



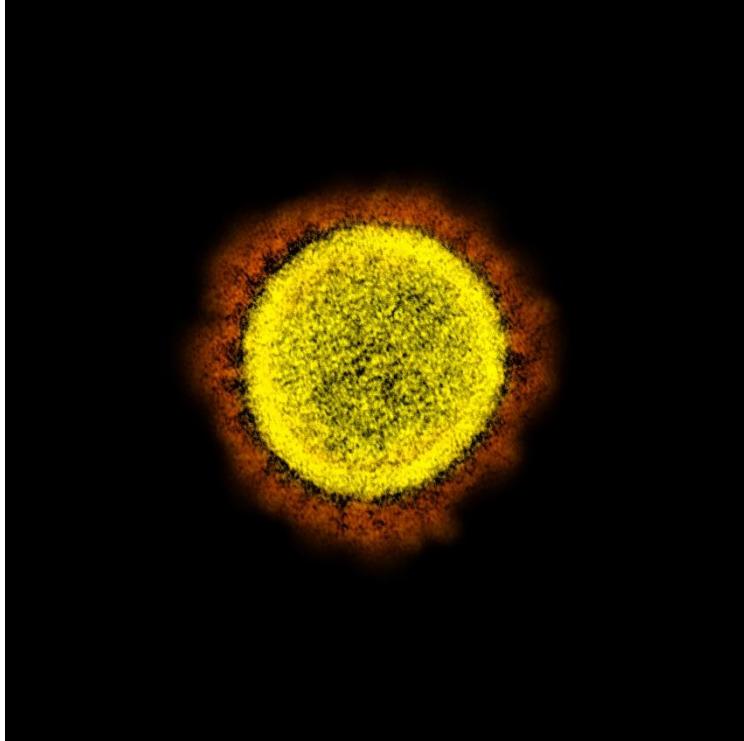
Oktatás, kutatás,
gyógyítás: 250 éve az
egészség szolgálatában

Pathology of SARS- v2/COVID-19 viral infection

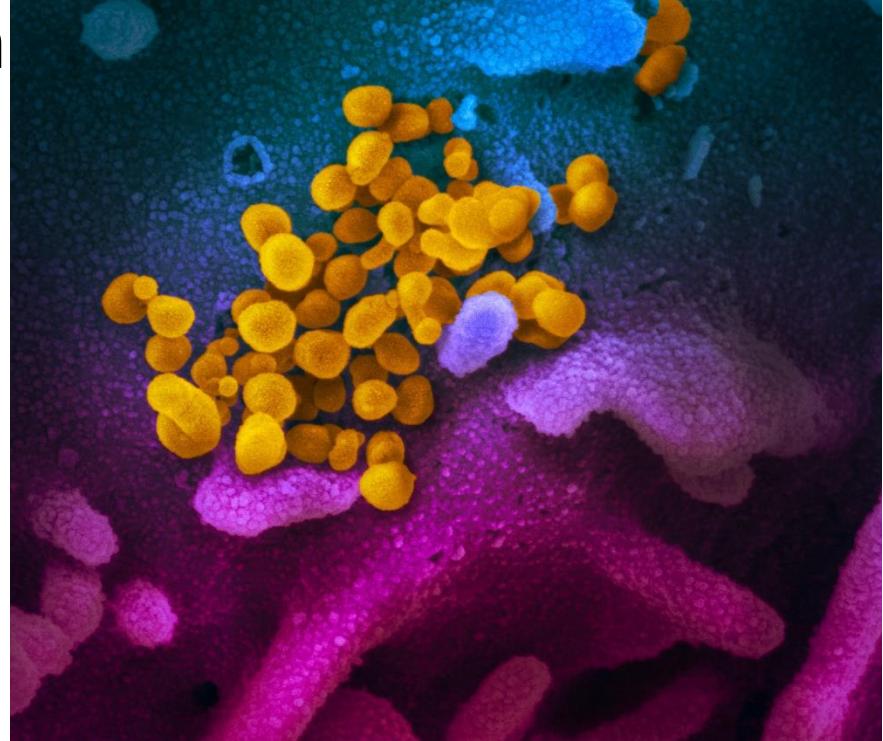
József Tímár

2nd Department of Pathology
Semmelweis University

SARS-COV2

- β-coronavirus, member of the SARS-COV and MERS
-  Transmission electron microscopy image showing several spherical SARS-CoV-2 virus particles against a black background. The particles have a distinct yellow/orange outer layer and a darker, granular internal structure.

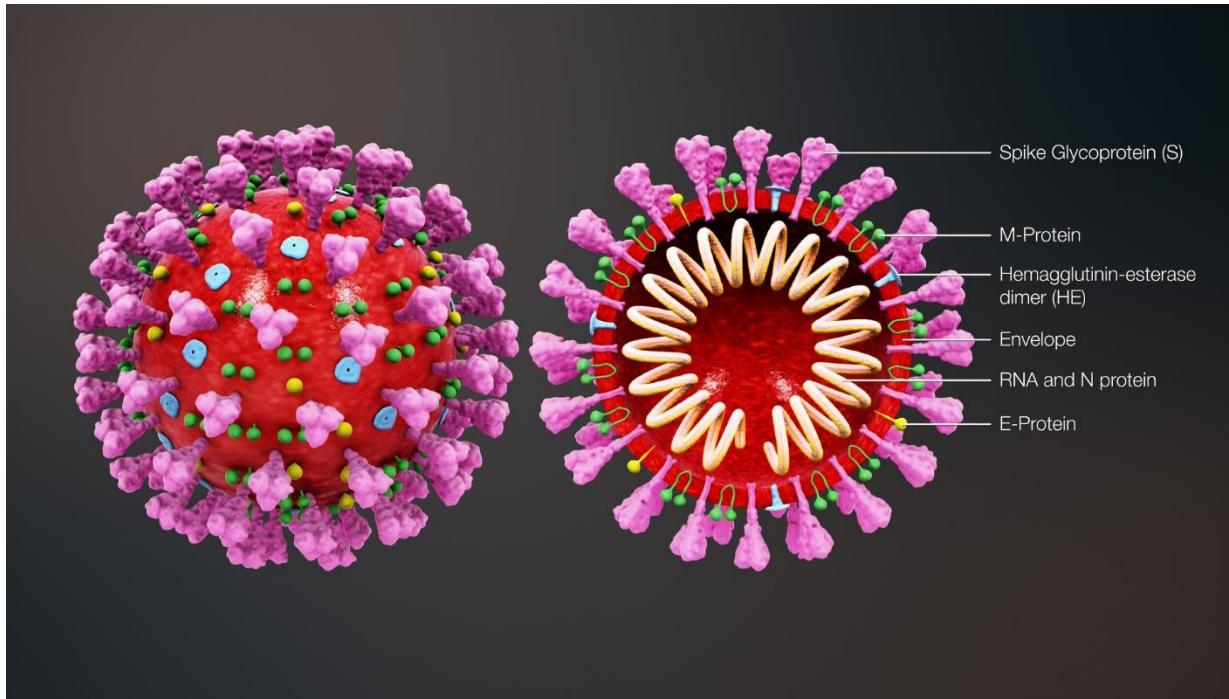
m



Transmission electron microscopy

scanning-electron microscopy

Structure of SARS-CoV-2



GENES

ORF1ab, nucleocapsid 1-3 (1-2. SARS2 specific): molecular diagnostics!

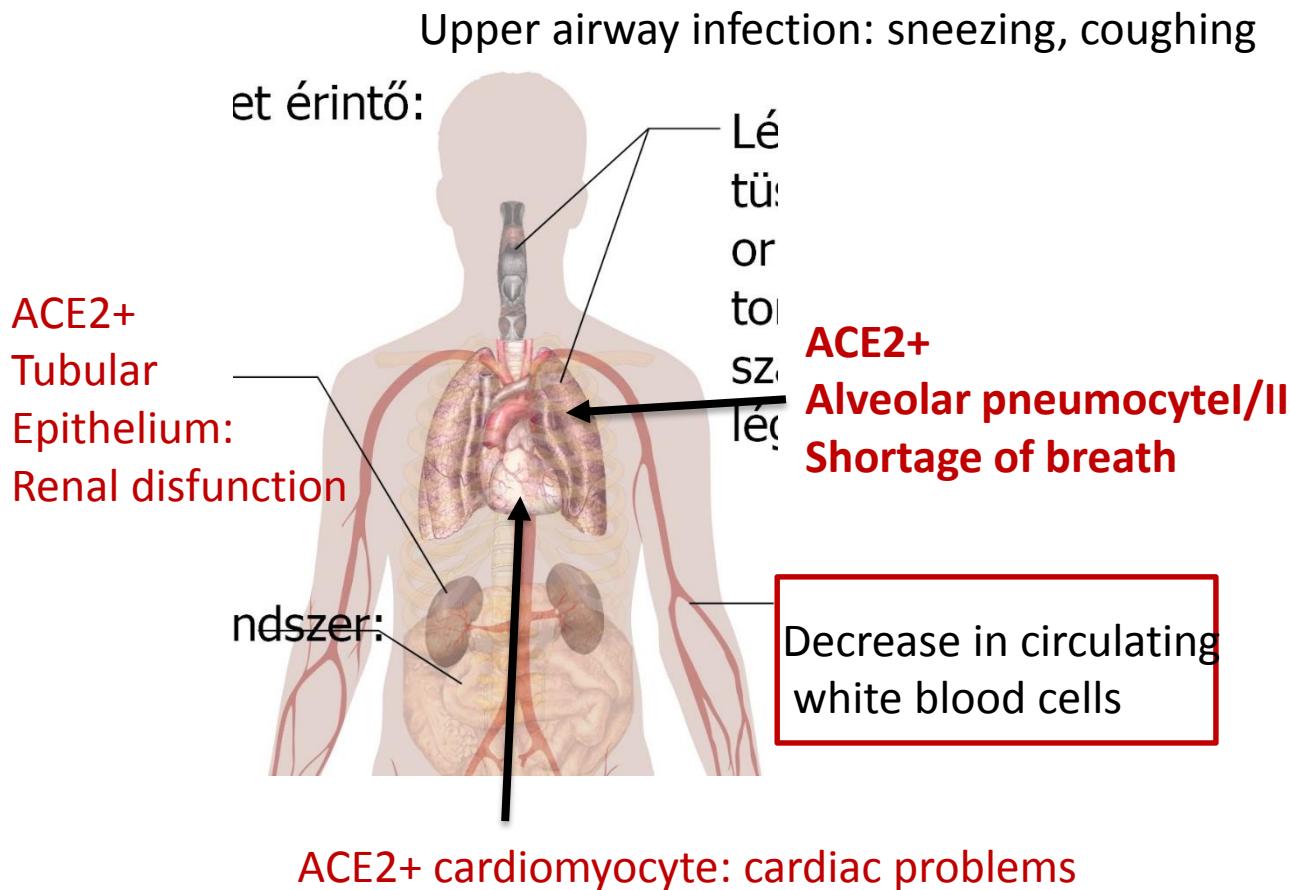
Spike-1, s2: ACE2 as viral receptor

Envelope

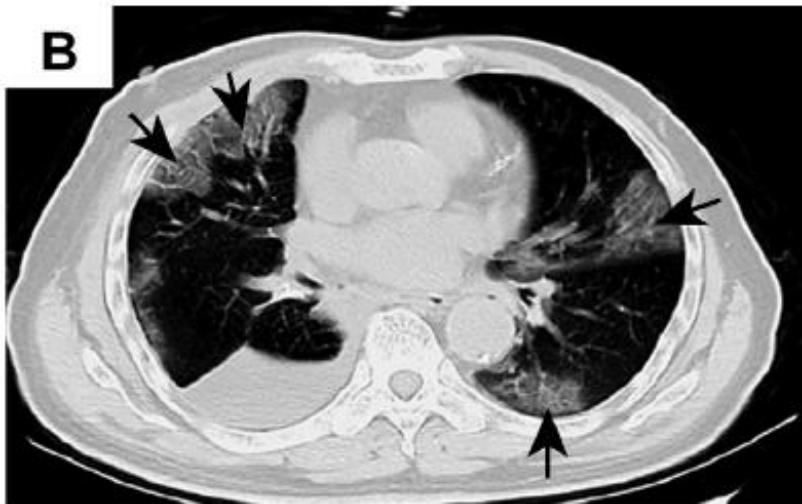
Membrane

NS proteins (non-structural) 6-14

COVID19 infection: airborne!



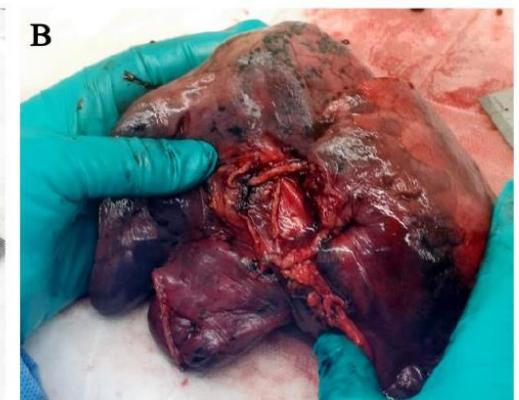
Xray, macroscopy



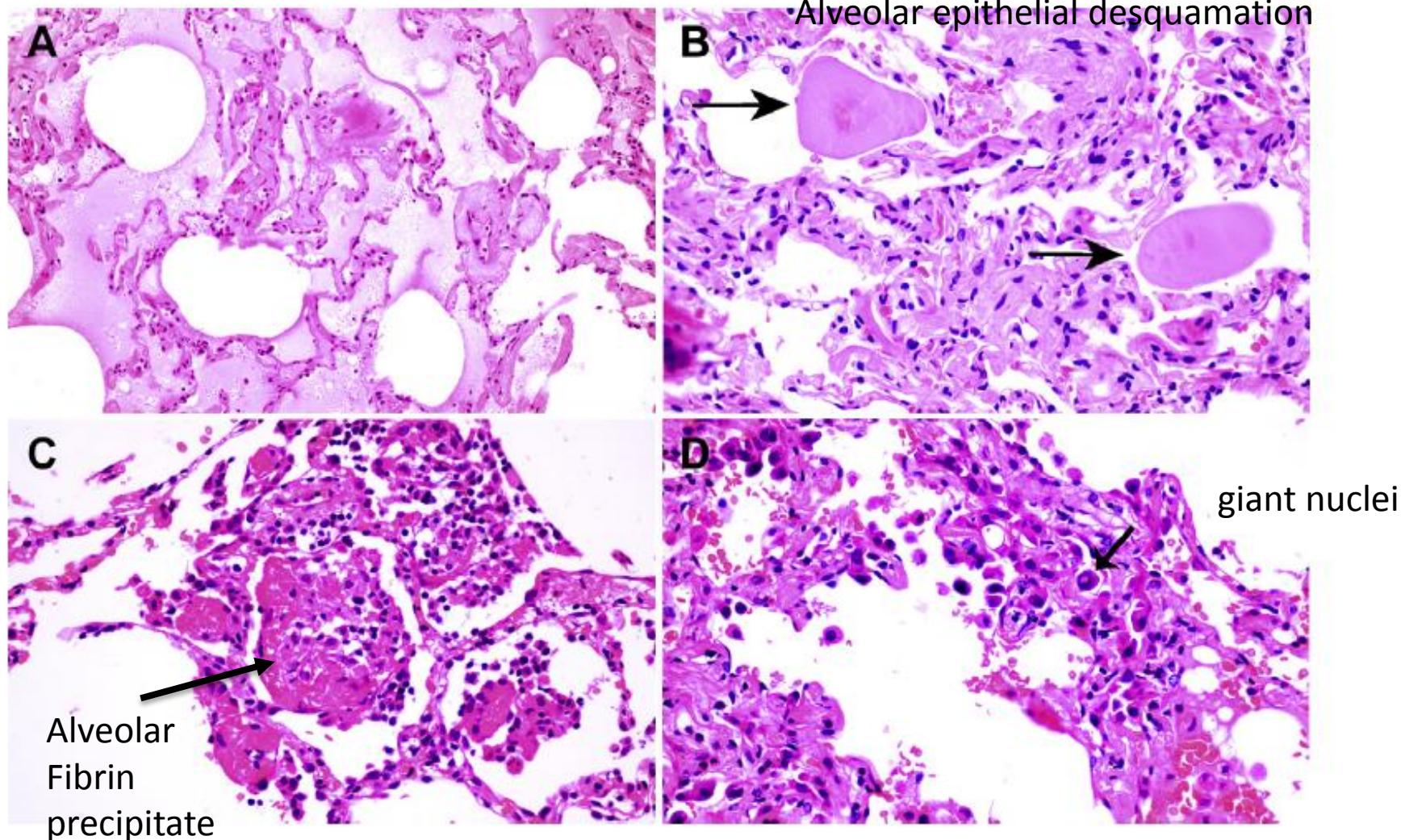
Diffuse lobar opacity (DLO)

Tian S et al. J Thorac Oncol, 2020

Acute lobar hemorrhagic pneumonia
Luo W et al. Preprint, 2020

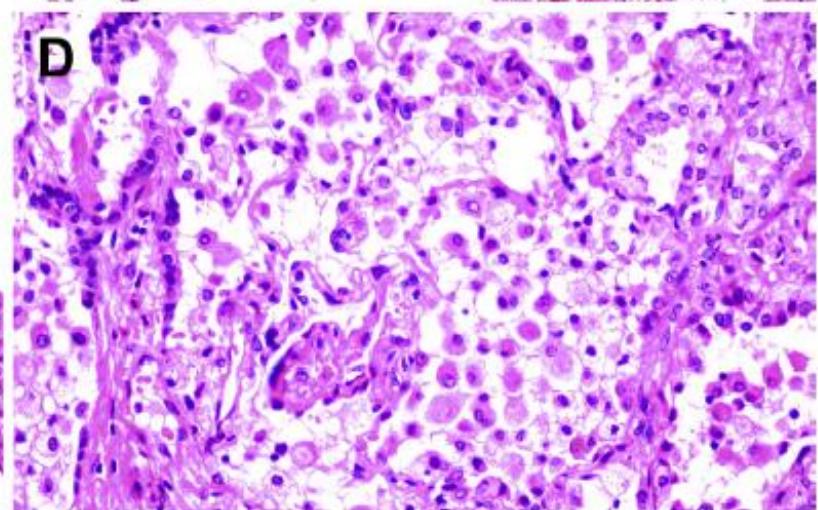
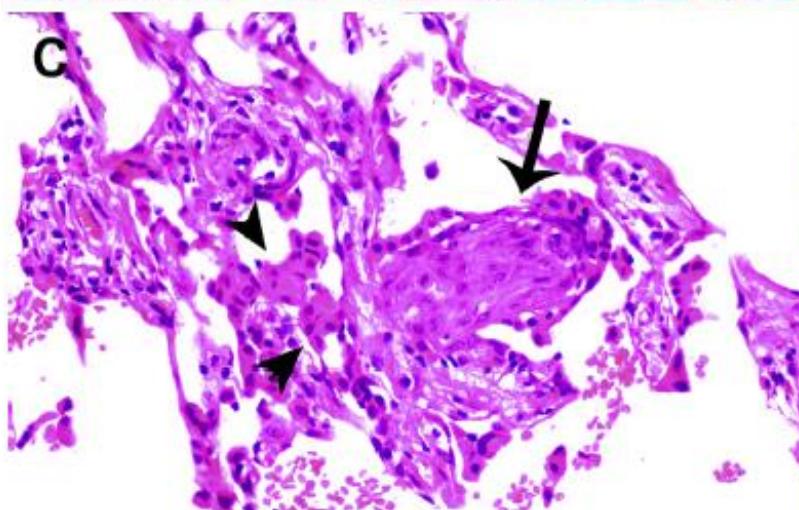
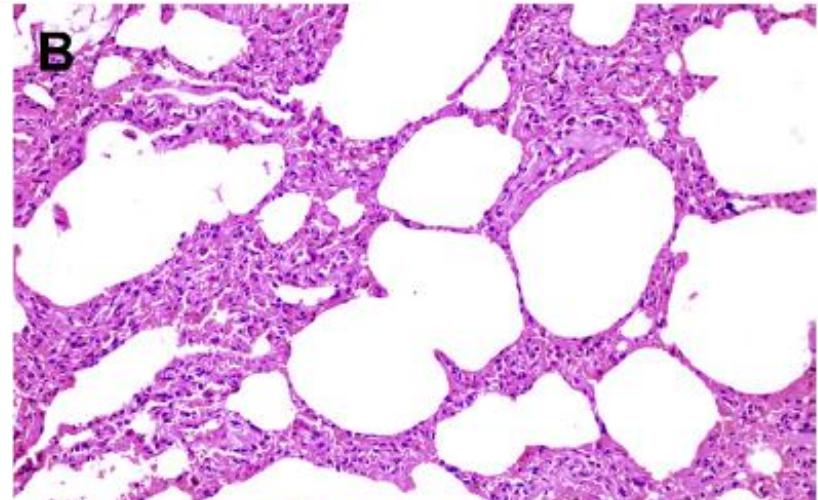
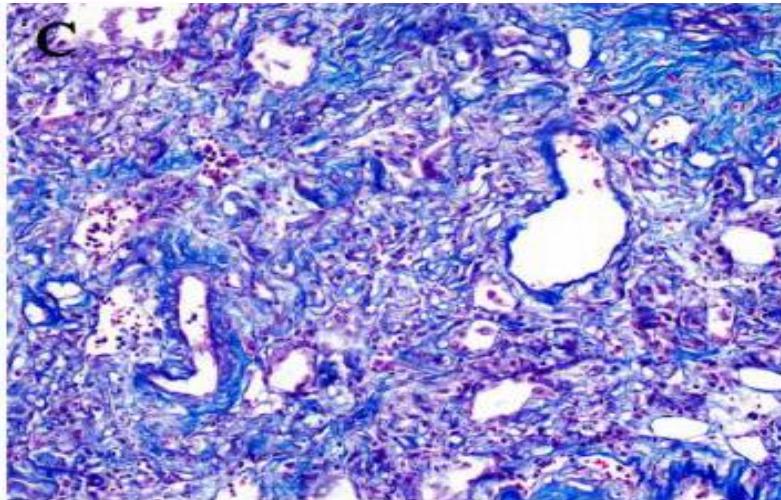


LUNG: early alterations
DAD(diffuse alveolar damage)
ARDS: (adult respiratory distress syndrome)

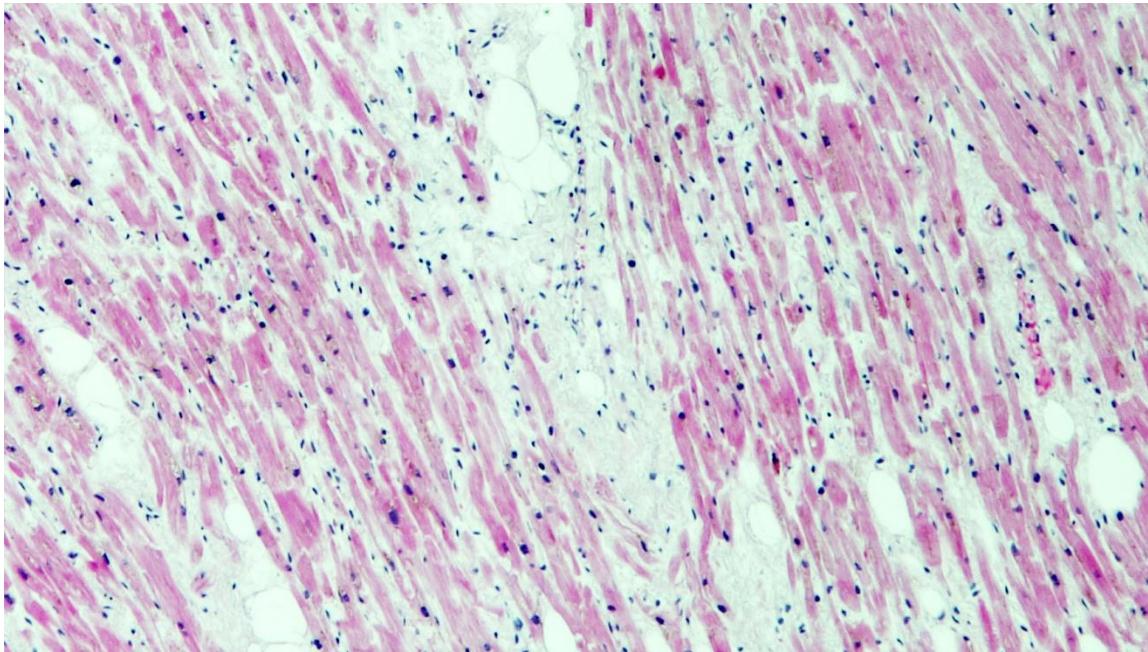


LUNG, late events: interstitial fibrosis, alveolar epithelial proliferation

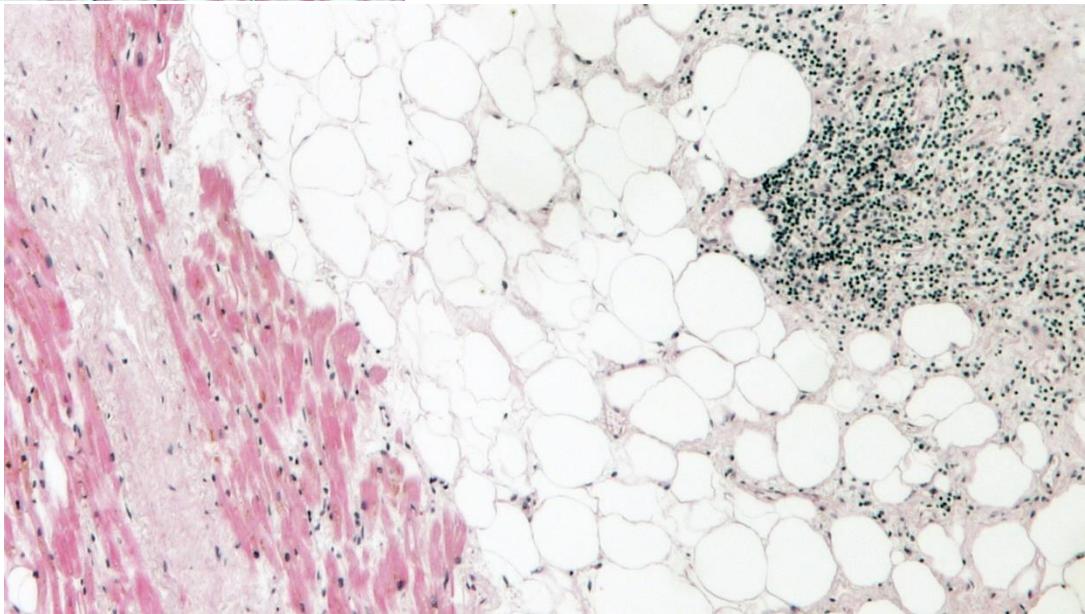
Mallory trichrome stain for collagen



SARS-v2 infection: Heart

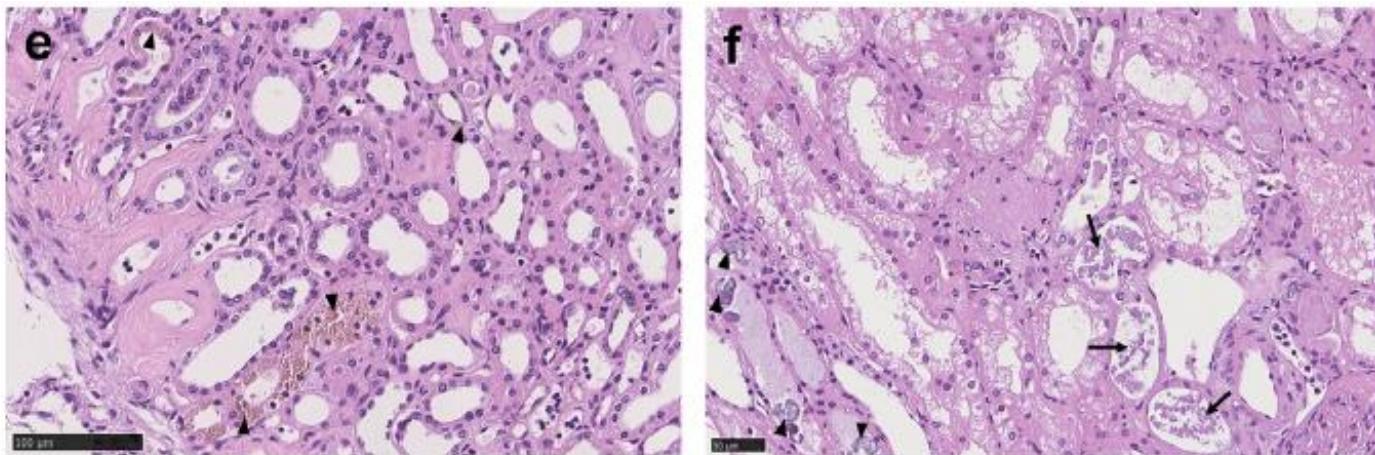


Lymphocytic myocarditis



Lymphocytic pericarditis

SARS-v2: Kidney



Tubular damage
Su H et al. *Kidney Int*, 2020

SARS-2 infection: direct cause of death

- In case of ARDS: acute right heart failure
- In case of myocarditis: acute heart failure
- In case of kidney damage: acute renal insufficiency

Immune response to SARS-2

- Acute infection : from 2. week anti-SARS2 IgM, latzer anti-SARS2 IgG+ (double positivity)
- After SARS2 infection: anti-SARS2 IgG postivity
- (serological tests!!!)