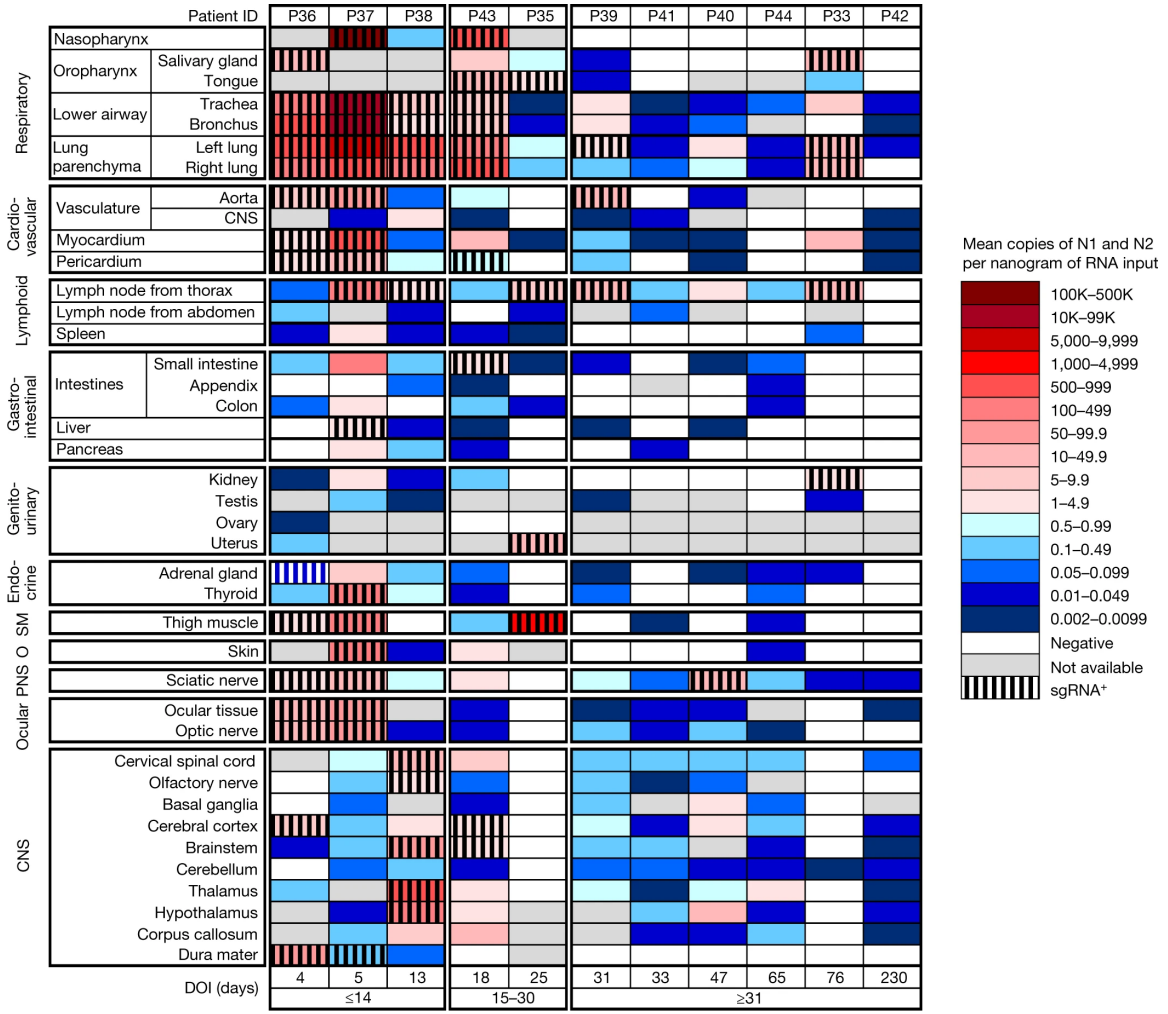
POLYBIO
SCIENCE IN ACTION

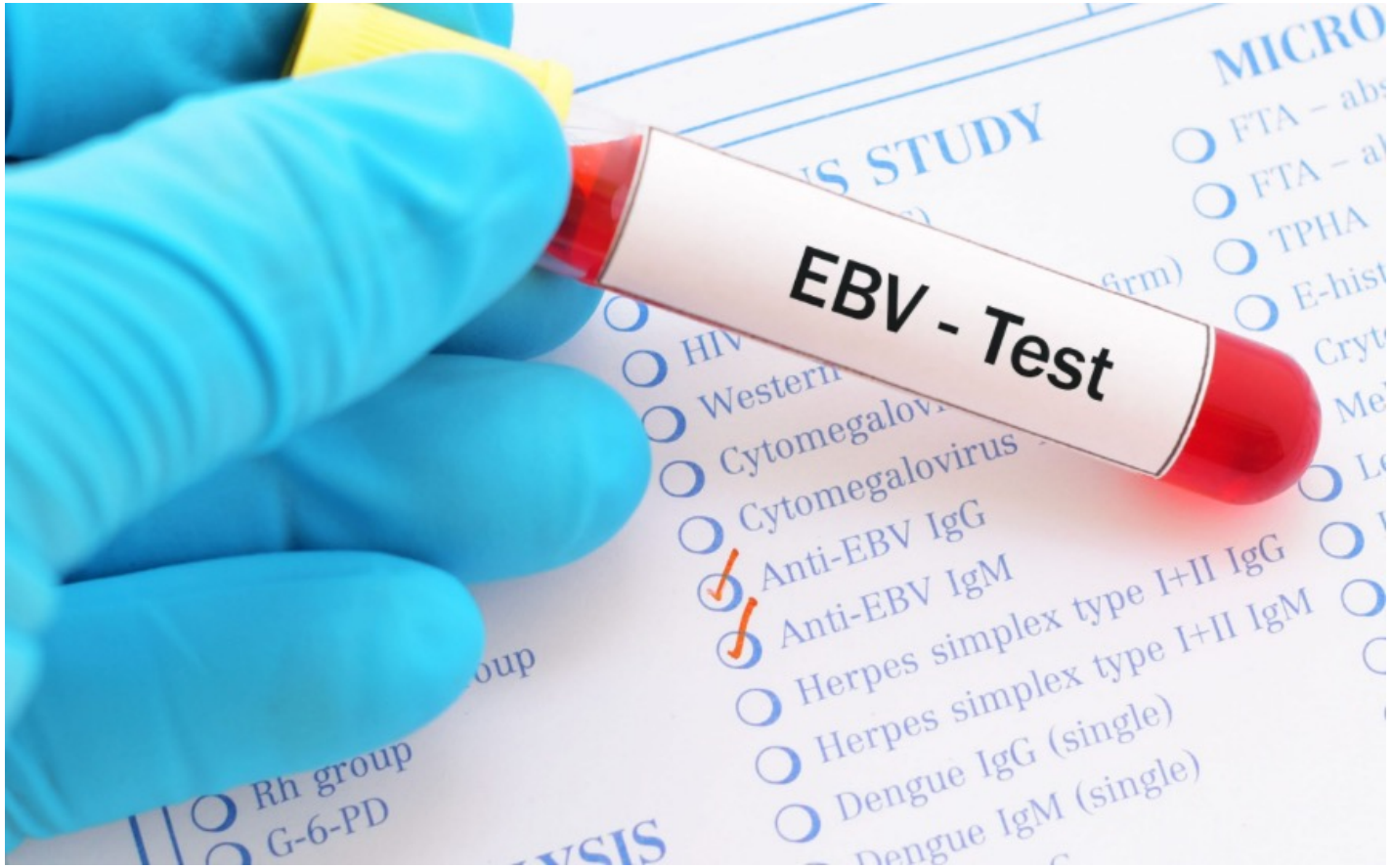
Central common drivers of infection-associated chronic disease

Pathogen persistence: The infecting pathogen does not fully clear from patient tissue where it continues to provoke the immune response or modulate host gene expression.

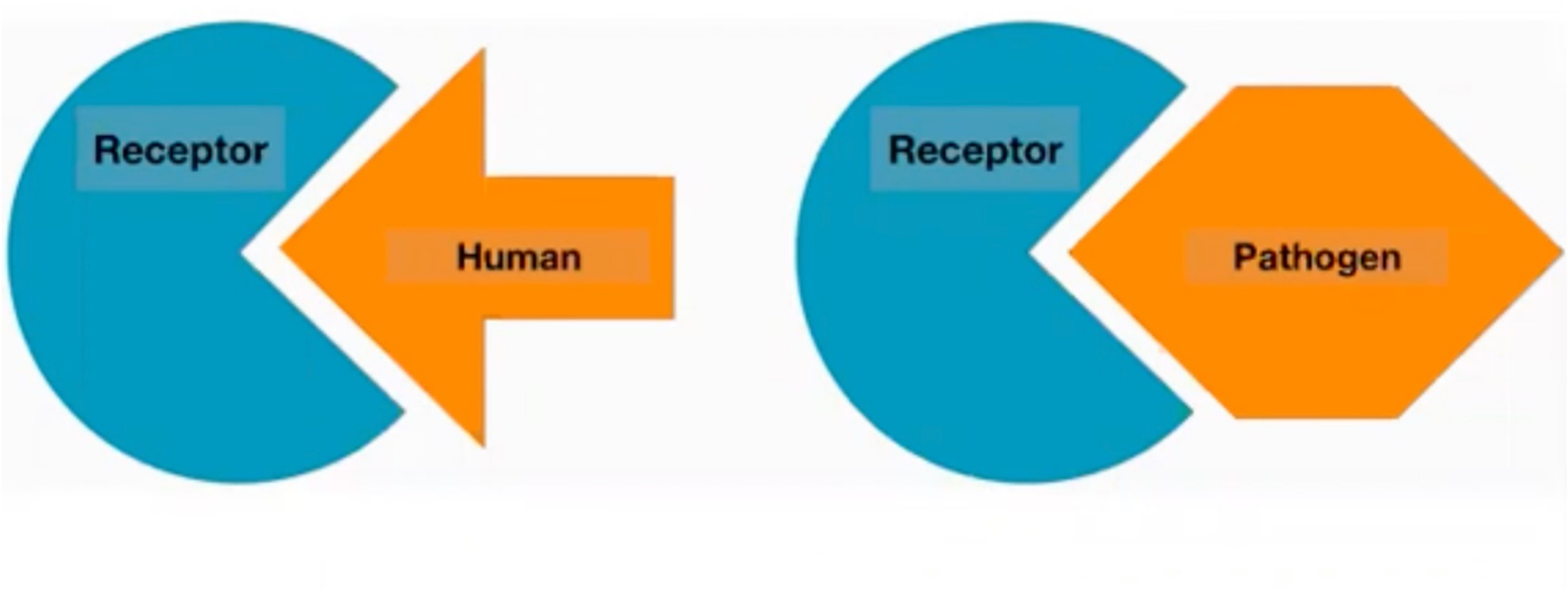


Stein, S.R., Ramelli, S.C.,. *et al.* SARS-CoV-2 infection and persistence in the human body and brain at autopsy. *Nature* **612**, 758–763 (2022).

Latent pathogen reactivation: The infecting pathogen disables the immune response, allowing other pathogens already harbored by the person to reactivate (such as herpesviruses).

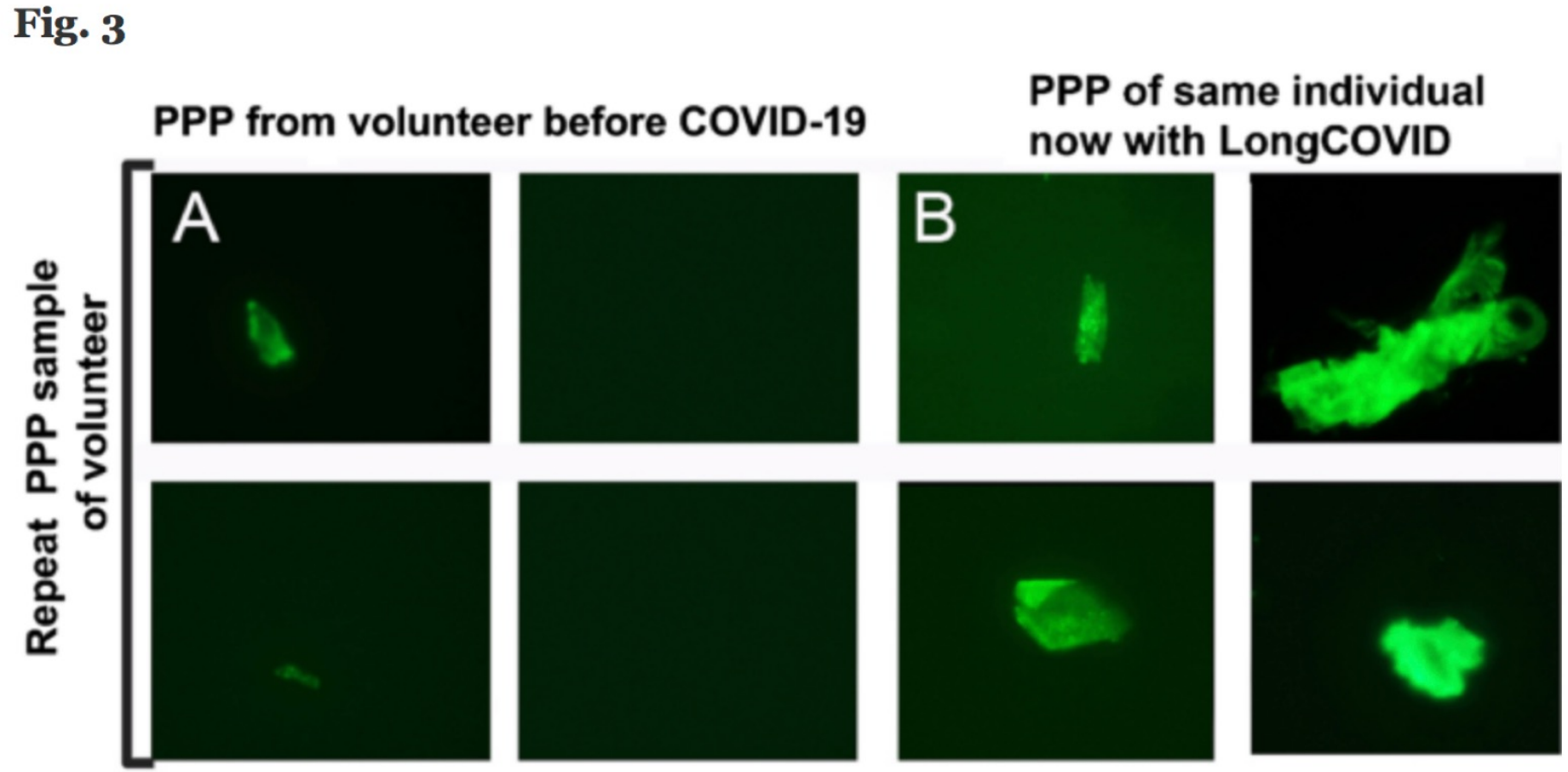


Autoimmunity (likely via molecular mimicry): A foreign antigen shares structural homology with human receptors or tissue, leading to “collateral damage.”



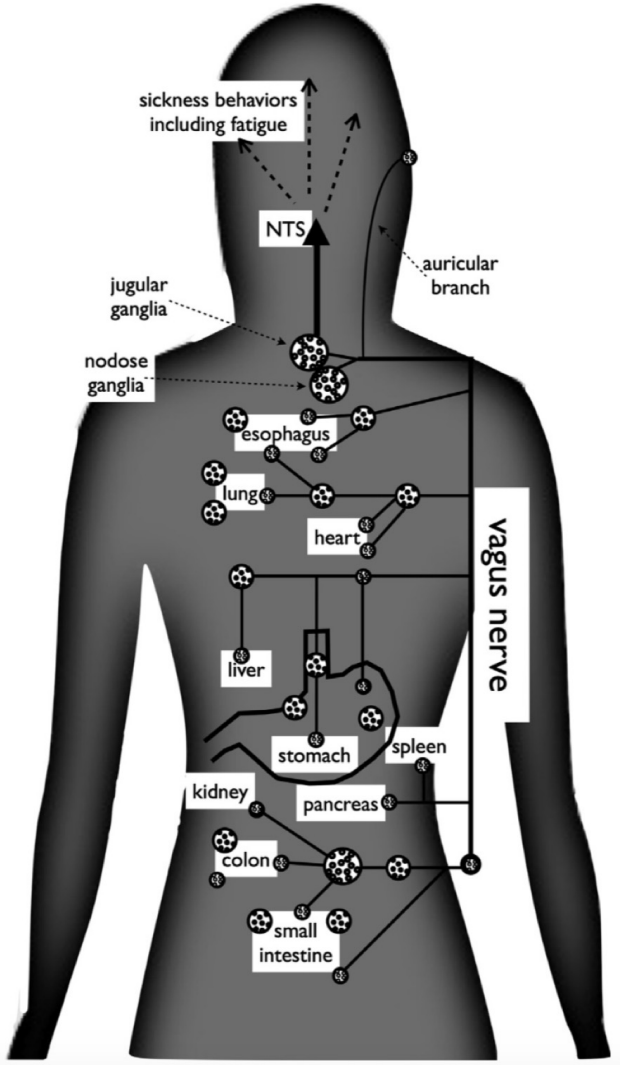
Microbiome imbalance: The infecting pathogen disables the immune response, allowing the body's microbial ecosystems to collectively move towards a state of imbalance.

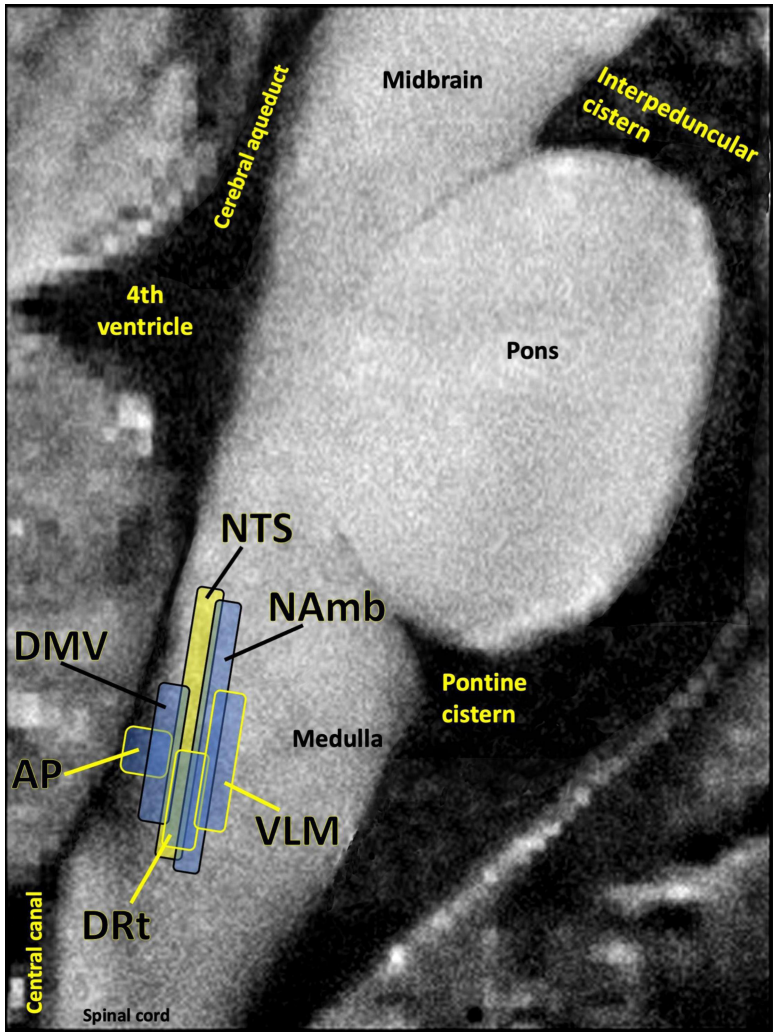
Clotting and vasculature issues: Pathogen proteins activate platelets or seed fibrin in a manner that impacts coagulation/vasculature, with flow on effects to neuropathy and autonomic dysfunction.



Pretorius . *et al.* Persistent clotting protein pathology in Long COVID/Post-Acute Sequelae of COVID-19 (PASC) is accompanied by increased levels of antiplasmin. Cardiovascular Diabetol. (2021).

Vagus nerve to brainstem "sickness behavior response": Pro-inflammatory signaling from vagus nerve to brainstem leads to common overlapping flu-like, autonomic, and inflammatory pain signaling.





Nuclei in the dorsal brainstem control:

- Flu-like symptoms and nausea
- Inflammatory pain signaling
- Autonomic functions

VanElzakker (2013)
Proal & VanElzakker (2021)