

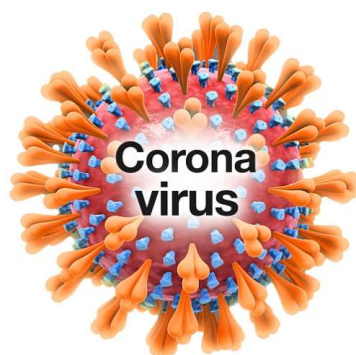
Immune Response in SARS-CoV-2 Infection, Inflammation, and Cancer Immune Evasion and Tumour Progression

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VIRCAN 2024

DIS



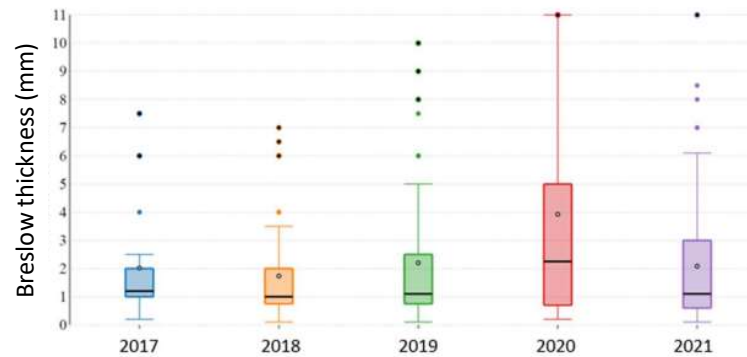
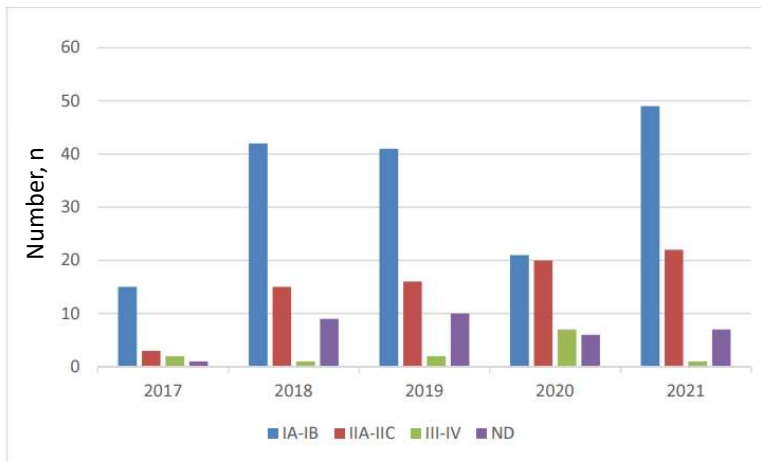
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Areas of concern:

- the impact of the pandemic on cancer care
- the vulnerability of cancer patients to severe COVID-19
- the potential biological links between the virus and cancer

Example: changes in melanoma staging and Breslow thickness during pandemic

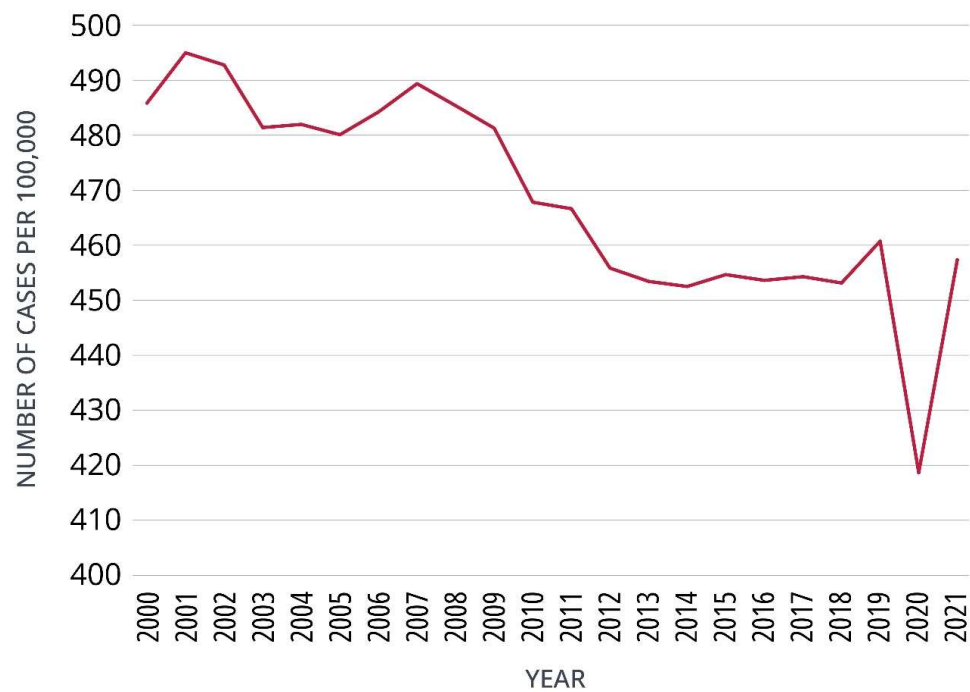


Data collected from the outpatient's department of the Riga East University Hospital

Melanoma incidence in the outpatient's department of the Riga East University Hospital during pandemic



NEW CANCER DIAGNOSES IN THE UNITED STATES, 2000–2021



Howlader N et al. *J Natl Cancer Inst.* 2024 Sep 24:djae180. doi: 10.1093/jnci/djae180

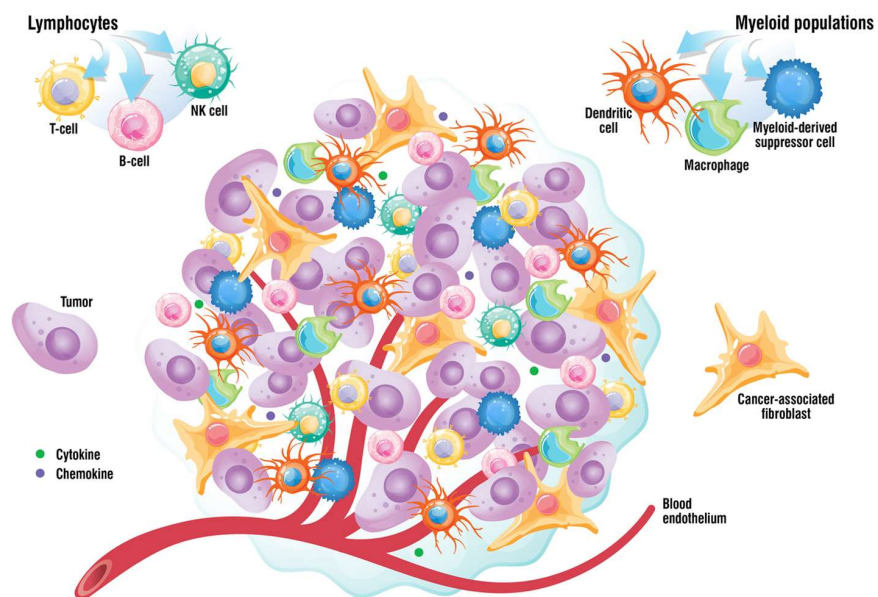
Outcomes of patients with cancer, with and without COVID-19

	With COVID-19	vs.	Without COVID-19
All-cause mortality	14%		2%
hospital admission	64%		14%
invasive respiratory support	11%		1%

Healio

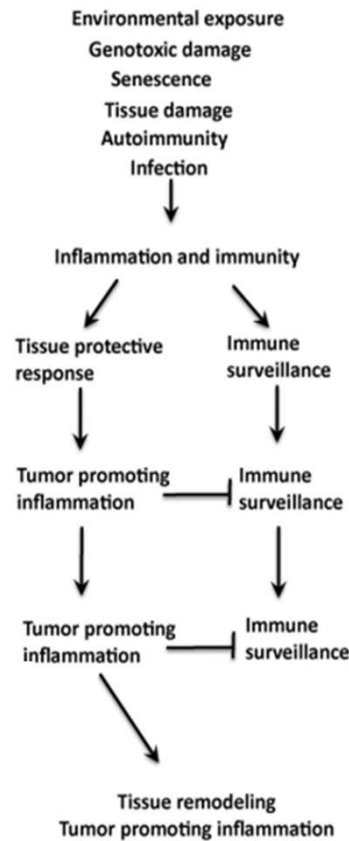
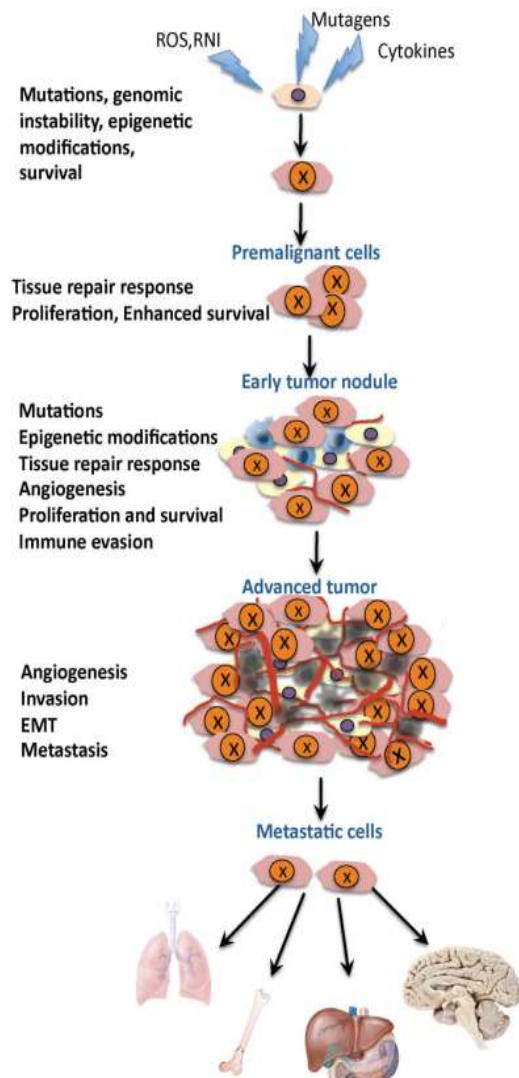
Hwang C. et al. *Cancer Rep (Hoboken)*. 2021 Oct;4(5):e1388. doi: 10.1002/cnr2.1388.

Tumour microenvironment



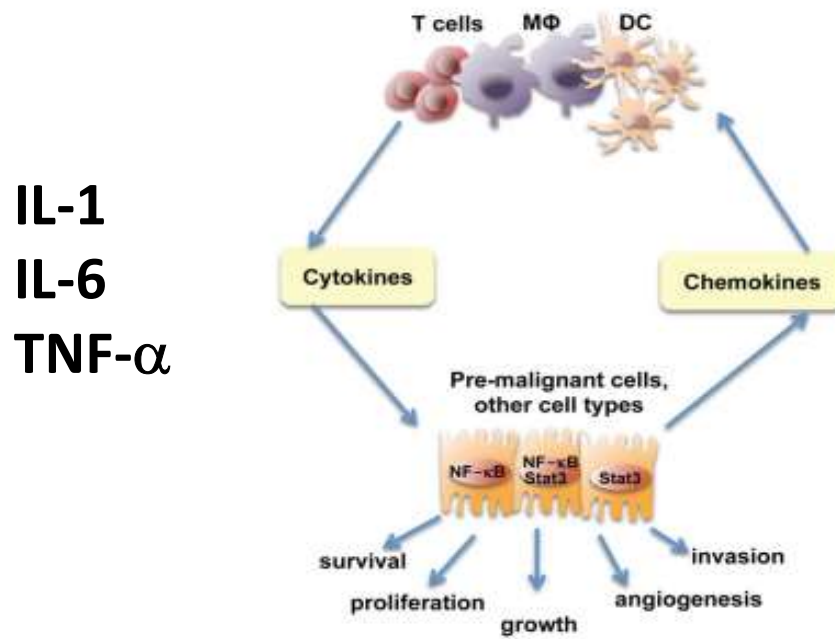
Picture from Zhang J and Veeramachaneni N. *Biomark Res.* 2022 Jan 27;10(1):5.
doi: 10.1186/s40364-021-00341-5.

The multifaceted role of inflammation in cancer

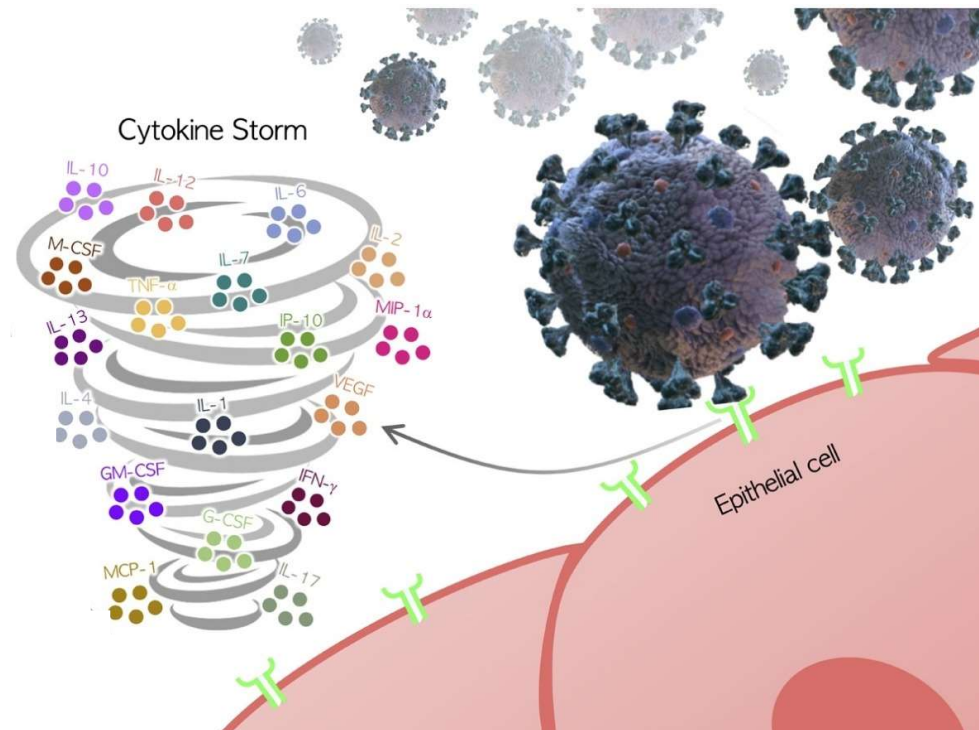


Grivennikov SI et al. Cell. 2010 Mar 19;140(6):883-99. doi: 10.1016/j.cell.2010.01.025.

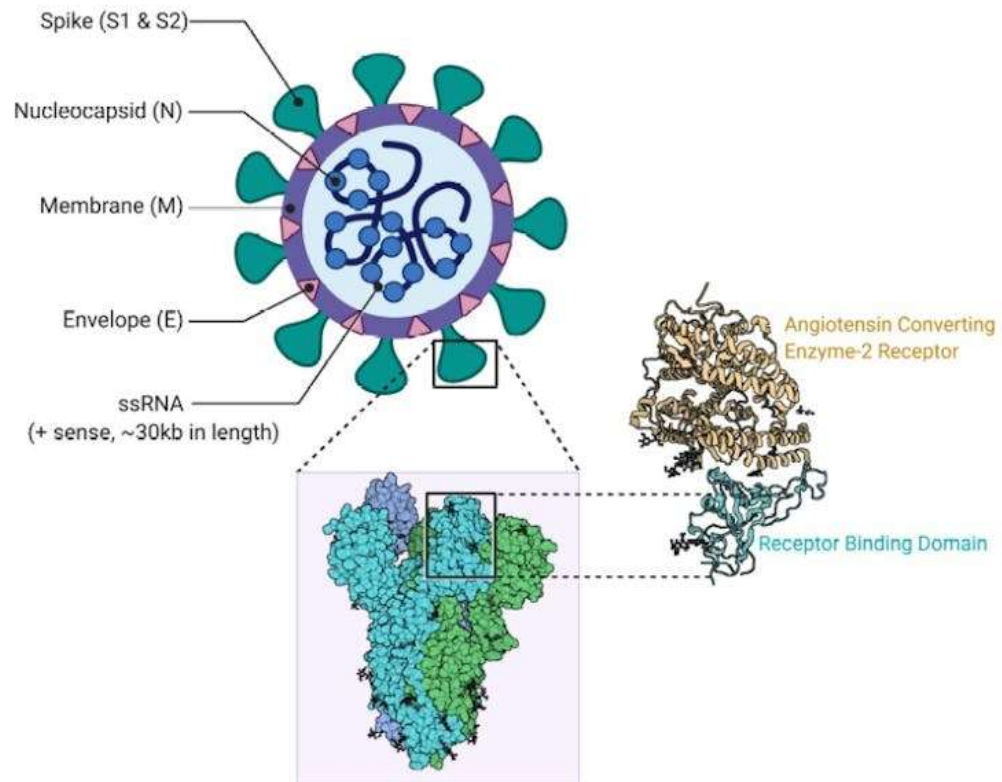
Role of inflammation in tumor initiation and promotion



COVID -19

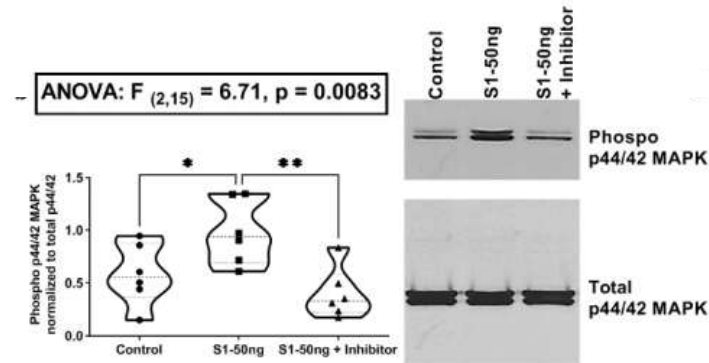
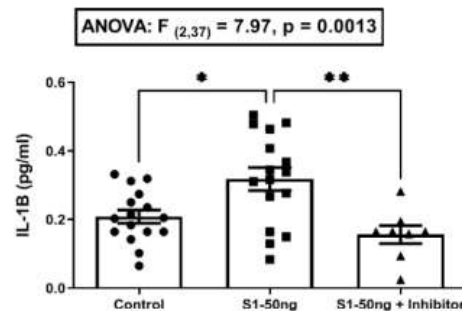


SARS-CoV 2 Structure

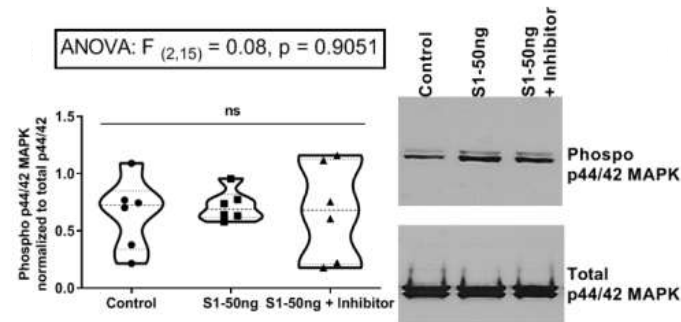
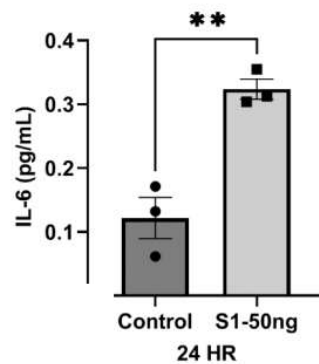


Spike protein induces the production of IL-1 β , IL-6 and activates ERK1/2-MAPK pathway

Lung
epithelial
cells A549

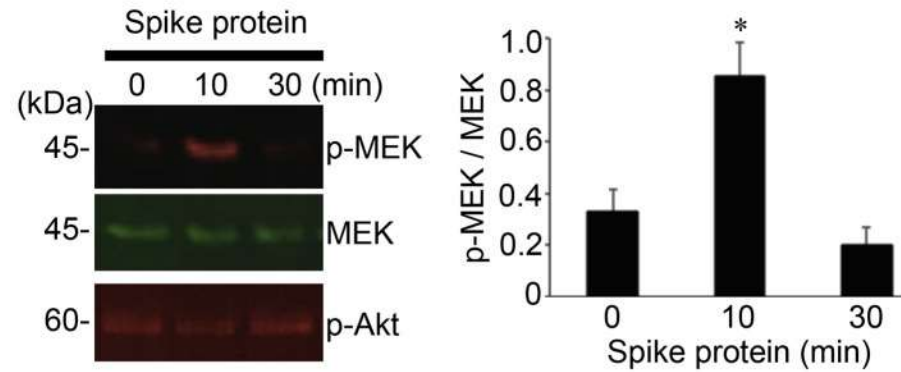


Intestinal
epithelial
cells Caco2

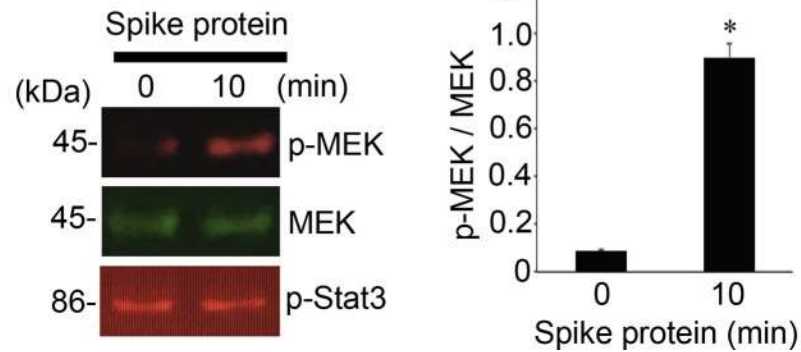


Spike protein MEK phosphorylation

Human
pulmonary
artery
smooth cells

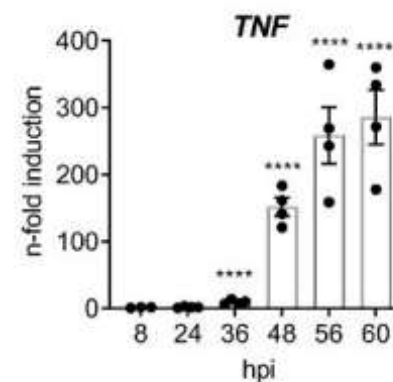
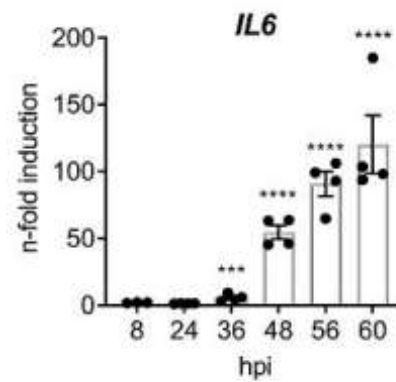
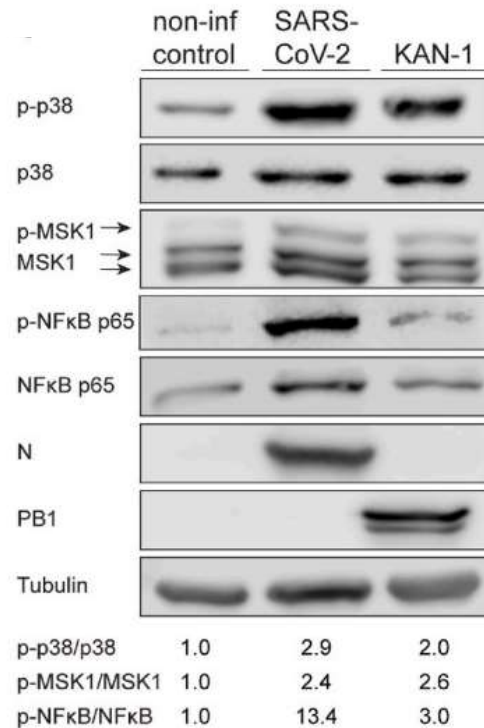


Human
pulmonary artery
endothelial cells



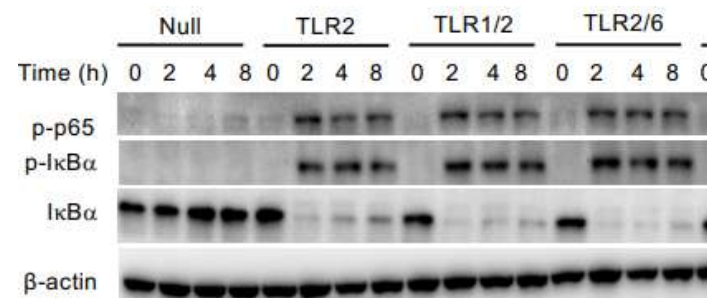
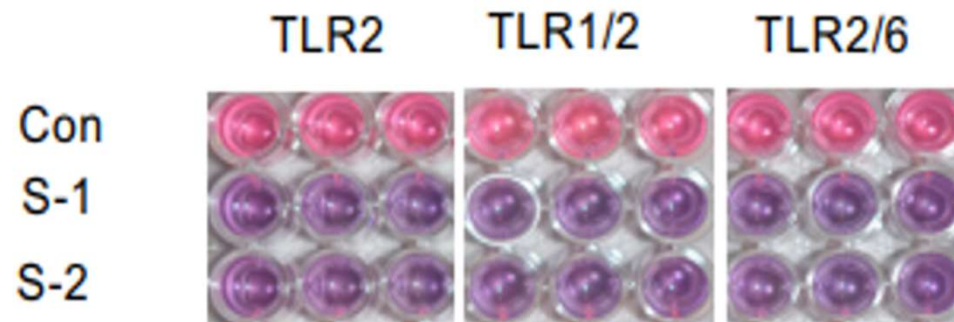
Suzuki YJ et al. *Vascul Pharmacol.* 2021 Apr;137:106823. doi: 10.1016/j.vph.2020.106823.

SARS-CoV-2 infection activates p38 MAPK signaling and induces a pro-inflammatory cytokine response (Calu3 cells)

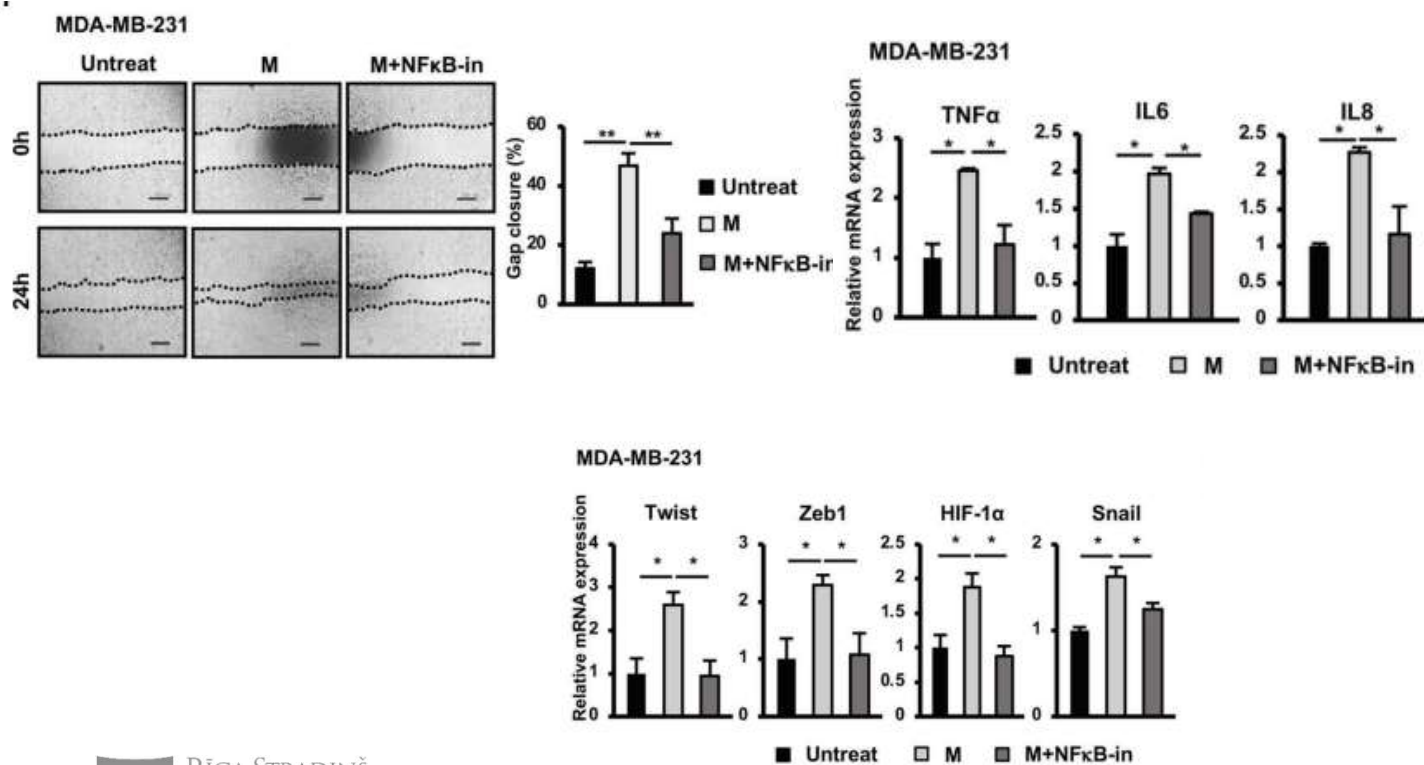


Toll-like receptors detect the spike protein and activates the NF- κ B pathway

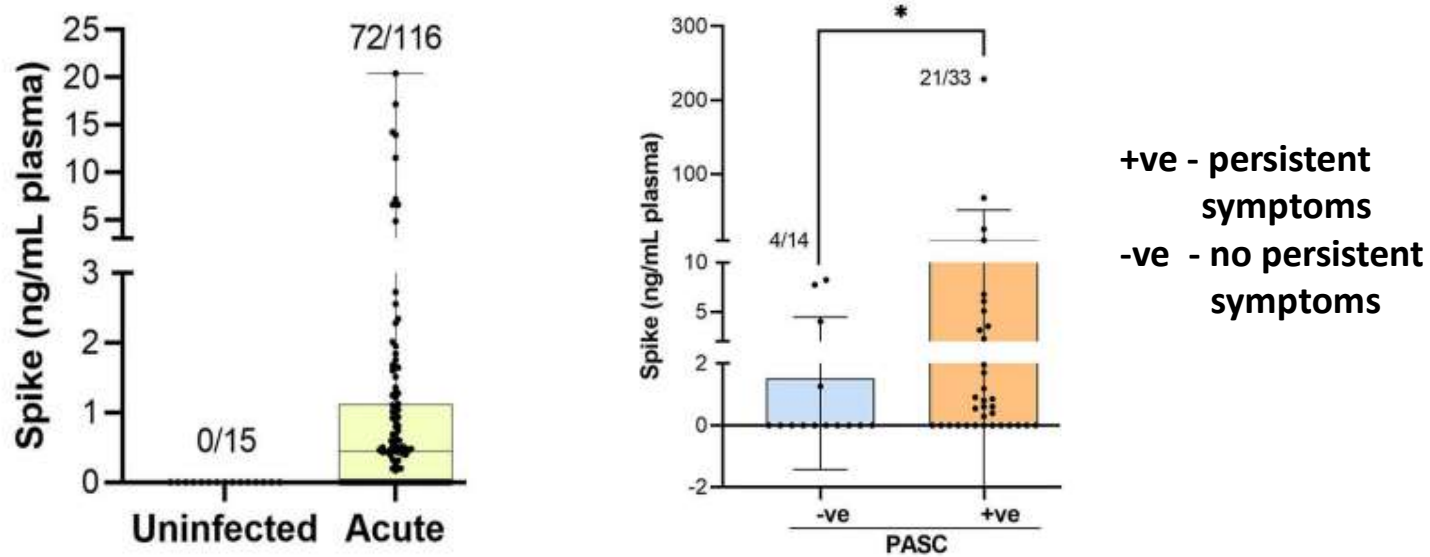
Human Embryonic
Kidney (HEK) cells



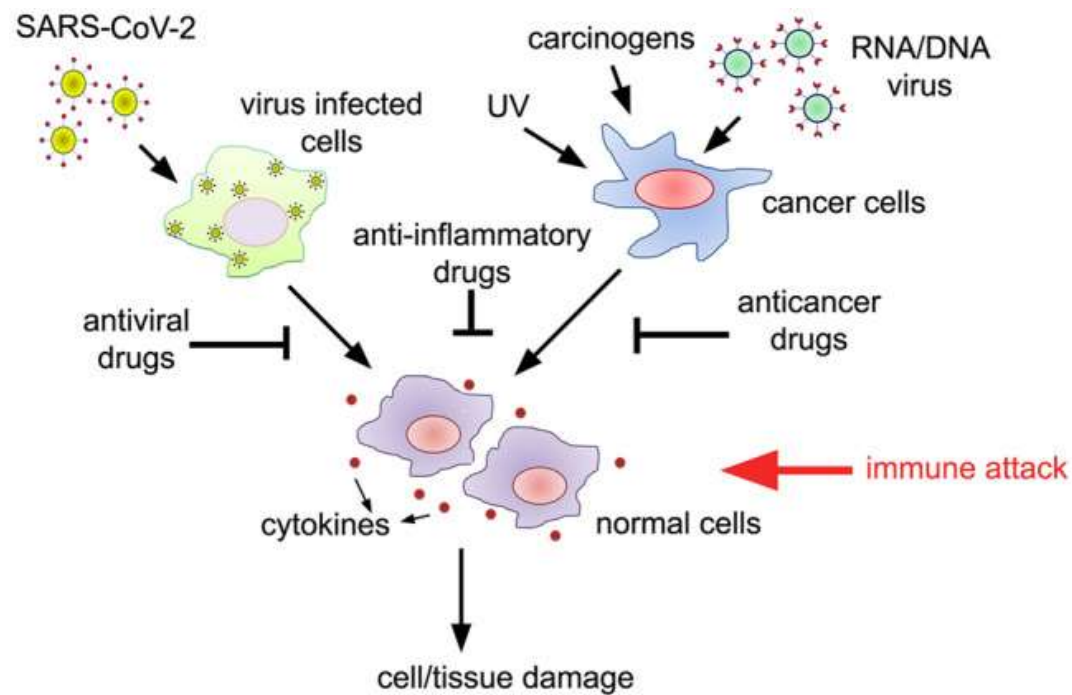
SARS-CoV-2 M protein influence on breast cancer cells



Spike protein persistence in the blood post-acute COVID-19



The co-similarity between SARS-CoV-2 infected cells and cancer cells in inducing the cytokine response



Amere Subbarao S. *Inflammopharmacology*. 2021 Apr;29(2):343-366. doi: 10.1007/s10787-021-00796-w

Thank you!

UDRS