, was inquisitor-general of that kingdom in 1633.

The Founder of the Society of Jesus (Jesuit) Ignatius de Loyola himself procured its [the inquisition] erection in Portugal in 1545-6 (The Encyclopaedia Britannica: A Dictionary of Arts, Sciences, Volume 13)

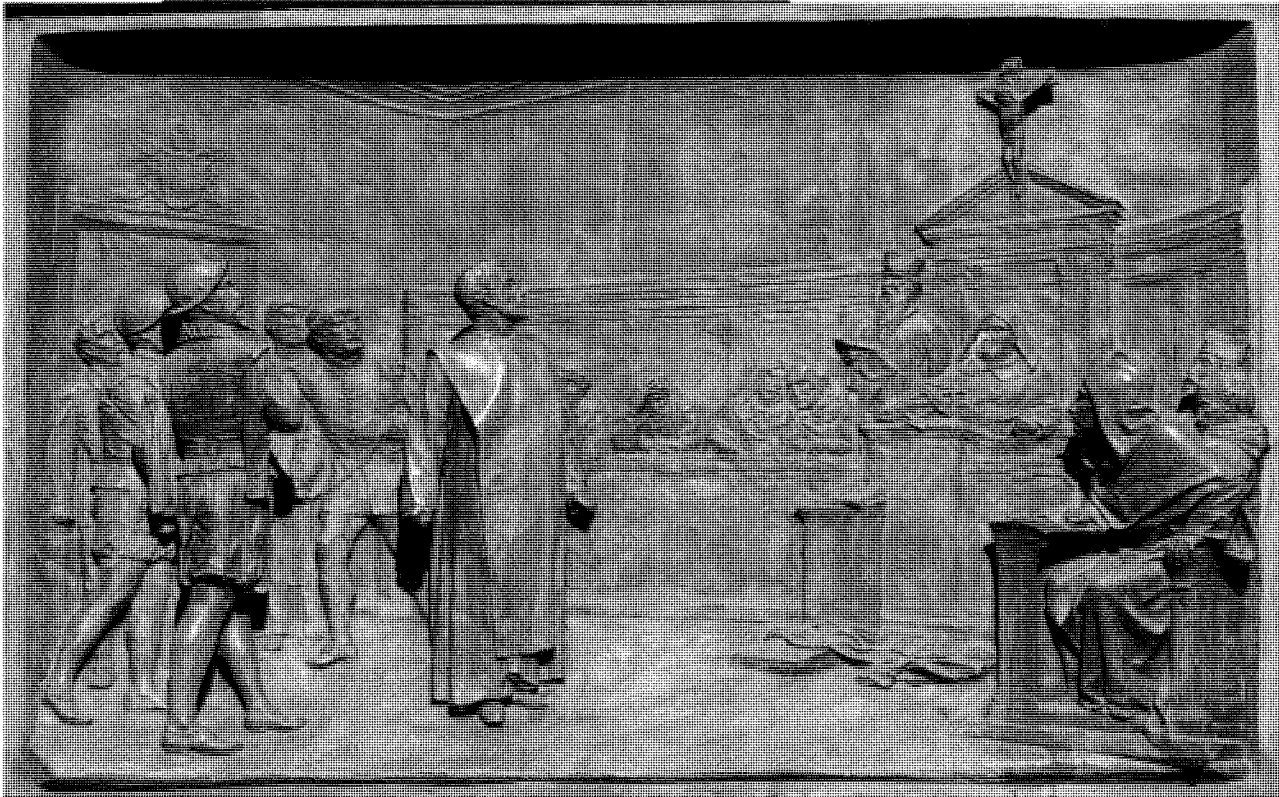
Photo:- Jesuit Francisco Antonio de Lorenzana, Grand Inquisitor of Spain (1794–1797) - https://en.wikipedia.org/wiki/Francisco_Antonio_de_Lorenzana





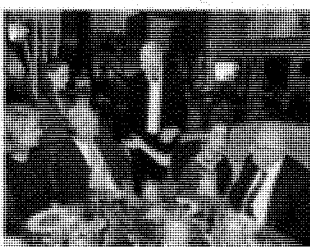
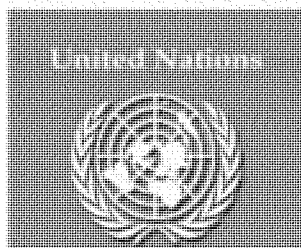
Pope Clement made him a Cardinal Inquisitor, in which capacity he served as one of the judges at the trial of Giordano Bruno, [https://en.wikipedia.org/wiki/Giordano Bruno](https://en.wikipedia.org/wiki/Giordano_Bruno) and concurred in the decision which condemned Bruno to be burned at the stake as a

heretic. <https://www.nndb.com/people/665/000029578/>

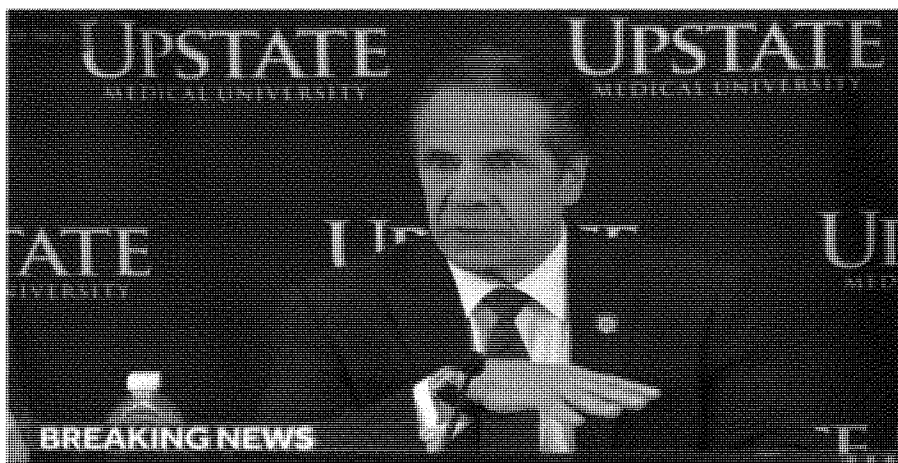


Pope Francis the Jesuit Pope & promoter of the World Lockdown in 2020 with UN Chief António Manuel de Oliveira Guterres .

Remarks by His Holiness The Jesuit Pope Francis and fellow Roman Catholic , United Nations Secretary-General António Guterres - <https://www.youtube.com/watch?v=CePSM3QMkEQ>



UN = World Government / Jacob Rothschild standing, Kissinger seated right.



Jesuit Coadjutor, Andrew Mark Cuomo flattening the curve ,
<https://www.youtube.com/watch?v=m8nCjNk3djc>

Andrew Mark Cuomo born December 6, 1957)
 Roman Catholic

<https://www.nndb.com/lists/758/000094476/>

Executive Summary:- Corona Virus Hoaxer

During his governorship, Cuomo oversaw the passage of a law legalizing same-sex marriage in New York; creation of the United States Climate Alliance, a group of states committed to fighting climate change by following the terms of the Paris Climate Accords; passage of the strictest gun control law in the U.S.; His parents were both of Italian descent; his paternal grandparents were from Nocera Inferiore and Tramonti in southern Italy, while his maternal grandparents were from Sicily His younger brother, Chris Cuomo, is a CNN journalist.

Andrew graduated from Roman Catholic St. Gerard Majella's School in 1971 a private Roman Catholic elementary school <https://www.privateschoolreview.com/st-gerard.../11423> and Archbishop Molloy High School in 1975 in Brooklyn NY https://en.wikipedia.org/wiki/Archbishop_Molloy_High_School He received a B.A. from Jesuit Fordham University in 1979, https://en.wikipedia.org/wiki/Fordham_University Cuomo will not release state death lists, nor did he order autopsies in this public health emergency as required!



Chris Cuomo

Jesuit Coadjutor, Chris Cuomo

AKA Christopher Charles Cuomo

Born: 9-Aug-1970

Birthplace: Queens, NY

Gender: Male

Religion: Roman Catholic

Race or Ethnicity: White

Sexual orientation: Straight

Occupation: Journalist

Nationality: United States

Executive summary: Co-Host, CNN New Day (Corona Virus Hoaxer)

Father: Mario Cuomo (Governor of New York, b. 15-Jun-1932, d. 1-Jan-2015)

Mother: Matilda Raffa

Sister: Margaret I. Cuomo

Brother: Andrew Cuomo (Governor of New York, b. 6-Dec-1957)

Sister: Maria Cuomo (m. Kenneth Cole)

Sister: Madeline Cuomo

Wife: Cristina Greeven (m. 24-Nov-2001, two daughters, one son)

Daughter: Bella

Daughter: Carolina Regina (b. 2011)

Son: Mario (b. 2005)

High School: The Albany Academy

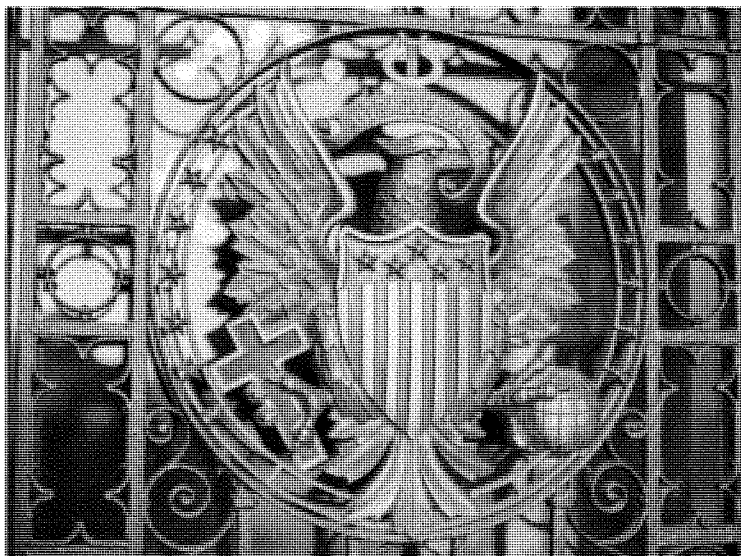
University: BA, Yale University

Law School: JD, Fordham University (1995) (jesuit)



The Dark Side of Andrew Cuomo finally exposed

<https://www.bitchute.com/video/EnV06Fabkq6Z/>



This email has been checked for viruses by Avast antivirus software.
www.avast.com

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From: Segales, Joaquim [joaquim.segales@irta.cat]
Sent: 8/30/2020 11:34:12 AM
To: Cesar Munoz-Fontela [munoz-fontela@bnitm.de]; Randy Albrecht [randy.albrecht@mssm.edu]; Dr. Hanne Andersen [handersen@bioqual.com]; Ralph Baric [rbaric@email.unc.edu]; Miles Carroll [miles.carroll@phe.gov.uk]; 秦川 [qinchuan@pumc.edu.cn]; Crozier, Ian (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8730a536d2c64480b554c36ac8fc2998-HHS-ian.cro]; Kai Dallmeier [kai.dallmeier@kuleuven.be]; Leon de Waal [dewaal@viroclinics.com]; De Wit, Emmie (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0995c7cc65ea4f0ba5e81bfc8b73e271-HHS-Emmie.d]; Leen Delang [leen.delang@kuleuven.be]; Erik Dohm [edohm@uab.edu]; Duprex, Paul [pduprex@pitt.edu]; Darryl Falzarano [darryl.falzarano@usask.ca]; Finch, Courtney L (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=874d23c0b64b4c4b8a97a78a6d6804c5-HHS-courtne]; Matthew Frieman [MFrieman@som.umaryland.edu]; Graham, Barney S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=973d6f4da1a94dad93621a6b52be9059-HHS-bgraham]; Lisa E Gralinski [lgralins@email.unc.edu]; guilfoyle@viroclinics.com; B. Haagmans [b.haagmans@erasmusmc.nl]; Geraldine Hamilton [geraldine.hamilton@emulatebio.com]; Hartman, Amy Lynn [hartman2@pitt.edu]; S. Herfst [s.herfst@erasmusmc.nl]; Suzanne Kaptein [suzanne.kaptein@kuleuven.be]; Klimstra, William Brown [klimstra@pitt.edu]; KNEZEVIC, Ivana [knezevici@who.int]; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Kuhn, Jens H (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b8ad971e5e2465e9597f4d70823da1f-HHS-kuhnjen]; Roger Le [roger.le-grand@cea.fr]; Dr. Mark Lewis [mlewis@bioqual.com]; Wen-chun Liu [wen-chun.liu@mssm.edu]; Pauline Maisonnasse [pauline.maisonnasse@cea.fr]; McElroy, Anita Katherine [MCELROYA@pitt.edu]; Munster, Vincent J (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ac6fbbee4f524312982918e77a2c5f7c-HHS-vincent]; Nadia Oreshkova [nadia.oreshkova@wur.nl]; Angela Rasmussen [alr2105@cumc.columbia.edu]; Joana Duarte Da Rocha Pereira [joana.rochapereira@kuleuven.be]; B. Rockx [b.rockx@erasmusmc.nl]; Estefania Bni [estefania.rodriguez@bnitm.de]; Thomas Rogers [trogers@scripps.edu]; Javier Salguero [javier.salguero@phe.gov.uk]; Michael Schotsaert [michael.schotsaert@mssm.edu]; Koert Stittelaar [stittelaar@viroclinics.com]; Hendrik Jan Thibaut [hendrikjan.thibaut@kuleuven.be]; Chien-Te Tseng [sktseng@UTMB.EDU]; Vergara, Julia [julia.vergara@irta.cat]; Martin Beer [Martin.Beer@fli.de]; Trevor Brasel [trbrasel@utmb.edu]; jfwchan [jfwchan@hku.hk]; Adolfo Garcia-Sastre [adolfo.garcia-sastre@mssm.edu]; Johan Neyts [johan.neyts@kuleuven.be]; Stanley Perlman [stanley-perlman@uiowa.edu]; Douglas Reed [dsreed@pitt.edu]; Juergen Richt [jricht@vet.k-state.edu]; Chad Roy [croy@tulane.edu]; Vasan Vasan [vasan.vasan@csiro.au]; Marco Cavaleri [ema.europa.eu]
Subject: RE: Review disclaimers

Many thanks for your efforts, César... definitively you and Dan, as well as all co-authors, did a great job and the outcome is excellent. Crossing fingers for final acceptance.

Very best regards,

Quim

De: Cesar Munoz-Fontela <munoz-fontela@bnitm.de>

Enviado el: diumenge, 30 d'agost de 2020 8:40

Para: Randy Albrecht <randy.albrecht@mssm.edu>; Dr. Hanne Andersen <handersen@bioqual.com>; Ralph Baric <rbaric@email.unc.edu>; Miles Carroll <miles.carroll@phe.gov.uk>; 秦川 <qinchuan@pumc.edu.cn>; Crozier, Ian (NIH) [C] <ian.crozier@nih.gov>; Kai Dallmeier <kai.dallmeier@kuleuven.be>; Leon de Waal <dewaal@viroclinics.com>; De wit, Emmie (NIH/NIAID) [E] <emmie.dewit@nih.gov>; Leen Delang <leen.delang@kuleuven.be>; Erik Dohm <edohm@uab.edu>; Duprex, Paul <pduprex@pitt.edu>; Darryl Falzarano <darryl.falzarano@usask.ca>; Finch, Courtney (NIH/NIAID) [C] <courtney.finch@nih.gov>; Matthew Frieman <MFrieman@som.umaryland.edu>; Barney Graham <bgraham@mail.nih.gov>; Lisa E Gralinski <lgralins@email.unc.edu>; guilfoyle@viroclinics.com; B. Haagmans <b.haagmans@erasmusmc.nl>; Geraldine Hamilton <geraldine.hamilton@emulatebio.com>; Hartman, Amy Lynn <hartman2@pitt.edu>; S. Herfst <s.herfst@erasmusmc.nl>; Suzanne Kaptein <suzanne.kaptein@kuleuven.be>; Klimstra,

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Asunto: Review disclaimers

Dear all,

Thank you all very much for your quick responses and input regarding the required review modifications. It has been a little hectic in the last couple of days and i did not have time to respond the individual emails but big thanks to all. As you probably know the review has been resubmitted and I would like to thank Dan Barouch for leading the process.

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- 1- Names and affiliations have been corrected when needed
- 2- The Supp table has been corrected and updated
- 3- The text has been modified according to the reviewers requests and your suggestions
- 4- We sent in a rebuttal letter based on your input

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We hope that this is acceptable for everyone.

Thank you again very much for your contribution to this important paper

César

From: Cesar Munoz-Fontela [munoz-fontela@bnitm.de]
Sent: 8/30/2020 2:39:49 AM
To: Randy Albrecht [randy.albrecht@mssm.edu]; Dr. Hanne Andersen [handersen@bioqual.com]; Ralph Baric [rbaric@email.unc.edu]; Miles Carroll [miles.carroll@phe.gov.uk]; 秦川 [qinchuan@pumc.edu.cn]; Crozier, Ian (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8730a536d2c64480b554c36ac8fc2998-HHS-ian.cro]; Kai Dallmeier [kai.dallmeier@kuleuven.be]; Leon de Waal [dewaal@viroclinics.com]; De Wit, Emmie (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0995c7cc65ea4f0ba5e81bfc8b73e271-HHS-Emmie.d]; Leen Delang [leen.delang@kuleuven.be]; Erik Dohm [edohm@uab.edu]; Duprex, Paul [pduprex@pitt.edu]; Darryl Falzarano [darryl.falzarano@usask.ca]; Finch, Courtney L (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=874d23c0b64b4c4b8a97a78a6d6804c5-HHS-courtne]; Matthew Frieman [MFrieman@som.umaryland.edu]; Graham, Barney S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=973d6f4da1a94dad93621a6b52be9059-HHS-bgraham]; Lisa E Gralinski [lgralins@email.unc.edu]; guilfoyle@viroclinics.com; B. Haagmans [b.haagmans@erasmusmc.nl]; Geraldine Hamilton [geraldine.hamilton@emulatebio.com]; Hartman, Amy Lynn [hartman2@pitt.edu]; S. Herfst [s.herfst@erasmusmc.nl]; Suzanne Kaptein [suzanne.kaptein@kuleuven.be]; Klimstra, William Brown [klimstra@pitt.edu]; KNEZEVIC, Ivana [knezevici@who.int]; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Kuhn, Jens H (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b8ad971e5e2465e9597f4d70823da1f-HHS-kuhnjen]; Roger Le [roger.le-grand@cea.fr]; Dr. Mark Lewis [mlewis@bioqual.com]; Wen-chun Liu [wen-chun.liu@mssm.edu]; Pauline Maisonnasse [pauline.maisonnasse@cea.fr]; McElroy, Anita Katherine [MCELROYA@pitt.edu]; Munster, Vincent J (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ac6fbeee4f524312982918e77a2c5f7c-HHS-vincent]; Nadia Oreshkova [nadia.oreshkova@wur.nl]; Angela Rasmussen [alr2105@cumc.columbia.edu]; Joana Duarte Da Rocha Pereira [joana.rochapereira@kuleuven.be]; B. Rockx [b.rockx@erasmusmc.nl]; Estefania Bni [estefania.rodriquez@bnitm.de]; Thomas Rogers [trogers@scripps.edu]; Javier Salguero [javier.salguero@phe.gov.uk]; Michael Schotsaert [michael.schotsaert@mssm.edu]; Koert Stittelaar [stittelaar@viroclinics.com]; Hendrik Jan Thibaut [hendrikjan.thibaut@kuleuven.be]; Chien-Te Tseng [sktseng@UTMB.EDU]; Vergara, Julia [julia.vergara@irta.cat]; Martin Beer [Martin.Beer@fli.de]; Trevor Brasel [trbrasel@utmb.edu]; jfwchan [jfwchan@hku.hk]; Adolfo Garcia-Sastre [adolfo.garcia-sastre@mssm.edu]; Johan Neyts [johan.neyts@kuleuven.be]; Stanley Perlman [stanley-perlman@uiowa.edu]; Douglas Reed [dsreed@pitt.edu]; Juergen Richt [jricht@vet.k-state.edu]; Chad Roy [croy@tulane.edu]; Quim Segales [joaquim.segales@irta.cat]; Vasana Vasana [vasana.vasana@csiro.au]; Marco Cavaleri [ema.europa.eu]
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We hope that this is acceptable for everyone.

Thank you again very much for your contribution to this important paper

César

From: Kai Dallmeier [kai.dallmeier@kuleuven.be]
Sent: 8/26/2020 5:17:39 PM
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Subject: Re: Review in Nature

Dear Cesar

Many thanks for sharing the prefinal version of the MS and the reviewers comments.

Please see in the following some corrections and suggestion for the rebuttal/response to the Reviewers concerns.

Kind regards
Kai

Line 12: co-author's name should be Michael Schotsaert
REF 41: first author's name should be Sanchez-Felipe

Some suggestions for Q-2 of Reviewer #1:

2- The authors did not critically discuss the comments regarding key outcome measures that should be assessed in the animal models. Based on data available in humans, what are the key immunologic tests that should be performed for comparative studies between species and as related to human immune responses (VN and ELISA antibodies are mentioned, but what about major cytokines, innate immune responses and T cell responses?)

Besides humoral immune responses to SARS-CoV-2 infections other biomarkers as established in current clinical practice (whole-blood count/lymphopenia, CRP, IL-6, computed tomography of the chest, etc.) have not been systematically evaluated in all the different pre-clinical models yet, partially in lack of reagents. A harmonised assessment of key biomarkers may be needed to evaluate and compare severity disease and mechanistic aspects of viral immunopathogenesis in the different endorsed models.

(Not fully sure where to put such a statement)

To Reviewer #2

5. Line 516: Please expand upon what the important implications of the 3-4 orders of magnitude difference in viral genome copy numbers and infectious titer are for evaluation of vaccines and therapeutics in animal models. What does the group think this difference means, what outcome measures should be followed and how should the data from animal models be interpreted? <Fitting also to Q1 and Q3 of Reviewer #1>

The group found that viral RNA/genome copy numbers measured by qPCR assays were three to four orders of magnitude higher than infectious virus titers measured by cell culture assays, as a likely consequence of both, (i) a higher sensitivity (a lower detection limit) of molecular methods versus virus titration, and (ii) a concomitant detection of viral RNA species (e.g. intracellular replicative intermediates) other than only those present in infectious virus particles by means of qPCR. These findings have important implications for the future evaluation of vaccines and therapeutics, in particular when aiming at defining stringent clinical endpoints such as virus clearance, or absence of virus shedding.

Likewise, currently only few drugs trialed or used off-label for the treatment of COVID-19 have been evaluated in preclinical models (REF 39,40). Defining future clinical candidates by use of less stringent endpoints (i.e. virus titer) in less stringent/relaxed preclinical models (e.g. mouse, ferret) poses the risk of overestimating their potency. Likewise, vaccine efficacy may not solely be judged based on a reduction of viral RNA loads, yet by the potency of a vaccine candidate to reduce infectious virus titers in the upper respiratory tract, or more directly, to which extent a vaccine candidate prevents horizontal SARS-CoV-2 transmission to co-housed sentinels.

Kai Dallmeier, PhD (Dr. rer. nat.)

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Sent: 26 August 2020 12:21

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Subject: Review in Nature

Dear all,

It is my pleasure to let you know that our review has been accepted in principle in Nature. There are however some last required modifications both from the editors and the reviewers. In order to address these final requests asap I would like to ask you to please make a final effort by helping me to address specific points as follows

(1) In the attachments you will find a document named 'Review_Comments2' Please check this doc. I have highlighted in red where input is needed either from the whole group or from specific authors. Please provide input and send back to me.

(2) Please take this opportunity to revise that your names and affiliations are correct.

I am attaching the last manuscript and table version for reference, but please at this point **do not make modifications in the ms!** If you spot something that needs to be changed please let me know indicating the specific lines.

We are almost there and, together with Bill and Simon, I would like to once more express our gratitude to the whole team for putting this together.

Best regards to all

César

From: Cesar Munoz-Fontela [munoz-fontela@bnitm.de]
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To: Randy Albrecht [randy.albrecht@mssm.edu]; andersen@bioqual.com; Ralph Baric [rbaric@email.unc.edu]; Miles Carroll [miles.carroll@phe.gov.uk]; 秦川 [qinchuan@pumc.edu.cn]; Crozier, Ian (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8730a536d2c64480b554c36ac8fc2998-HHS-ian.cro]; Kai Dallmeier [kai.dallmeier@kuleuven.be]; dewaal@viroclinics.com; De Wit, Emmie (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0995c7cc65ea4f0ba5e81bfc8b73e271-HHS-Emmie.d]; leen.delang@kuleuven.be; Erik Dohm [edohm@uab.edu]; Duprex, Paul [pduprex@pitt.edu]; Darryl Falzarano [darryl.falzarano@usask.ca]; Finch, Courtney L (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=874d23c0b64b4c4b8a97a78a6d6804c5-HHS-courtne]; Matthew Frieman [MFrieman@som.umaryland.edu]; Graham, Barney S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=973d6f4da1a94dad93621a6b52be9059-HHS-bgraham]; Lisa E Gralinski [lgralins@email.unc.edu]; guilfoyle@viroclinics.com; B. Haagmans [b.haagmans@erasmusmc.nl]; Geraldine Hamilton [geraldine.hamilton@emulatebio.com]; hartman2@pitt.edu; s.herfst@erasmusmc.nl; suzanne.kaptein@kuleuven.be; klimstra@pitt.edu; KNEZEVIC, Ivana [knezevici@who.int]; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Kuhn, Jens H (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b8ad971e5e2465e9597f4d70823da1f-HHS-kuhnjen]; Roger Le [roger.le-grand@cea.fr]; Dr. Mark Lewis [mlewis@bioqual.com]; Wen-chun Liu [wen-chun.liu@mssm.edu]; Pauline Maisonnasse [pauline.maisonnasse@cea.fr]; MCELROYA@pitt.edu; Munster, Vincent J (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ac6fbeee4f524312982918e77a2c5f7c-HHS-vincent]; Nadia Oreshkova [nadia.oreshkova@wur.nl]; Angela Rasmussen [alr2105@cumc.columbia.edu]; joana.rochapereira@kuleuven.be; B. Rockx [b.rockx@erasmusmc.nl]; Estefania Bni [estefania.rodriguez@bnitm.de]; Thomas Rogers [trogers@scripps.edu]; Javier Salguero [javier.salguero@phe.gov.uk]; Michael Schotsaert [michael.schotsaert@mssm.edu]; Koert Stittelaar [stittelaar@viroclinics.com]; hendrikjan.thibaut@kuleuven.be; sktseng@utmb.edu [sktseng@UTMB.EDU]; Vergara, Julia [julia.vergara@irta.cat]; Martin Beer [Martin.Beer@fli.de]; Trevor Brasel [trbrasel@utmb.edu]; jfwchan [jfwchan@hku.hk]; Adolfo Garcia-Sastre [adolfo.garcia-sastre@mssm.edu]; Johan Neyts [johan.neyts@kuleuven.be]; Stanley Perlman [stanley-perlman@uiowa.edu]; Douglas Reed [dsreed@pitt.edu]; Juergen Richt [jricht@vet.k-state.edu]; Chad Roy [croy@tulane.edu]; Quim Segales [joaquim.segales@irta.cat]; Vasan Vasan [vasan.vasan@csiro.au]
Subject: Review in Nature
Attachments: Review_Comments2.docx; WHO_COM review.docx; WHO COM Supp Table 1.xlsx

Dear all,

It is my pleasure to let you know that our review has been accepted in principle in Nature. There are however some last required modifications both from the editors and the reviewers. In order to address these final requests asap I would like to ask you to please make a final effort by helping me to address specific points as follows

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We are almost there and, together with Bill and Simon, I would like to once more express our gratitude to the whole team for putting this together.

Best regards to all

César

Editorial comments

(3) End the review with a forward-looking Outlook (**Dan**)

Reviewer comments

Reviewer 1

1- Although the authors discuss the suitabilities of the animal models for various studies, they did not directly answer the question if some of the routine treatments currently implemented in patients (dexamethasone, antibiotics, multiple drugs) or co-infections may prolong shedding or affect outcomes, so some discussion of the possible testing of the impact of these factors in the most relevant animal models is germane. (**ALL**)

2- The authors did not critically discuss the comments regarding key outcome measures that should be assessed in the animal models. Based on data available in humans, what are the key immunologic tests that should be performed for comparative studies between species and as related to human immune responses (VN and ELISA antibodies are mentioned, but what about major cytokines, innate immune responses and T cell responses?). (**ALL**)

3- Although the authors noted that viral infectivity titers in cell culture are much lower than viral RNA detected by RT-PCR, the issue remains how to validate shedding of infectious virus and potential for virus transmission. This is a critical question for vaccine induced protection against viral shedding/transmission so an indication on how to measure this is important. Maybe this requires animal transmission studies to assess viral infectivity based on viral RNA levels? (**Randy/Input from ALL welcomed, see also Q from Reviewer 2**)

4) The authors discussed only very briefly in silico data from 2 studies based on ACE2 to predict if certain species are susceptible to COVID-19 vs the experimental data. Other relevant references should be included and discussed. (**Simon**)

5) Bats are central to SARS-CoV-2 spillover and human infections and fruit bat studies are summarized. What about studies in Rhinolopus bats (or their cells) that harbor SARS-like CoVs? (**Martin**)

Specific comments.

6) line 393-. The authors should add the data about the COVID-19 outbreak and culling of mink in Spain which further demonstrates how susceptible mink appear to be (**Nadia/Quim**).

7) lines 423-427. For cats and dogs, although they may not be an optimal animal model for COVID-19, monitoring SARS-CoV-2 antibody seroprevalence in them should be stressed as a way to assess their susceptibility and potential as inadvertent hosts/reservoir in areas with a high density of human cases) (**Martin/Jürgen**)

Reviewer 2

5. Line 516: Please expand upon what the important implications of the 3-4 orders of magnitude difference in viral genome copy numbers and infectious titer are for evaluation of vaccines and therapeutics in animal models. What does the group think this difference means, what outcome measures should be followed and how should the data from animal models be interpreted? (**ALL**)

Animal Models for COVID-19

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124 **Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiological agent**
125 **of coronavirus disease 2019 (COVID-19), an emerging respiratory infection caused by**
126 **introduction of a novel coronavirus into humans in late 2019 in China's Hubei province.**
127 **As of July 24, 2020, SARS-CoV-2 has spread to 215 countries, has infected more than 16**
128 **million people, and has caused more than 640,000 deaths. Since humans do not have**
129 **pre-existing immunity against SARS-CoV-2, there is an urgent need to develop**
130 **therapeutics and vaccines to mitigate the current pandemic and to prevent the re-**
131 **emergence of COVID-19 in the future. In February 2020 the World Health Organization**
132 **(WHO) assembled an international panel of experts to develop animal models for COVID-**
133 **19 to accelerate testing of vaccines and therapeutics. This review summarizes the**
134 **findings to date and provides relevant information for preclinical testing of COVID-19**
135 **vaccine candidates and therapeutics.**

136

137 Although there are discrepancies in the estimated case-fatality ratio (CFR) of COVID-19 in
138 humans, it is clear that severity is age-stratified and that the CFR in patients over 65 years of
139 age is likely higher than 1% [ADDIN PAPERS2_CITATIONS
140 <citation><priority>0</priority><uuid>CD933F0D-A31A-4051-87F6-
141 7DB194E4D942</uuid><publications><publication><subtype>400</subtype><title>Estimates
142 of the severity of coronavirus disease 2019: a model-based
143 analysis.</title><url>https://linkinghub.elsevier.com/retrieve/pii/S1473309920302437</url><re
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147 accepted_date><submission_date>99202003101200000000222000</submission_date><doi

[PAGE]

148 >10.1016/S1473-3099(20)30243-7</doi><institution>MRC Centre for Global Infectious
149 Disease Analysis, Abdul Latif Jameel Institute for Disease and Emergency Analytics, and
150 Department of Infectious Disease Epidemiology, Imperial College London, London,
151 UK.</institution><bundle><publication><title>The Lancet infectious
152 diseases</title><uuid>F4161330-87A7-445F-824D-5630C2B4C24F</uuid><subtype>-
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155 me>Robert</firstName></author><author><lastName>Okell</lastName><firstName>Lucy</fi
156 rstName><middleNames>C</middleNames></author><author><lastName>Dorigatti</lastNa
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166 uthor><lastName>Griffin</lastName><firstName>Jamie</firstName><middleNames>T</midd
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187 or><lastName>Ferguson</lastName><firstName>Neil</firstName><middleNames>M</middl
188 eNames></author></authors></publication></publications><cites></cites></citation>].

189 Initially, infection with SARS-CoV-2 is characterized by a range of mild symptoms, including
190 fever, cough, dyspnea and myalgia [ADDIN PAPERS2_CITATIONS
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205 /firstName></author><author><lastName>Kang</lastName><firstName>Rui</firstName></au
206 thor></authors><editors><author><lastName>Hobman</lastName><firstName>Tom</firstNa
207 me><middleNames>C</middleNames></author></editors></publication></publications><cite
208 s></cites></citation>]. Partly these are caused by the capacity of SARS-CoV-2 to replicate
209 efficiently in the upper respiratory tract. While most patients subsequently resolve the infection,
210 the disease may also progress to severe pneumonia. In severe cases, bilateral lung
211 involvement with ground-glass opacities are the most common chest computed tomography
212 (CT) findings. Disease progression can then involve acute respiratory distress syndrome
213 (ARDS), and in some cases an inflammatory syndrome resembling septic shock. Histological
214 examination of the lungs of patients showed bilateral diffuse alveolar damage (DAD),
215 pulmonary edema and hyaline membrane formation [ADDIN PAPERS2_CITATIONS
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227 COVID-19 is also characterized by damage to other organ systems associated with
228 coagulopathy and characterized by elevated fibrinogen and D-dimer levels, indicating
229 increased thrombus generation and fibrinolysis [ADDIN PAPERS2_CITATIONS
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239 Health Science Centre at Tyler, Tyler, Texas; Texas Lung Injury Institute, University of Texas
240 Health Science Centre at Tyler, Tyler, Texas; Department of Anesthesiology and Perioperative
241 Medicine, Division of Molecular and Translational Biomedicine, Pulmonary Injury and Repair
242 Center, School of Medicine, University of Alabama at Birmingham, Birmingham, Alabama; and
243 Department of Medicine and Anesthesia, University of California San Francisco, San Francisco,

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253 ation>]. Those at higher risk of severe COVID-19 are individuals with underlying conditions
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255 disease [ADDIN PAPERS2_CITATIONS <citation><priority>4</priority><uuid>28A70BAB-
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306 Through the 'Solidarity' trials, the WHO has launched a global campaign to test therapeutics
307 and vaccines on an unprecedented scale [ADDIN PAPERS2_CITATIONS
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321 Name>John</firstName></author></authors></publication></publications><cites></cites></ci
322 tation>]. In order to test these and other potential medical countermeasures, it is imperative to
323 identify animal models for COVID-19 that provide measurable readouts for potential
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ame>Seshadri</firstName><middleNames>S</middleNames></author></authors></publicati
on></publications><cites></cites></citation>]. To this end, the WHO R&D Blueprint team
established an *ad hoc* expert working group focused on COVID-19 disease modelling (WHO-
COM). In this review we provide a summary of the current literature on COVID-19 animal
models (Supplementary Table 1), including studies generated by the WHO-COM group since
February 2020, which we hope will serve to facilitate further preclinical analysis of vaccines and
therapeutics.

361

362 **Mouse Models**

363

364 The main impediment for SARS-CoV-2 infection of murine cells is the lack of appropriate
365 receptors to initiate viral infection. SARS-CoV-2, like SARS-CoV, uses the cellular surface
366 protein angiotensin-converting enzyme 2 (ACE2) to bind and enter cells, and murine ACE2
367 does not effectively bind the viral spike protein [ADDIN PAPERS2_CITATIONS
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381 me>Yushun</firstName></author><author><lastName>Shang</lastName><firstName>Jian</
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383 ></author><author><lastName>Baric</lastName><firstName>Ralph</firstName><middleNa
384 mes>S</middleNames></author><author><lastName>Li</lastName><firstName>Fang</first
385 Name></author></authors></publication></publications><cites></cites></citation>]. To solve
386 this problem some strategies have been developed as follows:
387

388 *Virus adaptation to mACE2*

389 The spike protein of SARS-CoV-2 can be modified to gain effective binding to murine ACE2.

390 One strategy is sequential passaging of SARS-CoV-2 in mouse lung tissue [ADDIN

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403 >Hongjing</firstName></author><author><lastName>Chen</lastName><firstName>Qi</first

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423 astName>Han</lastName><firstName>Gencheng</firstName></author><author><lastName
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425 me><firstName>Xiaojun</firstName></author><author><lastName>Geng</lastName><firstN
426 ame>Shusheng</firstName></author><author><lastName>Sheng</lastName><firstName>Xi
427 aoli</firstName></author><author><lastName>Jiang</lastName><firstName>Shibo</firstNa
428 me></author><author><lastName>Sun</lastName><firstName>Shihui</firstName></author>
429 <author><lastName>Qin</lastName><firstName>Cheng-
430 Feng</firstName></author><author><lastName>Zhou</lastName><firstName>Yusen</firstN
431 ame></author></authors></publication></publications><cites></cites></citation>]. This
432 method is successful because RNA virus populations consist of a mutant swarm of closely
433 related viral quasispecies. Rare viruses in the swarm containing spike mutations that increase
434 their binding affinity to murine ACE2 are expected to be selected due to their higher levels of
435 replication in murine lungs. Alternatively, mouse adaptation of SARS-CoV-2 can be achieved

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436 using reverse genetics to modify the receptor-binding domain (RBD) of the virus so that it can
437 infect murine cells via the mouse ACE2 protein. Using these approaches, mice were sensitized
438 for infection but developed very mild disease [ADDIN PAPERS2_CITATIONS
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466 yant</lastName><firstName>Matthew</firstName><middleNames>D</middleNames></autho
467 r><author><lastName>Choong</lastName><firstName>Ingrid</firstName><middleNames>C
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471 e>Sheahan</lastName><firstName>Timothy</firstName><middleNames>P</middleNames>
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474 on>]. It is likely that additional efforts aimed at mouse-adaptation will result in the outgrowth of
475 additional virus variants that can cause more severe disease. These mice will be useful for
476 pathogenesis studies and for studies of antivirals and vaccines. One potential caveat is that the
477 mutations in the SARS-CoV-2 spike protein that enhance affinity for the mouse ACE2 receptors
478 are located in the receptor binding domain, the primary target for the neutralizing antibody
479 response. These mutations could result in a wild type virus neutralizing mAb being falsely
480 considered non-neutralizing.

481

482 *Expression of human ACE2 in genetically modified mice*

483 A different approach consists of modifying the mice to express hACE2. There are currently
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823]. However, more severe disease is expected to occur in hACE2 knock-in mice if virus is
824 passaged serially through mouse lungs. Overall, these mice will probably be very useful models
825 of human disease especially if combined with viral adaptation that increases virulence of SARS-
826 CoV-2 in mice.

827

828 Finally, instead of permanent genetic modification, it is also possible to generate mice
829 susceptible to SARS-CoV-2 infection by sensitizing the respiratory tract of these animals to
830 SARS-CoV-2 replication through transduction with adenovirus (Ad5) or adeno-associated virus
831 (AAV) expressing hACE2. This system, pioneered for MERS studies [ADDIN
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857 middleNames></author><author><lastName>Perlman</lastName><firstName>Stanley</first
858 Name></author></authors></publication></publications><cites></cites></citation>], allows
859 transient replication of SARS-CoV-2 in lungs of mice for several days until immune clearance,
860 and it has the advantage that it can be applied quickly to different strains of mice. Upon infection
861 with SARS-CoV-2, Ad5-*hACE2* mice develop a widespread infection of the lungs and
862 histopathological changes consistent with a viral pneumonia. Mice developed clinical disease
863 characterized by changes in body scoring (hunching) and weight loss. Virus is generally cleared
864 by 7 days after infection, although not in some immunocompromised mice [ADDIN
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sensitized mice are useful for evaluating vaccines and antiviral therapies, as well identifying
SARS-CoV-2-specific antibody and T cell epitopes. A limitation with these mice, as well as in
some of the transgenic hACE2 mice, is that hACE2 is expressed ectopically, which may change
the tissue or cellular tropism of the virus.

957

958 *Other mouse models and approaches*

959 Additional ongoing efforts to develop mouse models for SARS-CoV-2 infection studies involve
960 mice humanized with hACE2 and human hematopoiesis, and Collaborative-Cross (CC) mouse
961 studies. Mice transplanted with human immune cells or human immune system (HIS) mice,
962 have been widely used to study human-specific viral infections [ADDIN PAPERS2_CITATIONS

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1009 astName>Ploss</lastName><firstName>Alexander</firstName></author></authors></publica
1010 tion></publications><cites></cites></citation>] and the combination of HIS and ACE2

expression could help to further explore the efficacy of vaccines and therapies, in particular those that modulate human immune cells. Similarly, previous studies using the CC model of genetic diversity, a panel of recombinant inbred mice with expanded susceptibility to viruses that normally do not cause disease in laboratory mice can be used to enhance virus disease susceptibility, however, infection remains heavily dependent on a functional entry receptor

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1125 n>]. Presumably, CC studies could enable exploration of an expanded range of SARS-CoV-2
1126 phenotypes in mice that potentially better recapitulate human disease, as mouse adapted
1127 strains become available.

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1129 In summary, a variety of murine models for mild and severe COVID-19 have been described,
1130 or are under development. All will be useful for vaccine and antiviral evaluation and some share

1131 features with the human disease. No murine model at present recapitulates all aspects of
1132 human COVID-19, especially unusual features such as the pulmonary vascular disease and
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1286 Name><firstName>Danny</firstName></author></authors></publication></publications><cite
1287 s></cites></citation>]. However, continued refinement may eventually result in models for even
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1290 **Syrian Hamster Model**

1291

1292 Syrian hamsters (*Mesocricetus auratus*) are small mammals that have been used as animal
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 1417] suggested that Syrian hamsters might be susceptible to SARS-CoV-2 infection. Indeed, upon
 1418 experimental intranasal infection, Syrian hamsters show mild to moderate disease with

1419 progressive body weight loss starting very early after infection (days 1-2 post-inoculation). All
1420 animals challenged by different groups and with different SARS-CoV-2 isolates consistently
1421 showed respiratory signs, including labored breathing [ADDIN PAPERS2_CITATIONS
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 1560]. After two weeks of infection, hamsters typically recovered. Of particular interest is the fact
 1561 that SARS-CoV-2 infection in hamsters reflect some of the demographic differences of COVID-
 1562 19 in humans. Thus, aged hamsters as well as male hamsters seem to develop a more severe

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1633

1634 SARS-CoV-2 disease in hamsters is associated with high levels of virus replication and
1635 histopathological evidence of disease, which included ground glass opacities and evidence of
1636 gas in the cavity surrounding the lungs [ADDIN PAPERS2_CITATIONS
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1709 tract and other tissues, such as the small intestine, which could be useful for the evaluation of
1710 therapeutics and vaccines. Virus transmission to cage mates has also been observed [ADDIN
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1754], suggesting that hamsters could be useful in transmission studies. Histologically, inflammatory
1755 infiltrates with abundant viral antigen expression and apoptosis were observed in the upper and
1756 lower respiratory tract starting at 2 days post-infection (dpi), being most severe at 4 dpi and
1757 resolving at 14 dpi. Among the non-respiratory tract tissues, only the intestine demonstrated
1758 viral antigen expression in association with severe epithelial cell necrosis, damaged and
1759 deformed intestinal villi, and increased *lamina propria* mononuclear cell infiltration. Lung
1760 disease was also demonstrated by CT. High-resolution micro-CT scans showed airway dilation
1761 and significant consolidations in the lungs of infected hamsters [ADDIN
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1815 quantitative analysis revealed an increase of the non-aerated lung volume in these hamsters.
1816 This method thus allows quantitative monitoring of disease without the need of euthanizing the
1817 animals.
1818
1819 Expression of chemokines/cytokines in the lungs of hamsters peaked at 4 dpi and then
1820 gradually resolved at 7 dpi. Interferon-γ and proinflammatory chemokines/cytokines were
1821 potently induced at 2 dpi and 4 dpi and dropped to the baseline level at 7 dpi. SARS-CoV-2
1822 induced lung pathology in hamsters appears to be driven by immune pathology, as lung injury
1823 at 4 dpi is markedly reduced in STAT2 knockout hamsters while viral loads are massively
1824 increased and viral RNA disseminated in multiple peripheral tissues [ADDIN
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1878 neutralizing antibodies were detected as early as 7 dpi. Passive immunization of naïve
1879 hamsters with these convalescent serum samples resulted in significantly reduced respiratory
1880 tract viral loads but no obvious improvement in clinical signs and histological changes.
1881 Furthermore, SARS-CoV-2 can be transmitted between hamsters via close contact and non-
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Since studies in hamsters can be completed quickly and in a cost-effective manner, there is an
increasing interest in the use of this model for screening of therapeutics. Until now, lack of/or
limited efficacy was demonstrated for the re-purposed drugs hydroxychloroquine (with or
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2158 dleNames>G</middleNames></author><author><lastName>Burton</lastName><firstName>
2159 Dennis</firstName><middleNames>R</middleNames></author></authors></publication></p
2160 ublications><cites></cites></citation>]. A putative caveat of the model is the lack of research
2161 tools for this species which are still scarce compared for example with those for mice.

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2163 **Ferret Models**

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2165 Ferrets (*Mustela putorius furo*) have been shown to be a highly valuable model to test
2166 pathogenicity and transmission of human respiratory viruses, including influenza virus and
2167 respiratory syncytial virus (RSV) [ADDIN PAPERS2_CITATIONS
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citation>]. It is thus not surprising that the ferret model has been investigated for studies of
COVID-19 pathogenesis and SARS-CoV-2 transmission. Despite the use of different isolates
of SARS-CoV-2, the results have been remarkably consistent across all laboratories.

Following mucosal exposure with SARS-CoV-2, clinical alterations in ferrets are undetectable
or mild and may include lethargy, nasal discharge, wheezing, oropharyngeal mucus buildup,
sneezing, and loose stool [ADDIN PAPERS2_CITATIONS
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2241 elevated body temperatures have been observed in some studies, although alterations in body
2242 weight are absent or minimal. Minor alterations in hematological parameters such as mild
2243 lymphopenia and neutrophilia have also been observed. SARS-CoV-2 virus shedding is
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2410 ublications><cites></cites></citation>]. As with Syrian hamsters, virus replication is detected in
2411 the upper respiratory tract very early after infection (day 2) and is detectable during two weeks
2412 of infection. Virus replication in ferrets appears to be restricted to the respiratory and GI tracts
2413 (Table 1).

2414

2415 The predominant histopathology findings in SARS-CoV-2 infected ferrets euthanized at the
2416 peak of virus replication include mixed (pyogranulomatous or eosinophilic and histiocytic)
2417 inflammation within alveolar spaces and perivascular mononuclear inflammation. In addition,
2418 in the larger airways of these animals, bronchial submucosal granulomatous foci with
2419 eosinophilic material and collagen fragments (suggesting collagen degeneration) were
2420 observed. Microscopic findings in euthanized animals were mild and included bronchoalveolar
2421 or alveolar inflammation.

2422

2423 Ferrets also are able to transmit virus efficiently to uninfected animals in experimental settings.
2424 Efficient transmission occurred from experimentally infected ferrets to naïve cage mates;
2425 transmission from exposed ferrets to companion animals that were separated by steel grids did

2426 occur but was not efficient [ADDIN PAPERS2_CITATIONS
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2476 tName></author></authors></publication></publications><cites></cites></citation>]. These
2477 studies indicated that airborne transmission of SARS-CoV-2 can occur, and suggested that the
2478 ferret model may be useful for further transmission studies.

2479

2480 Studies performed to date strongly indicate that experimental SARS-CoV-2 infection in ferrets
2481 results in a predominantly upper respiratory tract infection. These findings make the ferret
2482 model especially suited to test the efficacy of mucosal vaccines and therapeutics aimed to
2483 prevent upper airway infection and/or transmission.

2484

2485 Non-Human Primate Models

2486

2487 Non-human primate models have been explored for COVID-19 in rhesus macaques,
2488 cynomolgus macaques, and African green monkeys. Studies from several laboratories have
2489 shown high levels of viral replication, including both viral RNA and infectious virus, in both the
2490 upper and lower respiratory tract, pathologic features of viral pneumonia, and variable induction
2491 of mild clinical disease [ADDIN PAPERS2_CITATIONS
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2689 clinical disease has been reported in nonhuman primates, and insufficient comparable data

exists at this time to determine if there is more clinical disease in rhesus macaques, cynomolgus macaques, or African green monkeys. Induction of innate, humoral and cellular immune responses as well as robust protection against re-challenge has also been reported, demonstrating induction of natural protective immunity in this model [ADDIN PAPER_S2_CITATIONS <citation><priority>37</priority><uuid>1EDE93F0-74B7-4DA7-A237-D24FD1C4C046</uuid><publications><publication><subtype>400</subtype><publisher>American Association for the Advancement of Science</publisher><title>SARS-CoV-2 infection protects against rechallenge in rhesus macaques.</title><url>https://www.sciencemag.org/lookup/doi/10.1126/science.abc4776</url><publication_date>99202005201200000000222000</publication_date><uuid>490CDDE6-79D5-4E92-BDAF-680090905437</uuid><type>400</type><accepted_date>99202005161200000000222000</accepted_date><submission_date>99202004261200000000222000</submission_date><doi>10.1126/science.abc4776</doi><institution>Center for Virology and Vaccine Research, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA 02215, USA.</institution><startpage>eabc4776</startpage><bundle><publication><title>Science</title><uuid>C631EE1A-87A6-469B-889C-42C04832B9B8</uuid><subtype>-100</subtype><publisher>American Association for the Advancement of Science</publisher><type>-100</type></publication></bundle><authors><author><lastName>Chandrashekar</lastName><firstName>Abishek</firstName></author><author><lastName>Liu</lastName><firstName>Jinyan</firstName></author><author><lastName>Martinot</lastName><firstName>Amanda</firstName><middleNames>J</middleNames></author><author><lastName>McMahan</lastName><firstName>Katherine</firstName></author><author><lastName>Mercado</lastName>

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route mucosal, intrabronchial, or aerosol exposure routes showed radiographic abnormalities
(chest X-ray, CT scan, or 18FDG-PET scan) within two days that tended to resolve by days 11-
15 post-infection. Evidence of live virus shedding has been found in both the respiratory and
GI tract. In addition, hematological changes with evidence of T cell activation, mild lymphopenia
and neutrophilia may be observed in infected NHPs.

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Infection with SARS-CoV-2 in the elderly is also associated with adverse clinical outcome.
Currently, two NHP studies in rhesus and cynomolgus macaques have focused on the effect of
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 2866 showed that aged animals shed virus from nose and throat for longer compared to young adult
 2867 animals. In rhesus macaques, higher viral loads were also detected in lung tissue of aged
 2868 animals. In addition, advanced age in rhesus macaques was also associated with increased
 2869 radiological and histopathological changes. These studies highlight the importance of including
 2870 age in the selection criteria of animals, as testing treatment options for severe disease require
 2871 animal models that recapitulate the disease seen in humans.
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 2873 Recent studies have reported the immunogenicity and protective efficacy of prototype
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2990 resulted in substantial reductions of viral replication in the lower respiratory tract, and to a lesser
2991 extent the upper respiratory tract, following SARS-CoV-2 challenge. These findings raise the
2992 possibility that vaccines may be more effective at blocking lower respiratory tract disease
2993 compared with upper respiratory tract disease. Anamnestic immune responses were observed
2994 following challenge, even in animals that had no virus detected after SARS-CoV-2 challenge,
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3072 **Additional Animal Models**

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3075 The mink (*Neovison vison*), which is listed in the zoological family Mustelidae, was shown

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3160 ></authors></publication></publications><cites></cites></citation>]. In contrast to ferrets,
3161 minks displayed moderate respiratory signs which included labored breathing, and some
3162 animals died as a result of infection. SARS-CoV-2 virus was found in the majority of throat and
3163 rectal swabs, collected from dead animals from both farms. Similar to ferrets, the viral loads in
3164 mink were higher in the throat swabs than in the rectal swabs. While minks may represent a
3165 suitable model for moderate to severe COVID-19, these animals are difficult to handle under
3166 laboratory conditions.

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3169 *Cats*

3170 Three experiments so far have demonstrated that domestic cats (*Felis catus*) are highly
3171 susceptible to SARS-CoV-2 infection, and are able to transmit the virus to naïve contact cats
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3252 ard</firstName><middleNames>A</middleNames></author></authors></publication></public
3253 ations><cites></cites></citation>]. For example, the inoculation of the Chinese SARS-CoV-2
3254 isolate CTan-H through the intranasal route into juvenile (70-100 days old) and subadult cats
3255 (6-9 months old) resulted in virus replication in the upper and lower respiratory tract as well as
3256 the GI tract. Both experimentally infected and contact cats seroconverted. At necropsy,
3257 interstitial pneumonia, loss of cilia and epithelial necrosis as well as inflammation in nasal
3258 turbinates and trachea were observed. The authors did not describe clinical signs in any of the
3259 infected cats, except that two juvenile cats (out of 10 total) died on day 3 and 13 post-infection
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turbinate, necrotic debris in the tonsil, submucosal glands of the trachea and enterocytes of
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3333 tName>Bu</lastName><firstName>Zhigao</firstName></author></authors></publication></p
3334 ublications><cites></cites></citation>]. While cats may represent a suitable model for
3335 asymptomatic to moderate COVID-19, the benefits should outweigh the concerns of using
3336 companion animals for research; also, cats are rather difficult to handle in biosafety level 3
3337 (BSL-3) containment and are not a standard animal model. However, due to their close contact

3338 to humans, additional studies e.g. on environmental contamination (cages, beds, food/water
3339 bowls, litterboxes, etc.) or transmission efficiency studies may be important to inform veterinary
3340 and public health authorities about the risk of cats as intermediate hosts/virus carriers in the
3341 SARS-CoV-2 human-animal interface.

3342

3343 *Dogs*

3344 Dogs (*Canis lupus familiaris*) have been shown to be susceptible to SARS-CoV-2, but to a very
3345 mild degree. Two experiments so far have been published in this species, concluding that dogs
3346 have a low susceptibility to the SARS-CoV-2 infection [ADDIN PAPERS2_CITATIONS
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3405 ations><cites></cites></citation>].

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3407 *Pigs*

3408 *In silico* data suggested that swine ACE2 should bind the SARS-CoV-2 spike protein. However,
3409 several experimental infections performed in pigs (*Sus scrofa domesticus*) by different research

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3410 groups indicate that this species is not susceptible to SARS-CoV-2 infection in vivo [ADDIN
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clinical signs and no clear evidence of virus replication have been observed in pigs. Therefore,
pigs do not appear to represent a suitable animal model for COVID-19. Conversely, previous
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3586 Therefore, due to their importance as livestock species and the enormous global number of
3587 pigs, it may be still important for future studies to address the putative susceptibility of additional
3588 pig breeds to SARS-CoV-2 infection.

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3590 *Chickens and Ducks*

3591 At least one in silico study using the informational spectrum methodology proposed chicken as
3592 a potential susceptible animal species for SARS-CoV-2 infection [ADDIN
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3612 ites></citation>]. However, the limited experimental studies performed so far have suggested
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3672 chicken nor ducks appear to represent suitable animal models for SARS-CoV-2 infection
3673 studies. These findings are similar to those previously reported for SARS-CoV infection, in

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Fruit bats

Bats are regarded as the natural reservoir of many coronaviruses including SARS-CoV and SARS-CoV-2 [ADDIN PAPERS2_CITATIONS <citation><priority>64</priority><uuid>707DA9D7-2543-4858-A00C-36C3835A1E52</uuid><publications><publication><subtype>400</subtype><publisher>American Association for the Advancement of Science</publisher><title>Bats Are Natural Reservoirs of SARS-Like Coronaviruses</title><url>https://www.sciencemag.org/lookup/doi/10.1126/science.1118391</url><volume>310</volume><publication_date>99200510281200000000222000</publication_date><uuid>83CBA667-52D0-4E6F-8B71-44878347938B</uuid><type>400</type><number>5748</number><doi>10.1126/science.1118391</doi><institution>Institute of Zoology, Chinese Academy of Sciences (CAS), Beijing, China.</institution><startpage>676</startpage><endpage>679</endpage><bundle><publication><title>Science</title><uuid>C631EE1A-87A6-469B-889C-42C04832B9B8</uuid><subtype>-100</subtype><publisher>American Association for the Advancement of Science</publisher><type>-100</type></publication></bundle><authors><author><lastName>Li</lastName><firstName>Wendong</firstName></author><author><lastName>Shi</lastName><firstName>Zhengli</firstName></author><author><lastName>Yu</lastName><firstName>Meng</firstName></author><author><lastName>Ren</lastName><firstName>Wuze</firstName></author><author><lastName>Smith</lastName><firstName>Craig</firstName></author><author><lastName>Ep

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me><firstName>Robert</firstName><middleNames>F</middleNames></author></authors></
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(*Rousettus aegyptiacus*) with SARS-CoV-2 resulted in efficient replication in the upper
respiratory tract and seroconversion in 7 out of 9 animals. Transmission occurred to one out of
3 direct contact animals. Clinical signs were absent, but rhinitis could be detected by
immunohistology [ADDIN PAPERS2_CITATIONS
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tName></author></authors></publication></publications><cites></cites></citation>].
Conversely, previous studies showed that a SARS-like coronavirus did not replicate in fruit bats
after experimental inoculation [ADDIN PAPERS2_CITATIONS
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These findings suggest that, although *Rousettus* bats are not the original reservoir species of
SARS-CoV-2, experimental infection of these fruit bats could help to model the physiopathology
of the virus in its host.

3814

3815 Preclinical Alternatives to Animal Models

3816

Historically animal alternatives for studying respiratory viruses have involved in vitro approaches such as cell lines (e.g. Vero cells, A549, MDCK) or primary tissue-derived human cells in conventional cell culture. However, over the past decade advances in engineering, cell biology, and microfabrication have come together to enable development of new human cell-based alternatives to animal models. In this regard, microengineered organs-on-chips and lung organoids have been shown to support key hallmarks of the cytopathology and inflammatory responses observed in human airways after infection with SARS-CoV-2 and have served to study human disease pathogenesis and test new candidate COVID-19 therapeutics and expedite drug repurposing [ADDIN PAPERS2_CITATIONS <citation><priority>49</priority><uuid>B9B80950-28A2-4F62-95F0-AFEF80FAD1EA</uuid><publications><publication><subtype>400</subtype><title>Identification of Candidate COVID-19 Therapeutics using hPSC-derived Lung Organoids.</title><url>http://biorxiv.org/lookup/doi/10.1101/2020.05.05.079095</url><publication_date>99202005051200000000222000</publication_date><uuid>850A6E23-0577-405E-90C3-7CE1A6C006C7</uuid><type>400</type><doi>10.1101/2020.05.05.079095</doi><institution>bioRxiv</institution><bundle><publication><title>bioRxiv</title><uuid>4E76F876-D9CB-438C-8EE8-C3BF8449F944</uuid><subtype>-100</subtype><publisher>Cold Spring Harbor Labs Journals</publisher><type>-100</type></publication></bundle><authors><author><lastName>Han</lastName><firstName>Yuling</firstName></author><author><lastName>Yang</lastName><firstName>Liuliu</firstName></author><author><lastName>Duan</lastName><firstName>Xiaohua</firstName></author><author><lastName>Duan</lastName><firstName>Fuyu</firstName></author><author><lastName>Nilsson-

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3889 rs></publication></publications><cites></cites></citation>].

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3891 **Conclusions**

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3893 Since SARS-CoV-2 emerged in the human population in late 2019, it has spread via human-
3894 to-human transmission to most countries in the world, leading to a coronavirus pandemic of an
3895 unprecedented scale. Under the umbrella of the WHO, the WHO-COM is fostering the
3896 development of COVID-19 animal models through international exchange of protocols,
3897 unpublished data and ideas across many laboratories in the world. As discussed in this review,
3898 an important number of studies have been conducted, many of them by members of the WHO-
3899 COM, indicating that most of the animal models susceptible to infection with SARS-CoV-2 show
3900 mild clinical disease, while others do not support viral replication.

3901

3902 In studies based on the three dimensional X-ray structure of SARS-CoV-2 spike protein bound
3903 to human ACE2, Zhai et al discussed the variance observed between 19 different animal
3904 species as well as within three colonies of the same species of bat from different provinces
3905 within China. This analysis noted that many predicted ACE2 receptor affinities (especially dog
3906 and pig) did not match their relative natural resistance to SARS-CoV-2. This was proposed to
3907 be due to differences in the ACE2 expression levels between species in the respiratory
3908 epithelium [ADDIN PAPERS2_CITATIONS

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3935 authors><editors><author><lastName>Gallagher</lastName><firstName>Tom</firstName></

author></editors></publication></publications><cites></cites></citation>]. Similarly, a recent study aimed to predict the host range of SARS-CoV-2 by a comparative structural analysis of ACE2 in more than 400 vertebrates. These data show discrepancies between the predicted susceptibilities and those experimentally observed, with ferrets for example predicted to have very low susceptibility to infection [ADDIN PAPERS2_CITATIONS <citation><priority>69</priority><uuid>C2B3911A-E71C-4E08-A39F-6733909355DA</uuid><publications><publication><subtype>400</subtype><publisher>Cold Spring Harbor Laboratory</publisher><title>Broad Host Range of SARS-CoV-2 Predicted by Comparative and Structural Analysis of ACE2 in Vertebrates.</title><url>http://biorxiv.org/lookup/doi/10.1101/2020.04.16.045302</url><volume>24</volume><publication_date>99202004181200000000222000</publication_date><uuid>2648192A-AFEA-4AE9-8A9E-474821695566</uuid><type>400</type><doi>10.1101/2020.04.16.045302</doi><institution>The Genome Center, University of California Davis, Davis, CA 95616, USA.</institution><startpage>125</startpage><bundle><publication><title>bioRxiv</title><uuid>4E76F876-D9CB-438C-8EE8-C3BF8449F944</uuid><subtype>-100</subtype><publisher>Cold Spring Harbor Labs Journals</publisher><type>-100</type></publication></bundle><authors><author><lastName>Damas</lastName><firstName>Joana</firstName></author><author><lastName>Hughes</lastName><firstName>Graham</firstName><middleNames>M</middleNames></author><author><lastName>Keough</lastName><firstName>Kathleen</firstName><middleNames>C</middleNames></author><author><lastName>Painter</lastName><firstName>Corrie</firstName><middleNames>A</middleNames></author><author><lastName>Persky</lastName><firstName>Nicole</firstName><middleNames>S</middleNames></author><author><lastName>Corbo</lastName><firstName>

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3976 ></citation>]. These data suggest that susceptibility to infection may be a function of several
3977 factors, including genetic ACE2 composition, organ-specific ACE2 expression and other host
3978 factors such as additional receptors and host immune responses.

3979

3980 One immediate goal of the group is to evaluate whether mimicking human co-morbidities, co-
3981 infections or the immune senescence associated with age in these animal models may result
3982 in more severe disease phenotypes. The existing animal models have also been valuable for
3983 testing vaccines and therapeutics. Several vaccine candidates have shown protection in rhesus

3984 macaques [ADDIN PAPERS2_CITATIONS
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]. Many of the pathogenesis studies described in this review have also highlighted an important
caveat in COVID-19 research, which are the methods utilized to measure virus replication. The
group found that viral RNA/genome copy numbers measured by qPCR assays were three to
four orders of magnitude higher than infectious virus titers measured by cell culture assays.
These findings have important implications for the future evaluation of vaccines and
therapeutics.

There have been concerns that coronaviruses might pose a risk of vaccine-associated
enhanced respiratory disease (VAERD) or antibody-dependent enhancement (ADE) of virus
entry and replication in Fc receptor-bearing cells [ADDIN PAPERS2_CITATIONS
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Name>Barney</firstName><middleNames>S</middleNames></author></authors></publicati
on></publications><cites></cites></citation>]. These types of syndromes have been linked to
vaccines that induced substantial levels of non-neutralizing antibodies or type 2 helper CD4 T
cell (Th2) biased responses. Therefore, evaluating the relative potency of neutralizing activity
to overall binding antibody and obtaining evidence for CD4 T cell subset biased responses
through cytokine production or antibody subtype response patterns would be informative. To
ensure such models are able to provide these vital readouts, it is important to attempt to induce
VAERD in COVID-19 challenge models using suboptimal doses of candidate vaccines or
antigenic preparations specifically designed to induce the required detrimental immune profile
and associated lung pathology. Such studies are of high priority for the WHO-COM group, which
intends to provide some guidance on the potential for vaccine-elicited immunopathology. In
summary, the work presented here demonstrates that there are a number of potential small
and large animal models that investigators can utilize to explore important aspects of COVID-

4176 19, including mechanisms underlying the pathology, transmission, and host response to the
4177 infection as well as the safety and efficacy of potential therapeutics or vaccines.

4178

4179 Future studies should standardize challenge models to allow comparison of different vaccine
4180 candidates, and should establish animal models for assessing VAERD. In the context of
4181 VAERD, the establishment of a positive control allowing comparisons between different vaccine
4182 candidates in preclinical models is a high priority. Continued refinement and development of
4183 COVID-19 animal models will contribute to the development of vaccines, therapeutics, and
4184 other countermeasures.

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4372 **Table 1. SARS-CoV-2 infection in humans and in animal models.** This table illustrates the
 4373 main features of SARS-CoV-2 infection in animal models and whether these features are also
 4374 present in human COVID-19. NHP: Non-human primates; CNS: Central nervous system; GI:
 4375 gastro-intestinal; ARDS: Acute respiratory distress syndrome.

4376

4377 **Virus replication**

4378	[ADDIN PAPER\$2_CITATIONS <papers2_bibliography/>] Humans, mink, hamster, ferrets, NHP, minks, cats, bats	
4379	Other organs	Humans, hACE2 mice (CNS), hamsters, ferrets (GI tract), NHP (GI tract)

4380 **Clinical signs** [ADDIN PAPER\$2_CITATIONS <papers2_bibliography/>]

Fever	Humans, ferrets
Nasal discharge	Humans, ferrets
Labored breathing	Humans, hamsters

Pneumonia

Bilateral lung involvement	Humans, hamsters, NHP
Ground-glass opacities	Humans, hamsters, NHP
Focal edema, inflammation	Humans, hamsters, ferrets, NHP
ARDS	Humans

Transmission

Humans, hamsters, ferrets, cats, bats

Immunology

Seroconversion	Humans, hamsters, NHP, ferrets, bats, mice
Neutralizing Ab titers	Humans, hamsters, NHP, ferrets, mice

Demographics

More severe disease: males	Humans, hamsters
More severe disease: aged	Humans, hamsters, NHP

Document produced natively.

From: Cesar Munoz-Fontela [munoz-fontela@bnitm.de]
Sent: 8/26/2020 7:20:24 AM
To: Randy Albrecht [randy.albrecht@mssm.edu]; andersen@bioqual.com; Ralph Baric [rbaric@email.unc.edu]; Miles Carroll [miles.carroll@phe.gov.uk]; 秦川 [qinchuan@pumc.edu.cn]; Crozier, Ian (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8730a536d2c64480b554c36ac8fc2998-HHS-ian.cro]; Kai Dallmeier [kai.dallmeier@kuleuven.be]; dewaal@viroclinics.com; De Wit, Emmie (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0995c7cc65ea4f0ba5e81bfc8b73e271-HHS-Emmie.d]; leen.delang@kuleuven.be; Erik Dohm [edohm@uab.edu]; Duprex, Paul [pduprex@pitt.edu]; Darryl Falzarano [darryl.falzarano@usask.ca]; Finch, Courtney L (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=874d23c0b64b4c4b8a97a78a6d6804c5-HHS-courtne]; Matthew Frieman [MFrieman@som.umaryland.edu]; Graham, Barney S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=973d6f4da1a94dad93621a6b52be9059-HHS-bgraham]; Lisa E Gralinski [lgralins@email.unc.edu]; guilfoyle@viroclinics.com; B. Haagmans [b.haagmans@erasmusmc.nl]; Geraldine Hamilton [geraldine.hamilton@emulatebio.com]; hartman2@pitt.edu; s.herfst@erasmusmc.nl; suzanne.kaptein@kuleuven.be; klimstra@pitt.edu; KNEZEVIC, Ivana [knezevici@who.int]; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Kuhn, Jens H (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8b8ad971e5e2465e9597f4d70823da1f-HHS-kuhnjen]; Roger Le [roger.le-grand@cea.fr]; Dr. Mark Lewis [mlewis@bioqual.com]; Wen-chun Liu [wen-chun.liu@mssm.edu]; Pauline Maisonnasse [pauline.maisonnasse@cea.fr]; MCELROYA@pitt.edu; Munster, Vincent J (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ac6fb4ee4f524312982918e77a2c5f7c-HHS-vincent]; Nadia Oreshkova [nadia.oreshkova@wur.nl]; Angela Rasmussen [alr2105@cumc.columbia.edu]; joana.rochapereira@kuleuven.be; B. Rockx [b.rockx@erasmusmc.nl]; Estefania Bni [estefania.rodriquez@bnitm.de]; Thomas Rogers [trogers@scripps.edu]; Javier Salguero [javier.salguero@phe.gov.uk]; Michael Schotsaert [michael.schotsaert@mssm.edu]; Koert Stittelaar [stittelaar@viroclinics.com]; hendrikjan.thibaut@kuleuven.be; Chien-Te Tseng [sktseng@UTMB.EDU]; Vergara, Julia [julia.vergara@irta.cat]; Martin Beer [Martin.Beer@fli.de]; Trevor Brasel [trbrasel@utmb.edu]; jfwchan [jfwchan@hku.hk]; Adolfo Garcia-Sastre [adolfo.garcia-sastre@mssm.edu]; Johan Neyts [johan.neyts@kuleuven.be]; Stanley Perlman [stanley-perlman@uiowa.edu]; Douglas Reed [dsreed@pitt.edu]; Juergen Richt [jricht@vet.k-state.edu]; Chad Roy [croy@tulane.edu]; Quim Segales [joaquim.segales@irta.cat]; Vasan Vasan [vasan.vasan@csiro.au]
Subject: IMPORTANT!: Review in Nature

I forgot to ask you to please send me back your input no later than **tomorrow Thurs 27 at 6PM CET!**

We would like to resubmit by Friday to avoid further delays

thanks again everyone

César

On 26. Aug 2020, at 12:21, Cesar Munoz-Fontela <munoz-fontela@bnitm.de> wrote:

<Review_Comments2.docx>

From: Raimonda Viburiene [raimonda.viburiene@cepi.net]
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To: Barrett, Alan [abarrett@utmb.edu]; Alash'le Abimiku [aabimiku@ihv.umaryland.edu]; Alloueché, Ali [Ali.alloueché@takeda.com]; christian.brechot [christian.brechot@pasteur.fr]; cbrechot [cbrechot@usf.edu]; happic [happic@run.edu.ng]; Schmaljohn, Connie S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8ba6458b80904995986f4a7257137cc5-HHS-connie.]; Daniel Brasseur [(b)(6)]@gmail.com; mimi darko [(b)(6)]@yahoo.co.uk; dongxp238 [dongxp238@sina.com]; HRees@wrhi.ac.za; Damon, Inger K (CDC) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=42b35bd733a34c66a5698f43f7026e88-HHS-iad7-cd]; James Robinson [(b)(6)]@outlook.com; Jean Lang [Jean.Lang@sanofipasteur.com]; Van Hoof, Johan [JRDBE] [JVHOOF1@its.jnj.com]; John Edmunds [John.Edmunds@LSHTM.ac.uk]; Josie Golding [j.golding@wellcome.ac.uk]; kneuzil [kneuzil@som.umaryland.edu]; Jansen, Kathrin [kathrin.jansen@pfizer.com]; Shibuya, Kenji [kenji.shibuya@kcl.ac.uk]; Michel De Wilde [(b)(6)]@aol.com; Levine, Myron [Mlevine@som.umaryland.edu]; Bryant, Paula R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eb42f9318014bbb8c14d39ef311d8f9-HHS-paula.b]; Penny Heaton [penny.heaton@gatesmri.org]; Peter.Smith@lshtm.ac.uk; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Ralf [(b)(6)]@outlook.com; Stanley Plotkin [stanley.plotkin@vaxconsult.com]; Tom Kariuki [t.kariuki@aasciences.ac.ke]; SATHIYAMOORTHY, Vaseeharan [moorthyv@who.int]; yves.levy [yves.levy@inserm.fr]
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Subject: SAC meeting agenda, August 2020

Dear SAC members,

We hope you and your families are staying safe.

The agenda for the SAC meeting Thursday August 20 is now uploaded to your SharePoint site.
Follow the link or paste into your browser:

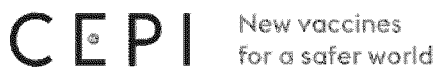
(b)(6)

If you have problems logging in or other access issues in please contact it@cepi.net

Kind regards,
On behalf of CEPI Secretariat
Raimonda

RAIMONDA VIBURIENE, PhD

Project manager



(+47) 936 06 967

raimonda.viburiene@cepi.net

Visiting address: Marcus Thranes gate 2, 0473 Oslo, Norway

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To: LESELLIER Sandrine [sandrine.lesellier@anses.fr]; romain.volmer@envt.fr; Pearl.Bamford@health.gov.au; Jin.Zhu@health.gov.au; Donis, Ruben (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=dea126c25cab404db922973cd7ccb459-HHS-Ruben.D]; Erlandson, Karl (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=680b325b1a6e48c1b23db0e7831cf1dd-HHS-Karl.Er]; Jayashankar, Lakshmi (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b140bac304f645cb951ea02cb93cc5a5-HHS-Lakshmi]; Little, James (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9ec1566776634a01940fae4f8976f25c-HHS-James.L]; Sabourin, Carol L (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=4f2324384f36463ca3cda2146829ff48-HHS-Carol.S]; Treanor, John (OS) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=043d9cf65ad94fa49d37b1522637a0af-HHS-John.Tr]; sivkog@battelle.org; langermans@bprc.nl; Dr. Mark Lewis [mlewis@bioqual.com]; MONALISA.CHATTERJI@gatesfoundation.org; Jacqueline.Kirchner@gatesfoundation.org; Harry.Kleanthous@gatesfoundation.org; Karen.Makar@gatesfoundation.org; David.Vaughn@gatesfoundation.org; Cesar Munoz-Fontela [munoz-fontela@bnitm.de]; Estefania Bni [estefania.rodriquez@bnitm.de]; Griffiths, Anthony [ahgriff@bu.edu]; dustin.johnson@canada.ca; Li, Sean (HC/SC) [sean.li@canada.ca]; dean.smith@canada.ca; Thornburg, Natalie J (CDC) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d950f584de8b4ddba2cee7e6bc9a8d9c-HHS-nax3-cd]; Roger Le [roger.le-grand@cea.fr]; Pauline Maisonnasse [pauline.maisonnasse@cea.fr]; sekim@krikt.re.kr; (b)(6)@hotmail.com; Carolyn Clark [carolyn.clark@cepi.net]; William Dowling [william.dowling@cepi.net]; amy.c.shurtleff@cepi.net; shanchao@wh.iov.cn; (b)(6)@gmail.com; Mariano Esteban Rodriguez [mesteban@cnb.csic.es]; JUAN FRANCISCO GARCIA ARRIAZA [jfgarcia@cnb.csic.es]; Luis Enjuanes [l.enjuanes@cnb.csic.es]; Angela Bosco-Lauth [mopargal@rams.colostate.edu]; Angela Rasmussen [alr2105@cumc.columbia.edu]; sandra cordo [scordo@qb.fcen.uba.ar]; (b)(6)@comcast.net; Vasana Vasana [Vasana.Vasana@csiro.au]; Duprex, Paul [pduprex@pitt.edu]; Flynn, Joanne L [joanne@pitt.edu]; White, Alexander G [agw13@pitt.edu]; Alyson Kelvin [AKelvin@dal.ca]; renee.wegrzyn@darpa.mil; john.c.trefry.civ@mail.mil; kanta.subbarao@influenzacentre.org; REIRELAND@mail.dstl.gov.uk; MSLEVER@dstl.gov.uk; MNELSON@mail.dstl.gov.uk; JLPRIOR@dstl.gov.uk; Amelia Karlsson [amelia.karlsson@duke.edu]; danielle.anderson@duke-nus.edu.sg; Marco.Cavaleri@ema.europa.eu; Geraldine Hamilton [geraldine.hamilton@emulatebio.com]; mariette.ducatez@envt.fr; B. Rockx [b.rockx@erasmusmc.nl]; B. Haagmans [b.haagmans@erasmusmc.nl]; Golding, Hana [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0619807f66f6406d9ece442207c82c95-goldingh]; MacGill, Tracy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=af70ffa710334d5c972ef0f87f099f79-Tracy.Macgi]; Wang, Tony [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=17daf80bb07e4c57a851dcb4b1b245d1-Tony.Wang]; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Levis, Robin [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d09daa7be5da44d983b8436c0ecf01b5-levis]; Martin Beer [Martin.Beer@fli.de]; Mettenleiter, Thomas C. [ThomasC.Mettenleiter@fli.de]; (b)(6)@yahoo.com; Dan Barouch [dbarouch@bidmc.harvard.edu]; luk_vandenbergh@mei.harvard.edu; (b)(6)@gmail.com; jfwchan [jfwchan@hku.hk]; hlchen@hku.hk; CarlosAlberto.Guzman@helmholtz-hzi.de; Krammer, Florian [florian.krammer@mssm.edu]; christiane.gerke@pasteur.fr; seungtaek.kim@ip-korea.org; mksong@ivi.int; Quim Segales [joaquim.segales@irta.cat]; Vergara, Julia [julia.vergara@irta.cat]; tomeri@iibr.gov.il; Nir Paran [nirp@iibr.gov.il]; nnagata@niid.go.jp; tksuzuki@nih.go.jp; terry.k.besch.ctr@mail.mil; Juergen Richt [jricht@vet.k-state.edu]; Ali.Mirazimi@folkhalsomyndigheten.se; Kai Dallmeier [kai.dallmeier@kuleuven.be]; Johan Neyts [johan.neyts@kuleuven.be]; erica@lji.org; muhammad.munir@lancaster.ac.uk; drevelli@lovelacebiomedical.org; Chi Van Dang [cdang@lcr.org]; sutter@micro.vetmed.uni-muenchen.de; kupke@staff.uni-marburg.de; Randy Albrecht [randy.albrecht@mssm.edu]; Adolfo Garcia-Sastre [Adolfo.Garcia-Sastre@mssm.edu]; Michael Schotsaert [michael.schotsaert@mssm.edu]; golinger@mriglobal.org; Giada.Mattiuzzo@nibsc.org; Mark Page [Mark.Page@nibsc.org]; Nicola.Rose@nibsc.org; Florence, Clint C (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9642ed58fd1448b78a415dcd78032f54-HHS-clint.f];

Lane, Mary C (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c172cd7ed3bf49efba26cd28a43ffa7c-HHS-mary.la]; Pickett, Thames E (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3534f82118194d95b4b1271fa0441590-HHS-pickett]; Stemmy, Erik J (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3401b6d3c82416696e0cdcf8228d829-HHS-erik.st]; Crozier, Ian (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8730a536d2c64480b554c36ac8fc2998-HHS-ian.cro]; Hensley, Lisa E (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=51c50958b38c47dabf373f6008a0df16-HHS-lisa.he]; Holbrook, Michael R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ab6ac5eb46f1450f8bab160b960169e-HHS-michael]; Schmaljohn, Connie S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8ba6458b80904995986f4a7257137cc5-HHS-connie.]; 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Subject: Re: WHO Animal Models Group Call-Aug 6 Agenda and Webex Invite

Dear all,

Just a friendly reminder of today's call and Agenda.

See you later

César, Simon and Bill.

On 3. Aug 2020, at 18:26, Cesar Munoz-Fontela <munoz-fontela@bnitm.de> wrote:

Dear colleagues,

Please find below the Agenda and Webex Invite for our upcoming WHO Animal Models call on Thursday Aug. 6 at 3PM CET (Geneva).

Thank you all very much for your continued support

César, Simon and Bill

Agenda Aug 6

Pathogenesis

Randy Albrecht (Mount Sinai)

Vaccines

Robert Seder (VRC, NIH)

Peter Palese (Mount Sinai)

Open Questions

Pierre GSELL invites you to join this Webex meeting.

Meeting number (access code): (b)(6)

Meeting password: (b)(6)

Thursday, August 6, 2020

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<Mail Attachment.ics>

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From: CEPI SAC [CEPISAC@cepi.net]
Sent: 9/16/2020 4:29:35 AM
To: Barrett, Alan [abarrett@utmb.edu]; Alash'le Abimiku [aabimiku@ihv.umaryland.edu]; Allouèche, Ali [Ali.allouèche@takeda.com]; christian.brechot [christian.brechot@pasteur.fr]; cbrechot [cbrechot@usf.edu]; happic [happic@run.edu.ng]; Schmaljohn, Connie S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8ba6458b80904995986f4a7257137cc5-HHS-connie.]; Daniel Brasseur [(b)(6)]@gmail.com; mimi darko [(b)(6)]@yahoo.co.uk; dongxp238 [dongxp238@sina.com]; HRees@wrhi.ac.za; Damon, Inger K (CDC) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=42b35bd733a34c66a5698f43f7026e88-HHS-iad7-cd]; James Robinson [(b)(6)]@outlook.com; Jean Lang [Jean.Lang@sanofipasteur.com]; Van Hoof, Johan [JRDBE] [JVHOOF1@its.jnj.com]; John Edmunds [John.Edmunds@LSHTM.ac.uk]; Josie Golding [j.golding@wellcome.ac.uk]; kneuzil [kneuzil@som.umaryland.edu]; Jansen, Kathrin [kathrin.jansen@pfizer.com]; Shibuya, Kenji [kenji.shibuya@kcl.ac.uk]; Michel De Wilde [(b)(6)]@aol.com; Levine, Myron [Mlevine@som.umaryland.edu]; Bryant, Paula R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eb42f9318014bbb8c14d39ef311d8f9-HHS-paula.b]; Penny Heaton [penny.heaton@gatesmri.org]; Peter.Smith@lshtm.ac.uk; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Ralf Clemens [(b)(6)]@outlook.com; Stanley Plotkin [stanley.plotkin@vaxconsult.com]; Tom Kariuki [t.kariuki@aasciences.ac.ke]; SATHIYAMOORTHY, Vaseeharan [moorthyv@who.int]; yves.levy [yves.levy@inserm.fr]
CC: Manisha Tirvassen [manisha.tirvassen@cepi.net]; Nick Jackson [nick.jackson@cepi.net]
Subject: Meeting minutes CEPI SAC meeting August 20-2020

Dear SAC members,

We have drafted the meeting minutes from the latest SAC meeting in August 20.

Please find the minutes via this link:

(b)(6)

Could I please ask for your feedback on the minutes by COB Friday September 18?

If you have problems with access to the secure SharePoint site please contact it@cepi.net

Looking forward to your response.

Best wishes

Stig

STIG TOLLEFSEN

Technology Office Lead

CEPI New vaccines
for a safer world

(+47) 901 50 770

stig.tollefsen@cepi.net

Visiting address: Marcus Thranes gate 2, 0473 Oslo, Norway

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www.cepi.net



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From: Mimi Darko [(b)(6)]@yahoo.co.uk]
Sent: 10/24/2020 5:15:37 AM
To: CEPI SAC [CEPISAC@cepi.net]
CC: Barrett, Alan [abarrett@utmb.edu]; smrivas [smrivas@utmb.edu]; Alash'le Abimiku [aabimiku@ihv.umaryland.edu];
oumunna [oumunna@ihvnigeria.org]; Alloueche, Ali [Ali.alloueche@takeda.com]; Ryanto.Ryanto
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[graca@health.usf.edu]; happic [happic@run.edu.ng]; Schmaljohn, Connie S (NIH) [/o=ExchangeLabs/ou=Exchange
Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8ba6458b80904995986f4a7257137cc5-HHS-connie.];
Daniel Brasseur [(b)(6)]@gmail.com; [(b)(6)]@yahoo.com; [(b)(6)]@yahoo.co.uk;
dongxp238 [dongxp238@sina.com]; HRees@wrhi.ac.za; SCornell@wrhi.ac.za; Damon, Inger K (CDC)
[/o=ExchangeLabs/ou=Exchange Administrative Group
(FYDIBOHF23SPDLT)/cn=Recipients/cn=42b35bd733a34c66a5698f43f7026e88-HHS-iad7-cd]; Malik, Sabahat Z (CDC)
[/o=ExchangeLabs/ou=Exchange Administrative Group
(FYDIBOHF23SPDLT)/cn=Recipients/cn=e7ac937f0a474e10a6b69c537a0fa348-HHS-fmw1-cd]; James Robinson
[(b)(6)]@outlook.com; Jean Lang [Jean.Lang@sanofipasteur.com]; Camille.Bayrat
[Camille.Bayrat@sanofi.com]; Van Hoof, Johan [JRDBE] [JVHOOF1@its.jnj.com]; michel De Wilde
[(b)(6)]@outlook.com; Lang, Jean /FR [Jean.Lang@sanofi.com]; Van Tulden, Karin [JRDBE]
[kvtulden@its.jnj.com]; John Edmunds [John.Edmunds@lshtm.ac.uk]; Josie Golding [j.golding@wellcome.ac.uk];
kneuzil [kneuzil@som.umaryland.edu]; KBozylinski-Bulos@som.umaryland.edu; Jansen, Kathrin
[kathrin.jansen@pfizer.com]; Hopps, Markay [markay.hopps@pfizer.com]; Zottoli, Jessica
[Jessica.Zottoli@pfizer.com]; Shibuya, Kenji [kenji.shibuya@kcl.ac.uk]; shinoyamaz [shinoyamaz@m.u-tokyo.ac.jp];
Michel De Wilde [(b)(6)]@aol.com; Levine, Myron [Mlevine@som.umaryland.edu]; Small, Dottie
[Dsmall@som.umaryland.edu]; Bryant, Paula R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group
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[penny.heaton@gatesmri.org]; Mary Burke [Mary.burke@gatesmri.org]; Peter.Smith@lshtm.ac.uk; Krause, Philip
[/o=ExchangeLabs/ou=Exchange Administrative Group
(FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; Ralf Clemens
[(b)(6)]@outlook.com; Stanley Plotkin [stanley.plotkin@vaxconsult.com]; admin@vaxconsult.com; Tom
Kariuki [t.kariuki@aasciences.ac.ke]; Anita Chami [a.chami@aasciences.ac.ke]; SATHIYAMOORTHY, Vaseeharan
[moorthyv@who.int]; bruniquel [bruniquel@who.int]; benassiv [benassiv@who.int]; yves.levy
[yves.levy@inserm.fr]; Richard Hatchett [richard.hatchett@cepi.net]; Frederik Kristensen
[frederik.kristensen@cepi.net]; Melanie Saville [melanie.saville@cepi.net]; Joseph Simmonds-Issler [jsi@cepi.net];
Nicole Lurie [nicole.lurie@cepi.net]; Jakob Cramer [jakob.cramer@cepi.net]; Nick Jackson [nick.jackson@cepi.net];
Mike Whelan [mike.whelan@cepi.net]; Paul Kristiansen [paul.kristiansen@cepi.net]; Svein Rune Andersen
[svein.rune.andersen@cepi.net]; Debra Yeskey [debra.yeskey@cepi.net]; Gabrielle Breugelmans
[gabrielle.breugelmans@cepi.net]; Ingrid Kromann [ingrid.kromann@cepi.net]; In-Kyu Yoon [in-kyu.yoon@cepi.net];
Christopher da Costa [christopher.da.costa@cepi.net]; Shanni Dhoofer [shanni.dhoofer@cepi.net]; Rebeka Yasmin
[rebeka.yasmin@cepi.net]; Haja Bally [haja.bally@cepi.net]; Raimonda Viburiene [raimonda.viburiene@cepi.net];
Eric Mungai [eric.mungai@cepi.net]; Oyeronke Oyebanji [oyeronke.oyebanji@cepi.net]; Gerald Voss
[gerald.voss@cepi.net]; Rihana Diabo [rihana.diabo@cepi.net]; Manisha Tirvassen [manisha.tirvassen@cepi.net];
Mark Polhemus [mark.polhemus@cepi.net]; Graca, Gerri [graca@usf.edu]; Stig Tollefsen [stig.tollefsen@cepi.net];
Carolyn Clark [carolyn.clark@cepi.net]
Subject: Re: CEPI SAC MEETING - 4 DECEMBER 2020

Dear Stig

This is understood. On our side there is also a lot of pressure at this time. CEPI has done a lot of good work and engaged
Effectively throughout this challenging period

Wish you all the best and keep safe until next meeting.

Be blessed,

Delese Mimi Darko(B.Pharm, MBA, FGCPHarm)

CEO FDA

P.O.Box CT 2783

Cantonments-Accra

(b)(6)

On 23 Oct 2020, at 12:34, CEPI SAC <CEPISAC@cepi.net> wrote:

Dear SAC members,

Given the current workload in CEPI, there is not enough bandwidth to prepare and arrange a November SAC meeting as initially intended. We are looking for an opportunity to arrange the SAC meeting in early January, and we will get back to you as soon as the details are in place. We are sorry for the inconvenience and hope for your understanding. We wish you all a good autumn and the prospect of staying healthy through the troubled times, in alignment with the motto "Stay positive, Test negative".

On behalf of the secretariat

Kind regards,

Stig

STIG TOLLEFSEN

Technology Office Lead

CEPI New vaccines
for a safer world

(+47) 901 50 770

stig.tollefsen@cepi.net

Visiting address: Marcus Thranes gate 2, 0473 Oslo, Norway

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-----Original Appointment-----

From: CEPI SAC <CEPISAC@cepi.net>

Sent: fredag 23. oktober 2020 12:55

To: Barrett, Alan; smrivas; Alash'le Abimiku; oumunna; Alloueche, Ali; Ryanto.Ryanto; christian.brechot; cbrechot; gracia; happic; Schmaljohn, Connie (NIH/NIAID) [E]; Daniel Brasseur; mimi darko; (b)(6)@yahoo.com; (b)(6) dongxp238; HRees@wrhi.ac.za; SCornell@wrhi.ac.za; Damon, Inger K. (CDC/OID/NCEZID); fmw1; James Robinson; Jean

From: Stanley Plotkin [stanley.plotkin@vaxconsult.com]
Sent: 10/23/2020 12:25:36 PM
To: 'CEPI SAC' [CEPISAC@cepi.net]; 'Barrett, Alan' [abarrett@utmb.edu]; 'smrivas' [smrivas@utmb.edu]; 'Alash'le Abimiku' [aabimiku@ihv.umaryland.edu]; 'oumunna' [oumunna@ihvnigeria.org]; 'Allouche, Ali' [Ali.allouche@takeda.com]; 'Ryanto.Ryanto' [Ryanto.Ryanto@takeda.com]; 'christian.brechot' [christian.brechot@pasteur.fr]; 'cbrechot' [cbrechot@usf.edu]; 'graca' [graca@health.usf.edu]; 'happic' [happic@run.edu.ng]; Schmaljohn, Connie S (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8ba6458b80904995986f4a7257137cc5-HHS-connie.]; 'Daniel Brasseur' [(b)(6)]@gmail.com; 'mimi darko' [(b)(6)]@yahoo.co.uk; [(b)(6)]@yahoo.com; [(b)(6)]@yahoo.co.uk; 'dongxp238' [dongxp238@sina.com]; HRees@wrhi.ac.za; SCornell@wrhi.ac.za; Damon, Inger K (CDC) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=42b35bd733a34c66a5698f43f7026e88-HHS-iad7-cd]; Malik, Sabahat Z (CDC) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=e7ac937f0a474e10a6b69c537a0fa348-HHS-fmw1-cd]; 'James Robinson' [(b)(6)]@outlook.com; 'Jean Lang' [Jean.Lang@sanofipasteur.com]; 'Camille.Bayrat' [Camille.Bayrat@sanofi.com]; 'Van Hoof, Johan [JRDBE]' [JVHOOF1@its.jnj.com]; 'michel De Wilde' [(b)(6)]@outlook.com; 'Lang, Jean /FR' [Jean.Lang@sanofi.com]; 'Van Tuldén, Karin [JRDBE]' [kvtulden@its.jnj.com]; 'John Edmunds' [John.Edmunds@LSHTM.ac.uk]; 'Josie Golding' [j.golding@wellcome.ac.uk]; 'kneuzil' [kneuzil@som.umaryland.edu]; KBozylinski-Bulos@som.umaryland.edu; 'Jansen, Kathrin' [kathrin.jansen@pfizer.com]; 'Hopps, Markay' [markay.hopps@pfizer.com]; 'Zottoli, Jessica' [Jessica.Zottoli@pfizer.com]; 'Shibuya, Kenji' [kenji.shibuya@kcl.ac.uk]; 'shinoyamaz' [shinoyamaz@m.u-tokyo.ac.jp]; 'Michel De Wilde' [(b)(6)]@aol.com; 'Levine, Myron' [Mlevine@som.umaryland.edu]; 'Small, Dottie' [Dsmall@som.umaryland.edu]; Bryant, Paula R (NIH) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3eb42f9318014bbb8c14d39ef311d8f9-HHS-paula.b.]; 'Penny Heaton' [penny.heaton@gatesmri.org]; 'Mary Burke' [Mary.burke@gatesmri.org]; Peter.Smith@lshtm.ac.uk; Krause, Philip [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=00c6330fea0042fdb5571c3fdef792ed-krause]; 'Ralf Clemens' [(b)(6)]@outlook.com; admin@vaxconsult.com; 'Tom Kariuki' [t.kariuki@aasciences.ac.ke]; 'Anita Chami' [a.chami@aasciences.ac.ke]; 'SATHIYAMOORTHY, Vaseeharan' [moorthyv@who.int]; 'bruniquel' [bruniquel@who.int]; 'benassiv' [benassiv@who.int]; 'yves.levy' [yves.levy@inserm.fr]; 'Richard Hatchett' [richard.hatchett@cepi.net]; 'Frederik Kristensen' [frederik.kristensen@cepi.net]; 'Melanie Saville' [melanie.saville@cepi.net]; 'Joseph Simmonds-Issler' [jsi@cepi.net]; 'Nicole Lurie' [nicole.lurie@cepi.net]; 'Jakob Cramer' [jakob.cramer@cepi.net]; 'Nick Jackson' [nick.jackson@cepi.net]; 'Mike Whelan' [mike.whelan@cepi.net]; 'Paul Kristiansen' [paul.kristiansen@cepi.net]; 'Svein Rune Andersen' [svein.rune.andersen@cepi.net]; 'Debra Yeskey' [debra.yeskey@cepi.net]; 'Gabrielle Breugelmans' [gabrielle.breugelmans@cepi.net]; 'Ingrid Kromann' [ingrid.kromann@cepi.net]; 'In-Kyu Yoon' [in-kyu.yoon@cepi.net]; 'Christopher da Costa' [christopher.da.costa@cepi.net]; 'Shanni Dhoofer' [shanni.dhoofer@cepi.net]; 'Rebeka Yasmin' [rebeka.yasmin@cepi.net]; 'Haja Bally' [haja.bally@cepi.net]; 'Raimonda Viburiene' [raimonda.viburiene@cepi.net]; 'Eric Mungai' [eric.mungai@cepi.net]; 'Oyeronke Oyeboji' [oyeronke.oyebanji@cepi.net]; 'Gerald Voss' [gerald.voss@cepi.net]; 'Rihana Diabo' [rihana.diabo@cepi.net]; 'Manisha Tirvassen' [manisha.tirvassen@cepi.net]; 'Mark Polhemus' [mark.polhemus@cepi.net]
CC: 'Graca, Gerri' [graca@usf.edu]; 'Stig Tollefsen' [stig.tollefsen@cepi.net]; 'Mark Polhemus' [mark.polhemus@cepi.net]; 'Carolyn Clark' [carolyn.clark@cepi.net]
Subject: RE: CEPI SAC MEETING - 4 DECEMBER 2020

Dear Stig:

I certainly understand that the workload of CEPI precludes a meeting in November or December. However, if the SAC is to have any value it needs to be informed. Could there not be a 2 page summary of the current status of things sent to us?

Thanks,

Stanley

From: CEPI SAC <CEPISAC@cepi.net>

Sent: Friday, October 23, 2020 8:34 AM

To: CEPI SAC <CEPISAC@cepi.net>; Barrett, Alan <abarrett@utmb.edu>; smrivas <smrivas@utmb.edu>; Alash'le Abimiku <aabimiku@ihv.umaryland.edu>; oumunna <oumunna@ihvnigeria.org>; Alloueche, Ali <Ali.alloueche@takeda.com>; Ryanto.Ryanto <Ryanto.Ryanto@takeda.com>; christian.brechot <christian.brechot@pasteur.fr>; cbrechot <cbrechot@usf.edu>; graca <graca@health.usf.edu>; happic <happic@run.edu.ng>; Schmaljohn, Connie (NIH/NIAID) [E] <Connie.schmaljohn@nih.gov>; Daniel Brasseur <(b)(6)@gmail.com>; mimi darko <(b)(6)@yahoo.co.uk>; <(b)(6)@yahoo.com>; <(b)(6)@yahoo.co.uk>; dongxp238 <dongxp238@sina.com>; HRees@wrhi.ac.za; SCornell@wrhi.ac.za; Damon, Inger K. (CDC/OID/NCEZID) <iad7@cdc.gov>; fmw1 <fmw1@cdc.gov>; James Robinson <(b)(6)@outlook.com>; Jean Lang <Jean.Lang@sanofipasteur.com>; Camille.Bayrat <Camille.Bayrat@sanofi.com>; Van Hoof, Johan [JRDBE] <JVHOOF1@its.jnj.com>; michel De Wilde <(b)(6)@outlook.com>; Lang, Jean /FR <Jean.Lang@sanofi.com>; Van Tulden, Karin [JRDBE] <kvtulden@its.jnj.com>; John Edmunds <John.Edmunds@LSHTM.ac.uk>; Josie Golding <j.golding@wellcome.ac.uk>; kneuzil <kneuzil@som.umaryland.edu>; KBozylinski-Bulos@som.umaryland.edu; Jansen, Kathrin <kathrin.jansen@pfizer.com>; Hopps, Markay <markay.hopps@pfizer.com>; Zottoli, Jessica <Jessica.Zottoli@pfizer.com>; Shibuya, Kenji <kenji.shibuya@kcl.ac.uk>; shinoyamaz <shinoyamaz@m.u-tokyo.ac.jp>; Michel De Wilde <(b)(6)@aol.com>; Levine, Myron <Mlevine@som.umaryland.edu>; Small, Dottie <Dsmall@som.umaryland.edu>; Bryant, Paula (NIH/NIAID) [E] <paula.bryant@nih.gov>; Penny Heaton <penny.heaton@gatesmri.org>; Mary Burke <Mary.burke@gatesmri.org>; Peter.Smith@lshtm.ac.uk; Phil Krause <philip.krause@fda.hhs.gov>; Ralf Clemens <(b)(6)@outlook.com>; Stanley Plotkin <stanley.plotkin@vaxconsult.com>; admin@vaxconsult.com; Tom Kariuki <t.kariuki@aasciences.ac.ke>; Anita Chami <a.chami@aasciences.ac.ke>; SATHIYAMOORTHY, Vaseeharan <moorthyv@who.int>; bruniquel <bruniquel@who.int>; benassiv <benassiv@who.int>; yves.levy <yves.levy@inserm.fr>; Richard Hatchett <richard.hatchett@cepi.net>; Frederik Kristensen <frederik.kristensen@cepi.net>; Melanie Saville <melanie.saville@cepi.net>; Joseph Simmonds-Issler <jsi@cepi.net>; Nicole Lurie <nicole.lurie@cepi.net>; Jakob Cramer <jakob.cramer@cepi.net>; Nick Jackson <nick.jackson@cepi.net>; Mike Whelan <mike.whelan@cepi.net>; Paul Kristiansen <paul.kristiansen@cepi.net>; Svein Rune Andersen <svein.rune.andersen@cepi.net>; Debra Yeskey <debra.yeskey@cepi.net>; Gabrielle Breugelmans <gabrielle.breugelmans@cepi.net>; Ingrid Kromann <ingrid.kromann@cepi.net>; In-Kyu Yoon <in-kyu.yoon@cepi.net>; Christopher da Costa <christopher.da.costa@cepi.net>; Shanni Dhoofer <shanni.dhoofer@cepi.net>; Rebeka Yasmin <rebeka.yasmin@cepi.net>; Haja Bally <haja.bally@cepi.net>; Raimonda Viburiene <raimonda.viburiene@cepi.net>; Eric Mungai <eric.mungai@cepi.net>; Oyeronke Oyebanji <oyeronke.oyebanji@cepi.net>; Gerald Voss <gerald.voss@cepi.net>; Rihana Diabo <rihana.diabo@cepi.net>; Manisha Tirvassen <manisha.tirvassen@cepi.net>; Mark Polhemus <mark.polhemus@cepi.net>
Cc: Graca, Gerri <graca@usf.edu>; Stig Tollefsen <stig.tollefsen@cepi.net>; Mark Polhemus <mark.polhemus@cepi.net>; Carolyn Clark <carolyn.clark@cepi.net>
Subject: RE: CEPI SAC MEETING - 4 DECEMBER 2020

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On behalf of the secretariat

Kind regards,

Stig

STIG TOLLEFSEN

Technology Office Lead

(+47) 901 50 770
stig.tollefsen@cepi.net

Visiting address: Marcus Thranes gate 2, 0473 Oslo, Norway
Postal address: P.O. BOX 123, Torshov, 0412 Oslo, Norway

www.cepi.net



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-----Original Appointment-----

From: CEPI SAC <CEPISAC@cepi.net>

Sent: fredag 23. oktober 2020 12:55

To: Barrett, Alan; smrivas; Alash'le Abimiku; oumunna; Allouche, Ali; Ryanto.Ryanto; christian.brechot; cbrechot; graca; happic; Schmaljohn, Connie (NIH/NIAID) [E]; Daniel Brasseur; mimi darko; (b)(6)@yahoo.com; (b)(6) dongxp238; HRees@wrhi.ac.za; SCornell@wrhi.ac.za; Damon, Inger K. (CDC/OID/NCEZID); fmw1; James Robinson; Jean Lang; Camille.Bayrat; Van Hoof, Johan [JRDBE]; Van Tulden, Karin [JRDBE]; John Edmunds; Josie Golding; kneuzil; KBozylinski-Bulos@som.umaryland.edu; Jansen, Kathrin; Hopps, Markay; Zottoli, Jessica; Shibuya, Kenji; shinoyamaz; Michel De Wilde; Levine, Myron; Small, Dottie; Bryant, Paula (NIH/NIAID) [E]; Penny Heaton; Mary Burke; Peter.Smith@lshtm.ac.uk; Phil Krause; Ralf Clemens; Stanley Plotkin; admin@vaxconsult.com; Tom Kariuki; Anita Chami; SATHIYAMOORTHY, Vaseeharan; bruniquel; benassiv; yves.levy; Richard Hatchett; Frederik Kristensen; Melanie Saville; Joseph Simmonds-Issler; Nicole Lurie; Jakob Cramer; Nick Jackson; Mike Whelan; Paul Kristiansen; Svein Rune Andersen; Debra Yeskey; Gabrielle Breugelmans; Ingrid Kromann; In-Kyu Yoon; Christopher da Costa; Shanni Dhoofer; Rebeka Yasmin; Haja Bally; Stig Tollefsen; Raimonda Viburiene; Eric Mungai; Oyeronke Oyebanji; Gerald Voss; Rihana Diabo; Manisha Tirvassen; Mark Polhemus

Cc: michel De Wilde; Lang, Jean /FR; Graca, Gerri

Subject: Canceled: CEPI SAC MEETING - 4 DECEMBER 2020

When: fredag 4. desember 2020 14:00-16:00 (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna.

Where: [https://cepi-net.zoom.us/j/\(b\)\(6\)](https://cepi-net.zoom.us/j/(b)(6))

Importance: High

Sensitivity: CEPI Internal

From: Stig Tollefsen [stig.tollefsen@cepi.net]
Sent: 10/26/2020 1:40:35 PM
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Subject: Request for SAC input regarding call for "wave 2" vaccines
Attachments: CFP2R-wave2 Call Text-draft_Oct_SAC.docx

Dear SAC members,

I write to you on behalf of the CEPI secretariat to seek your advice and guidance.

As you are well aware of and some of you have contributed substantially to the peer review processes for support of vaccine development against the COVID-19 pandemic, our last round of call for "wave 1" candidate vaccines closed on September 28.

In collaboration with the Bill and Melinda Gates Foundation, CEPI has been discussing the potential of supporting vaccine candidates relevant for a "wave 2" of vaccines. Through our previous calls, we have received proposals from some applicants that could fill gaps in the current portfolio of vaccines in "wave 1" based on differentiating scientific or technical features, even though these "wave 2" candidates may be somewhat behind the "wave 1" candidates in terms of pre-clinical and clinical development timelines.

With this in mind, we would like to open a call for vaccine technology platforms in order to support the development of these "wave 2" COVID-19 candidates. The call will be a sort of hybrid between our technology platform call CFP2R and the COVID-19 calls. We are specifically asking for vaccines technologies that also could be used in case of Disease X. The total budget for this call is 45 m USD and we aim to support 4-5 developers. Applications that have applied for and already been found eligible for previous COVID-19 calls, but rejected on peer review level, can be considered for this "wave 2" portfolio as long as they have relevant scientific/technological features.

Please find attached the draft call text for the "wave 2" call. Could you please have a look at the call text and write back to me with your comments and suggestions by **COB Wednesday October 28**.

The call will be run as previous calls from CEPI with eligibility review and the peer review process with external expert reviewers. In addition, could you please indicate if you would be available and willing to perform peer review for eligible applications?

In advance, thank you for your contribution.

Best wishes

Stig

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Call for Proposals:

Vaccine platform technologies for rapid response against SARS-CoV-2

CEPI is pleased to announce a new funding opportunity for vaccine development of platform technologies against SARS-CoV-2 and with the potential for use against other emerging infectious diseases (EIDs). This document describes the scope, requirements and processes for submission, review and selection for funding. Further details can be found at [[HYPERLINK "https://cepi.net/get_involved/cfps/"](https://cepi.net/get_involved/cfps/)]

The Call for Proposals asks for an Expression of Interest (EOI) with a description of the current status of the project and the plans for preclinical studies and conduct of a phase I study.

CEPI asks for submissions of EOIs for platform technologies that:

- enable rapid vaccine development **and**
- elicit robust induction of immunity against SARS-CoV2 **and**
- are relevant for other potential outbreaks of known viruses as well as novel or previously unrecognised viruses, i.e. "Disease X" ([[HYPERLINK "https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts"](https://www.who.int/activities/prioritizing-diseases-for-research-and-development-in-emergency-contexts)]).

These can be novel vaccine platforms or existing (proven) vaccine platforms where improvements can be made in terms of immune response, speed, costs and manufacturing scale-up, to respond mainly to the COVID-19 pandemic and potentially other known and unknown diseases.

This Call is open for EOIs from October XX, 2020 to November YY, 2020. The call may be extended or amended depending on programmatic need.

CEPI reviews and evaluates proposals on their merits in the context of stated eligibility criteria and CEPI's overall project portfolio. Regardless of eligibility at any stage of a funding Call, CEPI, in its sole discretion, reserves the right to consider and to decline any proposal.

Contents

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1. Introduction

The ongoing COVID-19 pandemic is a public health crisis causing unprecedented disruption to human activity. As national and regional governments assess containment measures, it is thought that only widely available safe and effective vaccines used in conjunction with other public health measures, will allow a return to normal life and help stop further loss of life and economic disruption.

CEPI is striving to accelerate vaccine development and to ensure that associated manufacturing capabilities and capacities will meet global demand as quickly as possible.

To reach this goal, CEPI has, among several supporting activities, had 3 rounds of Calls for Proposals (CfPs) for vaccine development to stop the COVID-19 pandemic, launched in February, May and July 2020. In total CEPI has received and evaluated close to 200 applications.

This Call for Proposals builds on and expands the previous 3 rounds of COVID-19 vaccine CfPs in combination with an earlier Call for vaccine technology platforms with a focus on suitable rapid response platforms. With a portfolio of COVID-19 vaccine candidates already in clinical trials, CEPI sees a need to recruit additional technologies that may fill the gaps in the portfolio in terms of antigen target, improved or differentiated immune responses compared to current COVID-19 vaccine candidates in advanced development, versatility of the platform for Disease X, manufacturing advantages, and other potentially advantageous characteristics. The vaccine developers should have realistic plans for rapid and flexible manufacturing and the potential involvement of Developing Country Vaccine Manufacturer(s). Improvements of current effective platform technologies that render them suitable for outbreak responses or that substantially reduce the costs of production and ease of field delivery will also be welcomed.

2. Objectives

The primary objective of this Call for Proposals is to develop novel vaccine candidates against COVID-19 with scientific, technical or manufacturing differentiation from current COVID-19 vaccine candidates in advanced development, and additionally strive for platforms with potential for use against other EIDs ([[HYPERLINK "https://www.who.int/blueprint/priority-diseases/en/"](https://www.who.int/blueprint/priority-diseases/en/)]). This Call for Proposals also supports CEPI's strategic goal of developing technology platforms as a toolbox and with preparedness for Disease X outbreaks. The broader goal of CEPI is to transform a selection of the platforms funded in this Call into a sustainable toolbox of active platform technologies that are ready for response.

Each platform will be evaluated against several criteria to assess its differentiation compared to our current portfolio of vaccines and for their versatility for future potential application against Disease X. The funding is for early development activities only at this stage (for example, preclinical work and Phase I clinical trials and associated CMC development) for an anticipated period of around 12 months.

3. Scope of the Call

This Call for Proposals is to identify novel or innovative technology platforms for developing vaccines that can be rapidly adapted for use against the ongoing COVID-19 pandemic and which also show differentiated value against current COVID-19 vaccine candidates in advanced development. Demonstration of versatility of the vaccine technology platform and its suitability for rapid response will also be evaluated.

To be eligible, the Applicant must have at least preclinical proof of concept data from one viral pathogen to support the platform. Applicants (individual organisations or consortia) must also provide information in their EOI that they meet the following **eligibility criteria**:

- Have preclinical data indicating likelihood of improved or differentiated immune response from existing COVID-19 vaccine candidates; applicants should also have existing data (or plans to generate such data) on safety, immunogenicity, and efficacy for SARS-CoV-2 that could enable clinical testing within 6-9 months from date of funding. Faster timelines would be advantageous.
- Vaccine candidate may be based on the Spike (S) protein (or modifications/portions of S), but should not just be limited to S-protein.

- Vaccine candidate has at least one or more of the following production advantages: simplicity of technology transfer (e.g. in-house, or established manufacturing relationship with partner), low cost, high productivity (e.g. potential for hundreds of millions to billions of doses per year), established regulatory pathway, involvement of Developing Country Vaccine Manufacturer(s).
- Platform must be applicable to other EIDs and Disease X.
- Provide evidence of other potentially advantageous characteristics such as (but not limited to):
 - Potential to protect after a single dose
 - Potential to prevent virus transmission
 - Plans for alternate routes of administration (e.g., intranasal or oral)
 - Suitability to boost prior heterologous immunizations
 - Proven stability at higher temperatures
 - Potential for use in pregnancy
 - Simplicity of adjuvant use or supply (if applicable)
- Present plans to enter Phase I clinical trial(s) (safety study and immunogenicity in healthy volunteers) within 6-9 months' time frame from date of funding. Faster timelines would be advantageous.
- Present plans to produce Good Manufacturing Practice (GMP) batch for clinical Phase I testing
- Present plans to integrate Phase I immunological testing which would utilize CEPI's available [[HYPERLINK "https://cepi.net/news_cepi/cepi-establishes-global-network-of-laboratories-to-centralise-assessment-of-covid-19-vaccine-candidates/"](https://cepi.net/news_cepi/cepi-establishes-global-network-of-laboratories-to-centralise-assessment-of-covid-19-vaccine-candidates/)], and apply for sample testing, by completing and submitting the [[HYPERLINK "http://www.surveymonkey.com/r/8K2YWLC"](http://www.surveymonkey.com/r/8K2YWLC)] \o [<http://www.surveymonkey.com/r/8k2ywlc>].
- Indicate willingness for data sharing, use of common assays, and contribution to COVAX Facility

Where an EOI does not meet all eligibility criteria it may still be considered if other aspects of the vaccine technology are deemed to be exceptionally strong and advantageous over the other criteria.

4. Applicant guidelines and the review process

The proposal must include essential evidence as required in **Section 3**, meet the presented timeline requirements, and contain sufficient information for review of the proposed vaccine development plans. Any claims made within the proposal must be supported by evidence.

The proposal should:

- be no longer than 10 pages (excluding references);
- include high-level budget (in USD) with costs in compliance with CEPI's [[HYPERLINK "https://cepi.net/wp-content/uploads/2019/01/CEPI-Cost-Guidance-v-01.2020-1.pdf"](https://cepi.net/wp-content/uploads/2019/01/CEPI-Cost-Guidance-v-01.2020-1.pdf)]; and
- be written in English.

This Call for Proposals is open until November XX, 15:00 CET, 2020. All applications will go through eligibility screening for CEPI to assess if the application and the Applicants meet the eligibility criteria. Eligible applications will be sent for peer-review performed by CEPI's internal and external expert reviewers. Responses to Applicants will be issued as soon as they are available and preferably within a month from closing of the call. CEPI will make every effort to accelerate these review timelines as it recognises that every day counts.

While each circumstance is different, CEPI has a track record of rapidly putting in place contractual agreements that allow Applicants to proceed with work while details that may take longer to address are resolved. In other words, in line with its commitment to acceleration, CEPI intends to issue awards quickly but also expects applicants to show willingness and flexibility.

The application template is accessible via the [[HYPERLINK "https://cepi.net/get_involved/cfps/"](https://cepi.net/get_involved/cfps/)]. To respond to this Call for Proposals, Applicants must submit their application to CEPI via a secure portal. Please send an email to [[HYPERLINK "mailto:cfp@cepi.net"](mailto:cfp@cepi.net)] to be provided with a secure link to upload your application to the secure portal (in the Subject field indicate: Application for COVID-19 vaccine platform). The application should be uploaded via the secure portal in a pdf format. Do not send any additional documents to [[HYPERLINK "mailto:cfp@cepi.net"](mailto:cfp@cepi.net)]. The application will be treated as confidential and personal data included in any proposal that is submitted will be handled according to [[HYPERLINK "http://www.cepi.net/terms"](http://www.cepi.net/terms)].

This is a direct Call for Proposals, which means that no additional information should be submitted.

5. Review criteria

Proposals that have met the eligibility criteria described under **Section 3** will be assessed against the following criteria where applicable, depending on the full or partial scope of the development plan proposed:

Criterion	Assessment levels	Definition
1. Scientific merit and clinical development	1.1. Antigen target and immunogenicity	- Antigen(s) may be based on S protein or variants thereof, but not limited to S protein. - Extent to which the technology will rapidly solicit immune responses providing protection/clinical benefit, with the likelihood of improvement or differentiation from existing COVID-19 vaccine candidates in advanced clinical development. - Relevance of platform for Disease X. - Minimal number of doses required; potential for single dose. - Potential use as heterologous booster. - Potential need of adjuvant. - Description and characterisation of the proposed route of delivery and/or system. - Objectives to secure licensure and label claims. - Estimated probability of technical and regulatory success (PTRS).
	1.2. Platform versatility	
	1.3. Dosing regimen	
	1.4. Delivery system	
	1.5. Clinical	
	1.6. Regulatory	
2. Safety potential	2.1 Non-clinical	- Safety profile of the platform in animal models and/or in humans - Potential for use in pregnant women
	2.2 Clinical	
3. Speed of development	3.1. Phase I ready	- Extent to which the vaccine candidate will be ready for entering Phase I within 6-9 months or less. - Plans for manufacturing scale-up and/or scale-out during clinical development. - Complexity of technology transfer plans. - Infrastructure, internally or through partnerships, to rapidly advance development.
	3.2. Manufacturing strategy	
	3.3. Infrastructure	
4. Technical/ Manufacturing scalability	4.1. Quality	- Extent to which the technology and plans are expected to enable fast production in very large volumes sufficient to respond to COVID-19. - Adjuvant access and supply (if applicable) - Quality control to ensure comparability and a fast release process. - FTE resources able to support any scale-up / scale-out plans, tech transfers, and experience doing so. - Likelihood of lower costs.
	4.2. Formulation	
	4.3. Speed of production and scale	
	4.4. Scale of production	
5. Access/Route to patient	5.1. Storage and delivery	- Possibility of formulations and presentations with suitable storage conditions and stability. - Extent to which the technology can be delivered easily. - Willingness to participate in the Access to COVID-19 Tools (ACT) Accelerator mechanism.
	5.2. Sustainability of supply	
	5.3. Access	

Criterion	Assessment levels	Definition
6. Partnership	6.1. Competency, experience and track-record	Extent to which the partnership, its plans and procedures are viable and of sufficient quality to deliver on the proposed activities of the project. The potential involvement of Developing Country Vaccine Manufacturer(s).

6. Note on vaccine access

CEPI is committed to the principle of universal, equitable and affordable access to vaccines, especially for the most vulnerable countries, as expressed in its [[HYPERLINK "https://cepi.net/wp-content/uploads/2019/01/Equitable-Access-Policy.pdf"](https://cepi.net/wp-content/uploads/2019/01/Equitable-Access-Policy.pdf)]. CEPI's access policy with respect to COVID-19 requires that vaccines are allocated fairly based on public health need rather than ability to pay. CEPI is a co-lead on the vaccine pillar (COVAX) of the [[HYPERLINK "https://www.who.int/initiatives/act-accelerator"](https://www.who.int/initiatives/act-accelerator)] and work is ongoing to develop a global mechanism to procure and fairly allocate COVID-19 vaccines (COVAX Facility). Awardees receiving funds through this Call for Proposals will ultimately be required to supply and sell vaccines to this mechanism (or make available their technologies in order to do so) in quantities reflective of the funding received and at fair prices that are sustainable to the manufacturer. CEPI is also working with international partners towards establishing an appropriate liability and indemnification mechanism, recognising the importance to developers that such issues be addressed comprehensively prior to supplying vaccine.

Any successful Applicant will become an Awardee, and as such must have rights in order to develop, use, manufacture, and sell the vaccine proposed here for funding. CEPI will not take ownership of patents arising from its funded projects. CEPI will not seek a share of any commercial return from the vaccine manufacture during the pandemic period, focusing instead on ensuring global allocation needs are met. CEPI has a common interest with Awardees to ensure that project results are quickly and broadly made available to further scientific research on COVID-19 and that publications are 'open access'. CEPI will work with Awardees to develop a plan to ensure that CEPI's investments result in vaccines which are licensed, including a clear pathway to successful conclusion of the development of vaccines, leading into their manufacture and global distribution.

[[HYPERLINK "https://www.who.int/who-documents-detail/access-to-covid-19-tools-\(act\)-accelerator"](https://www.who.int/who-documents-detail/access-to-covid-19-tools-(act)-accelerator)], which was recently announced, with the COVAX pillar, will positively impact conditions for the global deployment of vaccines.

7. Award conditions

Before submitting an application, Applicants should take note of two Award conditions. The first is that each Awardee recognises CEPI's governance, which can be found on [[HYPERLINK "https://cepi.net/about/governance/"](https://cepi.net/about/governance/)]. The second is that any funding is dependent on the signing of an Award Agreement, which provides the terms and conditions under which the Award will be made, in line with CEPI's Third Party Code, which can be found on [[HYPERLINK "https://cepi.net/wp-content/uploads/2019/10/CEPI-Third-Party-Code.pdf"](https://cepi.net/wp-content/uploads/2019/10/CEPI-Third-Party-Code.pdf)]

Contractual terms and conditions will need to be rapidly concluded in days or weeks and Awardees must be able to meet these pressing timelines given the urgency of the pandemic and the desire to start funding projects as quickly as possible.

Applicants unable or unwilling to meet these requirements should not submit an application.

8. Technical and administrative questions

Technical and administrative questions about this Call should be directed to the CEPI Secretariat ([HYPERLINK "mailto:cfp@cepi.net"]).

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jmullahy@wisc.edu; jnobles@ssc.wisc.edu; robrien@lafollette.wisc.edu; palloni@wisc.edu; patz@wisc.edu; ppeppard@wisc.edu; jraymo@ssc.wisc.edu; ferey@wisc.edu; sarobert@wisc.edu; schaeffer@ssc.wisc.edu; lschechter@wisc.edu; aschneider4@wisc.edu; cschwart@ssc.wisc.edu; aseshadr@ssc.wisc.edu; smeeding@lafollette.wisc.edu; econjeff@ssc.wisc.edu; psteiner@wisc.edu; ctaber@ssc.wisc.edu; tjernstroem@wisc.edu; walker@ssc.wisc.edu; wallace@lafollette.wisc.edu; tbwalsh@wisc.edu; yang.wang@lafollette.wisc.edu; mjwiswall@wisc.edu; wolfe@lafollette.wisc.edu; ysxiong2@wisc.edu; jzhu@stat.wisc.edu; ashivani@seas.upenn.edu; rbeck@jaeb.org; (b)(6)@gmail.com; t1dstats@jaeb.org; willi@email.chop.edu; weinstor@upstate.edu; paul.wadwa@cuanschutz.edu; jennifer.sherr@yale.edu; rmonzavi@chla.usc.edu; Laurel.Messer@cuanschutz.edu; sarah.corathers@cchmc.org; Amy.Criego@ParkNicollet.com; maclements@cmh.edu; inquires@sda.gov.cn; yerw@bjmu.edu.cn; yxy@xjtu.edu.cn; cfetpyhj@vip.sina.com; caodesheng@chinadaily.com.cn; yanwl@fudan.edu.cn; yiwang@shmu.edu.cn; zhangyp@chinacdc.cn; maojh88@zju.edu.cn

Subject: How dirty vaccines turned COVID-19 into a killer; Make Famotidine/Cetirizine standard of care for COVID-19; COVID-19 vaccines are unsafe

Immunological mechanisms explaining the role of vaccines, IgE, mast cells, histamine, elevating ferritin, IL-6, D-dimer, VEGF levels in COVID-19 and dengue, potential treatments such as mast cell stabilizers, antihistamines: Predictions and confirmations

<https://doi.org/10.5281/zenodo.4100663>

"Trump had been administered a Regeneron polyclonal antibody cocktail and has been taking zinc, vitamin D, **famotidine**, melatonin and a daily aspirin."

<https://www.cnn.com/2020/10/02/politics/president-donald-trump-walter-reed-coronavirus/index.html>

Trump gets **famotidine** for COVID-19 but it is not "standard of care" (SOC) for you and me.

The IDSA is killing hundreds of thousands by **DENYING** them **famotidine**, a cheap, safe and effective over-the-counter drug for COVID-19.

Did the money from vaccine makers and remdesivir maker Gilead, sloshing around at IDSA, influence their decision?

<https://www.idsociety.org/practice-guideline/covid-19-guideline-treatment-and-management/>

"The guideline panel suggests against famotidine for the sole purpose of treating COVID-19, unless in the context of a clinical trial."

Here's what the authors collected:

KATHRYN M EDWARDS collected ~\$150k from vaccine makers.

<https://openpaymentsdata.cms.gov/physician/651167>

Lindsey Baden collected ~\$50k from Janssen Pharma (a vaccine maker).

<https://openpaymentsdata.cms.gov/physician/884460>

RAJESH TIM GANDHI collected ~\$40k from Gilead and Merck.

<https://openpaymentsdata.cms.gov/physician/1273478>

WILLIAM J MULLER collected ~\$140k from Astrazeneca, Merck and Janssen

<https://openpaymentsdata.cms.gov/physician/613576>

SHUMEL SHOHAM collected \$180k from Merck, Gilead, Emergent, Jannsen

<https://openpaymentsdata.cms.gov/physician/780712>

Mechanistic evidence (prediction)

Proteins that contaminate influenza vaccines have high homology to SARS-CoV-2 proteins thus increasing risk of severe COVID-19 disease and mortality

<https://doi.org/10.5281/zenodo.3996984>

Epidemiological evidence (confirmation)

Flu shot increases risk of COVID-19 Hospitalization **240%**, ICU admission **204%**, Hospital mortality **232%**.

Safety of Influenza Vaccine during COVID-19

<https://doi.org/10.1017/cts.2020.543>

"Among individuals with a positive SARS-CoV-2 test, patients previously vaccinated for influenza in 2019 were more likely to be hospitalized. Once hospitalized, they were more likely to be admitted to the ICU and die during hospitalization."

From Table 1:

	Never Vaccinated (N=1,125)	Vaccinated in 2019 (N=309)
Hospitalization - no.(%)	192 (17.1)	127 (41.1)
ICU Admission - no.(%)	77 (6.8)	43 (13.9)
Hospital Mortality - no.(%)	32 (2.8)	20 (6.5)

My comment posted in the Annals of Internal Medicine

The iatrogenic cascade of illnesses

https://www.acpjournals.org/doi/full/10.7326/M20-2470#_comments

COVID-19 vaccines are **fundamentally flawed and unsafe**. Details below:

The CanSino Biologics vaccine:

<https://publons.com/r/9024531/>

The Oxford vaccine:

<https://publons.com/r/9015091/>

The Moderna mRNA vaccine:

<https://publons.com/r/9025990/>

The Pfizer/BioNTech vaccine:

<https://publons.com/r/9026177/>

The Novavax vaccine

<https://publons.com/review/9108287/>

Prof. Kounis' team and I, describe the common immunological mechanisms involved in cardiac injury in COVID-19, severe dengue infection and allergic reactions/anaphylaxis (Kounis syndrome). The medications for prevention/treatment include famotidine/cetirizine.

The passepartout wayfares of Covid-19, Cytokine storm and Kounis syndrome

<https://doi.org/10.5281/zenodo.3977923>

Dual-Histamine Blockade with Cetirizine - Famotidine Reduces Pulmonary Symptoms in COVID-19 Patients

<https://www.medrxiv.org/content/10.1101/2020.06.30.20137752v1>

I predicted in **JANUARY 2020** (email below) that mast cell stabilizers and antihistamines can help in COVID-19. I notified health authorities and thousands of doctors/researchers, worldwide. Hundreds of thousands of lives could have been saved.

The key is to understand that COVID-19 severity is a result of an allergic reaction to the virus, a "slow rolling anaphylaxis". WE HAVE PROVEN TREATMENTS FOR ANAPHYLAXIS. NO CLINICAL TRIALS NEEDED.

The diagnosis and management of anaphylaxis: An updated practice parameter

[https://www.jacionline.org/article/S0091-6749\(05\)00115-6/fulltext](https://www.jacionline.org/article/S0091-6749(05)00115-6/fulltext)

"These protocols have recommended the administration of H1 and H2 antagonists, ??-agonists, antileukotrienes, and corticosteroids."

Cetirizine is an histamine H1 blocker or antagonist. Famotidine is an histamine H2 blocker or antagonist.

These safe, OTC drugs above can be used immediately upon COVID-19 symptoms (or even a low dose if exposure is suspected). Mast cell stabilizers, ??-agonists, antileukotrienes, and corticosteroids can be prescribed as standard of care. Hundreds of thousands of lives can be saved.

As I wrote in my comment posted in the Annals of Internal Medicine:

Please see comments section:

<https://annals.org/aim/fullarticle/2764199/use-hydroxychloroquine-chloroquine-during-covid-19-pandemic-what-every-clinician>

Understanding mechanisms is better than demanding clinical trials in the middle of a pandemic

More details:

Immunological mechanisms explaining the role of IgE, mast cells, histamine, elevating ferritin, IL-6, D-dimer, VEGF levels in COVID-19 and dengue, potential treatments such as mast cell stabilizers, antihistamines, Vitamin C, hydroxychloroquine, ivermectin and azithromycin

<https://doi.org/10.5281/zenodo.3748303>

COVID-19: Famotidine, Histamine, Mast Cells, and Mechanisms

<https://www.researchsquare.com/article/rs-30934/v2>

Repositioning Chromones for Early Anti-inflammatory Treatment of COVID-19

<https://www.frontiersin.org/articles/10.3389/fphar.2020.00854/full>

Mast cells contribute to coronavirus-induced inflammation: new anti-inflammatory strategy??

<https://pubmed.ncbi.nlm.nih.gov/32013309/>

Thanks,
Vinu

----- Forwarded Message -----

Subject: Wuhan 2019-nCoV treatment; Vaccines induce autoimmunity: Epitope database evidence; Ebola vaccine will cause rice allergy epidemic

Date: Fri, 24 Jan 2020 17:42:02 -0800

From: vinu arumugham: (b)(6)@yahoo.com>

To: jay.slater@fda.hhs.gov <jay.slater@fda.hhs.gov>, jane.woo@fda.hhs.gov <jane.woo@fda.hhs.gov>, maureen.hess@fda.hhs.gov <maureen.hess@fda.hhs.gov>, Richard.Forshee@fda.hhs.gov <Richard.Forshee@fda.hhs.gov>, Mark.Walderhaug@fda.hhs.gov <Mark.Walderhaug@fda.hhs.gov>, CBER OCOD Consumer Account <cberocod@fda.hhs.gov>, Destefano, Frank (CDC/OID/NCEZID) <fxdl@cdc.gov>, isq8@cdc.gov <isq8@cdc.gov>, nar5@cdc.gov <nar5@cdc.gov>, hjn0@cdc.gov <hjn0@cdc.gov>, Secretary@HHS.gov <Secretary@HHS.gov>, CommissionerFDA@fda.hhs.gov <CommissionerFDA@fda.hhs.gov>, olx1@cdc.gov <olx1@cdc.gov>, directorsincoming@cdc.gov <directorsincoming@cdc.gov>, francis.collins@nih.gov <francis.collins@nih.gov>, mrolfes1@cdc.gov <mrolfes1@cdc.gov>, xzd2@cdc.gov <xzd2@cdc.gov>, acy9@cdc.gov <acy9@cdc.gov>, dbj0@cdc.gov <dbj0@cdc.gov>, jmk9@cdc.gov <jmk9@cdc.gov>, tft9@cdc.gov <tft9@cdc.gov>, gll9@cdc.gov <gll9@cdc.gov>, sharplessne@nih.hhs.gov <sharplessne@nih.hhs.gov>, tnc4@cdc.gov <tnc4@cdc.gov>, kok4@cdc.gov <kok4@cdc.gov>, rxl3@cdc.gov <rxl3@cdc.gov>, gbq7@cdc.gov <gbq7@cdc.gov>, fwf7@cdc.gov <fwf7@cdc.gov>, megan.mcseveney@fda.hhs.gov <megan.mcseveney@fda.hhs.gov>, afauci@niaid.nih.gov <afauci@niaid.nih.gov>,

Emelia.Benjamin@bmc.org
<Emelia.Benjamin@bmc.org>, mjessup@leducq.com
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<tavori@ohsu.edu>, jessica.lilley@vanderbilt.edu
<jessica.lilley@vanderbilt.edu>,
web@beasleyallen.com <web@beasleyallen.com>,
dr.flegg@bfwhospitals.nhs.uk
<dr.flegg@bfwhospitals.nhs.uk>

IgE mediated sensitization to peptides that have homology to 2019-nCoV peptides may contribute to disease severity. In that case, antihistamines and other allergy treatments such as mast cell stabilizers may help reduce infection severity.

A BLASTP analysis of 2019-nCoV proteome against common vaccine antigens was performed. Preliminary results suggest that IgE mediated sensitization to common vaccine antigens can result in cross reactive immune responses to 2019-nCoV.

Please see details of the mechanisms here:

Influenza vaccines and dengue-like disease

<https://www.bmj.com/content/360/bmj.k1378/tr-15>

<https://www.quora.com/Why-was-the-flu-so-deadly-in-outbreaks-in-the-past-And-what-made-the-flu-become-less-deadly/answers/86456279>

"Scientists" at the global vaccine safety summit spill the beans: There is no science behind vaccine safety claims, it's a fairy tale.

The party is over folks.

<https://youtu.be/s2IujhTdCLE>

ERVEBO Ebola vaccine will create a rice allergy epidemic, add to numerous autoimmune diseases, cancer and make Ebola disease even more severe. Design for safety and vaccine safety regulation remain abject failures. Incompetence or indifference?

<https://doi.org/10.5281/zenodo.3595020>

Analyzing 23000+ epitopes covering 82 autoimmune diseases in the Immune Epitope Database, 57% have only one and 78% have up to two amino acid residue differences compared to animal, fungal or plant peptides present in vaccines; an unmistakable signature of the role of vaccines in their etiologies

<https://doi.org/10.5281/zenodo.3603480>

Analyzing 23000+ epitopes covering 82 autoimmune diseases in the Immune Epitope Database, 57% have only one and 78% have up to two amino acid residue differences compared to animal, fungal or plant peptides present in vaccines; an unmistakable signature of the role of vaccines in their etiologies

Vinu Arumugham

Jan 2020

vinucubeacc@gmail.com

Lay summary

Proteins are a chain of amino acids. Proteins can have up to several hundred amino acids. Snippets of proteins (peptides), 7-15 amino acids in length are important in immunology. There are 20 types of amino acids. Each is assigned a letter (1 letter code).

Antibodies are proteins that can bind to peptides that have a specific amino acid sequence. Such a target peptide is known as an epitope.?? When an antibody binds to a peptide (which is part of a protein, which in turn may be part of a cell surface), it can trigger an immune attack on the cell. If the cell were a bacterium, the bacterium would be killed.

Humans (like all organisms) are made of numerous proteins (self proteins). So we have self-proteins, self-peptides and self-epitopes. In a healthy person, the body will not make antibodies that bind strongly to self-peptides (self-tolerance).

DNA is a chain of base-pairs. The DNA base-pair sequence determines the amino acid sequence in the protein produced. If there is a mutation that alters a single base-pair, the resulting protein will have a single amino acid that is altered. To prevent cancer, the immune system is capable of making antibodies against such altered peptides. Such antibodies can also weakly bind (cross react) to the unaltered normal peptide thus resulting in destruction of some healthy cells.

Say a normal protein has the following peptide (10 amino acids, each represented by its 1 letter code):

ALSTLVVNKI

Say DNA in a cell mutates due to a carcinogen exposure and it alters the protein thus resulting in this peptide with a single amino acid change:

ALSTLVVSKI

When the immune system makes antibodies targeted at ALSTLVVSKI (to attack the cell with the DNA mutation), the same antibodies can weakly bind to the normal ALSTLVVNKI peptide.

ALSTLVVNKI is an epitope associated with rheumatoid arthritis (RA).

So as a result of the immune system defending against cancer, the person can develop RA.

Now consider vaccines containing animal proteins. Animal proteins are very similar to human proteins, containing only occasional amino acid differences. An animal peptide could therefore have the ALSTLVVSKI sequence. Such a vaccine would fool the immune system into creating an anti-cancer immune response, creating antibodies targeted at ALSTLVVSKI. The result is vaccine induced RA.

Therefore one can predict that analyzing epitopes associated with autoimmune diseases, such single amino acid difference compared to animal peptides present in vaccines, would occur more frequently than can be expected merely by chance. The analysis confirms that this prediction is valid.

Abstract

The National Institute of Allergy and Infectious Diseases (NIAID) sponsors the Immune Epitope Data Base (IEDB). IEDB contains epitopes identified from the medical literature and organized by diseases and categories of diseases. All epitopes (23000+) associated with 82 autoimmune diseases in humans were analyzed.

The role of animal, plant, fungal proteins contained in vaccines in the etiology of autoimmune diseases have been described in humans and animals. BLASTP was used to analyze IEDB derived epitopes for sequence alignment to animal, plant, fungal (APF) proteins present in vaccines and biologics. Specifically, the search was performed against bovine, chicken, porcine, guinea pig, African green monkey, Chinese hamster, murine, peanut, soy, wheat, corn, sesame and *Saccharomyces cerevisiae* proteomes.

The results show that 57% of epitopes differed by exactly one amino acid residue from an APF peptide. 78% of the epitopes differed by up to two amino acid residues from an APF peptide. The rest of the epitopes were either identical or differed by more than two amino acid residues.

A majority of IEDB epitopes analyzed were 9-mer peptides. Comparing randomly selected 9-mer human peptides with APF proteomes, the probability of single amino acid residue difference (SAARD) outcomes was derived. This was used to estimate the probability that actual IEDB SAARD alignments to APF peptides were merely a chance outcome. The estimates show that the probability that the observed IEDB alignments to APF being merely a chance outcome are vanishingly small. So the results make it absolutely clear that APF proteins in vaccines cause all these autoimmune diseases.

Introduction

Vaccines contain thousands of residual animal, plant and fungal (APF) proteins from the manufacturing process (1)???. 293 chicken proteins were identified in the influenza vaccine (7)???, for example. Actin and vimentin proteins were detected in the Priorix Tetra vaccine (8)???. Immunization with homologous xenogeneic antigens resulting in autoimmune diseases has been known for at least 40 years (9)???. Vaccines that contain bovine proteins caused autoimmunity in dogs (10)???. We previously described the immunological mechanism involved in autoimmunity induction by immunization with homologous xenogeneic antigens (11)???

Cancer cells have minor differences when compared to healthy cells. Due to mutation of the DNA encoding the proteins, cancer cells can display altered proteins on their surface. Healthy cancer defense mechanisms include immune responses directed at such altered proteins. Therefore an immune response directed against cancer cells always carries a risk of cross reactive immune responses against healthy cells displaying the unaltered protein. Therefore, cancer induced autoimmune responses are a consequence of normal, healthy immune system behavior.

Animal proteins have minor differences compared to human proteins. Peptides that are identical between humans and animals are unlikely to cause any problem due to strong self tolerance. However, peptides with one amino acid residue difference produce the strongest cross reactive immune responses (11)???. They are ideally suited to induce autoimmune diseases. Injecting animal proteins results in anti-cancer immune responses because the immune system perceives animal proteins as altered human proteins. Adjuvants in the vaccine boost this anti-cancer immune response. This artificial anti-cancer response directed at thousands of APF proteins in vaccines or biologics, therefore cross react and cause numerous autoimmune disorders.

For this reason, one can predict that single amino acid residue difference (SAARD) between autoimmune disease related epitopes in the IEDB and homologous APF peptides in vaccines, would occur at a higher probability than by mere chance. We perform a BLASTP analysis to verify.

Methods

Basic local alignment search tool for proteins (BLASTP) (12)???, Universal Protein Resource (UniProt)(13)??? and the Immune Epitope Database (IEDB) (14)??? were used for bioinformatics analysis.

Specifically, the BLASTP sequence alignment of IEDB peptides was performed against bovine, chick, porcine, guinea pig, African green monkey, Chinese hamster, murine, peanut, soy, wheat, corn, sesame and *Saccharomyces cerevisiae* proteomes. Vaccines and biologics contain residual proteins from all these organism due to media used to grow viruses or bacteria, recombinant cells/organisms used for protein expression or as excipients.

Results

57% of IEDB peptides have a SAARD and 78% have up to two amino acid differences compared to animal, fungal or plant peptides present in vaccines.

Discussion

Could this result be a chance occurrence?

A majority of IEDB epitopes analyzed were 9-mer peptides. Five thousand 9-mer peptides were chosen at random from the human proteome. BLASTP was run using these peptides to compare against each organism???s proteome or a subset. This provides us the probability that randomly selected human peptides have an alignment providing a SAARD compared to peptides from these organisms. These are listed in table 1 under ??? Random SAARD alignment???. Given this, we can compute the probability of the actual SAARD alignment to IEDB epitopes, occurring by chance. This is listed in table 1 under ???Estimated probability of actual SAARD outcome occurring just by chance???

For a simple coin toss example, we would perform the calculation as follows:

Computing probability of say a 7 heads, 3 tails outcome of 10 trials of a fair coin:

$$\text{Probability} = (0.5^7) \times (0.5^3) \times 10! / (7! \times 3!)$$

Where:

0.5 is the probability of a head or tail outcome of a fair coin.

For an unfair coin, say probability of head outcome = 0.4 and tail outcome 0.6, we would have:

$$\text{Probability} = (0.4^7) \times (0.6^3) \times 10! / (7! \times 3!)$$

For the IEDB peptide probability analysis, the outcome is for 23192 trials (peptides).

The ???head outcome??? is the ???Random SAARD alignment ??? entries in table 1. The ???tail outcome??? probability is 1-???head outcome???

Sample calculation for Chinese Hamster:

$$\text{Probability} = ((889/5000)^{4574}) \times ((4111/5000)^{18618}) \times 23192! / (4574! \times 18618!)$$

$$\text{Probability} = 1.488\text{e-}15$$

Where: $889 \times 100 / 5000 = 17.8\%$ is the entry in Table 1 for Chinese Hamster. BLASTP analysis shows 889 SAARD out of 5000 peptides analyzed.

And, $4574 \times 100 / 23192 = 19.7\%$ is the IEDB entry in Table 1 for Chinese Hamster. BLASTP analysis shows 4574 SAARD out of 23192 peptides analyzed.

So the 1.488e-15 value is the probability that we will have exactly 4574 SAARD alignments out of 23192 peptides. The probability goes down for all values > 4574. Conservatively, applying the same probability as for 4574, to all values >4574, we can calculate the probability of the chance occurrence of 4574 or greater number of SAARD alignments as $1.488\text{e}15 \times 18618 = 27\text{e-}12$, entry in table.

The Gnome calculator was used to perform these calculations and the results were verified using the Qalculate! calculator and WolframAlpha (15)??? since spreadsheets are unable to perform these calculations.

Table 1

Organism	Random SAARD alignment Number of Peptides(%)	Actual (IEDB) SAARD alignment Number of Peptides (%)	Estimated probability of actual SAARD outcome occurring just by chance	Remarks
African green monkey (<i>Chlorocebus aethiops</i>)	26 (0.5)	420 (1.8)	$\sim 1.7\text{e-}96$	Probability of this outcome occurring just by chance is vanishingly small. So these animal proteins in vaccines, caused these diseases.
Cow (<i>Bos taurus</i>)	936 (18.7)	4385 (18.9)	~ 1	There are two possibilities. (1) This outcome occurred just by chance. (2) The assumption that all cow proteins are present in the vaccines in equal amount is not true. We know that cow???s milk, bovine gelatin, bovine serum albumin are used in vaccines. So these proteins and proteins present in tissues in the vicinity, are included in vaccines but other cow proteins may not be present. This is the more likely explanation. Please see Cow???s milk entry below.
Cow???s Milk (<i>Bos taurus</i>)	0 (0)	12 (0.05)	0	Probability of this outcome occurring just by chance is 0. So these animal proteins in vaccines, caused these diseases.
Chinese Hamster (<i>Cricetulus griseus</i>)	889 (17.8)	4574 (19.7)	$\sim 27\text{e-}12$	Probability of this outcome occurring just by chance is vanishingly small. So these animal proteins in vaccines, biologics caused these diseases.
Chicken (<i>Gallus gallus</i>)	536 (10.7)	3901 (16.8)	$< 1\text{e-}100$	Probability of this outcome occurring just by chance is vanishingly small. So these animal proteins in vaccines, caused these diseases. Unlike bovine, porcine and murine proteins, since chicken egg or embryo is used for vaccine manufacture, all chicken proteins can be present in vaccines.

Organism	Random SAARD alignment Number of Peptides(%)	Actual (IEDB) SAARD alignment Number of Peptides (%)	Estimated probability of actual SAARD outcome occurring just by chance	Remarks
Guinea Pig (<i>Cavia porcellus</i>)	837 (16.7)	4439 (19.1)	$\sim 1e-18$	Probability of this outcome occurring just by chance is vanishingly small. So these animal proteins in vaccines, caused these diseases.
Mice (<i>Mus musculus</i>)	940 (18.8)	4467 (19.3)	~ 1	There are two possibilities. (1) This outcome occurred just by chance. (2) The assumption that all mice proteins are present in biologics in equal amount is not true. We know that mice myeloma cells are used in biologics. So these proteins and proteins present in tissues in the vicinity, are present in biologics but other mice proteins may not be present. This is the more likely explanation.
Maize (<i>Zea mays</i>)	303 (6.1)	1667 (7.2)	$\sim 5e-9$	Probability of this outcome occurring just by chance is vanishingly small. So these plant proteins in vaccines, caused these diseases.
Peanut (<i>Arachis hypogaea</i>)	223 (4.5)	1697 (7.3)	$\sim 79e-81$	Probability of this outcome occurring just by chance is vanishingly small. So these plant proteins in vaccines, caused these diseases.
Yeast (<i>Saccharomyces cerevisiae</i>)	64 (1.3)	828 (3.6)	$< 1e-100$	Probability of this outcome occurring just by chance is vanishingly small. So these fungal proteins in vaccines, biologics caused these diseases.
Sesame (<i>Sesamum indicum</i>)	155 (3.1)	1398 (6.0)	$< 1e-100$	Probability of this outcome occurring just by chance is vanishingly small. So these plant proteins in vaccines, caused these diseases.
Soy (<i>Glycine max</i>)	215 (4.3)	1548 (6.7)	$\sim 86e-59$	Probability of this outcome occurring just by chance is vanishingly small. So these plant proteins in vaccines, caused these diseases.
Pig (<i>Sus scrofa</i>)	963 (19.3)	4407 (19.0)	~ 1	There are two possibilities. (1) This outcome occurred just by chance. (2) The assumption that all porcine proteins are

Organism	Random SAARD alignment Number of Peptides(%)	Actual (IEDB) SAARD alignment Number of Peptides (%)	Estimated probability of actual SAARD outcome occurring just by chance	Remarks
				present in the vaccines in equal amount is not true. We know that porcine gelatin is used in vaccines. So these proteins and proteins present in tissues in the vicinity are included in vaccines but other porcine proteins may not be present. This is the more likely explanation.
Wheat (<i>Triticum aestivum</i>)	138 (2.8)	977 (4.2)	~18e-33	Probability of this outcome occurring just by chance is vanishingly small. So these plant proteins in vaccines, caused these diseases.

The calculations make it clear that the findings cannot be merely a chance outcome and that immunization against animal/plant/fungal antigens in the vaccines do cause these autoimmune diseases in the IEDB.

Conclusion

Vaccines containing animal, plant or fungal proteins are extremely dangerous and cause numerous autoimmune diseases and cancer (16??19)???. All non-target proteins in vaccines must be immediately removed using processes such affinity chromatography (20)???

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Subject: Re: CEPI SAC MEETING - 4 DECEMBER 2020

Dear Stig and Melanie

I am sure that the SAC understands the pressure that everyone is working under and the reasons for the postponement. There are a couple of agenda items that we might want to tackle before the next meeting, but I think these could be done on line and I will follow up with Melanie. If any SAC member has specific questions that you would like to raise and discuss before January, can you copy myself and Melanie and we can see what interim arrangement can be made.

In the meantime, we can make sure that everyone receives Richard's very helpful correspondence that updates us on CEPI's progress. Thanks to the team for your commitment in pushing CEPI's incredibly important agenda forward.

Warm wishes to you all and stay well.
Helen

From: CEPI SAC <CEPISAC@cepi.net>

Date: Friday, 23 October 2020 at 14:34

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Subject: RE: CEPI SAC MEETING - 4 DECEMBER 2020

Dear SAC members,

Given the current workload in CEPI, there is not enough bandwidth to prepare and arrange a November SAC meeting as initially intended. We are looking for an opportunity to arrange the SAC meeting in early January, and we will get back to you as soon as the details are in place. We are sorry for the inconvenience and hope for your understanding. We wish you all a good autumn and the prospect of staying healthy through the troubled times, in alignment with the motto "Stay positive, Test negative".

On behalf of the secretariat

Kind regards,

Stig

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Technology Office Lead



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From: CEPI SAC <CEPISAC@cepi.net>

Sent: fredag 23. oktober 2020 12:55

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Cc: michel De Wilde; Lang, Jean /FR; Graca, Gerri

Subject: Canceled: CEPI SAC MEETING - 4 DECEMBER 2020

When: fredag 4. desember 2020 14:00-16:00 (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna.

Where: <https://cepi-net.zoom.us/j/> (b)(6)

Importance: High

Sensitivity: CEPI Internal

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On behalf of the secretariat

Kind regards,

Stig

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-----Original Appointment-----

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Sent: fredag 23. oktober 2020 12:55

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Cc: michel De Wilde; Lang, Jean /FR; Graca, Gerri

Subject: Canceled: CEPI SAC MEETING - 4 DECEMBER 2020

When: fredag 4. desember 2020 14:00-16:00 (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna.

Where: [https://cepi-net.zoom.us/j/\(b\)\(6\)](https://cepi-net.zoom.us/j/(b)(6))

Importance: High

Sensitivity: CEPI Internal

From: Simon Funnell [Simon.Funnell@phe.gov.uk]
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Subject: OFFICIAL: WHO COVID-19 Models Working Group Agenda - 8th October 2020

OFFICIAL

Dear all,

Please find below the agenda for our group call that as usual will take place this Thursday Oct 8th at 3PM CET (Geneva time).

Best regards,

César, Simon and Bill

Agenda for the WHO working group on COVID-19 models

1. S Funnell – introduction to the focus session on viral stock propagation 5 min
2. PHE – Kevin Richards and Karen Osman – comparative stock propagation and sequencing - 10 min
3. NIBSC – Yann LeDuff – comparative stock propagation and sequencing 10 min
4. NIAID/BEI – Clint Florence and Sujatha Rashid - comparative stock propagation and sequencing - 20 min
5. Mark Lewis and Shelby O'Connor – Sequencing of the stocks used for *in vivo* samples and some of the consequences – 15 min
6. Questions and discussion – 20 min
7. Announcement of the WHO RFP with a brief overview of the scope of the call – 5 min

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Thursday, October 8, 2020

3:00 pm | (UTC+02:00) Brussels, Copenhagen, Madrid, Paris | 1 hr 30 mins

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