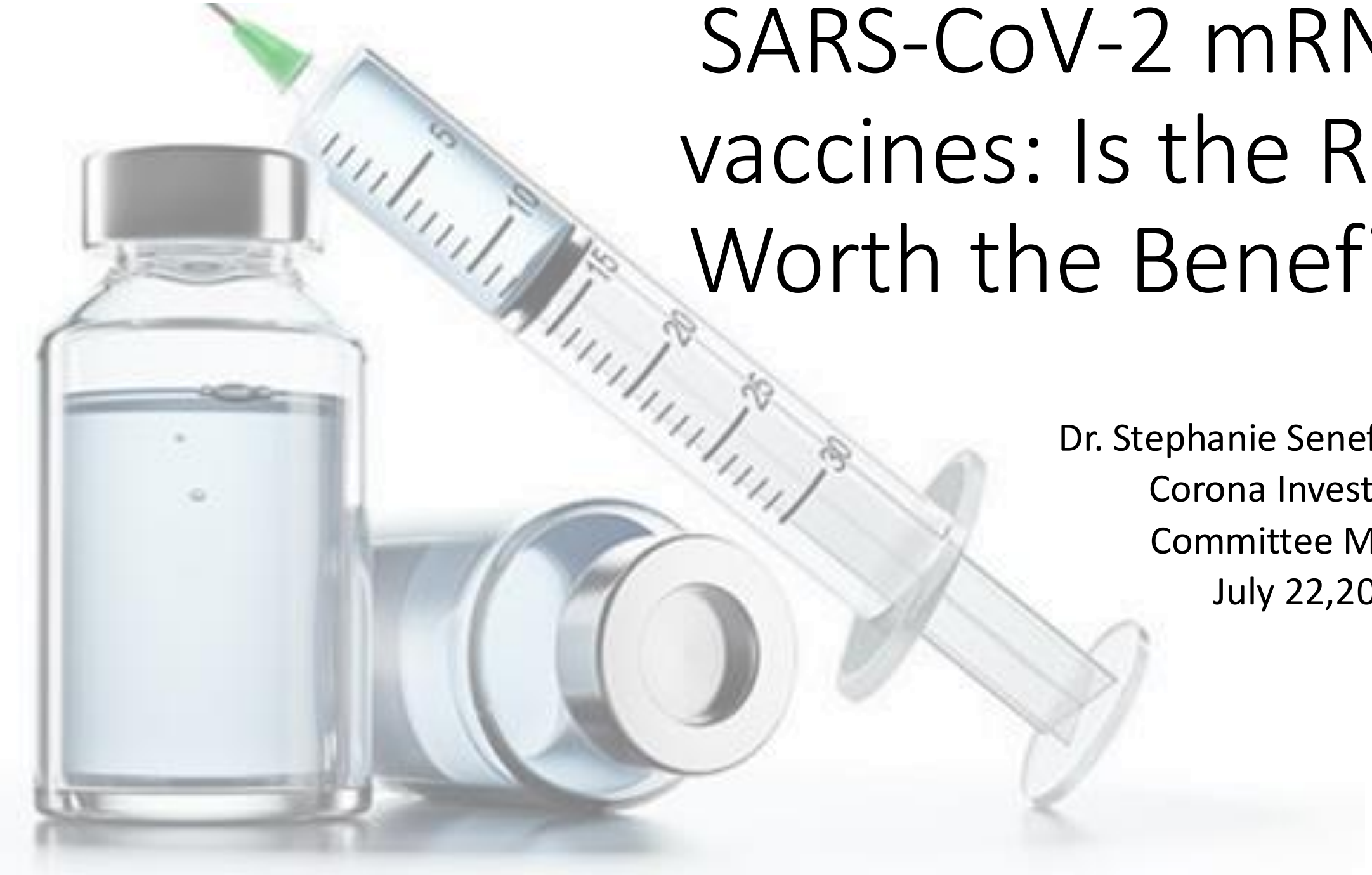

SARS-CoV-2 mRNA vaccines: Is the Risk Worth the Benefit?

Dr. Stephanie Seneff, MIT CSAIL

Corona Investigative Committee Meeting

July 22,2022

Download these slides

- Powerpoint slides

https://people.csail.mit.edu/seneff/2022/Seneff_Corona_2022.pptx

- Pdf file, two slides per page

https://people.csail.mit.edu/seneff/2022/Seneff_Corona_2022.pdf

Outline

- Introduction
- Exosomes and Neurodegeneration
- mRNA Vaccines and Heart Disease
- G-quadruplexes
- Other Aspects
- Summary

Introduction

Food and Chemical Toxicology 164 (2022) 113008

Contents lists available at ScienceDirect

Food and Chemical Toxicology

journal homepage: www.elsevier.com/locate/foodchemtox

Innate immune suppression by SARS-CoV-2 mRNA vaccinations: The role of G-quadruplexes, exosomes, and MicroRNAs

Stephanie Seneff [a,*], Greg Nigh [b], Anthony M. Kyriakopoulos [c], Peter A. McCullough [d]

"In this paper, we present evidence that vaccination induces a profound impairment in type I interferon signaling, which has diverse adverse consequences to human health."

"These disturbances potentially have a causal link to neurodegenerative disease, myocarditis, immune thrombocytopenia, Bell's palsy, liver disease, impaired adaptive immunity, impaired DNA damage response and tumorigenesis."

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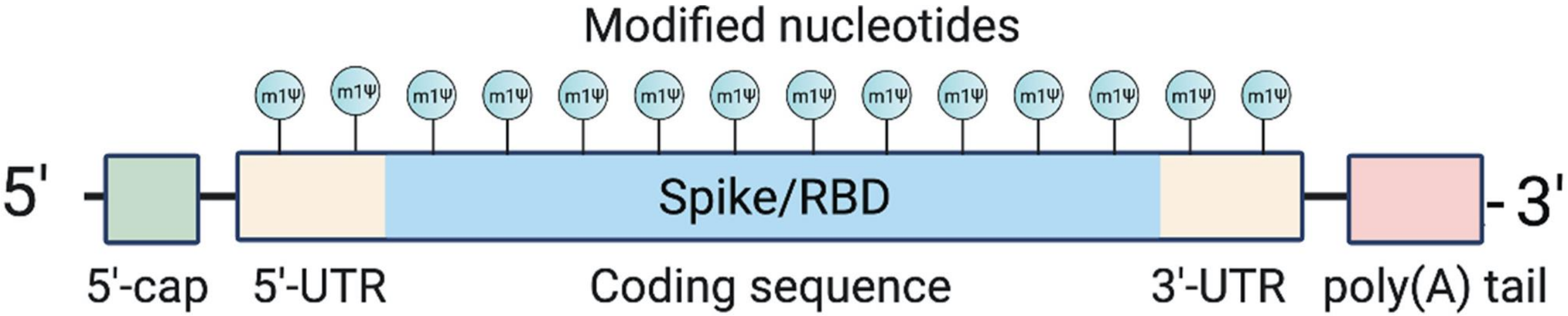


- mRNA vaccines contain the genetic code to make spike protein
- The RNA is carefully engineered to resist breakdown
  - All of the uridines are replaced with 1-methyl-pseudouridine (m1Ψ)
- The mRNA is incorporated into a lipid particle along with polyethylene glycol (PEG)
- A synthetic ionizable cationic (positively charged) lipid is added as an adjuvant – very toxic to the cells
- The “humanized” mRNA is a stealth entry system for massive production of spike protein

*S Seneff et al. Food and Chemical Toxicology 2022; 164: 113008.

The Cationic Lipid is Toxic

- The vaccines include synthetic cationic (positively charged) lipids that have not been evaluated for toxicity
- Experiment involving LNPs [lipid nanoparticles] complexed with noncoding polycytosine mRNA:*

  > "We show that in mice intradermal, intramuscular, or intranasal delivery of LNPs [lipid nanoparticles] used in preclinical studies triggers inflammation characterized by leukocytic infiltration, activation of different inflammatory pathways, and secretion of a diverse pool of inflammatory cytokines and chemokines"

- The cationic lipid, released into the vasculature by vaccine transfected cells, would cause a drop in zeta potential, inducing a thrombosis risk

*Sonia Ndeupen et al. iScience 2021; 24; 103479.

Exosomes and Neurodegeneration

mRNA Vaccines, Exosomes and Parkinson's Disease*

- Parkinson's disease often begins in the gut as an immune reaction to prion-like proteins produced by pathogens
  - The spike protein is a prion-like protein
- Immune cells invade the arm muscle in response to the mRNA vaccine
  - They actively take up the vaccine and start making lots of spike protein
- Immune cells carry the mRNA via the lymph system into the spleen
- Stressed immune cells in germinal centers release the spike protein packaged up within exosomes (small lipid particles)
- The exosomes travel *along the vagus nerve* to the brainstem nuclei
- Damage to the substantia nigra causes Parkinson's disease

*S Seneff and G Nigh. IJVTPR 2021; 2(1): 38-79.

Exosome Transfer from Cell to Cell*

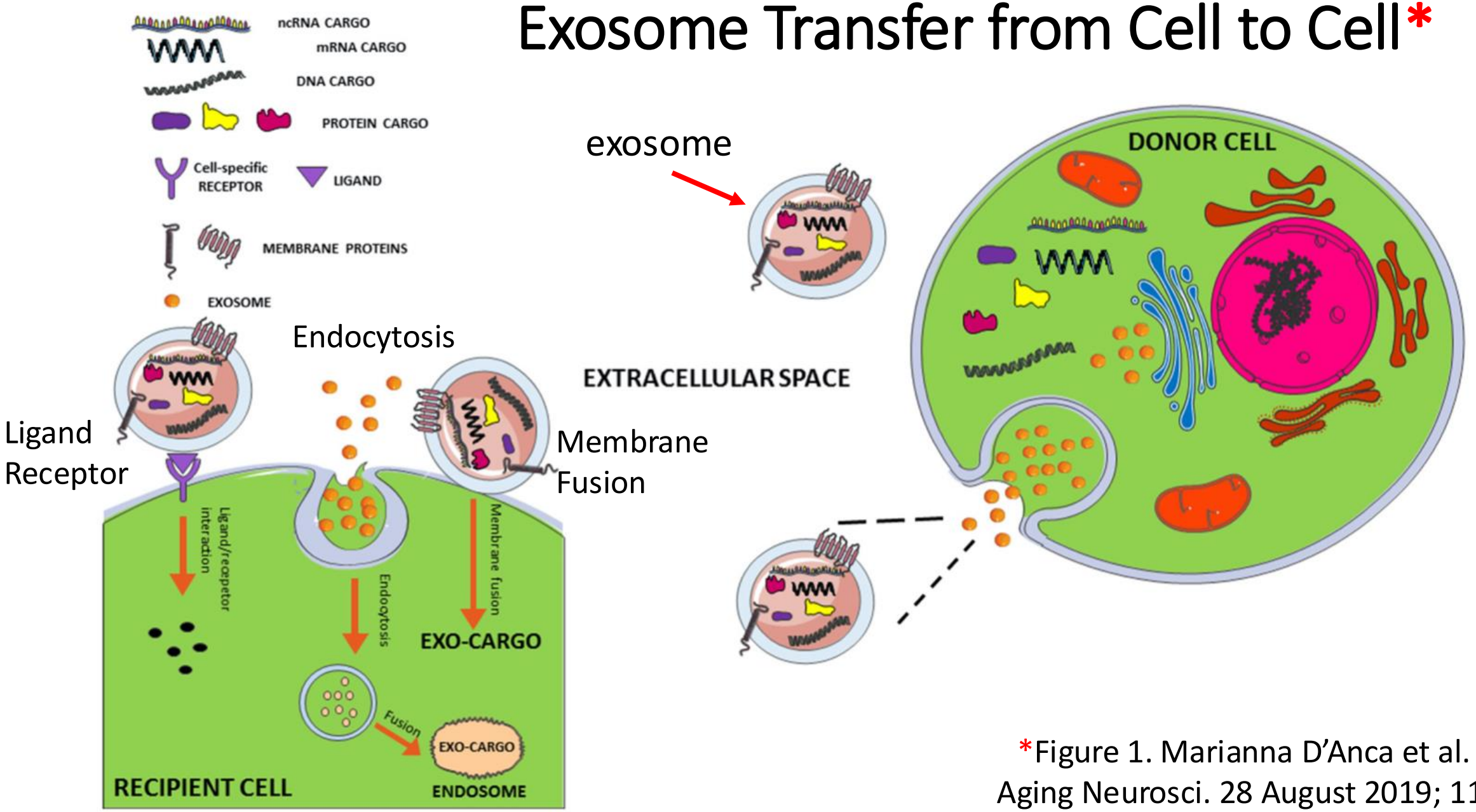


*Figure 1. Marianna D'Anca et al. Front. Aging Neurosci. 28 August 2019; 11: 232.

“Cutting Edge: Circulating Exosomes with COVID Spike Protein Are Induced by BNT162b2 (Pfizer-BioNTech) Vaccination prior to Development of Antibodies”*

- “Our results demonstrated the induction of circulating exosomes carrying the SARS-CoV-2 spike protein by day 14”
- “We propose that the mechanism by which immune responses developed following immunization of mice requires binding of exosomes with mice APCs (antigen presenting cells)”
- “It is also of interest that such an immunization strategy resulted in increased frequency of *splenic lymphocytes* secreting IFN-gamma and TNF-alpha following antigenic stimulation”

*Sandhya Bansal et al. J Immunol 2021; 207(10): 2405-2410.

Symptoms in VAERS in 2021 for conditions related to vagus nerve damage*

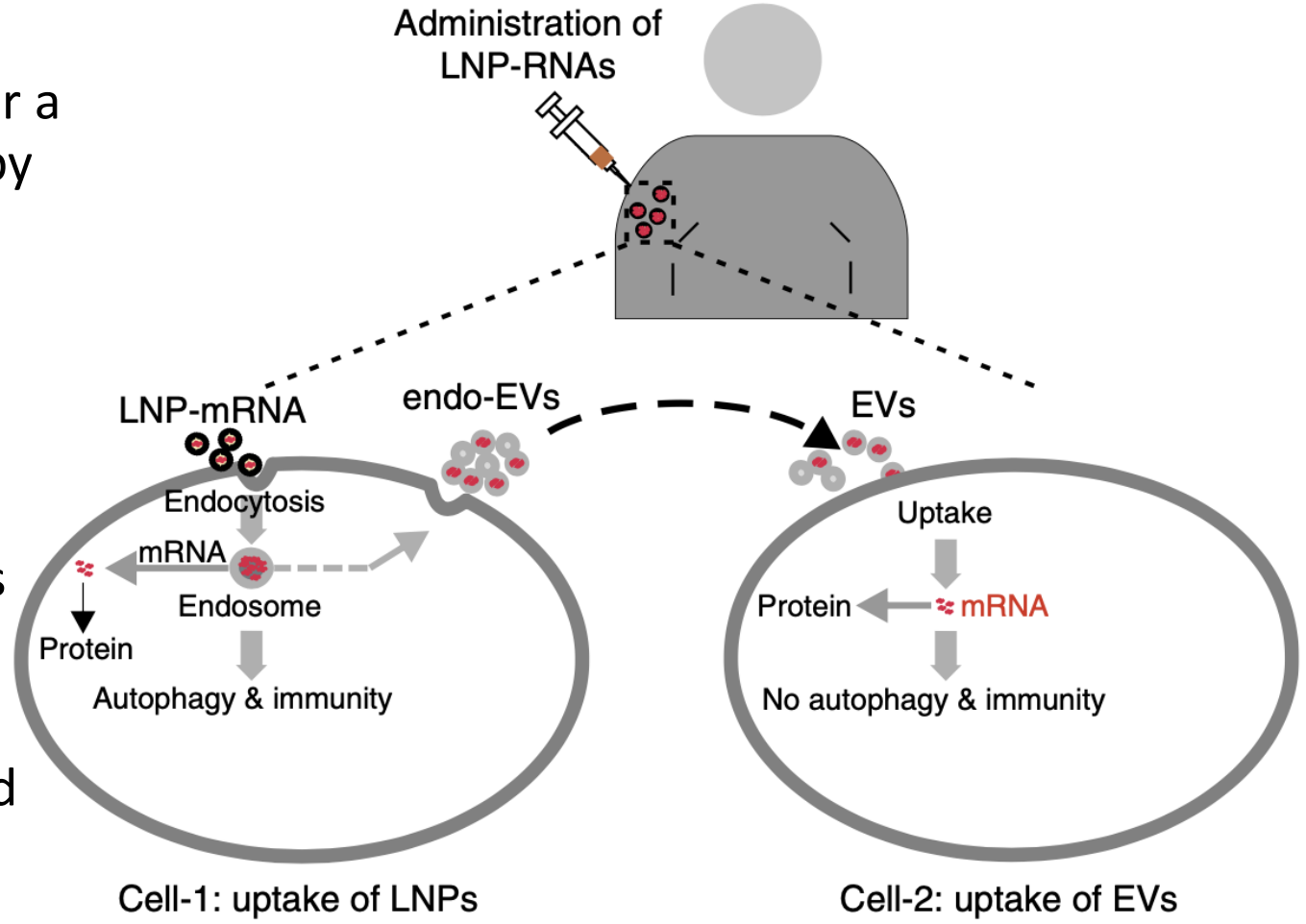
Symptom	COVID-19 Vaccines	All Vaccines	Percent COVID-19
Anosmia	3,657	3,677	99.5
Tinnitus	13,275	13,522	98.2
Deafness	2,895	3,033	95.5
Bell's Palsy/facial palsy	5,881	6,129	96.0
Vertigo	7,638	7,819	97.7
Migraine headache	8,872	9,059	97.9
Dysphonia	1,692	1,751	96.6
Dysphagia	4,711	4,835	97.4
Nausea	69,121	7,1275	97.0
Vomiting	27,885	28,955	96.3
Dyspnea	39,551	40,387	97.9
Syncope	14,701	15,268	96.3
Bradycardia	673	699	96.3
TOTAL	**200,552**	**206,409**	**97.2**

loss of smell

*S Seneff et al. Food and Chemical Toxicology 2022; 164: 113008.

mRNA Transfer to Other Cells via Exosomes*

- Lipid nanoparticles containing mRNA coding for a specific protein (erythropoietin) are taken up by cells at the injection site and repackaged into endosomal vesicles that are then released into the circulation as exosomes
- The ionizable cationic lipid is included in the exosomes at 1:1 ratios with the nucleotides
- These exosomes can be taken up by other cells which then *translate the RNA into protein*
- "Because of their small size, EVs can escape from rapid phagocytosis, and steadily carry and deliver RNA in circulation, passing through the vascular endothelium to the target cells"



EVs= extracellular vesicles = exosomes

*Marco Maugeri et al. Nature Communications 2019; 10: 4333.

mRNA Transfer to Other Cells via Exosomes*

"When mRNA is delivered via LNPs *[lipid nanoparticles],* the LNPs alone may not deliver mRNA to all cells that express the protein; part of the RNA delivery may be achieved via endo-EVs *[extracellular vesicles]* secreted by cells that internalize the LNPs."

"Most importantly, these endo-EVs protect exogenous mRNA during in vivo transport to organs and deliver the intact hEPO-mRNA *to the cytoplasm* of recipient cells."

*Marco Maugeri et al. Nature Communications 2019; 10: 4333.

SARS-CoV-2 Spike Activates Human Microglia in the Brain via Exosomes Loaded with miRNAs*

- "SARS-CoV-2 spike transfected cells release a significant amount of exosomes loaded with microRNAs such as miR-148a and miR-590”
- "MicroRNAs get internalized by human microglia in the brain”
- These two microRNAs collaborate to suppress the response to type I interferon
- "These results uncover a bystander pathway of SARS-CoV-2 mediated CNS *[central nervous system]* damage through hyperactivation of human microglia"

*Ritu Mishra and Akhil C. Banerjea. Frontiers in Immunology 2021; 12:656700

Type I Interferon is Critical*

- Type I interferon plays an important role in the initial battle against pathogens and in keeping cancer in check
- The microRNAs released by transfected immune cells within exosomes along with spike protein suppress type I interferon response
  - This results in reduced levels of CD8+ killer T cells
  - Increases risk to other infections and cancer
- A preprint study showed that a strong type I interferon response along with robust production of CD8+ cytotoxic T cells characterized the response to infection, but were largely absent following vaccination**
- A reduced type I interferon response is associated with severe COVID-19 disease

*S Seneff et al. Food and Chemical Toxicology 2022; 164: 113008.

**Ellie N Ivanova et al. medRxiv preprint doi: 10.1101/2021.04.20.21255677.

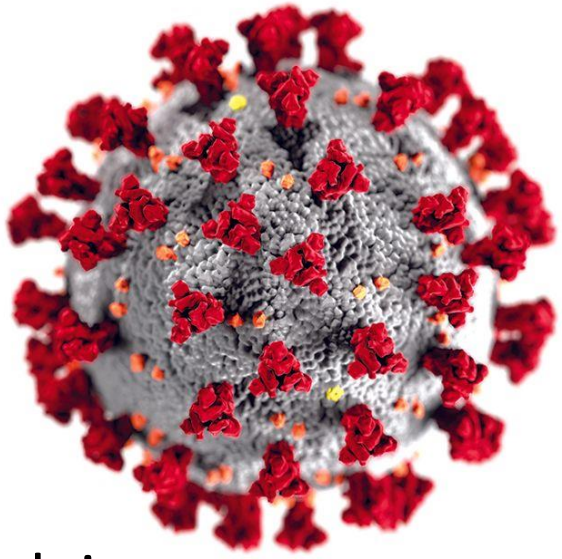
Trends Neurosci. 2020 Dec; 43(12): 931–933.
Published online 2020 Oct 21. doi: 10.1016/j.tins.2020.10.009

Is COVID-19 a Perfect Storm for Parkinson's Disease?

Patrik Brundin,[1,*] Avindra Nath,[2] and J. David Beckham[3]

- Loss of smell (anosmia) is a common early symptom of Parkinson's and of COVID-19
- Virus can gain access to the brain along nerve fibers
  - Olfactory nerve
  - *Vagus nerve*
- Neuroinvasion of SARS-COV-2 could upregulate α-synuclein
  - High levels of α-synuclein leads to misfolding and toxicity
- Dopaminogenic neurons in substantia nigra express high levels of the ACE2 receptor

"SARS-CoV-2 Proteins Interact with Alpha Synuclein and Induce Lewy Body-like Pathology In Vitro”*



- Lewy bodies are clumps of protein that accumulate in the brain in association with Parkinson’s disease
- The spike protein causes cells in the brain to make more alpha synuclein, a protein that appears in Lewy bodies during the disease process
- Aggregation of alpha synuclein into Lewy bodies was increased after spike protein exposure *(a classic prion-like behavior)*
- "By confirming that SARS-CoV-2 proteins directly interact with α-Syn, our study offered new insights into the mechanism underlying the development of PD [Parkinson’s disease] on the background of COVID-19."

*Zhengcun Wu et al. Int. J. Mol. Sci. 2022, 23, 3394.

PREMIUM **HEALTH NEWS**

Studies Link Incurable Prion Disease With COVID-19 Vaccines

By Marina Zhang | June 4, 2022 Updated: June 23, 2022 Print

Prof. Luc Montagnier's preprint paper:

- 26 people developed symptoms of CJD (Creutzfeldt Jakob Disease) within one month of their second mRNA vaccine
- Many died within 3 months
- All are now dead

https://www.theepochtimes.com/studies-link-incurable-prion-disease-with-covid-19-vaccine_4511204.html

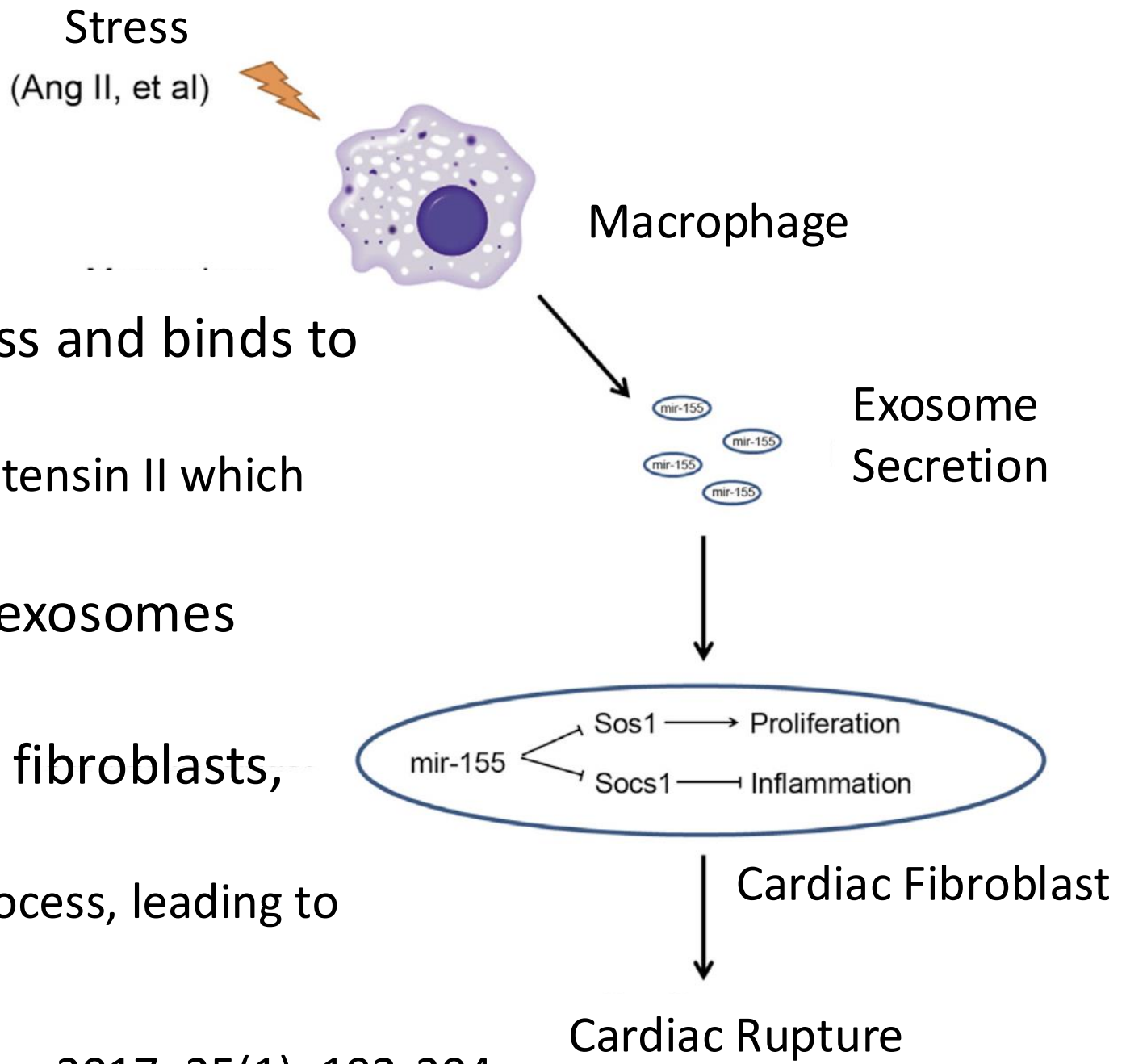
mRNA Vaccines and Heart Disease

How the mRNA Vaccines Cause Heart Disease

- Stressed immune cells release *exosomes* containing *microRNAs* that signal to tissue cells and can induce an inflammatory response
  - In particular, *miR-155* plays a special role in SARS-CoV-2, facilitated by spike
- The spike protein S1 subunit detaches and becomes free to bind to ACE2 receptors which are present at high levels in the heart
  - The suppression of ACE2 by spike S1 causes upregulation of angiotensin II, which induces inflammation (myocarditis) and cardiovascular disease
- S1 has been found in COVID-19 patients long after the virus is cleared, and is believed to play a critical role in “long-haul COVID”
- S1 has also been found in the vasculature following vaccination
- miR-155 overexpression is linked to worse outcomes in heart attack

How Spike Protein can Cause Cardiac Issues*

- Spike protein S1 unit causes stress and binds to ACE2 receptors, disabling them
  - This causes accumulation of Angiotensin II which activates macrophages
- Macrophages secrete abundant exosomes containing miR-155
- These exosomes are taken up by fibroblasts, suppressing their proliferation
  - This interferes with the healing process, leading to cardiac rupture

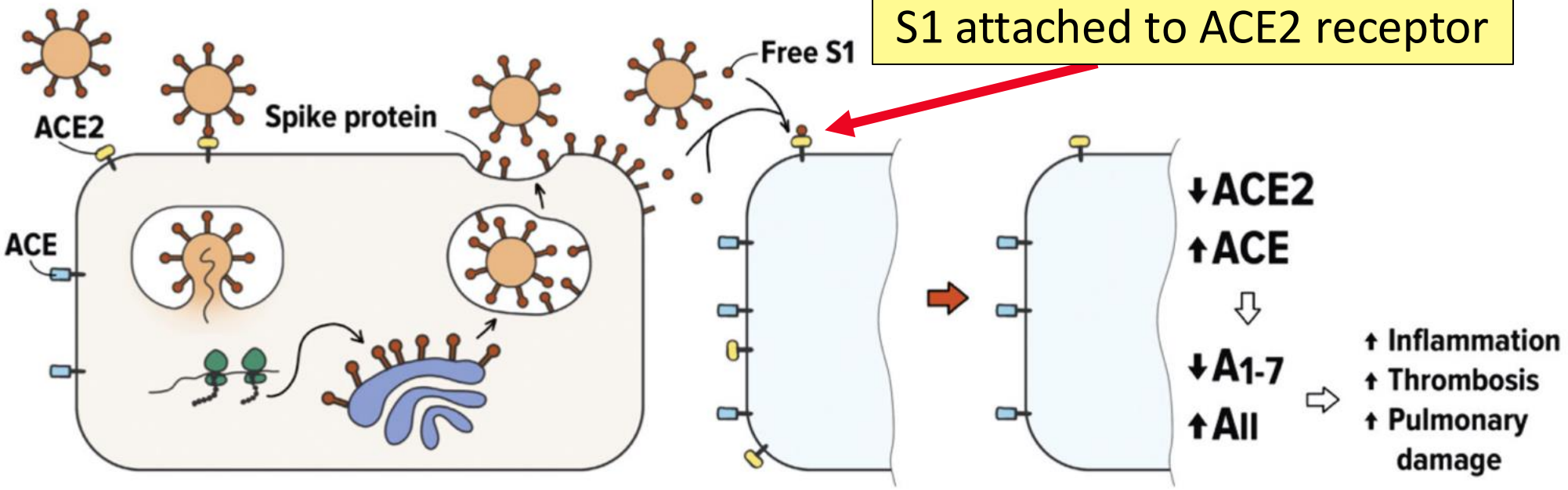


*Chunxiao Wang et al. Molecular Therapy 2017; 25(1): 192-204.

“Free SARS-CoV-2 Spike Protein S1 Particles May Play a Role in the Pathogenesis of COVID-19 Infection”*

Disabling ACE2 receptors causes Inflammation, thrombosis (blood clots) and damage to the lungs

S1 attached to ACE2 receptor

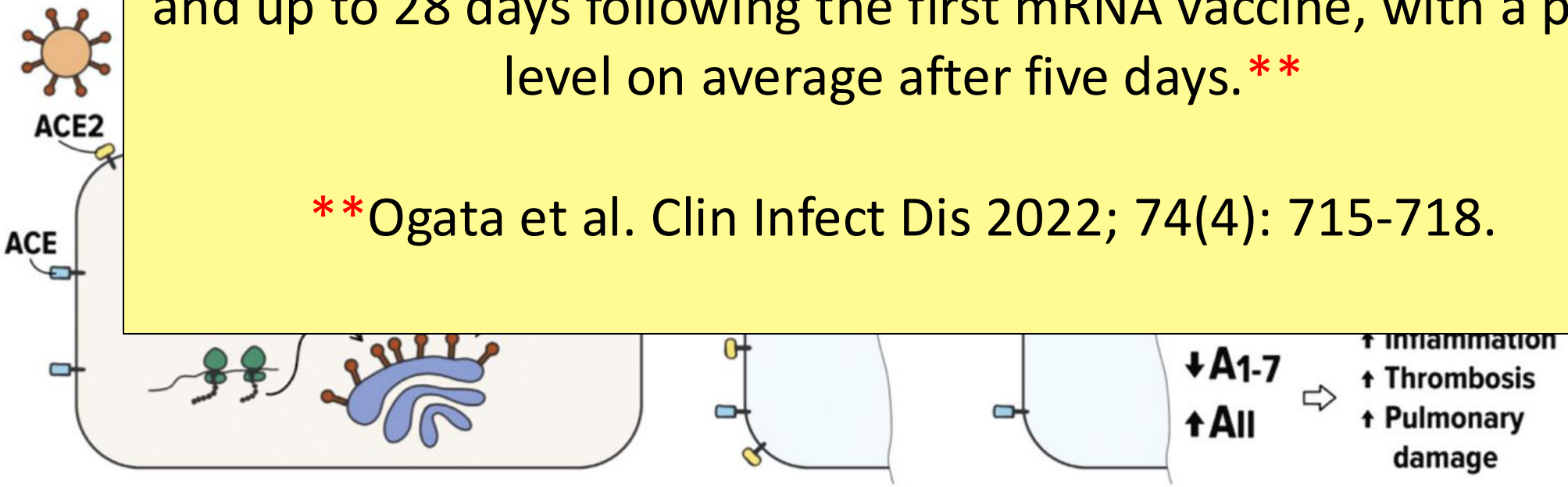


*Andrey V. Letarov et al. Biochemistry (Moscow) 2020 Dec 30: 1–5.

“Free SARS-CoV-2 Spike Protein S1 Particles May Play a Role in the Pathogenesis of COVID-19 Infection”*

Eleven out of 13 health care workers had detectable levels of spike protein and/or S1 in their blood plasma as early as 1 day and up to 28 days following the first mRNA vaccine, with a peak level on average after five days.**

**Ogata et al. Clin Infect Dis 2022; 74(4): 715-718.



*Andrey V. Letarov et al. Biochemistry (Moscow) 2020 Dec 30: 1–5.

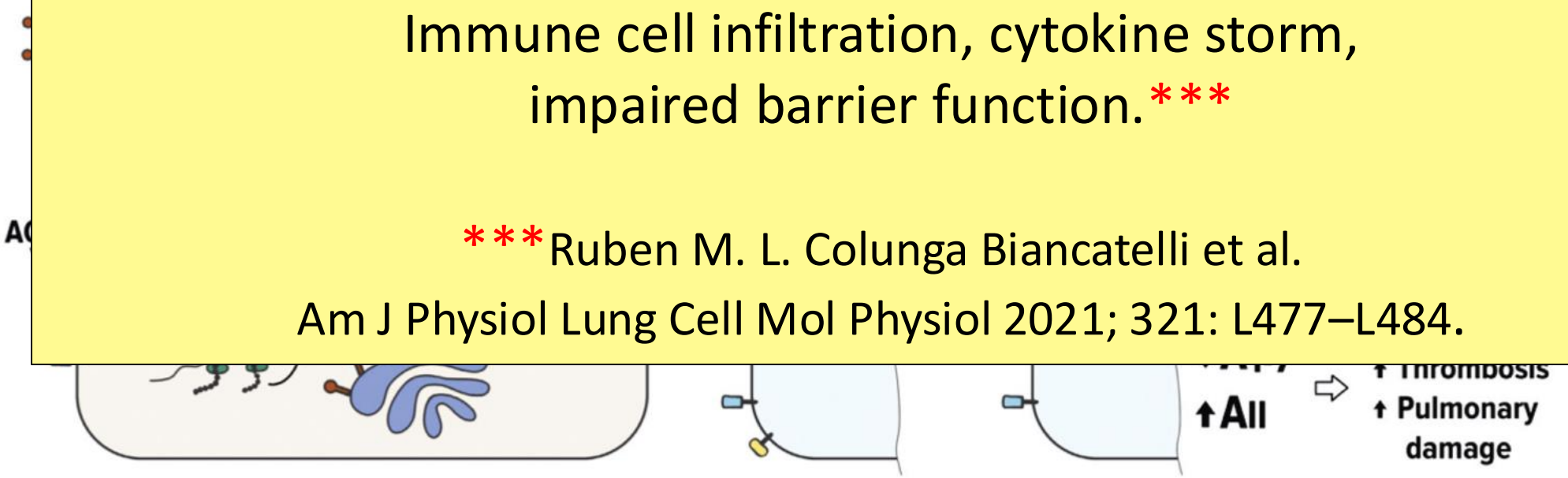
“Free SARS-CoV-2 Spike Protein S1 Particles May Play a Role in the Pathogenesis of COVID-19 Infection”*

S1 alone caused COVID-19-like lung symptoms in mice equipped with human ACE2 receptors:

Immune cell infiltration, cytokine storm, impaired barrier function.***

***Ruben M. L. Colunga Biancatelli et al.

Am J Physiol Lung Cell Mol Physiol 2021; 321: L477–L484.



*Andrey V. Letarov et al. Biochemistry (Moscow) 2020 Dec 30: 1–5.

miR-155 overexpression linked to worse outcomes in heart attack*

- Measured three miRNA levels in autopsy samples of 50 patients with MI

"innate immunity resulting in an intense inflammatory reaction plays an important role in the pathogenesis of the VR [ventricular rupture] after MI [myocardial infarction] in humans."

MI1: heart attack within first 24 hours of clinical symptoms
MI2: heart attack 2-7 days after onset of clinical symptoms

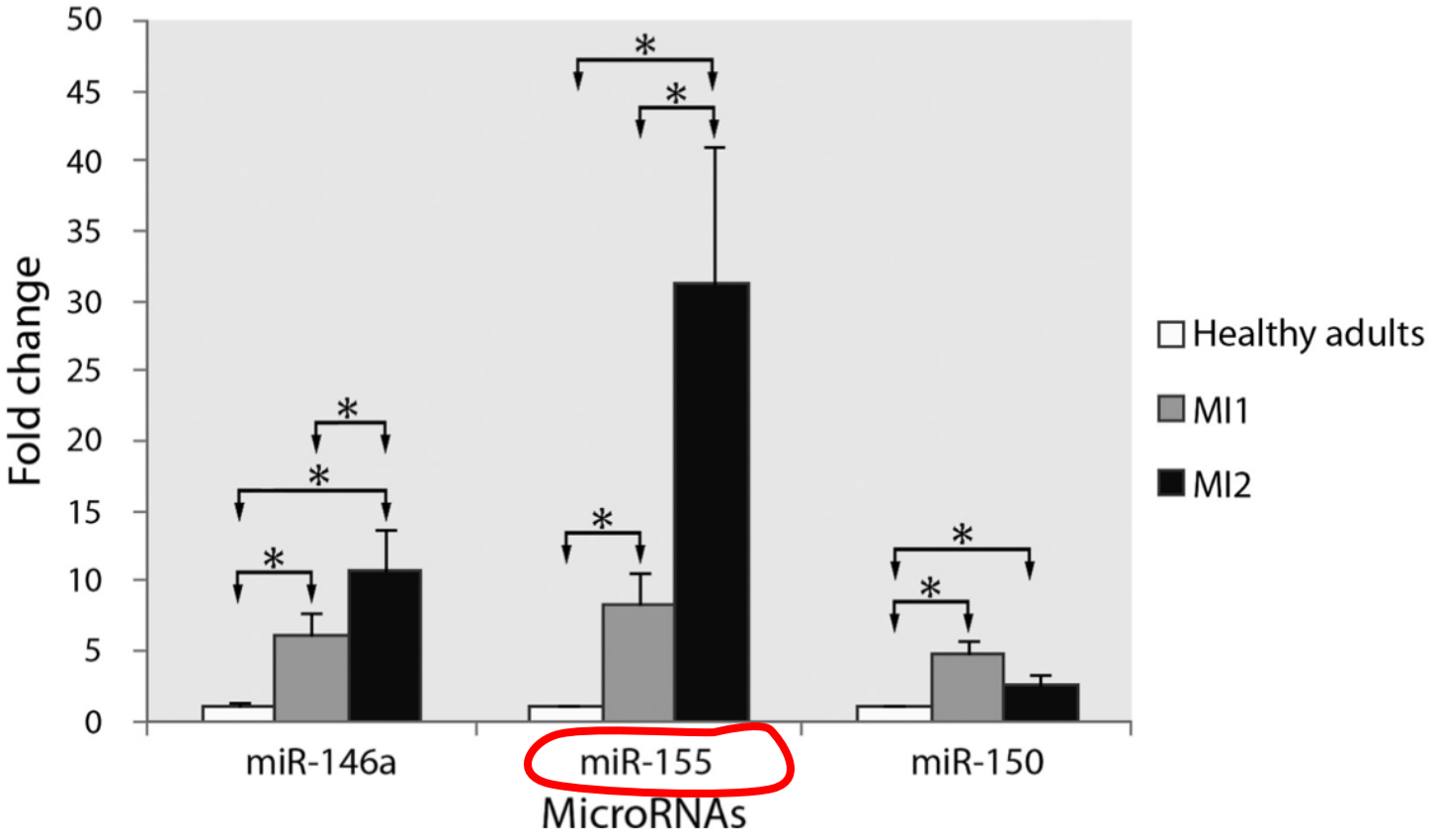
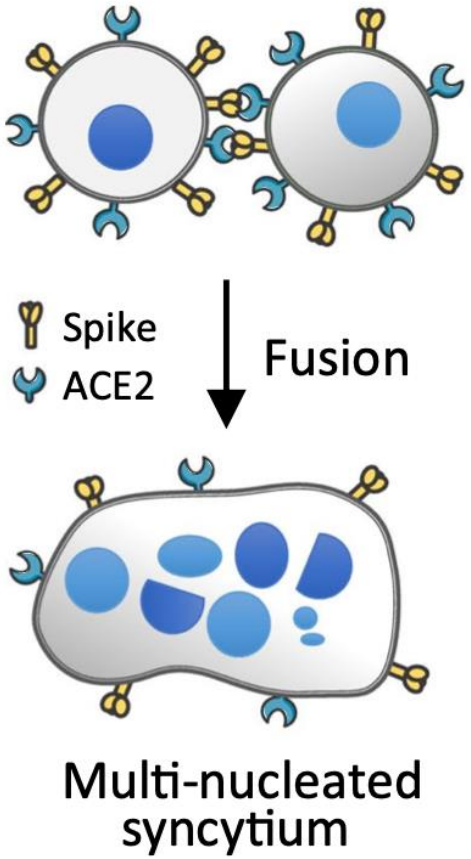


*Figure 1. Nina Zidar et al. Disease Markers 2011; 31: 259-265.

Spike protein causes infected cells to fuse into a giant multi-nucleated cell*



Giant cells become senescent and release cytokines and chemokines that induce inflammation and damage

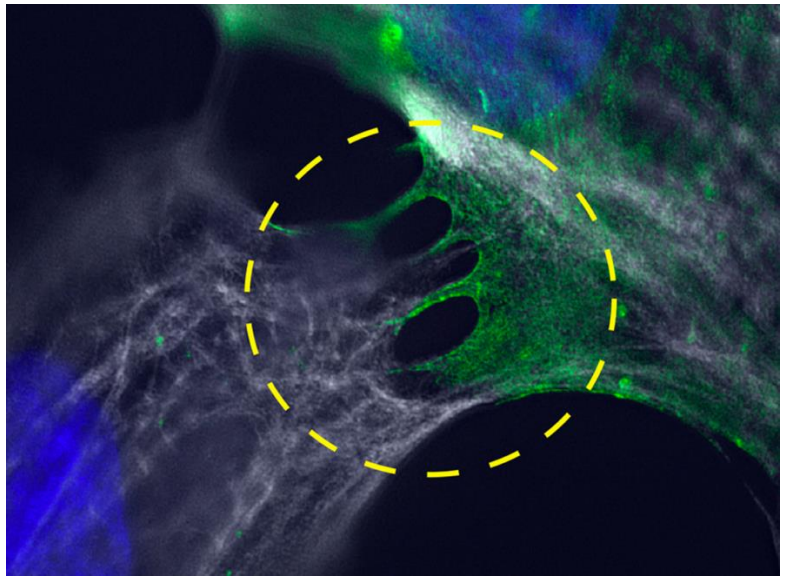
Presence of micronuclei in those cells indicates DNA double strand breaks

→genetic mutations → cancer

*He Ren et al. Biol Direct 2021 Oct 21; 16(1): 202021. https://pubmed.ncbi.nlm.nih.gov/34674770/

Spike protein induces cell-cell fusion in cardiomyocytes (heart muscle cells)*

- Viral spike protein induces filopodia formation and fuses cardiomyocytes, generating syncytia
- Furin cleavage site (generates S1/S2) essential for syncytia formation



Filopodia linking
two cardiomyocytes

*Chanakha Navaratnarajah et al. Journal of Virology 2021; 95(24): e01368-21

Number of events in VAERS for 2021 where cardiac symptoms were indicated*

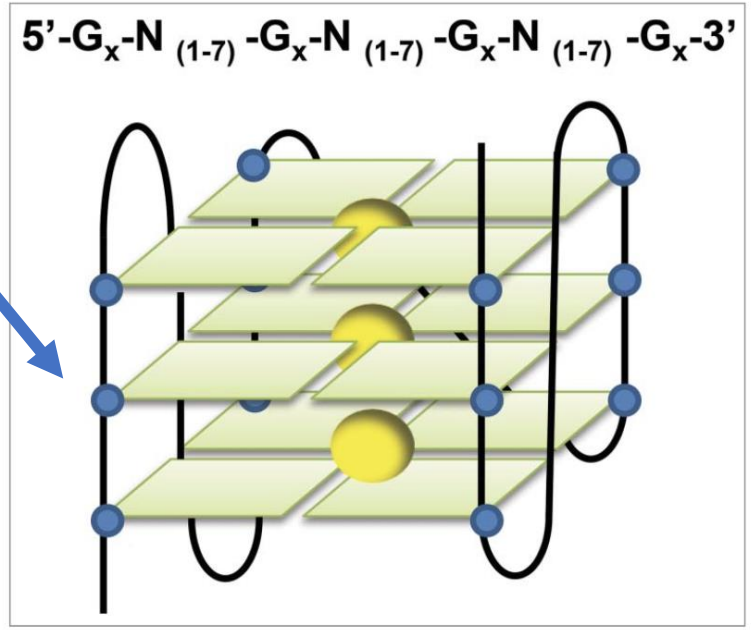
Symptom	Covid-19 Vaccines	All Vaccines	Percent COVID-19
Myocarditis	2,322	2,361	98.3
Arrest	1,319	1,371	96.2
Arrhythmia	1,069	1,087	98.3
Heart attack	2,224	2,272	97.9
Heart failure	1,156	1,190	97.1
TOTAL	**8,090**	**8,281**	**97.7**

*S Seneff et al. Food and Chemical Toxicology 2022; 164: 113008.

G-Quadruplexes

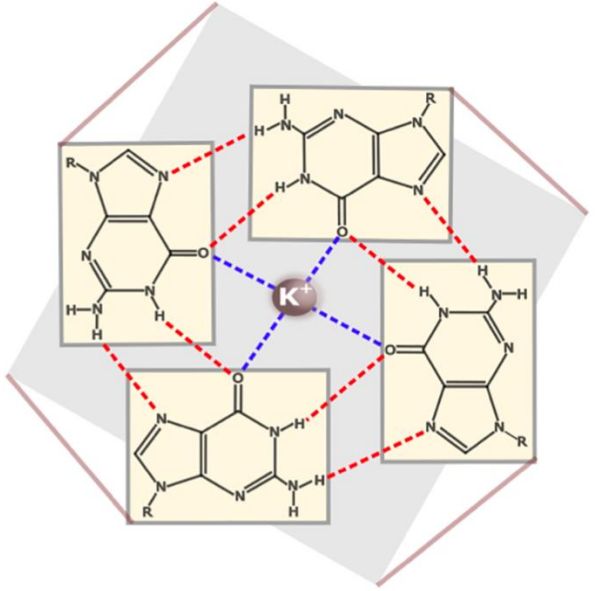
G-Quadruplexes: Many Unknowns

- G-quadruplexes (G4s) are a unique structure assumed by several guanines (G) folding together within an mRNA strand
- They form gelled water around the structure that impedes activities
  - Many proteins that regulate protein production bind to G4s to carry out their regulatory influence
- Prion proteins have many G4s in their mRNA, and the prion protein itself binds to its own mRNA at the G4s*
  - Such binding can cause the protein to misfold into its toxic form



*René CL Olsthoorn. Nucleic Acids Research, 2014; 42(14): 9327-9

Spike is a prion-like protein*



- Prion proteins have a characteristic GxxxG motif (two glycine residues spaced by three wildcard amino acids)
- Most proteins have 0 GxxxGs
- The human prion protein has 14 GxxxGs
- Amyloid beta, the protein that forms plaques in Alzheimer's, has 4
- The SARS-CoV-2 spike protein has 7

GGx	GGx	GGx	UGG	GGx
G	G	G	W	G
G	x	x	x	G

G = Guanine in mRNA
G = Glycine in protein
The GxxxG motif

- The mRNA in the mRNA vaccines has been manipulated to be enriched in guanine through a process called codon optimization
- This causes it to produce excess G4s compared to the viral version

*S Seneff et al. Food and Chemical Toxicology 2022; 164: 113008.

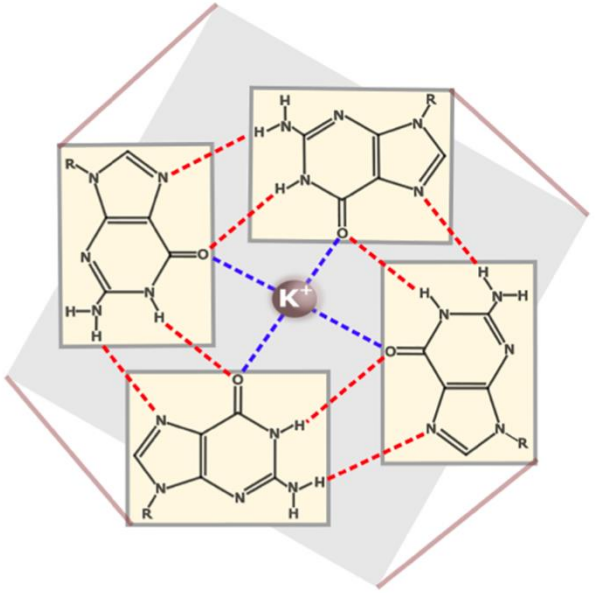
The vaccines are enriched in G4 potential

- A process termed “codon optimization” alters the RNA in the vaccine to optimize for efficient synthesis of spike protein
- This results in enrichment in GC content, potentiating G4 formation

  - Original viral protein: 36% GC; 4 G4s
  - Pfizer vaccine: 53% GC; 9 G4s
  - Moderna 61% GC; 19 G4s

The Intricate Coding of G4s

- GxxxG motif is a signature motif of prion proteins and prion-like proteins
- Glycine (G) DNA code is GGx – two guanine nucleotides followed by any nucleotide
- Tryptophan (W) DNA code is UGG
- GGGWG is a motif in the human prion protein that repeats many times in the protein
- Glycine-glycine-glycine-tryptophan-glycine = GGGWG



GGx	GGx	GGx	UGG	GGx
G	G	G	W	G
G	x	x	x	G

Guanine

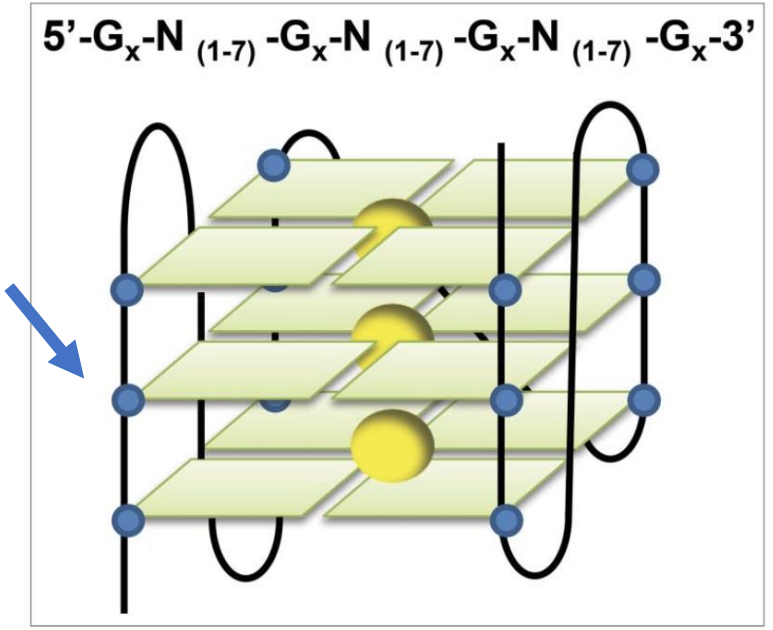
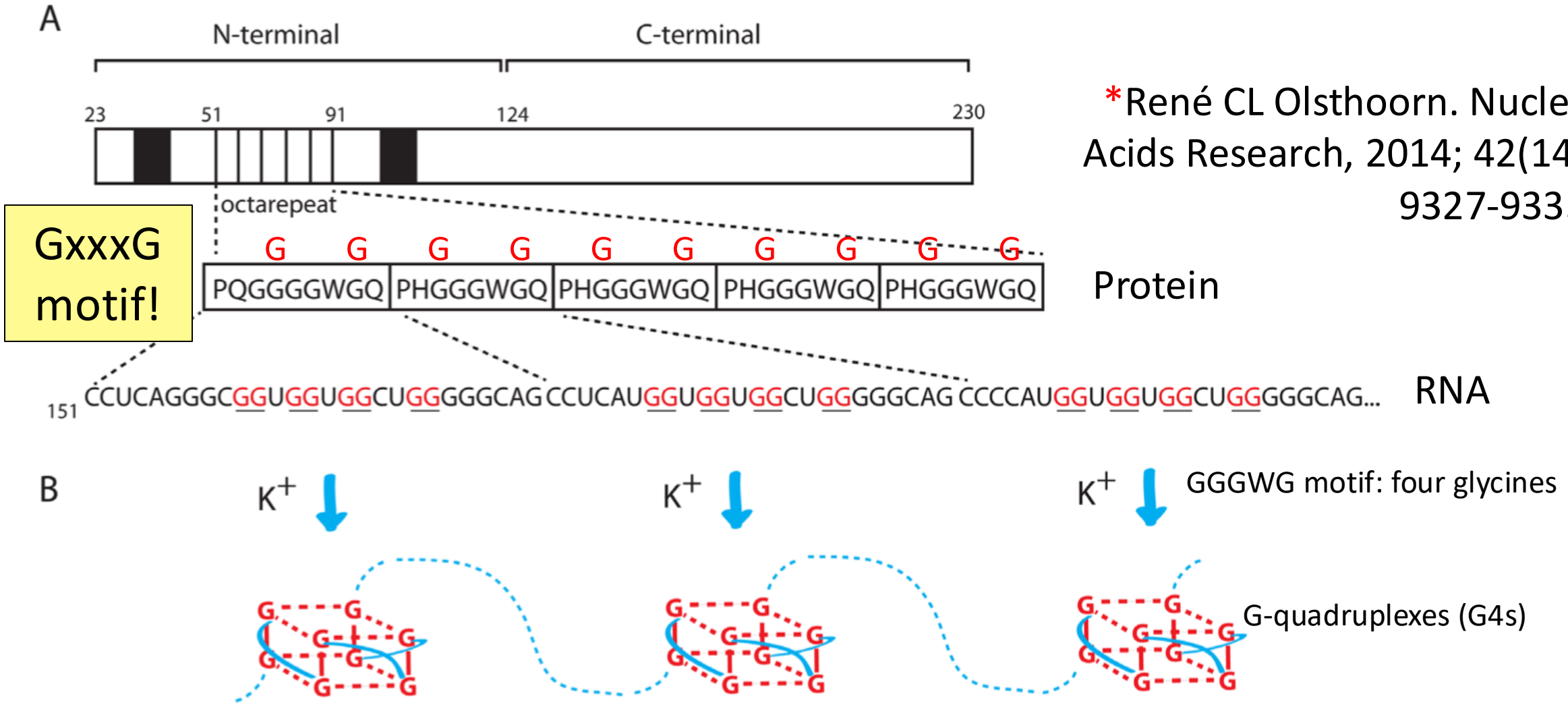


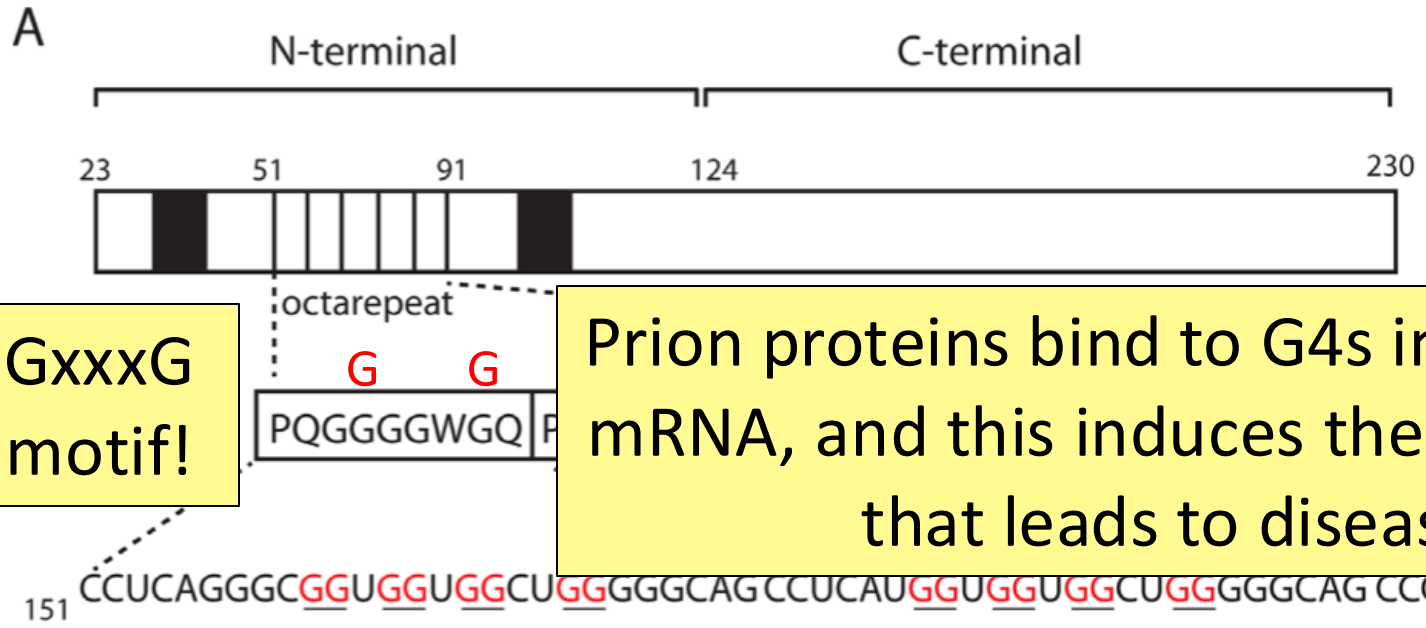
Figure 1. Jingwen Song et al. Translation 2016; 4:2, e1244031.

“G-quadruplexes within prion mRNA: the missing link in prion disease?”*



*René CL Olsthoorn. Nucleic Acids Research, 2014; 42(14): 9327-9333.

“G-quadruplexes within prion mRNA: the missing link in prion disease?”*



GxxxG motif!

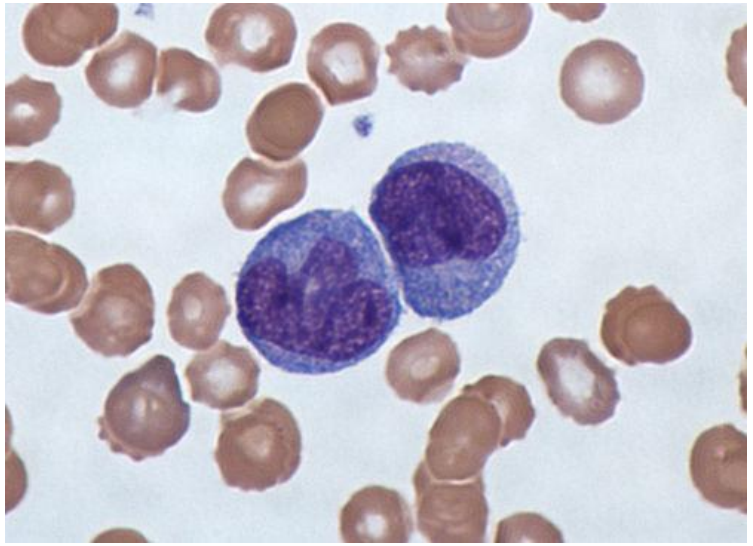
Prion proteins bind to G4s in their own mRNA, and this induces the misfolding that leads to disease

*René CL Olsthoorn. Nucleic Acids Research, 2014; 42(14): 9327-9333.

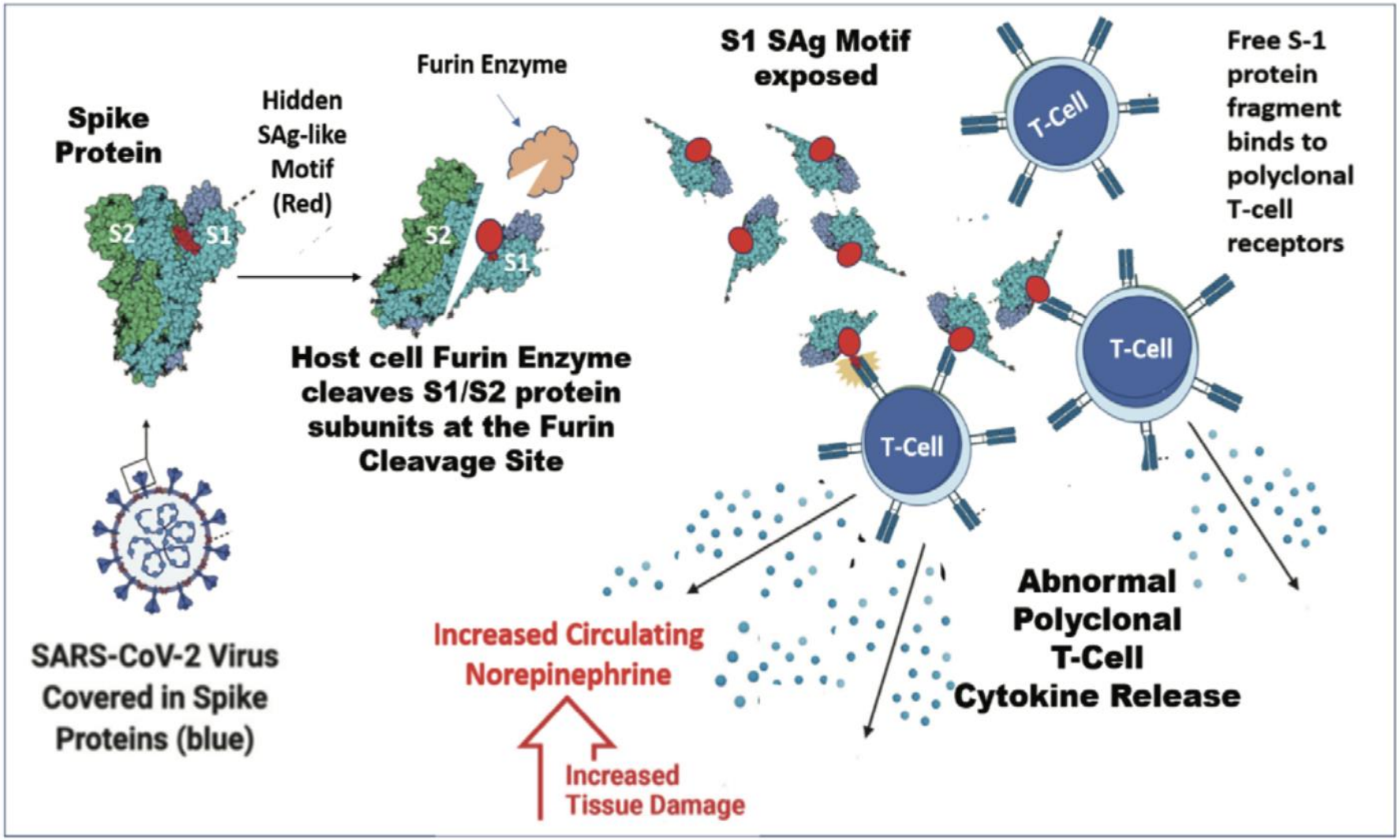
Other Aspects

"SARS-CoV-2 S1 Protein Persistence in SARS-CoV-2 Negative Post-Vaccination Individuals with Long COVID/ PASC-Like Symptoms"*

- 50 people who experienced symptoms of long COVID after vaccination
- Statistically significant elevations of sCD40L, CCL5, IL-6, and IL-8
  - Markers of platelet activation and inflammation
- S1 peptides as well as *mutant* S1 peptides and S2 peptides were present in CD16+ non-classical monocytes months after vaccination



*Bruce Patterson et al. Research Square Preprint. July 12, 2022.



Spike S1 contains a sequence (red) similar to a potent endotoxin synthesized by Staph aureus*

*Steven J. Hatfill. Journal of American Physicians and Surgeons 2022; 27(2).

Birth rate changes in Hungary*

5 Least Vaccinated Counties:	
County	**Birth Rate Drop**
Borsod-Abaúj-Zemplén	-3.50%
Hajdú-Bihar	-10.10%
Jász-Nagykun-Szolnok	-1%
Bács-Kiskun	-10.50%
Szabolcs-Szatmár-Bereg	1.80%
Averaged:	**-4.66%**

5 Most Vaccinated Counties:	
County	**Birth Rate Drop**
Budapest	-22.20%
Pest	-15.10%
Fejér	-13.10%
Tolna	-19.10%
Vas	-6.50%
Averaged:	**-15.20%**

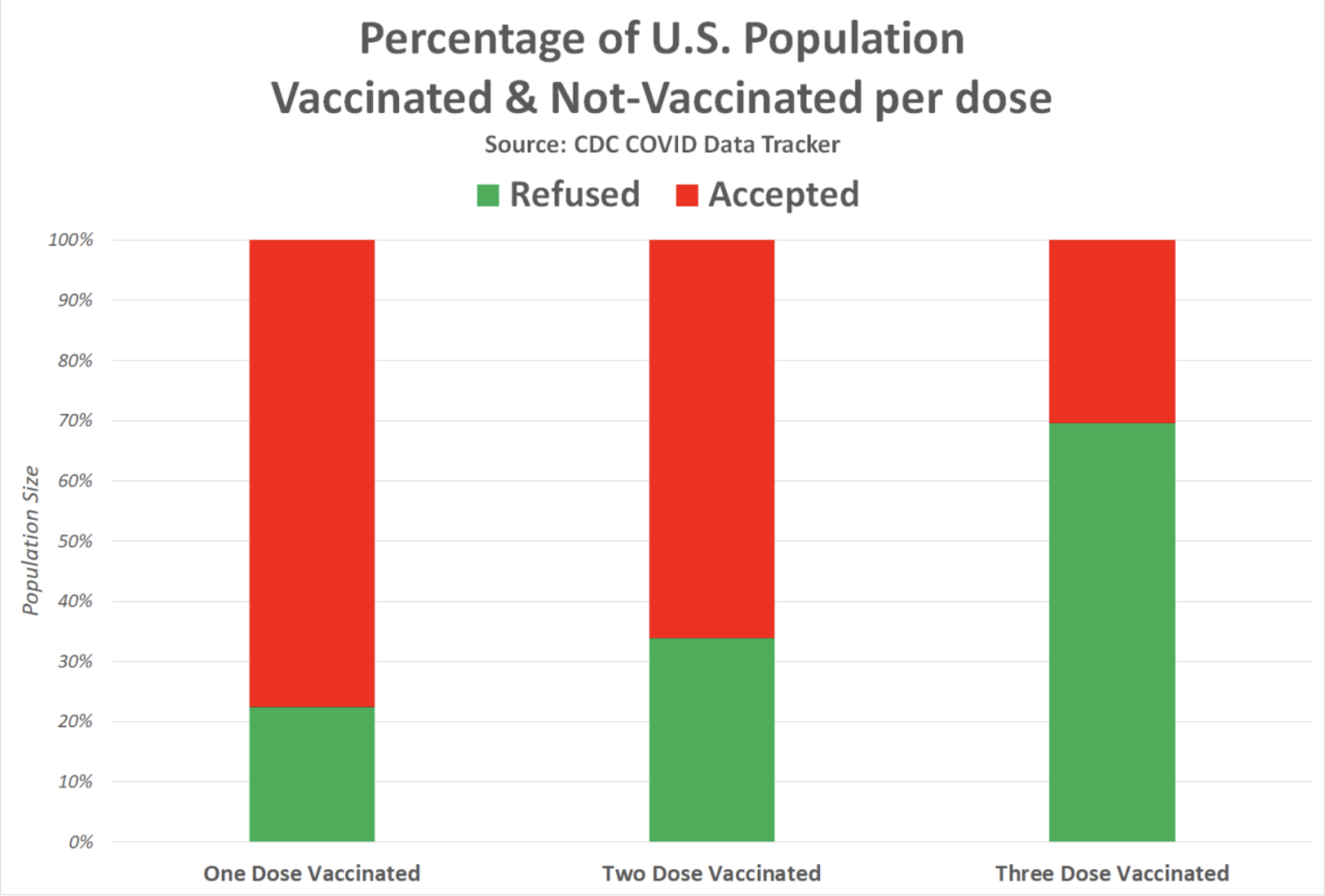
- Counties with the highest vaccination rate had a much greater drop in birth rate compared to counties with the lowest vaccination rates

*https://igorchudov.substack.com/p/hungary-most-vaccinated-counties

Future plans for the vaccines

- The FDA has decided that *it is not necessary to do any clinical trials* for new versions of the mRNA vaccines with mixes of multiple strains of the spike protein incorporated (to test for safety and effectiveness)
- There is a plan to release a version that has both the original omicron (BA.1) and the original Wuhan variant mixed in
- A recent study showed that omicron has already mutated to variants now called BA.4 and BA.5 that are resistant even to antibodies against the original omicron BA.1*

*https://www.eurekalert.org/news-releases/957703



People are waking up!

https://expose-news.com/2022/07/03/157million-americans-refuse-covid-vaccine/

Summary

- The mRNA vaccines have not been adequately evaluated for safety and effectiveness
- The mRNA in the vaccine has been highly altered compared to the original viral version
- The vaccines induce rapid production of spike protein by human immune cells in the spleen over a sustained long duration
- Spike is a neurotoxic prion-like protein that induces a strong inflammatory response and subsequent tissue destruction
- Exosomes play a central role in the distribution of toxic spike protein to diverse organs, notably the heart and the brain
- There is growing evidence that these vaccines may cause infertility
- People are wising up