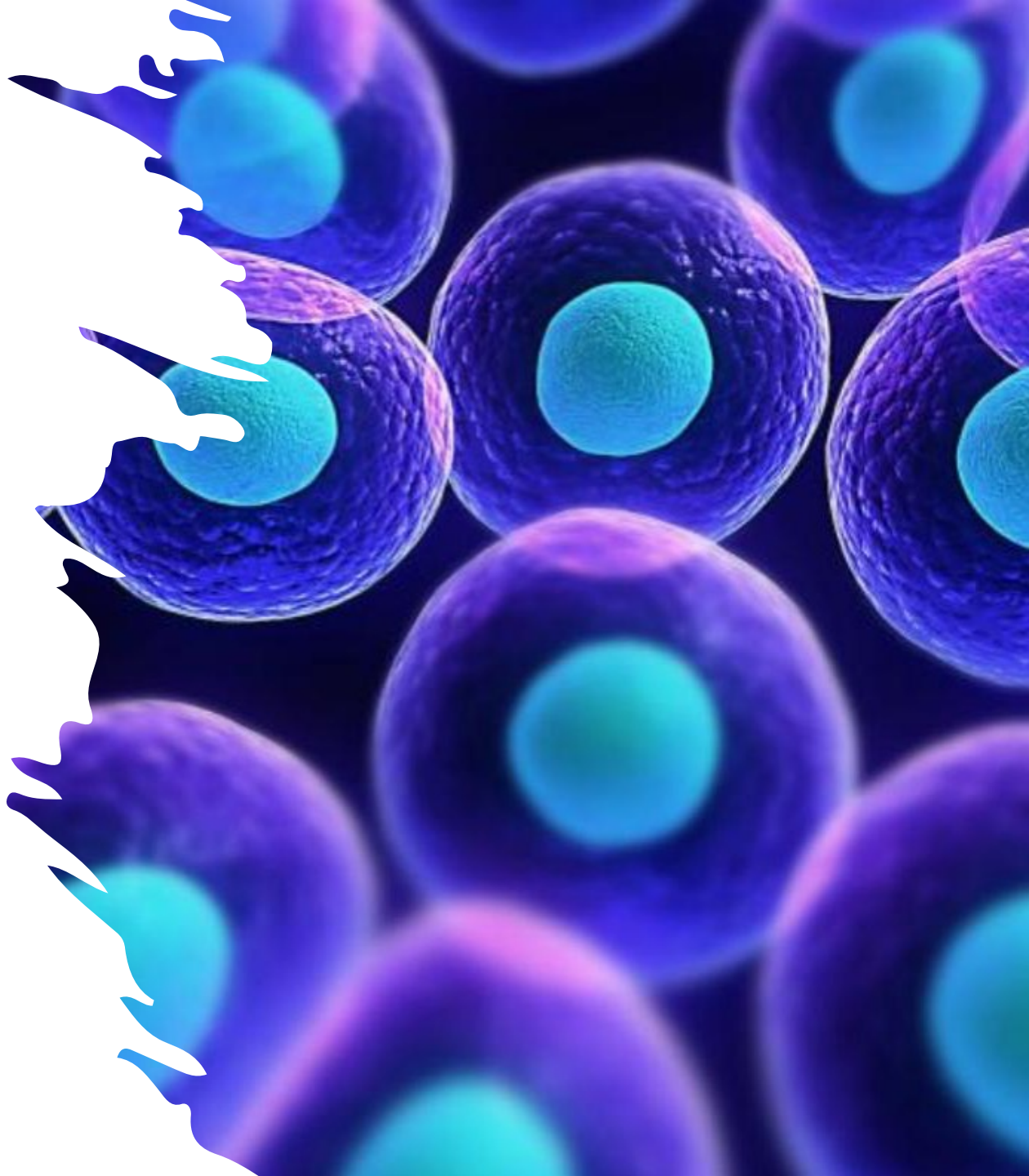
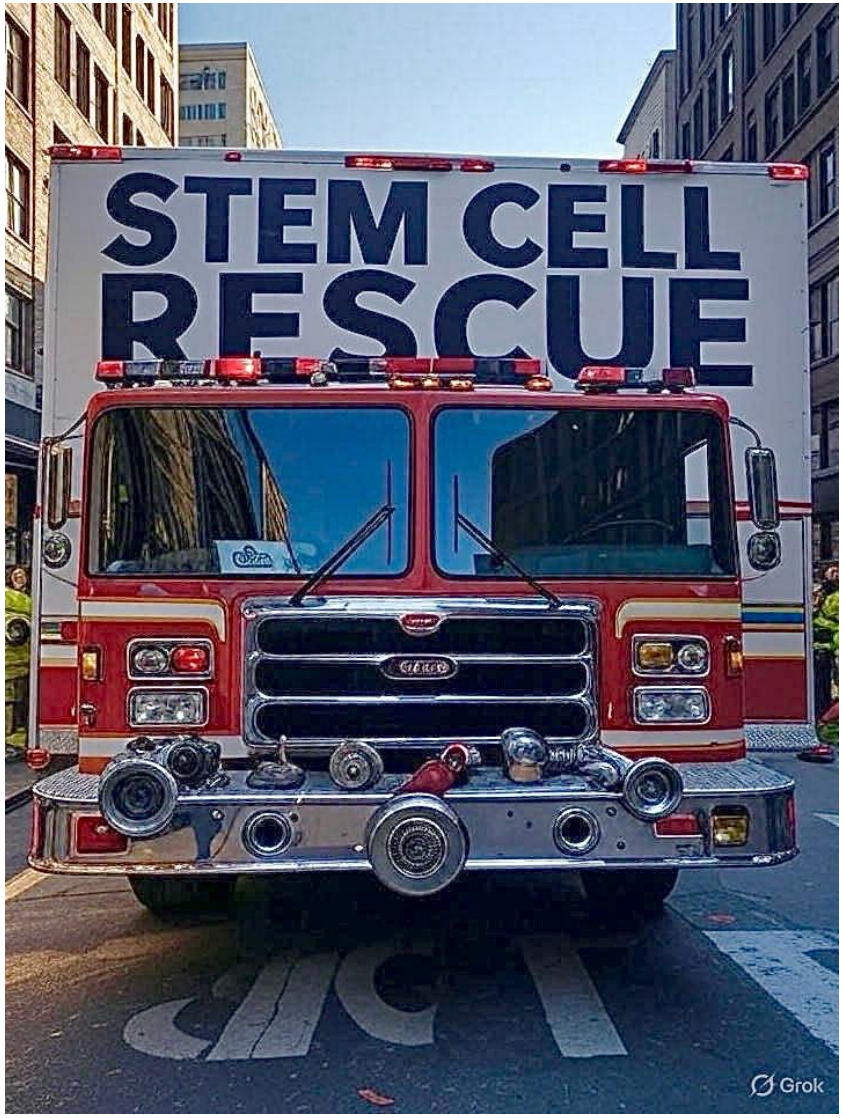
ALL
ROTTEN APPLES
AND FRIED EGGS

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

- **SARS-CoV-2 and its spike protein induce virus-induced senescence (VIS) in stem cells, characterized by cell cycle arrest, DNA damage, and mitochondrial dysfunction, often leading to irreversible senescence due to persistent viral elements or chronic SASP (senescence-associated secretory phenotype) activation. Spike promotes syncytia formation (cell fusion) in ACE2-expressing cells, which become senescent (e.g., via MAVS/RIG-I signaling and TNFα-TNFR2 axis), exacerbating pathology like inflammation and organ damage. Paracrine senescence occurs when SASP factors (e.g., cytokines like TNF-α, IL-6) from infected/senescent cells spread to uninfected bystanders, inducing secondary senescence in neighboring cells—this is potentially reversible if SASP is suppressed early, unlike direct VIS which is more persistent/irreversible due to ongoing damage.**



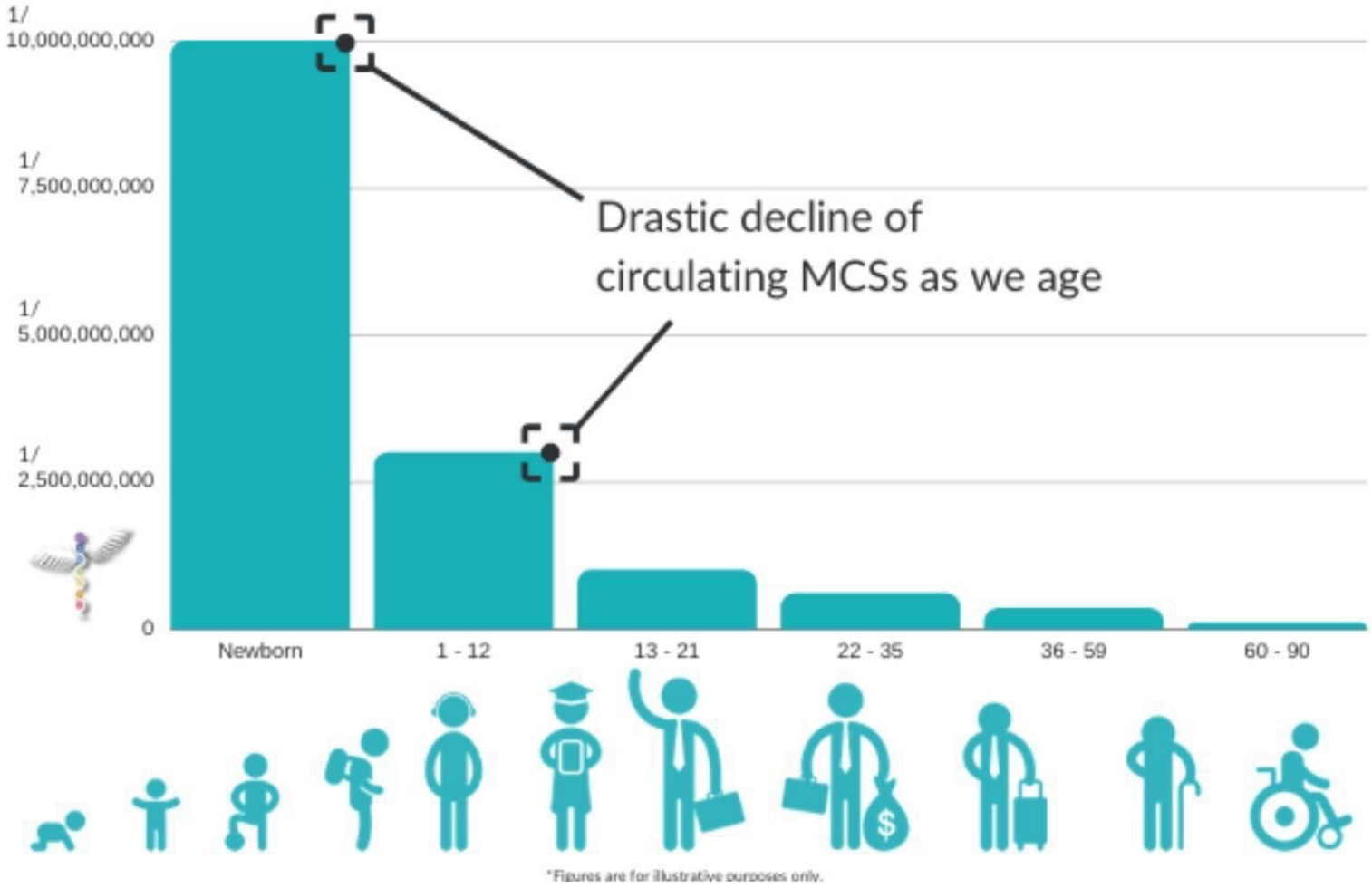
SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS



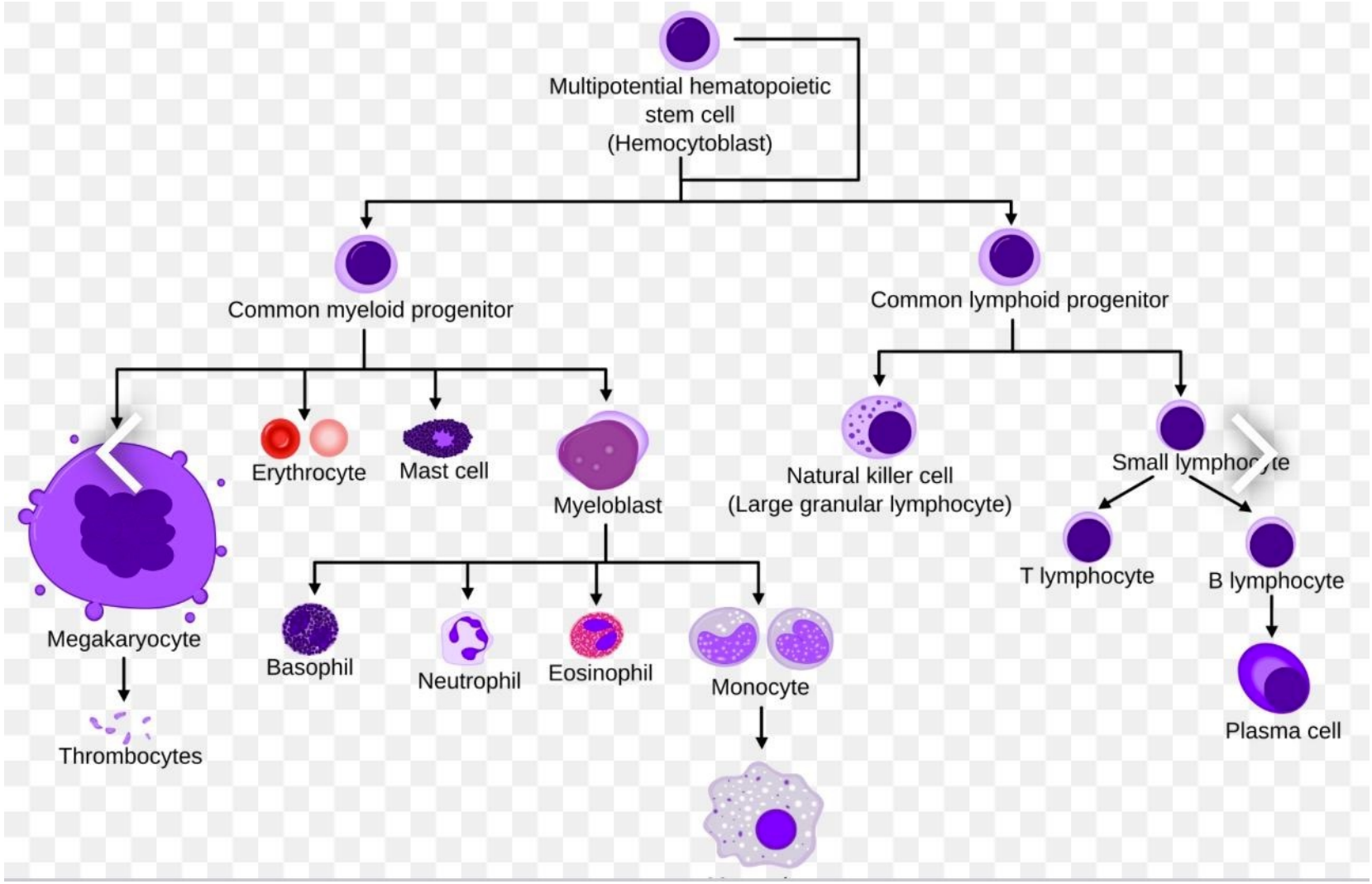
Overall ratios: Direct VIS (irreversible) ~10–20%; paracrine/bystander (potentially reversible) ~20–50% or higher, amplifying 2–5x via SASP spread. Data gaps exist for other stem types (e.g., mesenchymal); estimates from models like organoids or biopsies.

WHY ARE SENOMOROHICS IMORTANT IN PC/PV CONDITIONS?

STEM CELL RESERVOIRS ARE DEPLETED BY AGE & SARS-COV-2/ SPIKE EXPOSURE!



PBMC STEM CELL RESERVOIRS THAT NEED TO BE PROTECTED



SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

Hematopoietic Stem/Progenitor Cells (HSCs/HPCs, Bone Marrow): Direct spike invasion via ACE2 (expressed in 5–65% of HSCs); induces senescence in 15–38% via ROS/p53 pathways. Bystander effects: 20–50% via paracrine SASP, leading to exhaustion.
- Source: [Link to PMC: Hematopoietic Stem Cells Respond to Spike](https://pmc.ncbi.nlm.nih.gov/articles/PMC7781328/)

Neural Stem/Progenitor Cells (e.g., Dopaminergic Neurons from hPSCs): Infection induces senescence in 10–30% directly (e.g., increased β-gal+ cells, IGFBP7 upregulation); syncytia formation noted, with bystander effects amplifying to 40–60% via SASP/ROS.
- Source: [Link to Cell Stem Cell: SARS-CoV-2 Infects Dopamine Neurons Causing Senescence](https://www.cell.com/cell-stem-cell/fulltext/S1934-5909(23)00442-3)

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

Endothelial Progenitor Cells (Vascular/Lung): Spike induces paracrine senescence in 30–50% via CM (conditioned medium) from spike-expressing cells; syncytia form and become senescent (up to 70% of syncytia show markers like SA-β-gal); direct VIS in 10–20%.
- Source: [Link to PLOS Pathogens: Spike-Induced Syncytia Are Senescent](https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1012291)
- Source: [Link to Journal of Virology: Spike Induces Paracrine Senescence in Endothelial Cells](https://journals.asm.org/doi/10.1128/jvi.00794-21)

Lung Epithelial Progenitor Cells (e.g., AT2 Cells, Bronchial Organoids): Direct infection induces VIS in 10–20% (p16+ cells); paracrine senescence spreads to 30–50% via TNF-α/IL-6, with bystander effects sustained post-virus clearance.
- Source: [Link to Nature Aging: SARS-CoV-2 Induces Paracrine Senescence](https://www.nature.com/articles/s43587-022-00170-7)

***Cardiovascular System (Infection of Stem Cell-Derived Cardiomyocytes, Smooth Muscle Cells [SMCs],** and Endothelial Progenitors)*

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

SARS-CoV-2 (the virus causing COVID-19) can infect various stem cells and progenitor cells, which express entry receptors like ACE2 and TMPRSS2. This infection can disrupt cell function, regeneration, differentiation, and immune responses, leading to a wide range of disease expressions.

*Hematopoietic System (Infection of Hematopoietic Stem Cells [HSCs] and Progenitor Cells

[e.g., Erythroid, Megakaryocyte-Erythroid, CD34+ Cells])*

- ***Anemia*:** Disruption of erythroid progenitor cells, hemoglobin homeostasis, and iron metabolism, leading to reduced red blood cell production and inflammatory anemia.

- ***Lymphopenia*:** Decreased T-cell, B-cell, and NK-cell counts due to reduced lymphoid-primed progenitors and severe B-cell loss in bone marrow/spleen.

- ***Thrombocytopenia*:** Impaired megakaryocyte development and platelet production, contributing to platelet defects, thrombophilia, and systemic thrombosis.

- ***Neutrophilia*:** Increased neutrophil counts from myeloid-biased differentiation and altered myelopoiesis.

- ***Dysregulated Hematopoiesis*:** Reduced primitive/long-term HSCs, decreased multipotential progenitors (e.g., CFU-GEMM, BFU-E), and increased granulocyte-macrophage progenitors (CFU-GM), leading to imbalanced blood cell production.

- ***Inflammaging*:** Upregulation of proinflammatory (e.g., TNF, IL-6, NLRP3), aging-related (e.g., p16, IL-1β), and ROS-related genes, causing chronic inflammation and accelerated aging in HSPCs.

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

***Cardiovascular System (Infection of Stem Cell-Derived Cardiomyocytes, Smooth Muscle Cells [SMCs],** and Endothelial Progenitors)*

- ***Myocardial Injury*:** Elevated cardiac troponin, inflammation, and cell death in cardiomyocytes, often linked to cytokine storms.

- ***Arrhythmias*:** Irregular heart rhythms due to impaired electrical function and contraction in infected cardiomyocytes.

- ***Acute Coronary Syndrome (ACS)*:** Including acute myocardial infarction, caused by plaque rupture, microthrombi, coronary spasms, and inflammation.

- ***Venous Thromboembolism (VTE)*:** Deep vein thrombosis and pulmonary embolism from pro-inflammatory states, increased coagulation mediators, and endothelial dysfunction.

- ***Heart Failure*:** Reduced pumping capacity, exacerbated by systemic inflammation, cytokine overproduction (e.g., IL-6), and cell death/fragmentation in cardiomyocytes.

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

Neurological System (Infection of Neuronal Stem/Progenitor Cells and Brain Organoid-Derived Neurons)

- ***Encephalopathy and Encephalitis*:** Brain inflammation, metabolic changes, and neuronal death (e.g., in dopaminergic neurons).

- ***Stroke and Seizures*:** Vascular and inflammatory damage from disrupted blood-CSF barrier and bystander effects on neighboring cells.

- ***Loss of Olfactory Function (Anosmia)*:** Damage to olfactory stem cells or related neurons.

- ***Other*:** Hyperphosphorylation and abnormal localization of Tau protein, cell death pathways, and long-term neurological deficits (e.g., cognitive impairment).

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

Gastrointestinal System (Infection of Intestinal Stem Cells [e.g., Lgr5+ Cells] and Enterocyte Progenitors)

- ***Diarrhea, Nausea, and Vomiting*:** Direct infection of gut enterocytes increases viral load and disrupts intestinal function.

- ***Inflammatory Responses*:** Cell death, type I/III IFN activation, and cytokine signatures (e.g., TNF, IL-17), leading to gut inflammation.

- ***Other*:** Potential long-term effects on quiescent vs. active stem cell populations, with Wnt/β-catenin signaling possibly modulating viral propagation.

Renal System (Infection of Kidney Stem/Progenitor Cells [e.g., Tubule Epithelial Cells, Podocytes])

- ***Acute Kidney Injury*:** Direct viral invasion causes cell damage, pro-inflammatory/profibrotic processes, and imbalance in the renin-angiotensin-aldosterone system (e.g., increased Ang II signaling).

- ***Other*:** Higher mortality in patients with kidney impairment, with potential for chronic kidney disease due to impaired regeneration.

SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS

1. *MDPI (2021)*: SARS-CoV-2 Infection and Disease Modelling Using Stem Cell Technology and Organoids. Covers organoid models for multi-organ effects.
   Link: https://www.mdpi.com/1422-0067/22/5/2356

2. *Nature (2020)*: SARS-CoV-2 infects human neural progenitor cells and brain organoids. Focuses on neurological impacts.
   Link: https://www.nature.com/articles/s41422-020-0390-x

3. *Nature (General Collection, up to 2025)*: SARS-CoV-2 - Latest research and news. Includes studies on stem cell resistance and viral infection.
   Link: https://www.nature.com/subjects/sars-cov-2

4. *Nature Methods (2022)*: Human organoid models to study SARS-CoV-2 infection. Discusses organoid applications across systems.
   Link: https://www.nature.com/articles/s41592-022-01453-y

5. *Cell Stem Cell (2020)*: A Human Pluripotent Stem Cell-based Platform to Study SARS-CoV-2 Tropism and Model Virus Infection in Human Cells and Organoids. Key for hPSC-derived models and tropism.
   Link: https://www.cell.com/cell-stem-cell/fulltext/S1934-5909(20)30300-3 (or PubMed: https://pubmed.ncbi.nlm.nih.gov/32579880/)

6. *Cell Stem Cell (2020)*: Human Pluripotent Stem Cell-Derived Neural Cells and Brain Organoids Reveal SARS-CoV-2 Neurotropism Predominates in Choroid Plexus Epithelium (Jacob F et al.). Neurological focus.
   Link: https://www.cell.com/cell-stem-cell/fulltext/S1934-5909(20)30491-4

7. *Stem Cell Reviews and Reports (2021)*: Human Hematopoietic Stem, Progenitor, and Immune Cells Respond Ex Vivo to SARS-CoV-2 Spike Protein. Hematopoietic system effects.
   Link: https://link.springer.com/article/10.1007/s12015-020-10056-z

Case study

Vol. 6, Issue 3, 2024 • July 26, 2024 BST

SARS-CoV2 is not just infection but a culprit of donor graft failure post-allogeneic stem cell transplant

Yoojin Park, Silvia Park, Wichai Chinratanalab, Bipin Savani, Adetola Kassim, Jonathan J Douds, Salyka Sengsayadeth, Tae Kon Kim

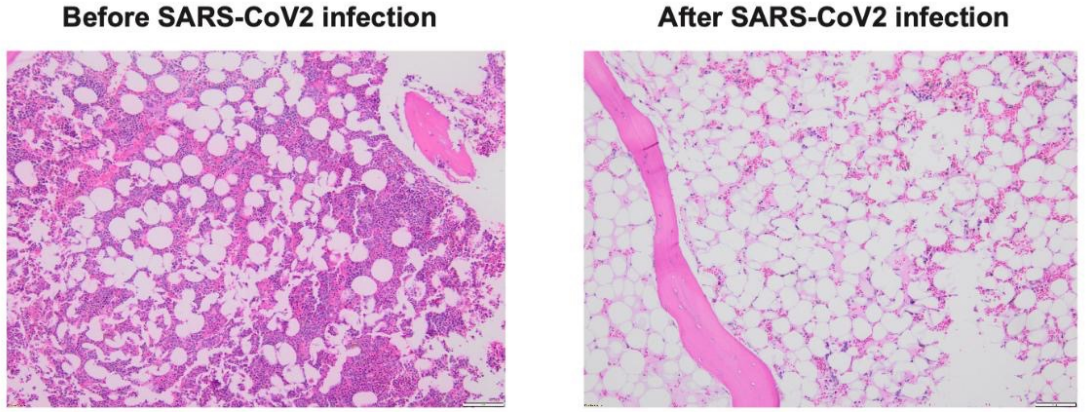


Figure 1. SARS-CoV2 infection suppresses bone marrow post-allogeneic stem cell transplant. Compared with day +30 post-SCT bone marrow, bone marrow biopsy after SARS-CoV2 infection revealed significantly low cellularity.

https://chi.scholasticahq.com/article/121430

SARS-COV-2 & SPIKE CAN INFECT, CAUSE SYNCITYA FORMATION AND INDUCE IRREVERSIBLE AND REVERSIBLE SENESCENCE IN STEM CELLS!

SARS-CoV-2 can induce **senescence in hematopoietic stem cells (HSCs) both directly and indirectly.** Infected cells exhibit a senescence-associated secretory phenotype (SASP), releasing pro-inflammatory cytokines that can trigger senescence in neighboring uninfected cells, including HSCs[1][2]. This paracrine effect contributes to systemic inflammation and may impair the regenerative capacity of HSCs, leading to altered hematopoiesis and increased risk of complications in COVID-19 patients[5][6]. Thus, SARS-CoV-2 infection significantly impacts HSC functionality and promotes cellular aging processes.

Quellen
[1] COVID-19 and cellular senescence | Nature Reviews Immunology https://www.nature.com/articles/s41577-022-00785-2
[2] SARS-CoV-2 infection triggers paracrine senescence and leads to a ... https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10154207/
[3] SARS-CoV-2 infection causes dopaminergic neuron senescence https://www.cell.com/cell-stem-cell/pdf/S1934-5909(23)00442-3.pdf
[4] Virus-induced senescence is a driver and therapeutic target ... - Nature https://www.nature.com/articles/s41586-021-03995-1
[5] Hematopoietic responses to SARS-CoV-2 infection - PMC - NCBI https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8918078/
[6] Spotlight on the impact of viral infections on Hematopoietic Stem ... https://biosignaling.biomedcentral.com/articles/10.1186/s12964-023-01122-3
[7] T cell - Wikipedia https://en.wikipedia.org/wiki/T_cell
[8] A clinically applicable and scalable method to regenerate T-cells from iPSCs for off-the-shelf T-cell immunotherapy - Nature Communications https://www.nature.com/articles/s41467-020-20658-3

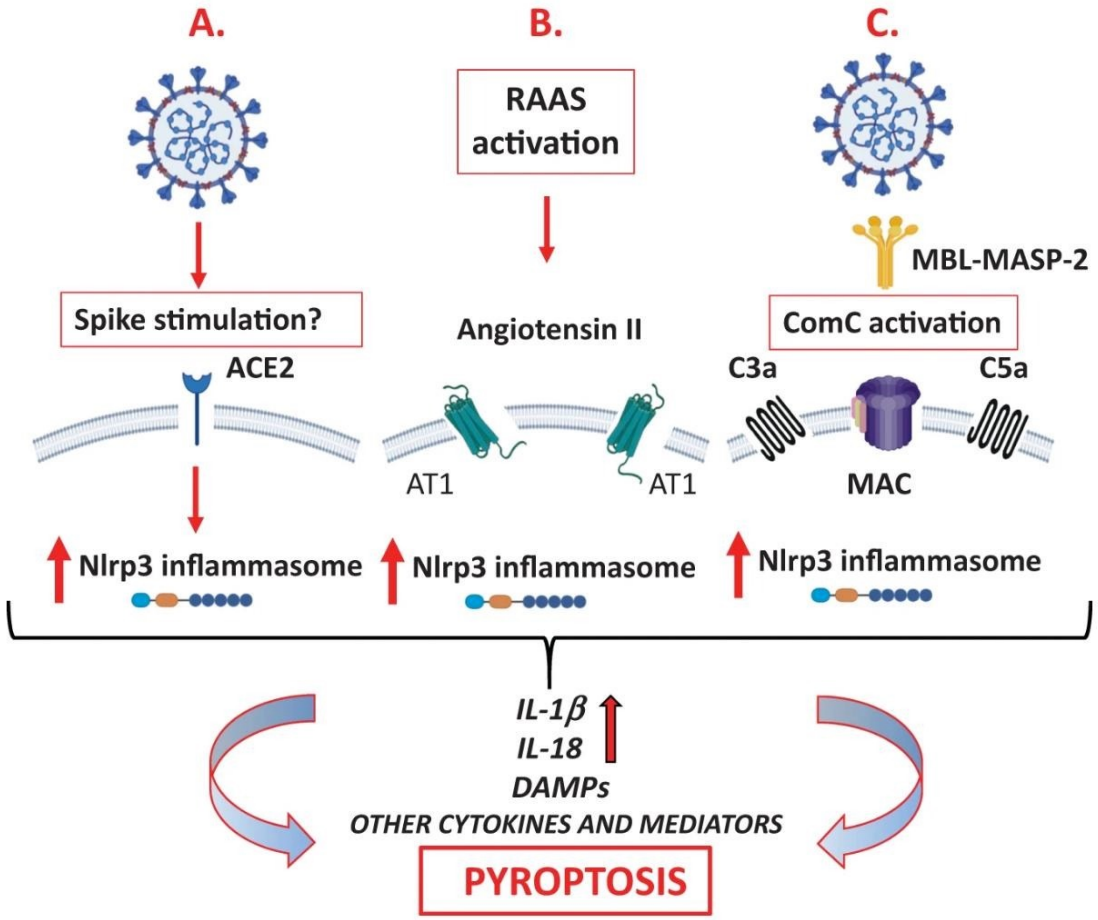
Stem cell biology

SARS-CoV-2 infection and overactivation of Nlrp3 inflammasome as a trigger of cytokine "storm" and risk factor for damage of hematopoietic stem cells

Mariusz Z. Ratajczak ✉ & Magda Kucia

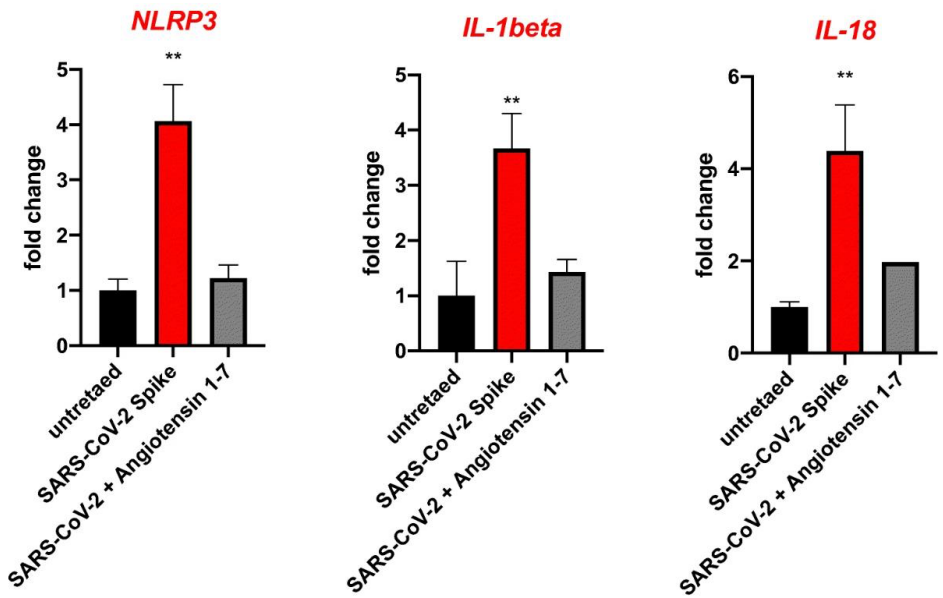
Specifically, there is evidence that the SARS-CoV-2 virus entry receptor (angiotensin-converting enzyme 2; ACE2) and receptor for angiotensin II (AT1) are expressed and functional on the surface of **hematopoietic stem/progenitor cells (HSPCs) . Therefore, SARS-CoV-2 may on one hand directly infect pool of HSPCs, and on other pathological activation of Nlrp3 inflammasome may lead to cytokine storm and pyroptosis of these cells.**

https://www.nature.com/articles/s41375-020-0887-9

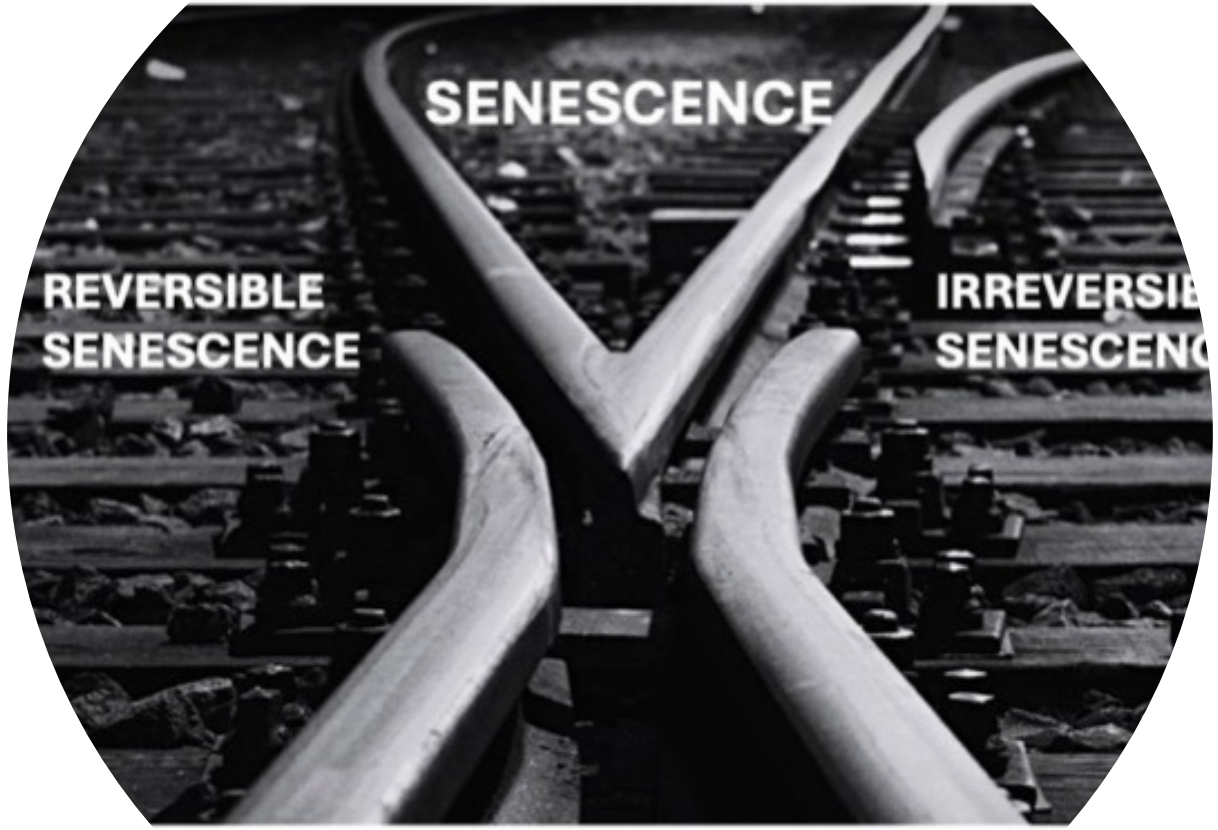


a It is possible that, by binding to ACE2 via the spike protein, SARS-CoV-2 directly activates the Nlrp3 inflammasome. This possibility is currently being investigated by our team. **b** Activation of

From: SARS-CoV-2 Entry Receptor ACE2 Is Expressed on Very Small CD45⁻ Precursors of Hematopoietic and Endothelial Cells and in Response to Virus Spike Protein Activates the Nlrp3 Inflammasome

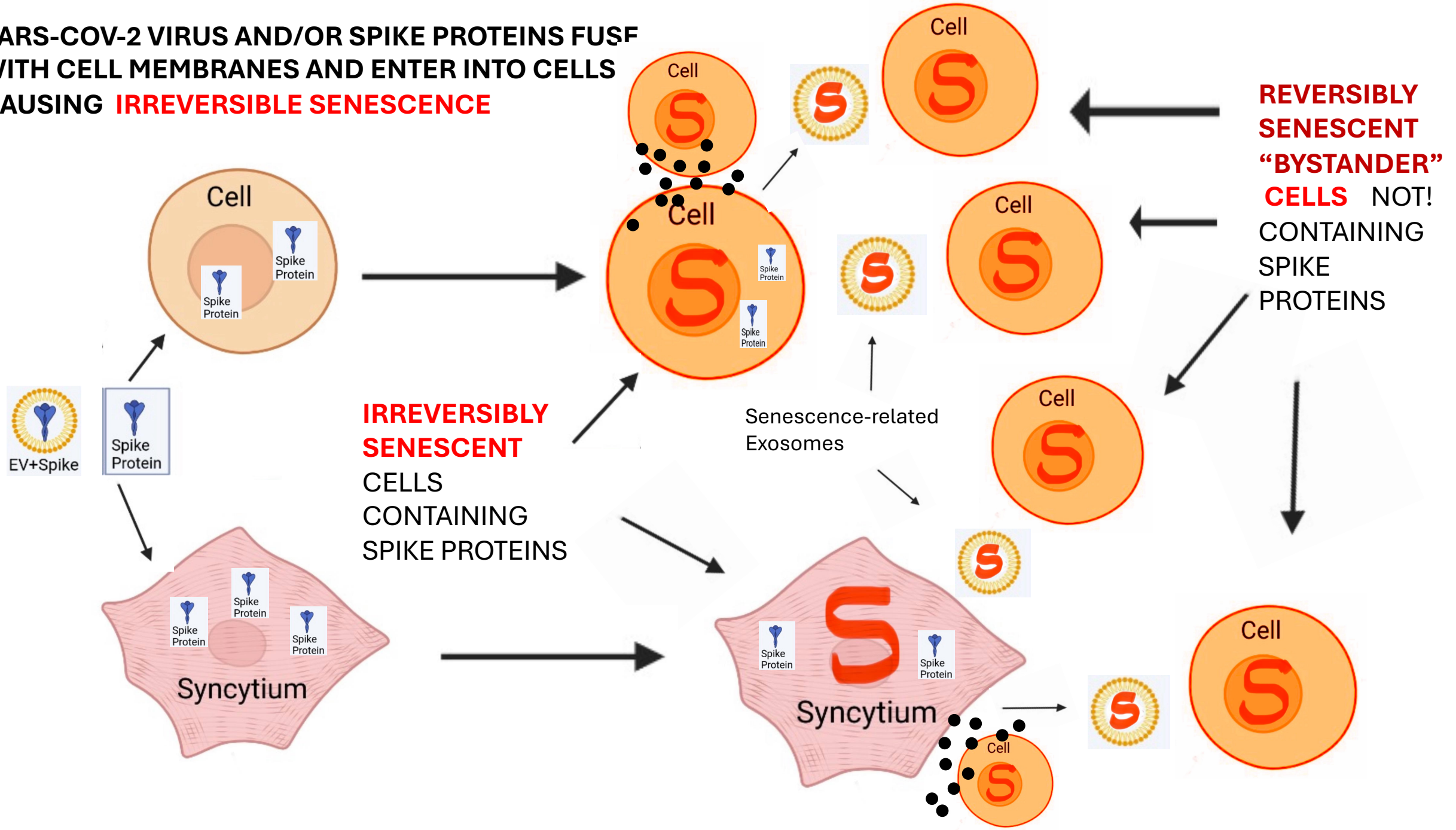


https://link.springer.com/article/10.1007/s12015-020-10010-z



- **WHY IT IS IMPORTANT AND WHAT CAN BE DONE**

SARS-COV-2 VIRUS AND/OR SPIKE PROTEINS FUSE WITH CELL MEMBRANES AND ENTER INTO CELLS CAUSING IRREVERSIBLE SENESCENCE



IRREVERSIBLY SENESCENT CELLS CONTAINING SPIKE PROTEINS

Senescence-related Exosomes

REVERSIBLY SENESCENT "BYSTANDER" CELLS NOT! CONTAINING SPIKE PROTEINS

SENESCENT "BYSTANDER" CELLS NOT!
CONTAINING SPIKE PROTEINS SWITCH INTO:

"REVERSIBLE SENESCENCE"

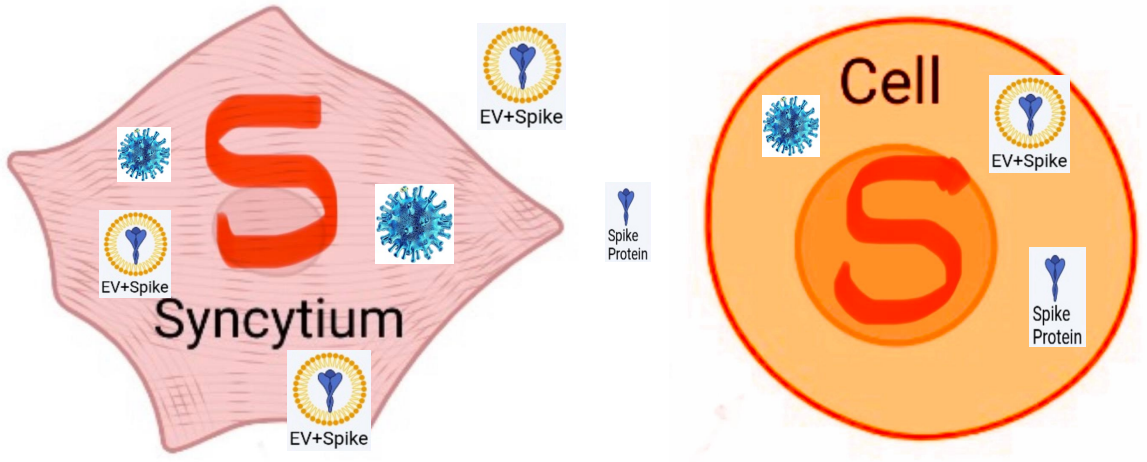
SENESCENT "BYSTANDER" CELLS THAT
DO NOT CONTAIN
SPIKE, VIRUS OR REPLICABLE RNA CAN BE:

-RESCUED AND RESTORED BY SENOMORPHICS!??

THIS ATTEMPT HAS TO BE DONE FIRST!! BEFORE USING SENOLYTICS

CELLS CONTAINING VIRUS AND/OR PRODUCING SPIKE PROTEINS SWITCH INTO:

"IRREVERSIBLE SENESCENCE"



SENESCENT CELLS (AND OR SYNCYTIA) THAT CONTAIN SPIKE ,VIRUS OR REPLICABLE RNA

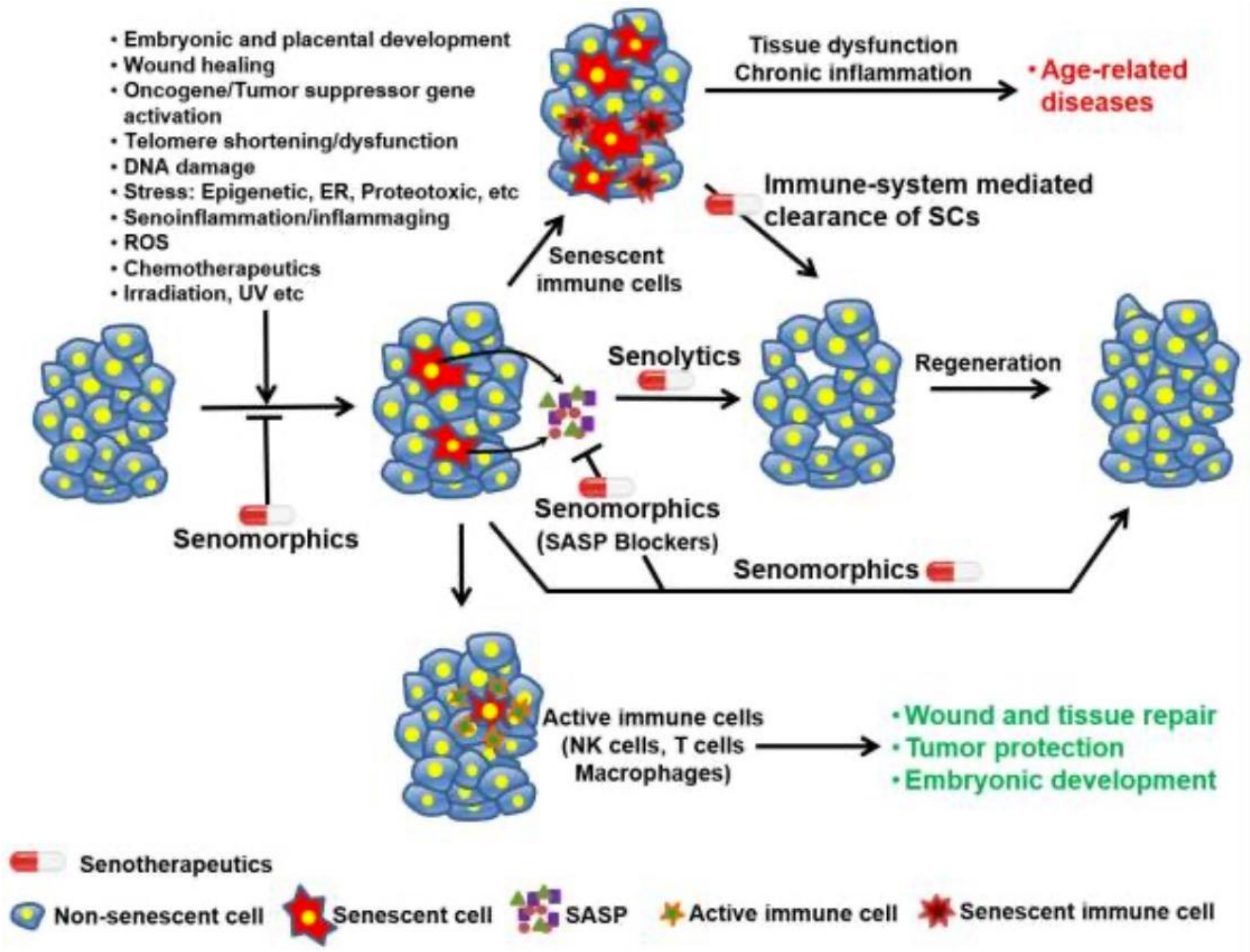
HAVE TO BE CLEARED BY SENOLYTICS

UPON WHICH THE CELLS BREAK UP AND RELEASE THEIR CONTENT!!

Senotherapeutics: emerging strategy for healthy aging and age-related disease

Eok-Cheon Kim [1], Jae-Ryong Kim [1,*]

Senotherapeutics is comprised of 3 classes: **senolytics** which kill SCs selectively; **senomorphics** which modulates or even reverses the phenotypes of SCs to those of young cells by interfering with triggers of CS, targeting SCs directly, or blocking SASP: and **mediators of the immune-system clearance of SCs**.

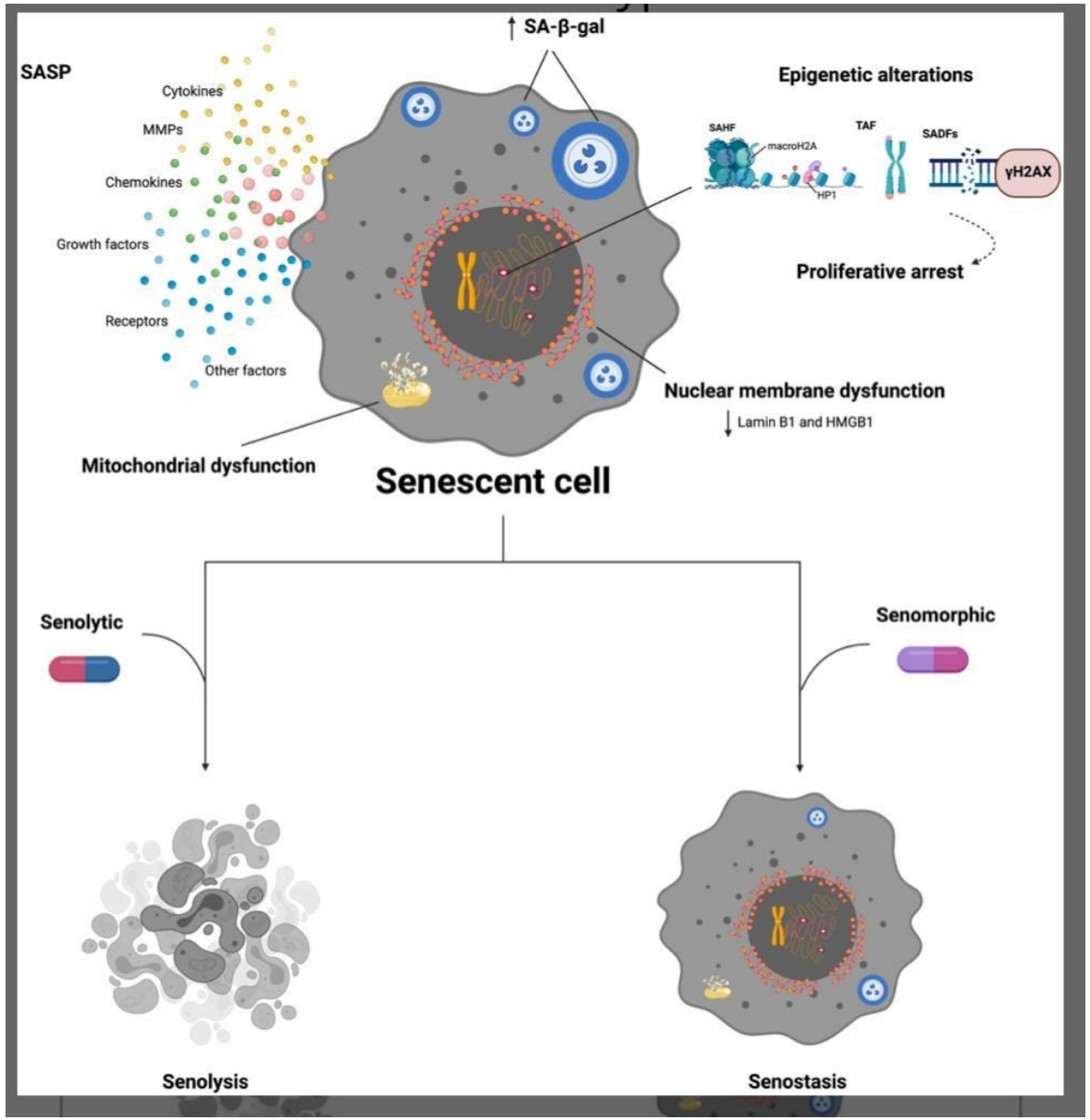


https://pmc.ncbi.nlm.nih.gov/articles/PMC6386227/

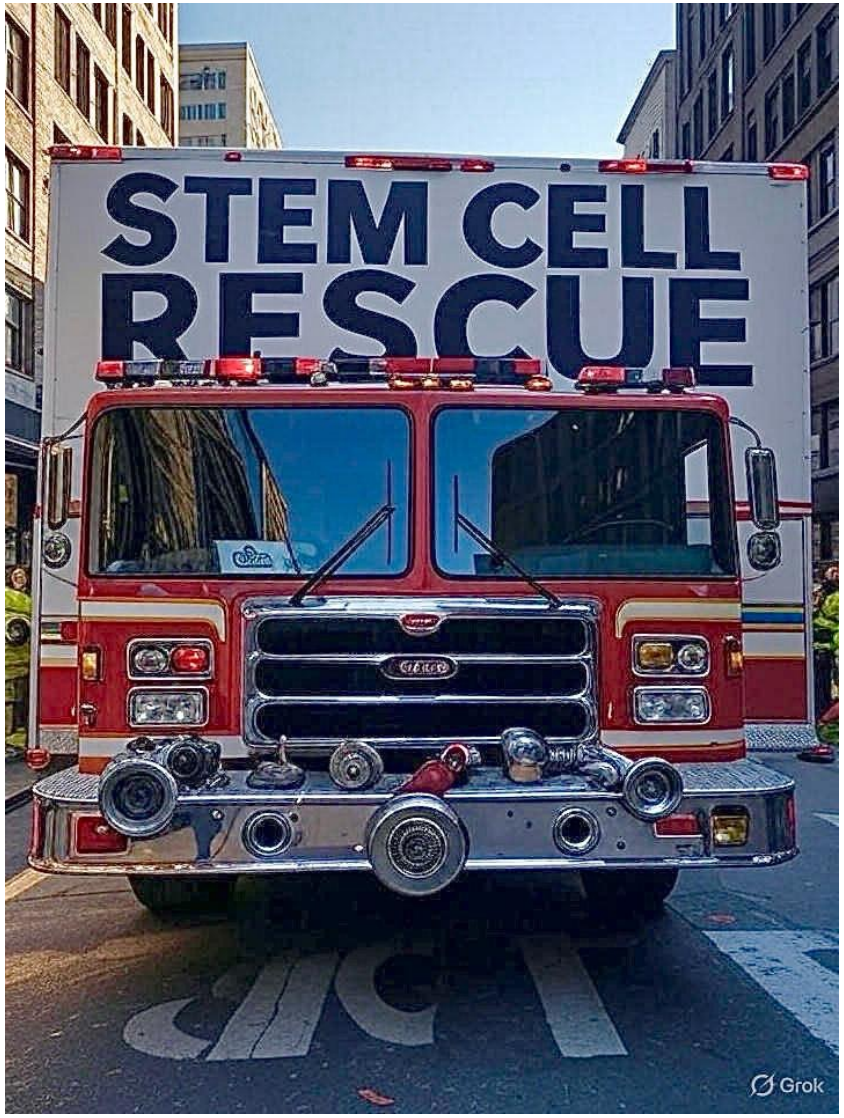
Senomorphics vs Senolytics

Senomorphics are agents that modify senescent cells, aiming to restore their function and morphology to resemble that of younger cells **without necessarily eliminating them**. These compounds can suppress the senescence-associated secretory phenotype (SASP) and other markers of senescence, thereby potentially reversing some effects of cellular aging.

RUTIN
LUTEOLIN
QUERCETIN (DOSAGE DEPENDENT)
EGCG
CURCUMIN
RESVERATROL
MELATONIN



SARS-COV-2 AND OR SPIKE PROTEIN INFECTING STEM CELLS



Overall ratios: Direct VIS (irreversible) ~10–20%; paracrine/bystander (potentially reversible) ~20–50% or higher, amplifying 2–5x via SASP spread. Data gaps exist for other stem types (e.g., mesenchymal); estimates from models like organoids or biopsies.

HEALTHY APPLES RESEMBLING HEALTHY CELLS

BEFORE EXPOSURE TO SARS-COV-2 AND OR SPIKE PROTEIN

APPLES RESEMBLING SENESCENT CELLS AFTER EXPOSURE TO SARS-COV-2 AND OR SPIKE PROTEIN

CELL CONTAINING SPIKE
“IRREVERSIBLY SENESCENT”

BYSTANDER SENESCENT CELL
“REVERSIBLY SENESCENT”

BEFORE FIRST ROUND OF TREATMENT

AFTER FIRST ROUND OF TREATMENT THE BYSTANDER SENESCENT CELLS HAVE RECOVERED, LEAVING THE IRREVERSIBLY SENESCENT IN THE MIDDLE

AFTER FIRST ROUND OF TREATMENT

AFTER SECOND ROUND OF TREATMENT
THE IRREVERSIBLY SENESCENT CELLS ARE REMOVED

REVERSING

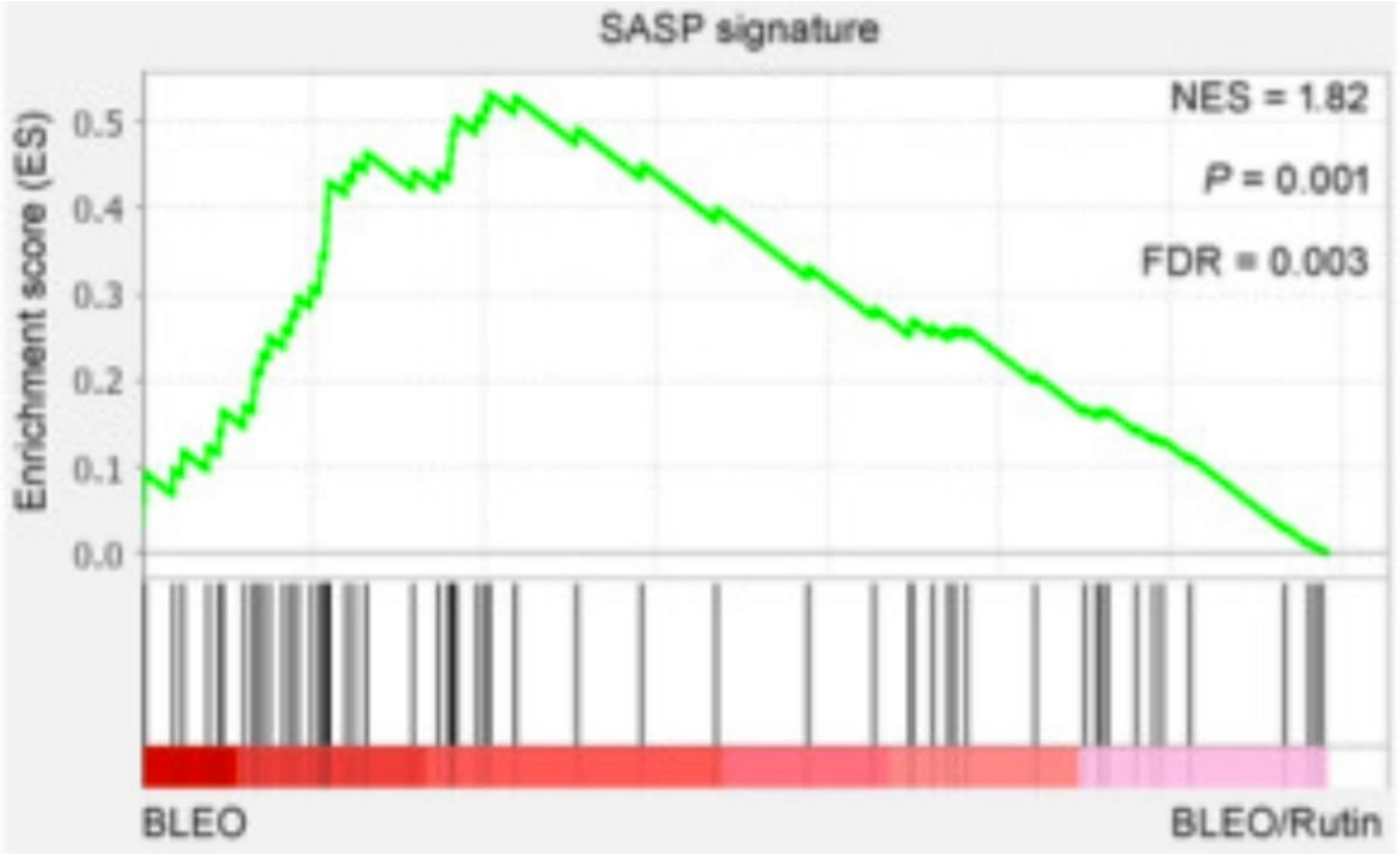
“BYSTANDER SENESCENCE”

(IN DEVELOPMENT)

Rutin is a potent senomorphic agent to target senescent cells and can improve chemotherapeutic efficacy

Hanxin Liu [1], Qixia Xu [2], Halidan Wufuer [2], Zi Li [3], Rong Sun [4], Zhirui Jiang [2], Xuefeng Dou [2], Qiang Fu [1,✉], Judith Campisi [5,6,✉], Yu Sun [1,2,7,✉]

https://pmc.ncbi.nlm.nih.gov/articles/PMC10776113/



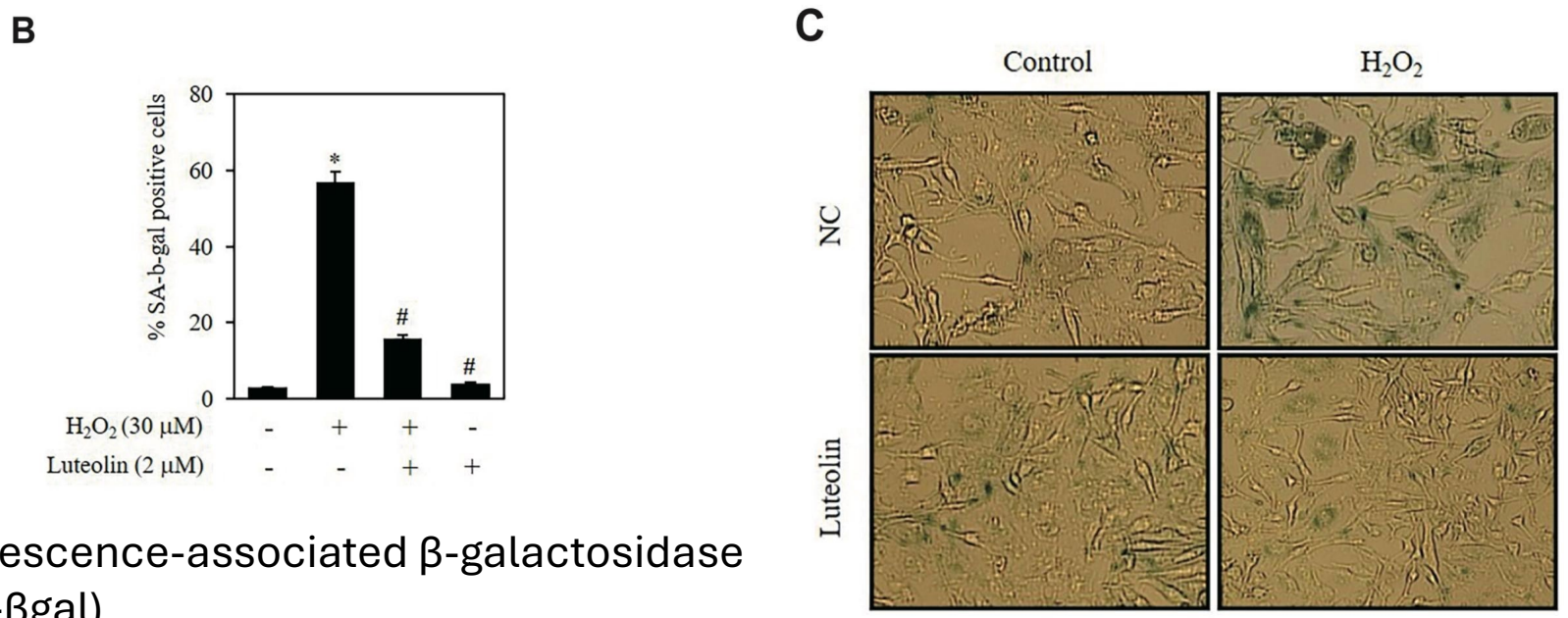
In our study, rutin displays a senomorphic, rather than senolytic activity in vitro, when used at an optimal concentration of 100 μM. In contrast to rapamycin, which though alleviates age-related dysfunctions in model organisms, induces hyperlipidaemia, thrombocytopenia, metabolic dysregulation, and impairs wound healing (similar to navitoclax), rutin seems to be a moderate senomorphic agent with decent safety and limited cytotoxicity

Luteolin inhibits H_2O_2-induced cellular senescence *via* modulation of SIRT1 and p53

Ri Zhe Zhu[#], Bing Si Li[#], Shang Shang Gao, Jae Ho Seo*, and Byung-Min Choi*

Department of Biochemistry, Wonkwang University School of Medicine, Iksan 54538, Korea

This study indicates that luteolin effectively protects against oxidative stress-induced cellular senescence through p53 and SIRT1. These results suggest that luteolin possesses therapeutic potentials against age-related hearing loss that are induced by oxidative stress.



Senescence-associated β-galactosidase (SA-βgal)

Fig. 1. Luteolin reduces hydrogen peroxide (H_2O_2)-induced cellular senescence in House Ear Institute-Organ of Corti 1 (HEI-OC1) cells. (A–C) Cells were pretreated with luteolin for 12 h, then incubated in 30 μM H_2O_2 for 3 days. Cell viability was determined by MTT assay (A). The percentage of SA-β-gal positive cells out of total cells was counted and the average data was obtained from three independent experiments (B). The senescent phenotype of HEI-OC1 cells was detected by the SA-β-gal assay (×100) (C). (D) Cell growth was evaluated by MTT assay at various time points indicated in the figure after addition of H_2O_2. Data represents means values of triple experiments. *$p < 0.05$ *vs.* control, [#]$p < 0.05$ *vs.* H_2O_2. Piperine was used as a positive control.

https://www.researchgate.net/publication/352886601_Luteolin_inhibits_H_2_O_2_-induced_cellular_senescence_via_modulation_of_SIRT1_and_p53/fulltext/

Exploring Senolytic and Senomorphic Properties of Medicinal Plants for Anti-Aging Therapies

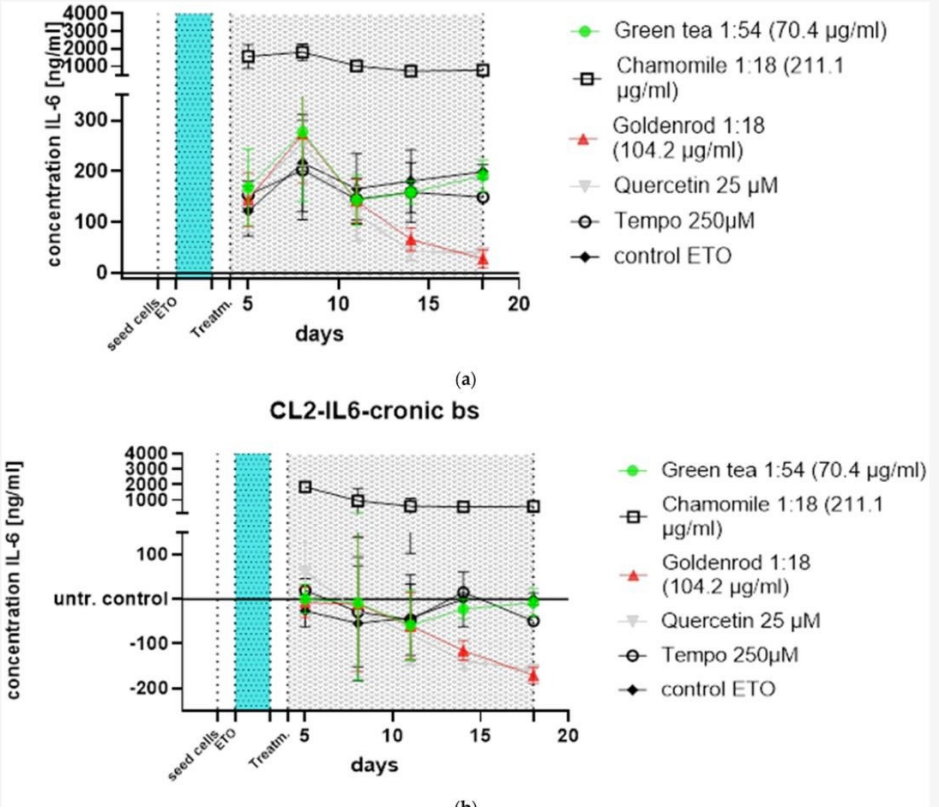
by **Monika Imb**, **Zsolt Véghelyi**, **Michael Maurer** and **Harald Kühnel** *

Goldenrod and quercetin tend to have a senolytic and senomorphic effect, respectively. Regarding the senolytic and senomorphic properties of herbs, we found that all tested herbs can have a senolytic effect, and a **senomorphic effect of quercetin** has also been discovered.

Quercetin has a (dosage dependent) senomorphic effect.

https://www.mdpi.com/1422-0067/25/19/10419

Figure 6. Time course of chronic treatments of HDF CL2. (**a**) Values detected by ELISA. Chamomile shows a massive increase in IL-6 excretion, and quercetin and goldenrod also show decreased IL-6 production in CL2 because of senomorphic and senolytic properties, respectively. (**b**) Data normalized to control (blank subtracted (bs)-control ETO) treatment illustrate the alleviating effects of quercetin and the massive induction of SASP by chamomile.

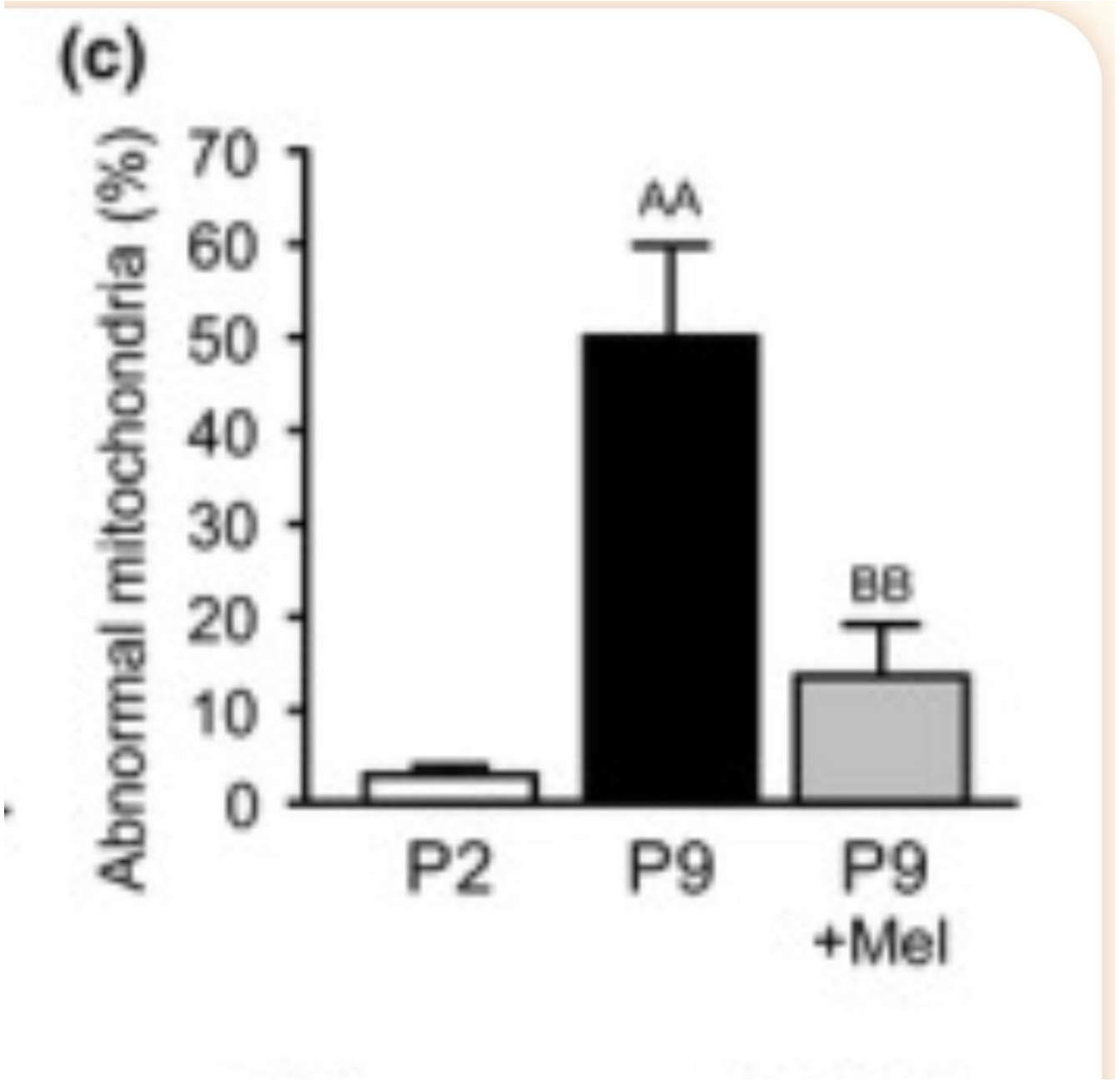


Melatonin suppresses senescence-derived mitochondrial dysfunction in mesenchymal stem cells via the HSPA1L–mitophagy pathway

Jun Hee Lee, [1,2] Yeo Min Yoon, [1] Keon-Hyoung Song, [3] Hyunjin Noh, [4,5] and Sang Hun Lee [1,2]

In a murine hindlimb ischemia model, melatonin-treated senescent MSCs enhanced functional recovery by increasing blood flow perfusion, limb salvage, and neovascularization. This study, for the first time, suggests that melatonin protects MSCs against replicative senescence during ex vivo expansion for clinical application via mitochondrial quality control.

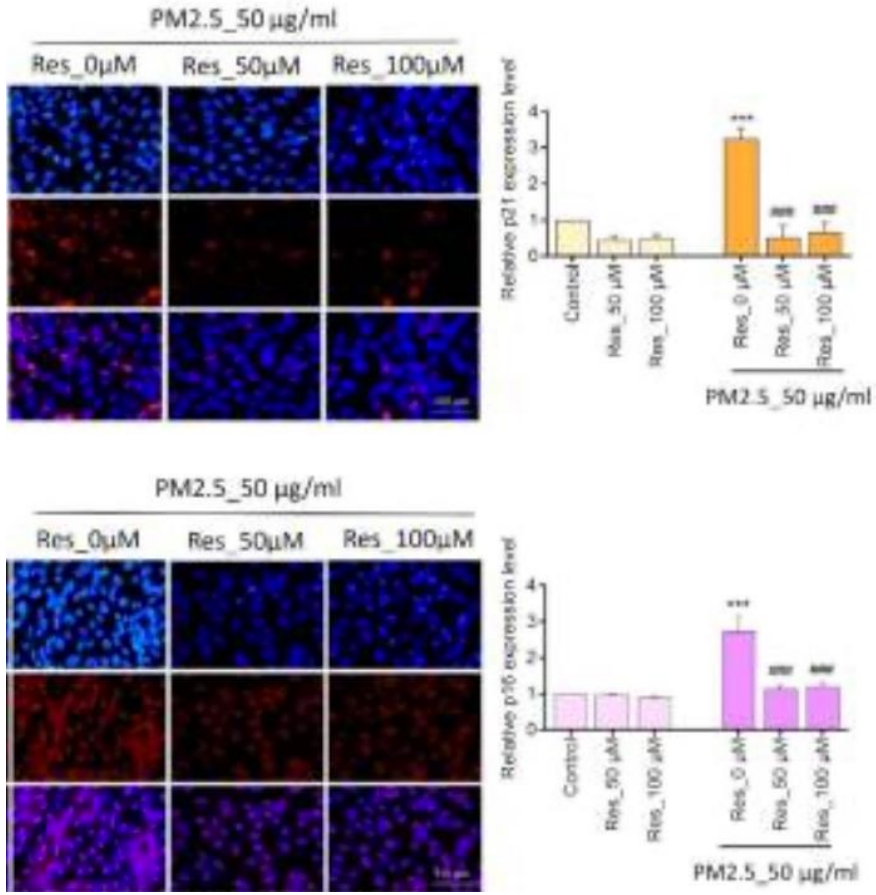
Percentages of abnormal mitochondria which were swollen with evidence of severely disrupted cristae throughout a mitochondrion obtained from TEM images in healthy MSCs (P2), senescent MSCs (P9), and senescent MSCs treated with melatonin (P9 + Mel)



Resveratrol Shows Potent Senescence Reversal in Experimental Cellular Models of Particular Matter 2.5-induced Cellular Senescence in Human Dermal Papilla Cells

ZIN ZIN EI,[1,2] THUNWADEE SRITHAWIRAT,[3] PREEDAKORN CHUNHACHA,[2,4]

Here we demonstrated the potential use of a well-known antioxidant compound named resveratrol in the **reversal of senescence** in **human stem cells**.



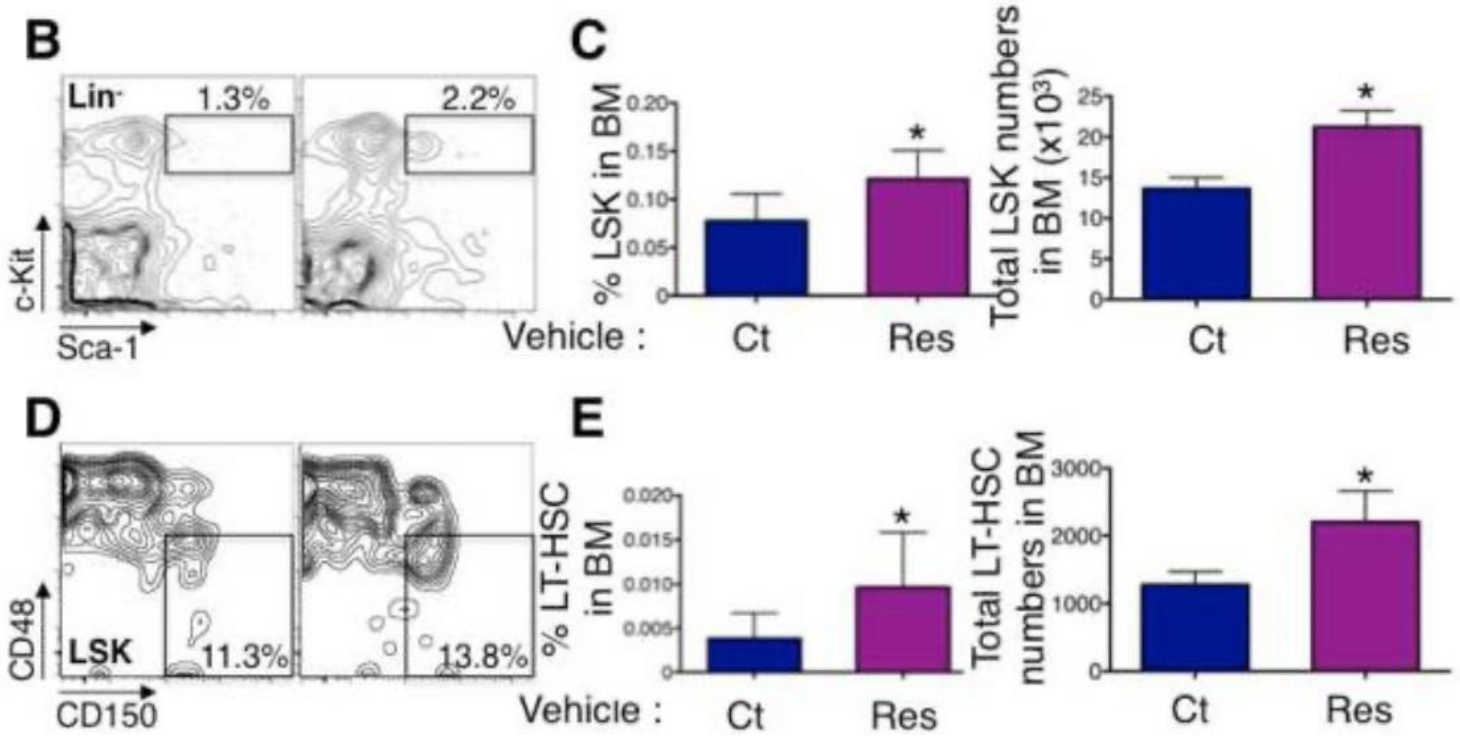
Res treatment of PM2.5-treated senescent DP cells for 24 h was followed by an assessment of p21 and p16 protein expression levels using immunofluorescence analysis. The findings indicated that Res treatment of PM2.5-treated senescent cells led to a significant 3-fold reduction in p21 protein expression level and a 2-fold reduction in p16 protein expression (Figure 4D and E).

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10905444/

Resveratrol Increases the Bone Marrow Hematopoietic Stem and Progenitor Cell Capacity

Pauline Rimmelé,[1] Sébastien Lofek-Czubek,[1] and Saghi Ghaffari[1,2,3,4,5,&]

Here we show that a **three-week treatment** of resveratrol increases the frequency and total numbers of normal bone marrow hematopoietic stem cells (HSC)



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4237620/

A Senomorphic-Conjugated Scaffold for Application of Senescent Cells in Regenerative Medicine

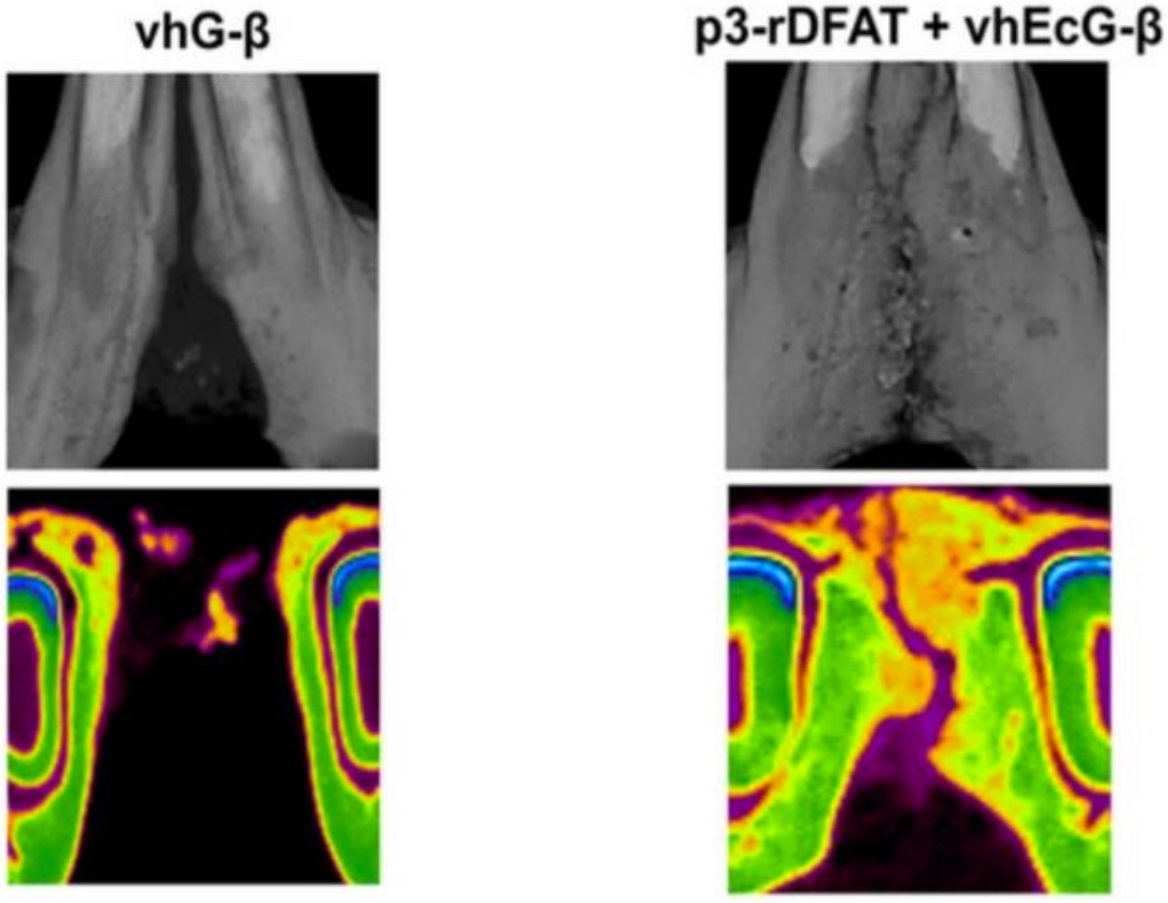
Wenqi Deng, Jun-ichiro Jo ✉, Tomonari Tanaka, Hidetoshi Morikuni, Yoshiya Hashimoto, Naoyuki Matsumoto, Yoshitomo Honda ✉

EGCG and incorporated with β-tricalcium phosphate: vhEcG-β) significantly restored bone volume and reduced the production of SASP factors and reactive oxygen species even in vivo.

Because senomorphics exert their effects without eliminating senescent cells themselves, administration of **senomorphics** can facilitate the regeneration of a sufficient number of **senescent stem/progenitor** cells for regenerative therapy.

https://onlinelibrary.wiley.com/doi/full/10.1002/adtp.202200276

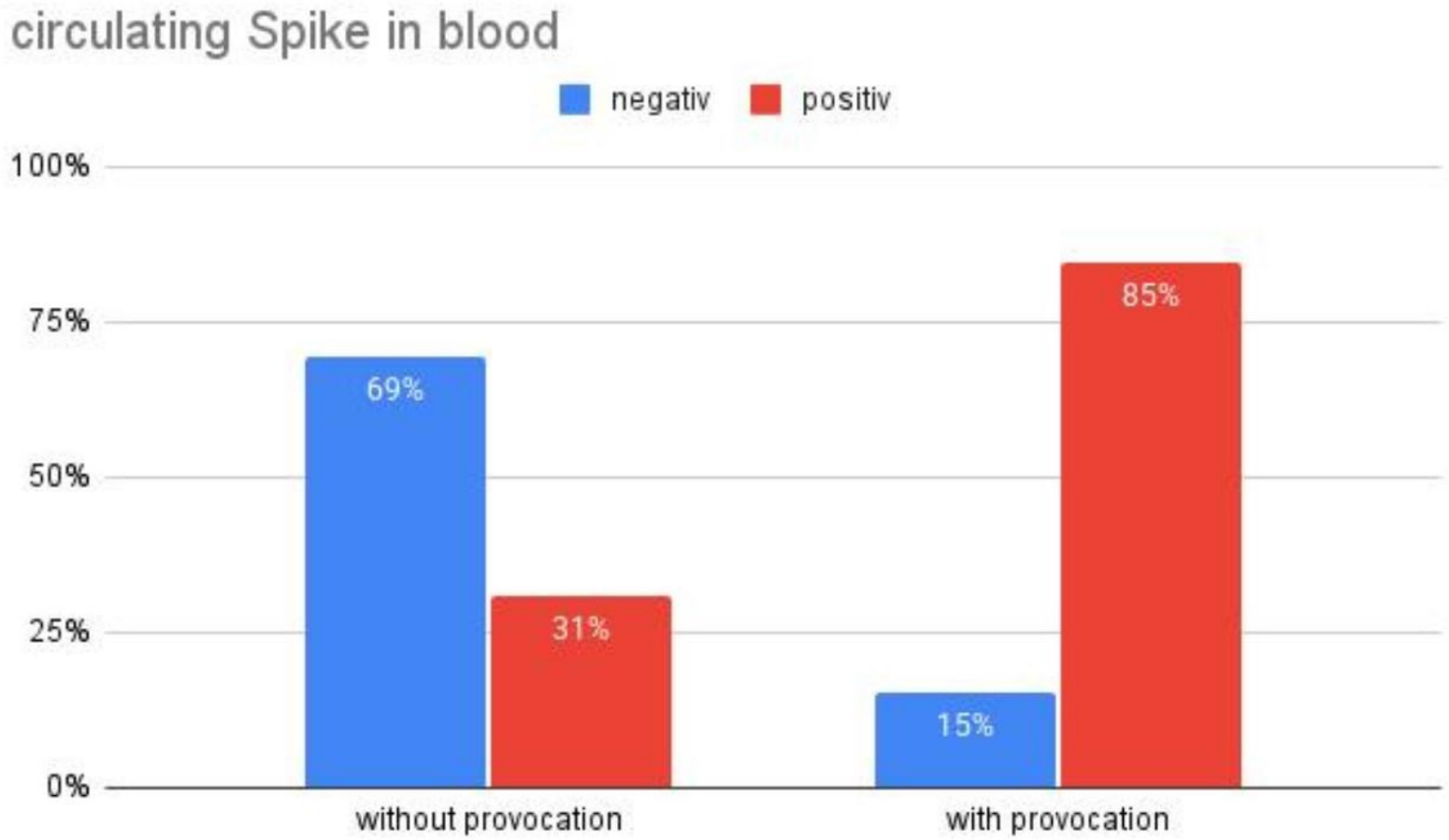
2.5 Restoration of Bone Formation Using Senomorphic-Conjugated Scaffolds



STEM CELLS IN VIVO RESULTS!

SENOLYTICS
REMOVING “IRREVERSIBLY SENESCENT CELLS”

SPIKE PROVOCATION DIAGNOSTICS



SPIKE LEVELS **2 HOURS AFTER PROVOCATION**

SPIKE PROVOCATION DIAGNOSTICS

Spike before standardized on average hemoglobin	Spike after standardized on average hemoglobin	Difference standardized	% Difference standarized	S
1,0	63,1	62,1	6214%	
10,8	44,7	33,8	316%	
13,2	21,3	8,0	54%	
48,3	91,6	43,3	111%	
2,2	12,3	10,1	314%	
60,8	70,5	9,6	14%	
37,6	46,6	9,1	24%	
22,9	115,1	92,2	415%	
28,5	33,7	5,2	17%	
15,5	66,1	50,5	339%	
22,6	60,9	38,3	169%	
30,2	48,1	17,9	54%	
15,2	33,2	18,0	122%	

SPIKE LEVELS
BEFORE PROVOCATION

SPIKE LEVELS
2 HOURS AFTER PROVOCATION

SPIKE PROVOCATION DIAGNOSTICS

SPIKE LEVELS BEFORE PROVOCATION: 235 pg

Patient	Andrew before pill prov.
Geburtsdatum	
Probennahme	13.01.2025
Probeneingang	13.01.2025
Untersuchungsende	23.01.2025
Validiert von	Prof. Dr. Brigitte König
Ärztliche Leitung	Prof. Dr. Gerhard Jorch

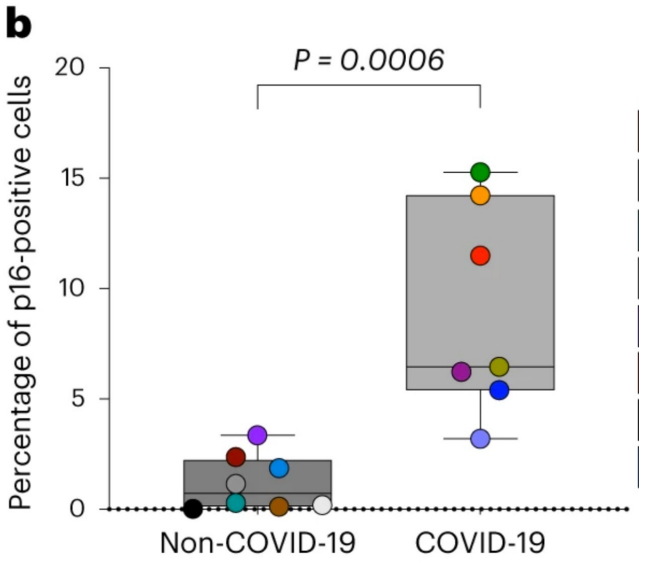
Spikeprotein in Plasma/Serum	**NEGATIV**
Spikeprotein in Exosomen	**POSITIV 235,94 pg/ml**
Spikeprotein in Immunzellen (PBMC)	**POSITIV 8,23 pg/2,5x10^6 Zellen**

SPIKE LEVELS **2 HOURS AFTER PROVOCATION**: 1131 pg

Patient	Andrew after pill prov.
Geburtsdatum	
Probennahme	13.01.2025
Probeneingang	13.01.2025
Untersuchungsende	23.01.2025
Validiert von	Prof. Dr. Brigitte König
Ärztliche Leitung	Prof. Dr. Gerhard Jorch

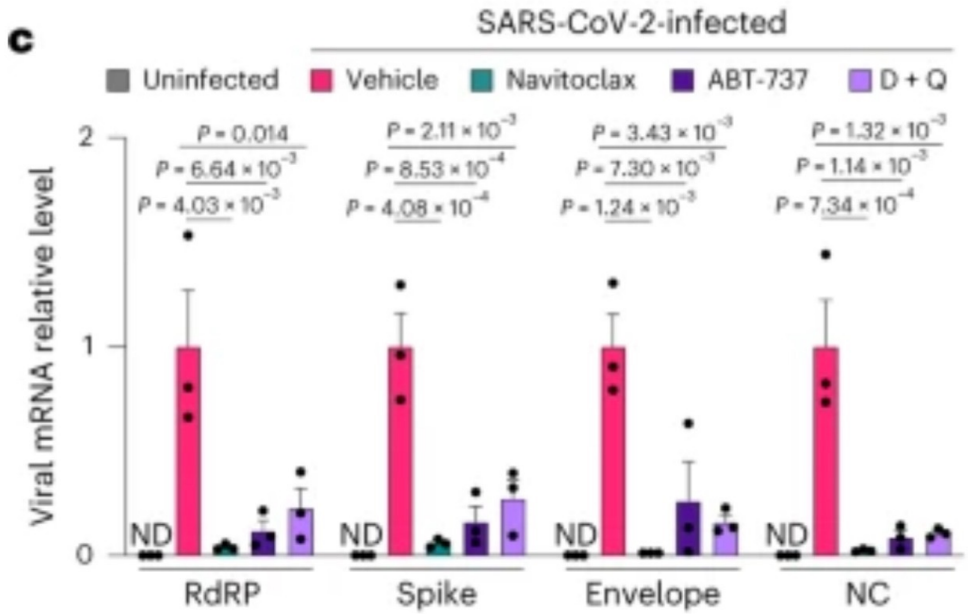
Spikeprotein in Plasma/Serum	**NEGATIV**
Spikeprotein in Exosomen	**POSITIV 1131,84 pg/ml**
Spikeprotein in Immunzellen (PBMC)	**NEGATIV**

Fig. 3: Brains of patients with COVID-19 exhibit increased accumulation of p16 senescent cells.



sections of frontal cortex regions from patients with severe COVID-19 and age-matched non-COVID-related controls

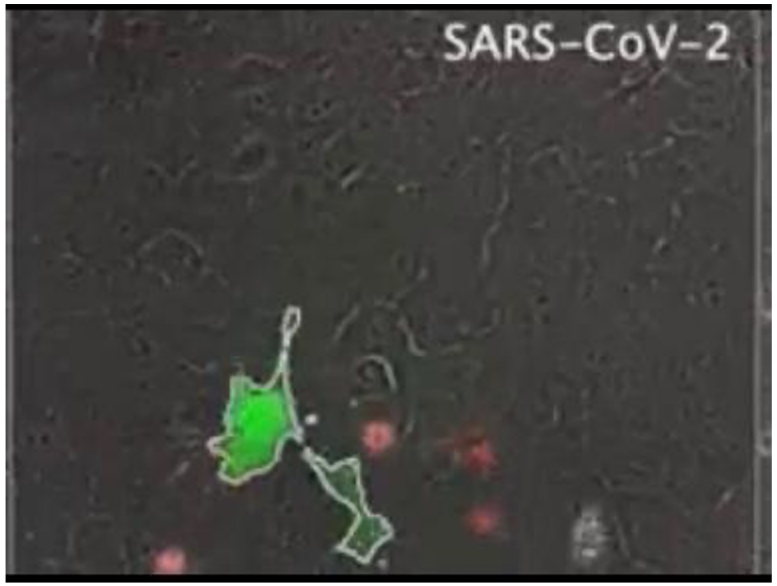
Fig. 6: Senolytic treatments mitigate COVID-19 brain pathology in vivo.

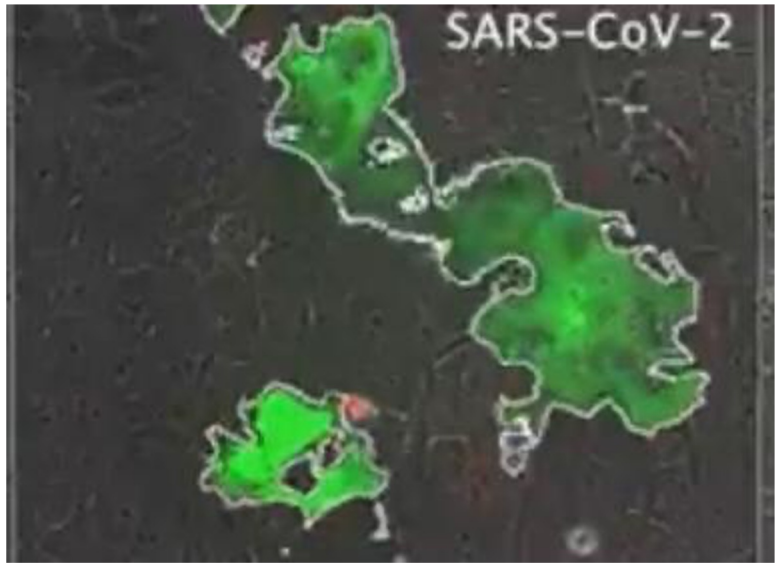


Total RNA of individual brains from mice—either uninfected or Delta variant-infected and treated with senolytics—was used to quantify the indicated levels of viral RNAs and was normalized to Rplp0 mRNA and compared with infected vehicle controls.


AND NOW TO THE FRIED EGGS:

Senescent cells / Syncytia are harboring Spike and or persistent viruses. Our protocols prevent the formation of cell fusion by Spike proteins which is important during detox as organ protection!



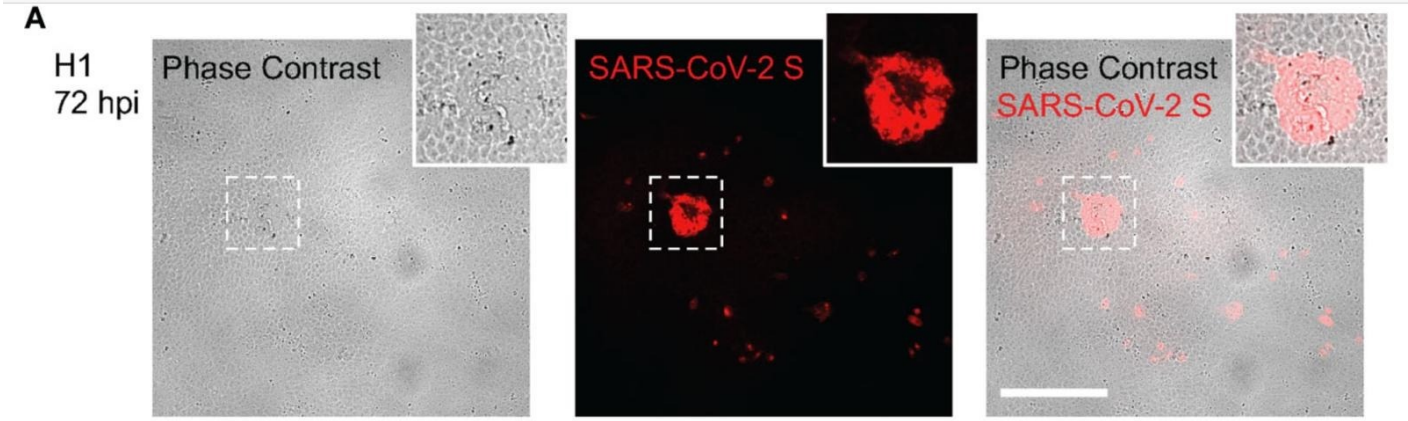


SARS-COV-2 DIRECTLY INFECTS STEM CELLS AND EVEN CAUSES SYNCYTIA FORMATION!

frontiers

Evidence of Infection of Human Embryonic Stem Cells by SARS-CoV-2

Weijie Zeng† Fan Xing† Yanxi Ji
Sidi Yang Tiefeng Xu Siyao Huang
Chunmei Li Junyu Wu* Liu Cao*
Deyin Guo*



Altogether, our results provide novel evidence to support the ability of SARS-CoV-2 to infect and replicate in hESCs.

Syncytium formation in hESCs after SARS-CoV-2 infection. (A) Combined bright field phase contrast and fluorescence images of H1 hESC after SARS-CoV-2 at 72 hpi.

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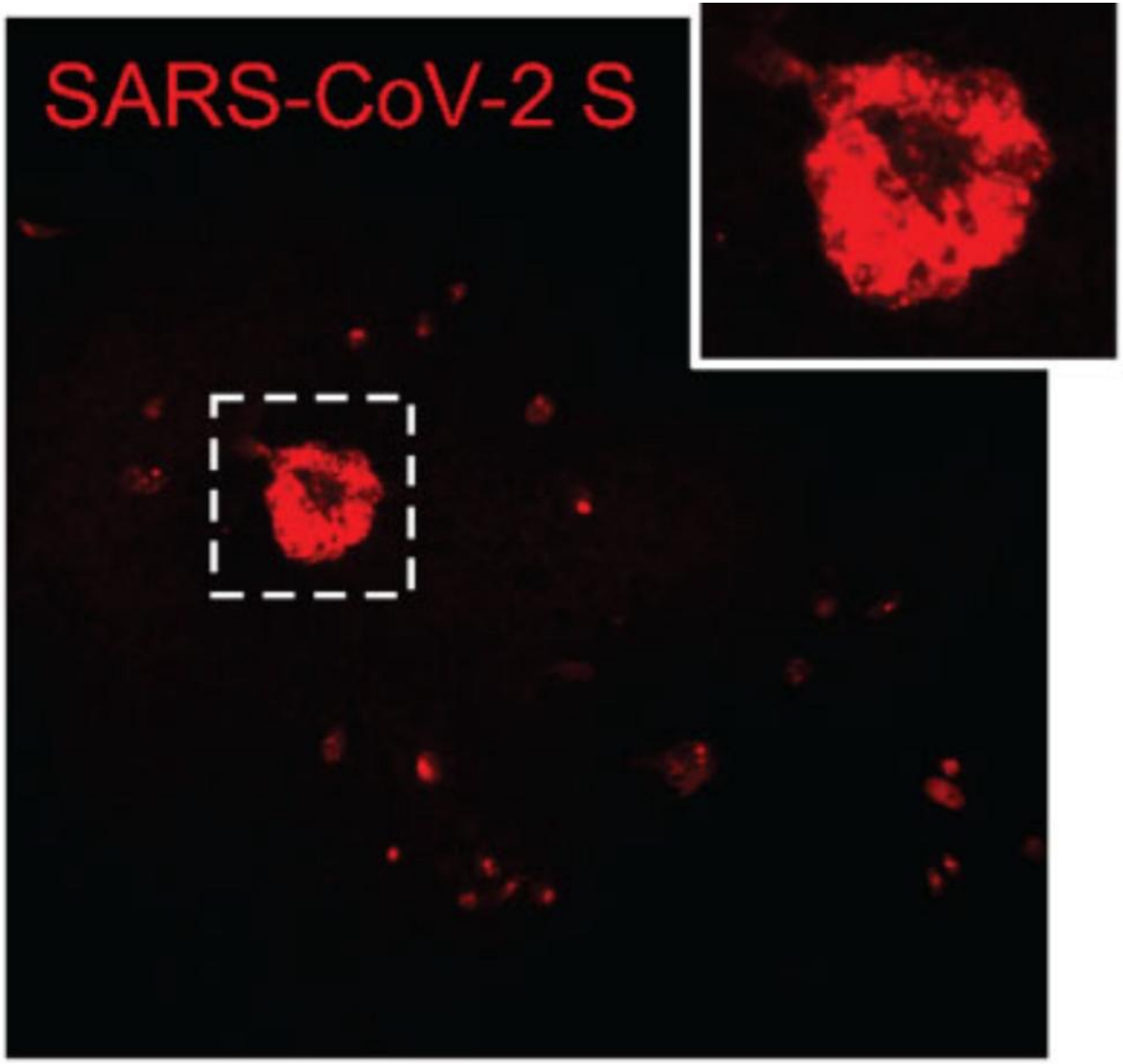
https://www.frontiersin.org/journals/cellular-and-infection-microbiology/articles/10.3389/fcimb.2022.911313/full



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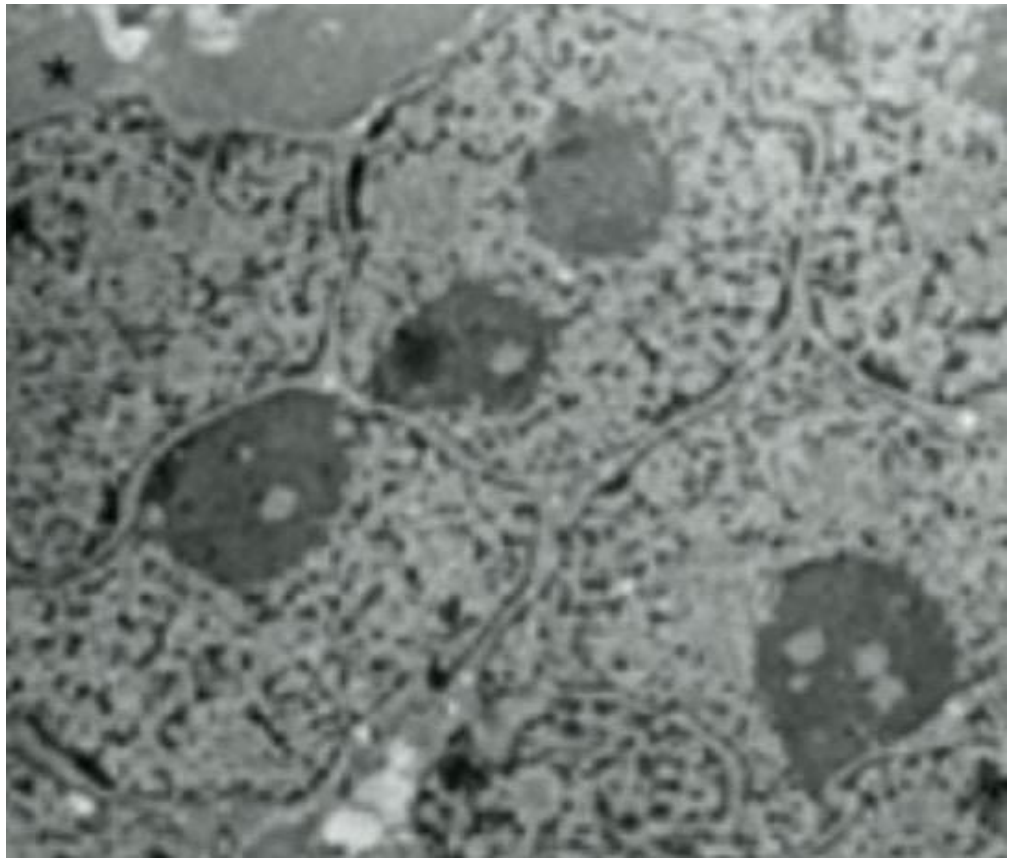
IRREVERSIBLY SENESCENT CELL CONGLOMERATES (SYNCYTIA)

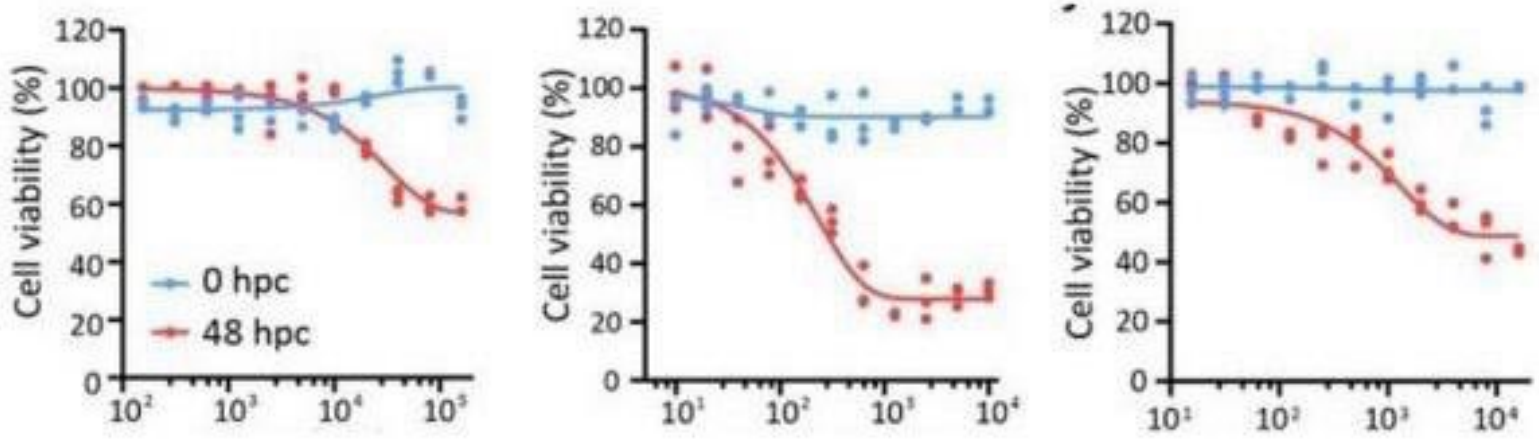


A) portion of a syncytium with multiple nuclei and a morbillivirus nucleocapsid cytosolic inclusion

FRIED EGGS 🤣
NO CHICKS WILL HATCH FROM THIS ONE!

CLEARANCE OF CELL CONGLOMERATES (SYNCYTIA)
·PROOF OF CONCEPT·

Furthermore, SARS-2-S syncytia could be selectively killed



health care channel