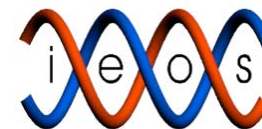




Dipartimento di Scienze Mediche Traslazionali
Università degli Studi di Napoli "Federico II"

&

Istituto di Endocrinologia e Oncologia Sperimentale
Consiglio Nazionale delle Ricerche (CNR)-
URT "Genomica del Diabete"



GENOMICA
DEL DIABETE
URT - CNR

Infiammazione e immunità nell'infezione da SARS-CoV-2

Pietro Formisano

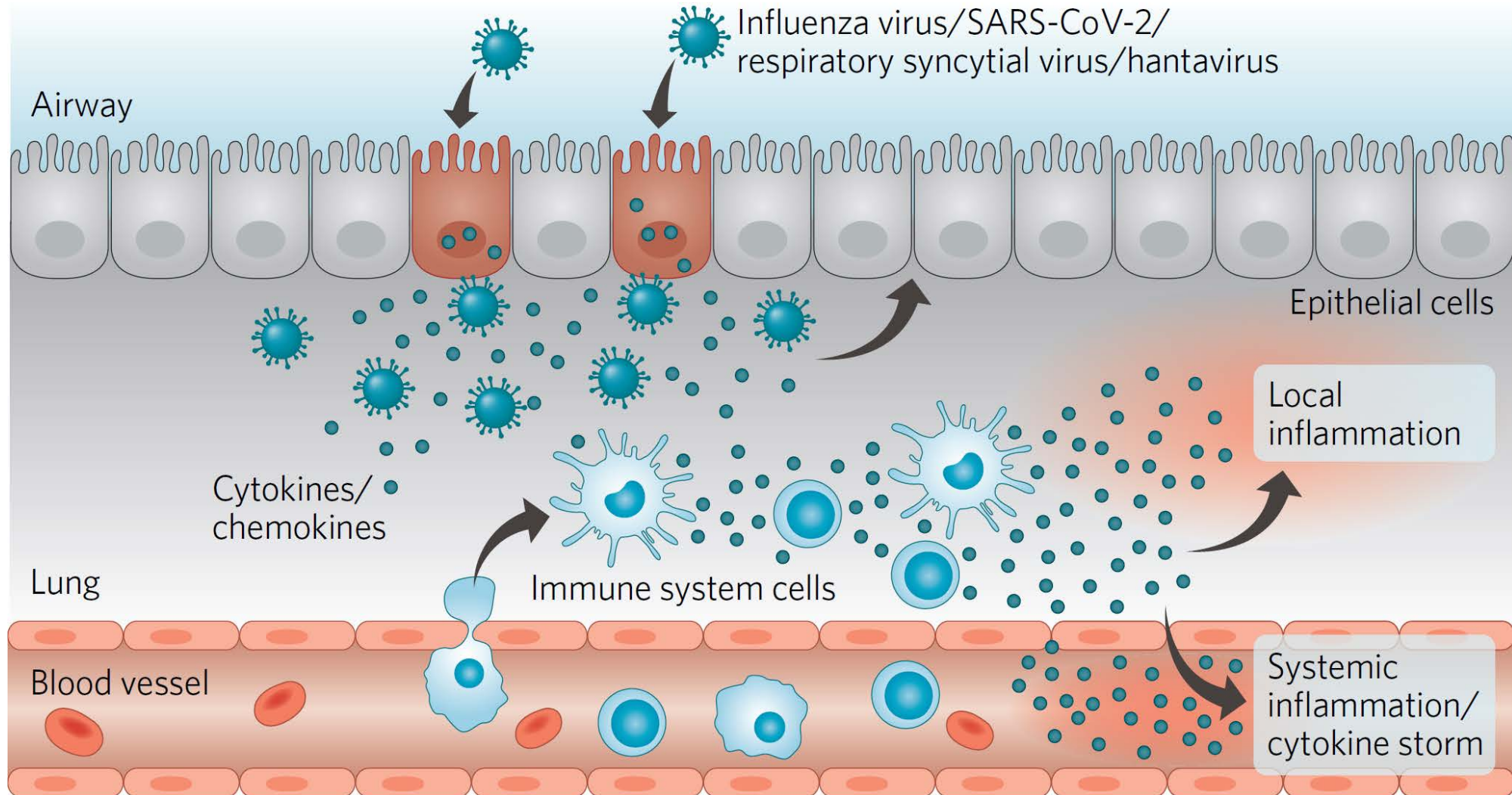
**WEBINAR FORMATIVO
AMD SID CAMPANIA BASILICATA**

**DARE CERTEZZE PER SCIOGLIERE I DUBBI
"Il vaccino contro il COVID-19"**

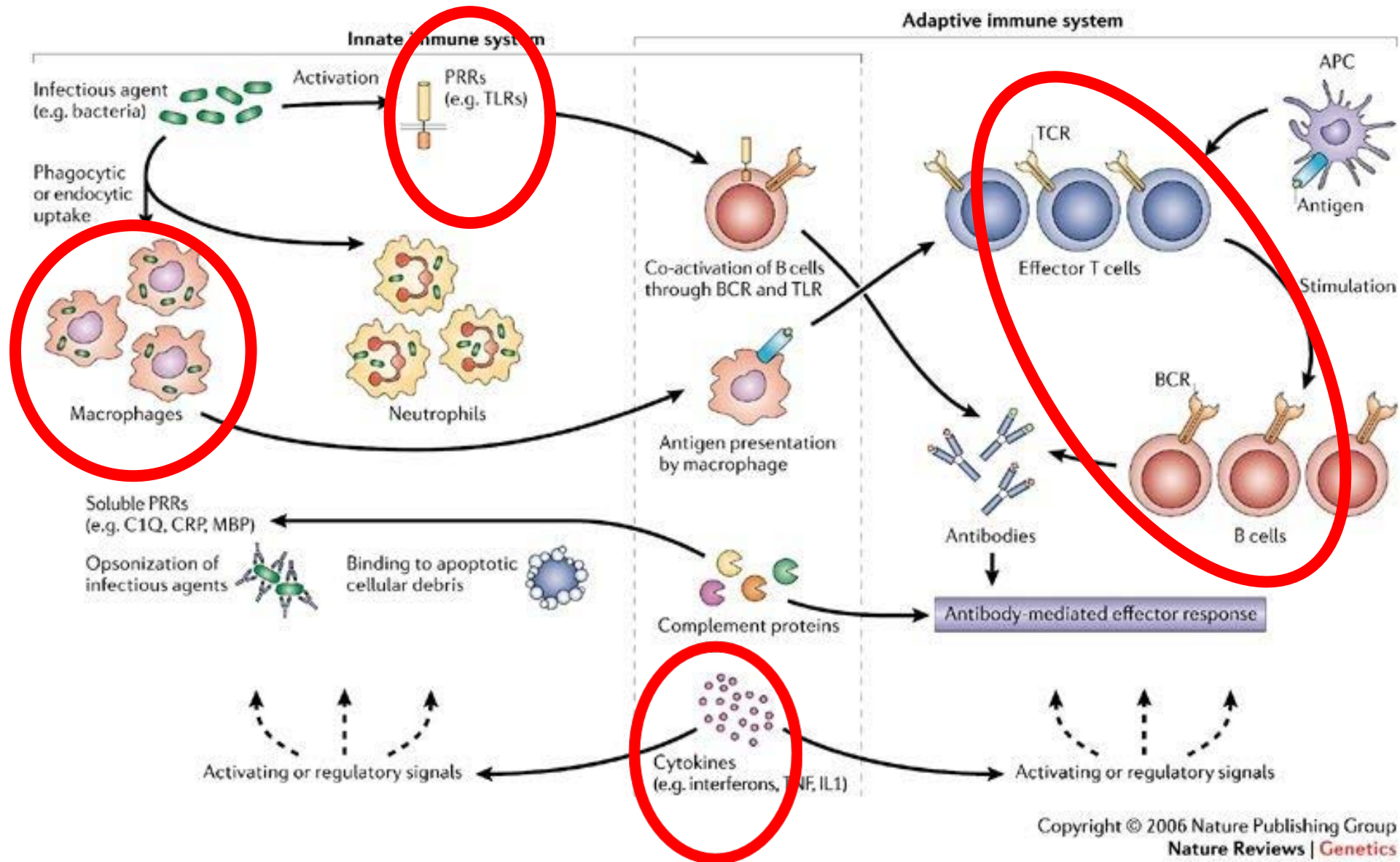


13 GENNAIO 2021

SARS-CoV-2 & Inflammation

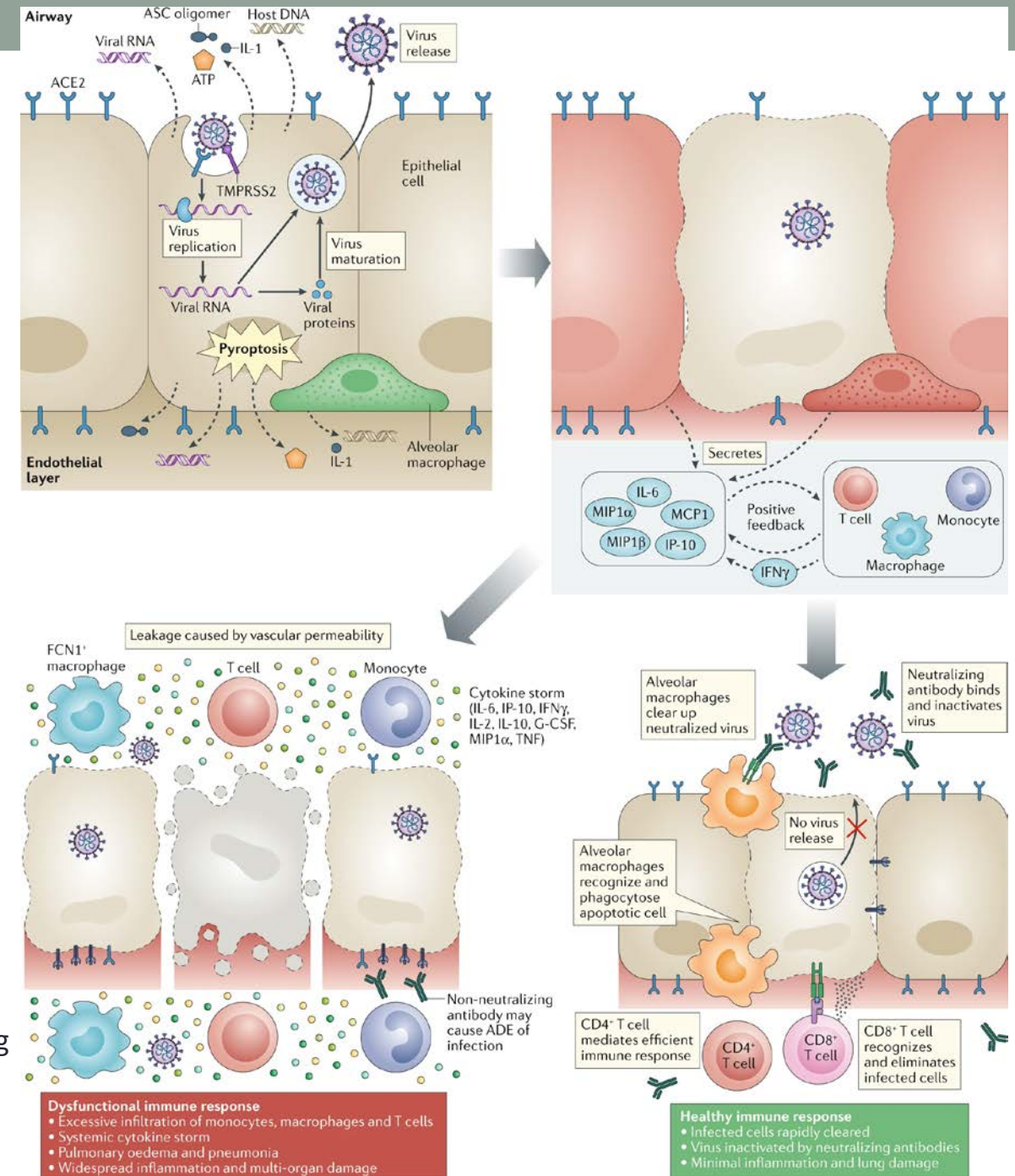


L' *outcome* dell' infezione dipende dalle interazioni tra patogeno e ospite



First-line: Innate Immune system

- Pathogen-associated molecular patterns(PAMPs)
- Damage-associated molecular patterns (DAMPs)
- Pattern Recognition Receptors (PRRs)
 - Toll-like receptors
 - RIG-I-like receptors

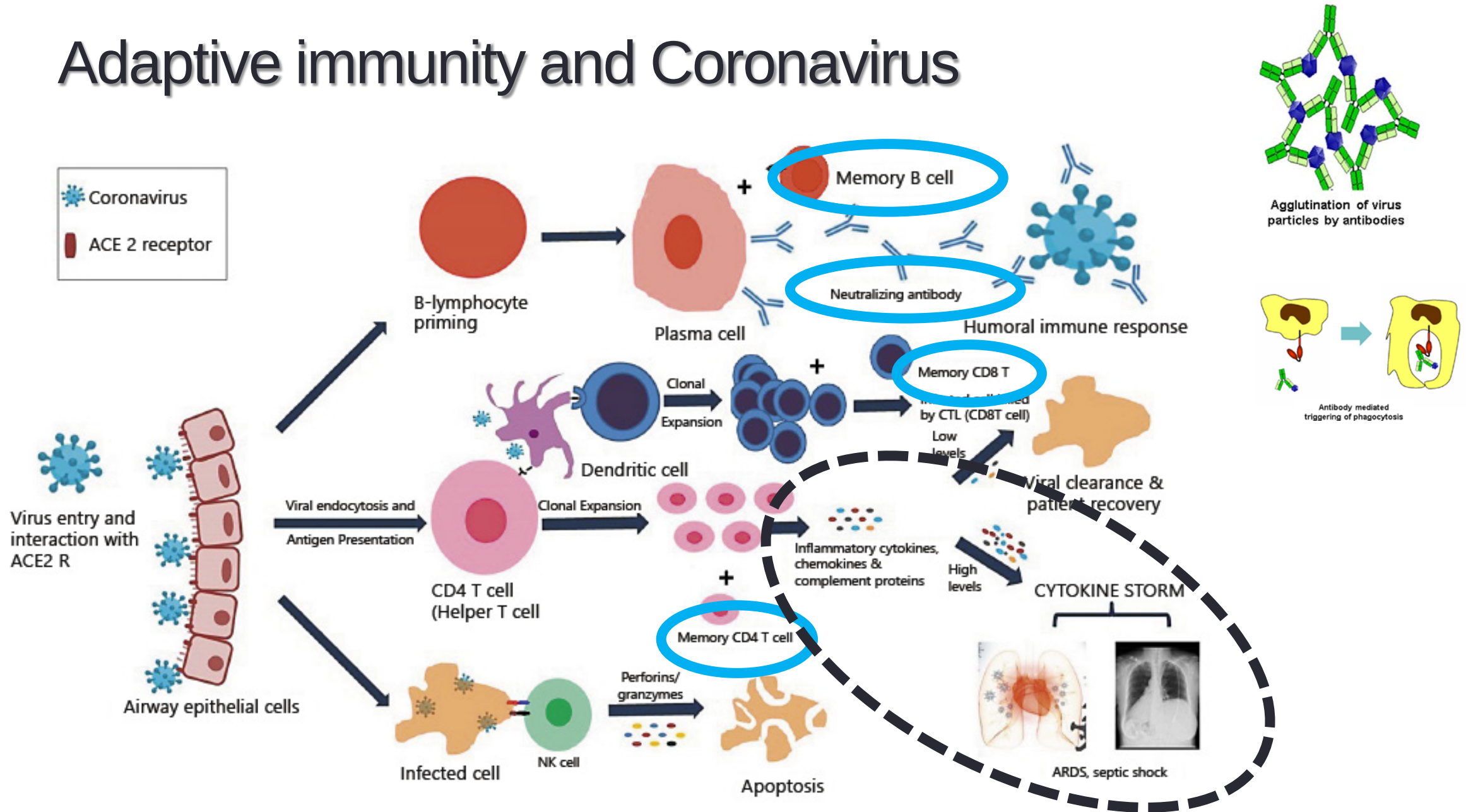


The trinity of COVID-19: immunity, inflammation and intervention

Matthew Zirui Tay, Chek Meng Poh, Laurent Rénia, Paul A. MacAry & Lisa F. P. Ng

Nature Reviews Immunology, 20, 363–374 (2020)

Adaptive immunity and Coronavirus



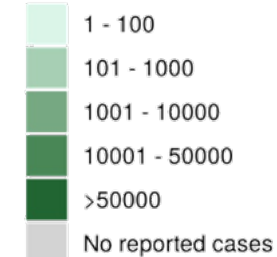
Two-wave COVID-19 pandemics in Europe

WHO January 11, 2020

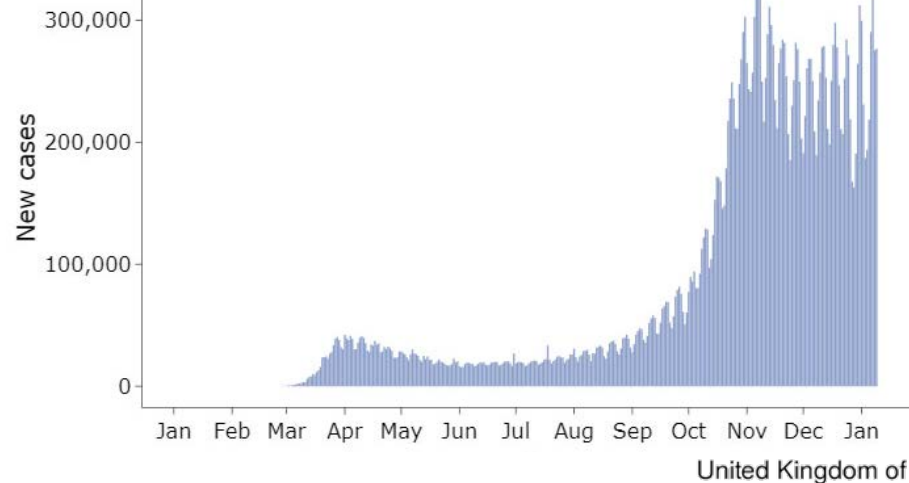
New cases by ISO week



Number of new cases



New confirmed cases in Europe (28,794,000)



Study design

Wave 1 and Wave 2 :
March- May 2020 /
September-October 2020

**Healthy
Controls**

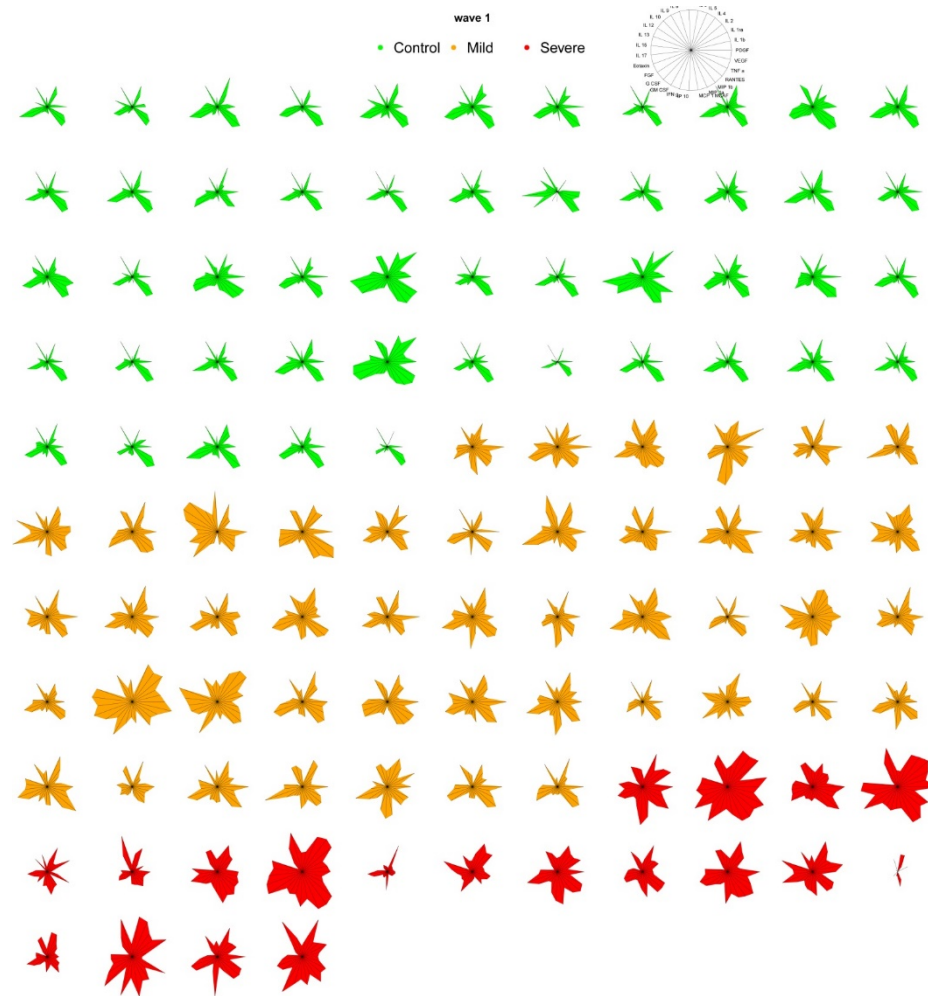
- N=64
- Healthy blood donors

**Mild
COVID-19**

- N=72
- WHO score 3-4

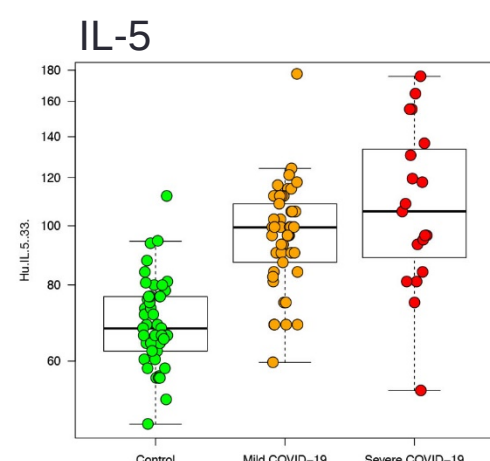
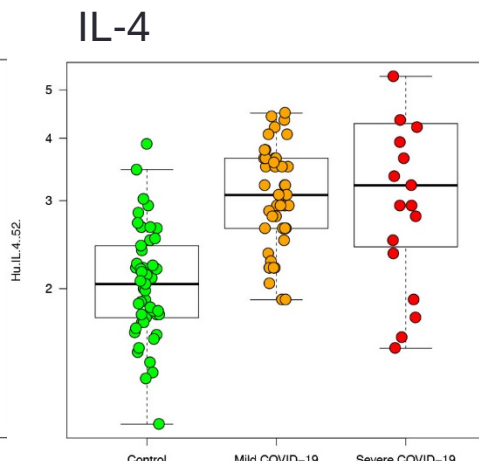
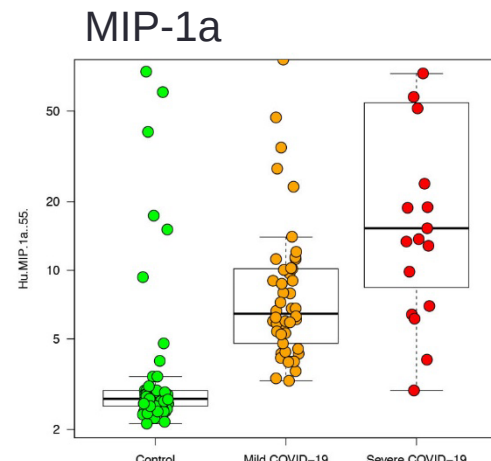
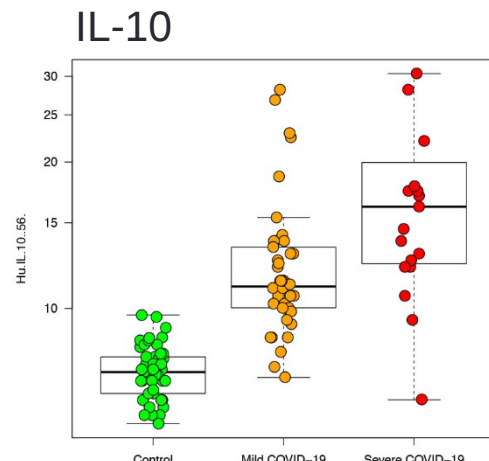
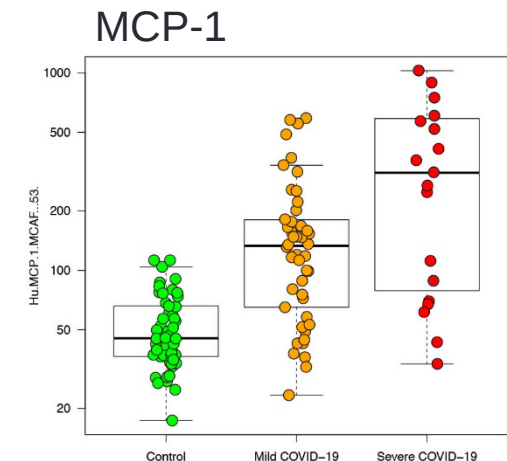
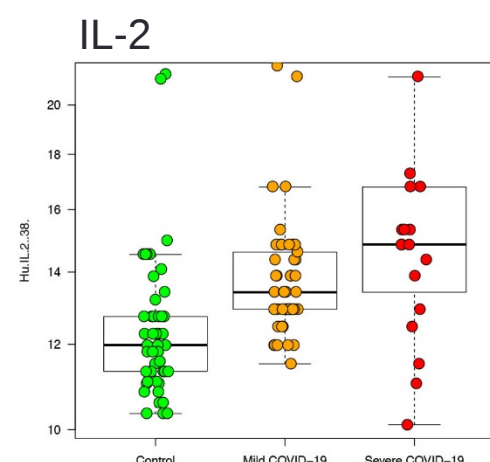
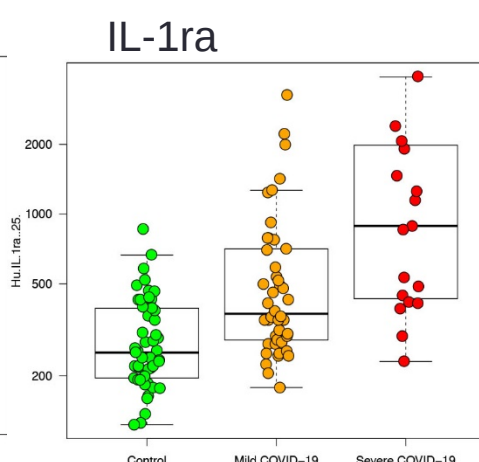
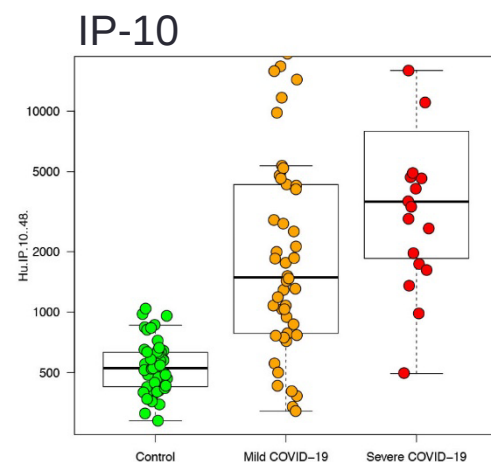
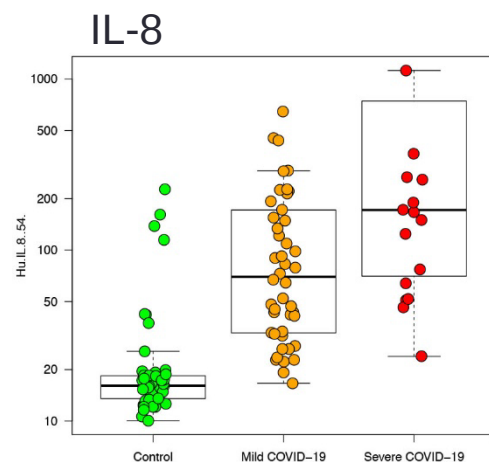
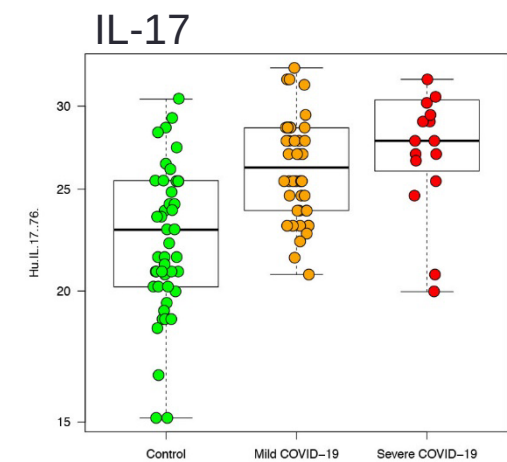
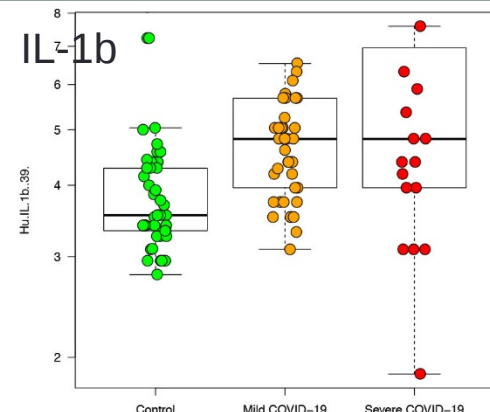
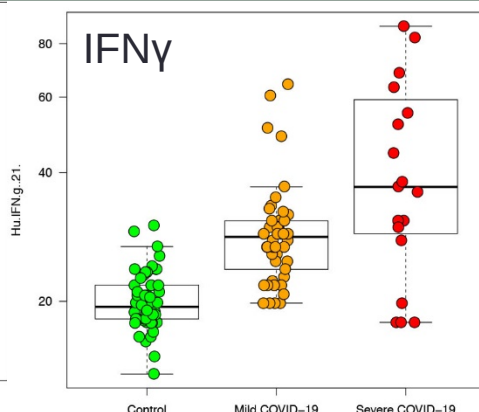
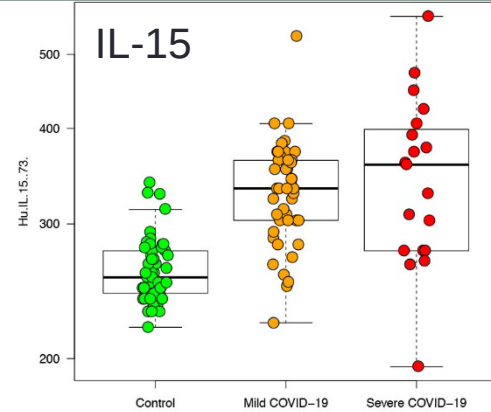
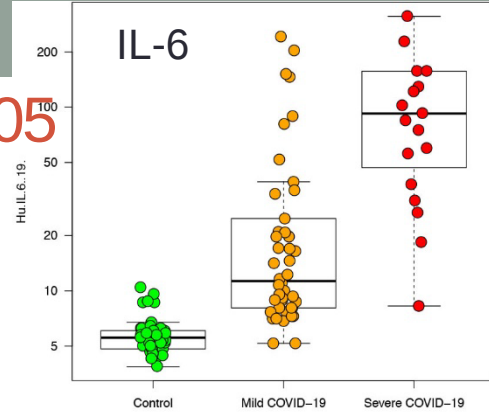
**Severe
COVID-19**

- N=29
- WHO score 5-8 (ICU)



Determination of IL-1ra, IL-1b, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-12(p70), IL-13, IL-15, IL-17A, basic FGF, Eotaxin, G-CSF, GM-CSF, IFN- γ , IP-10, MCP-1, MIP-1 α , MIP-1 β , CCL5/RANTES, TNF- α , PDGF-BB and VEGF (ELISA multiplex)

Jonckheere test < 0.05

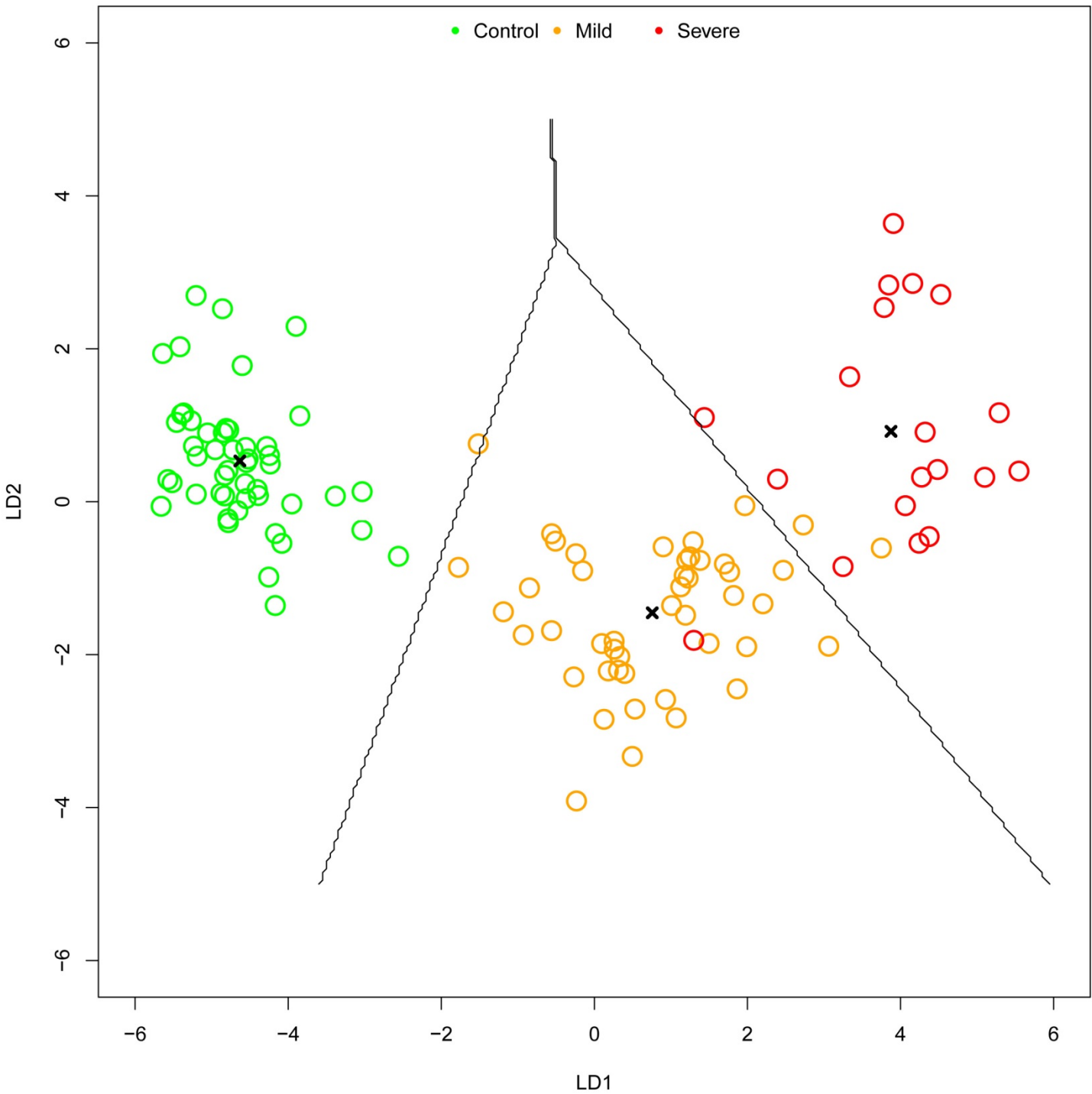


Linear Discriminant Analysis (LDA)

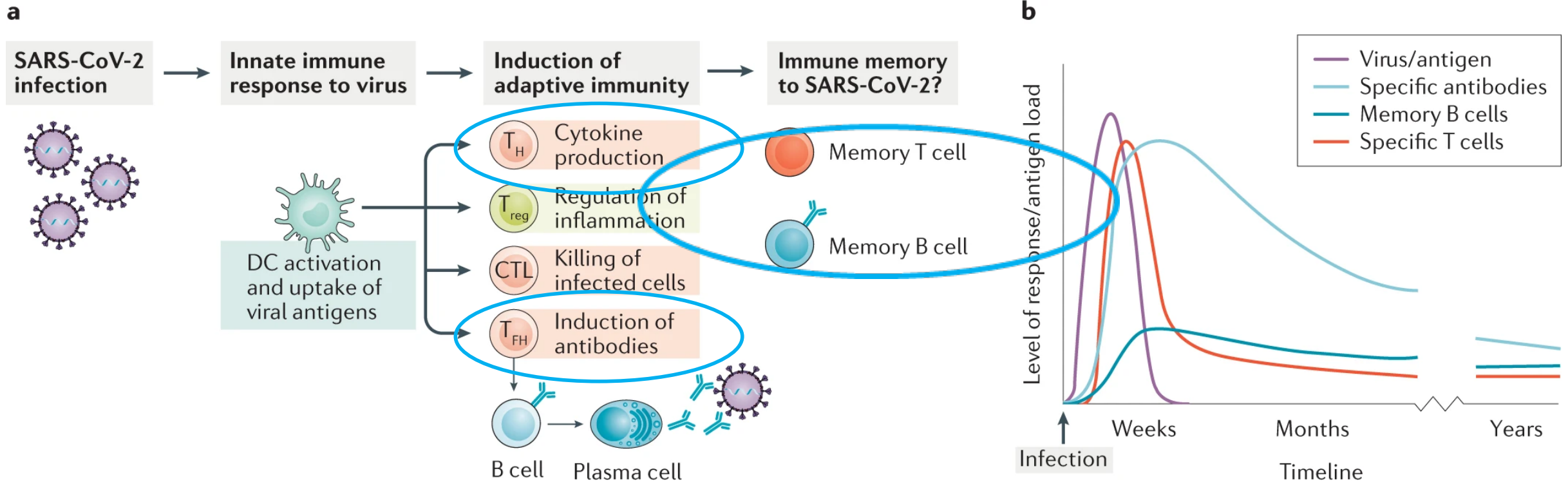
Accuracy : 0.9649

95% CI : (0.9126, 0.9904)

	C	M	S
Sensitivity	1.0000	0.9348	0.9474
Specificity	0.9846	0.9853	0.9789



Roadmap of CoViD-19 immunity



Not just antibodies: B cells and T cells mediate immunity to COVID-19

Rebecca J. Cox & Karl A. Brokstad

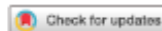
[Nature Reviews Immunology](#) **20**, 581–582 (2020)

October 2020

First release: 6 January 2021

Cite as: J. M. Dan *et al.*, *Science* 10.1126/science.abf4063 (2021).

LETTERS

<https://doi.org/10.1038/s41591-020-0995-0>nature
medicine

Humoral and circulating follicular helper T cell responses in recovered patients with COVID-19

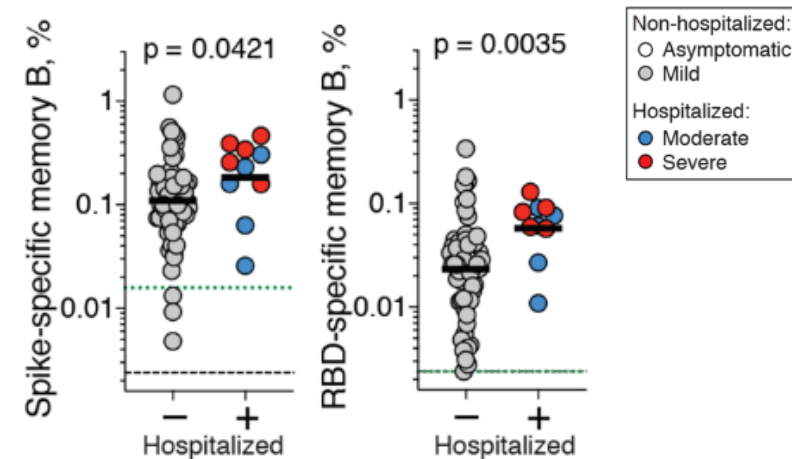
Jennifer A. Juno^{1,9}, Hyon-Xhi Tan^{1,9}, Wen Shi Lee¹, Arnold Reynaldi², Hannah G. Kelly^{1,3}, Kathleen Wragg¹, Robyn Esterbauer^{1,3}, Helen E. Kent^{1,4}, C. Jane Batten¹, Francesca L. Mordant¹, Nicholas A. Gherardin^{1,5}, Phillip Pymm^{6,7}, Melanie H. Dietrich^{6,7}, Nichollas E. Scott¹, Wai-Hong Tham^{1,6}, Dale I. Godfrey^{1,5}, Kanta Subbarao^{1,8}, Miles P. Davenport², Stephen J. Kent^{1,3,4,9} and Adam K. Wheatley^{1,3,9}✉

T cell (cTFH) immunity against spike in recovered patients with coronavirus disease 2019 (COVID-19). We found that S-specific antibodies, memory B cells and cTFH are consistently elicited after SARS-CoV-2 infection, demarking robust humoral immunity and positively associated with plasma neutralizing activity. Comparatively low frequencies of B cells or cTFH specific for the receptor binding domain of S were elicited. Notably, the phenotype of S-specific cTFH differentiated subjects with potent neutralizing responses, providing a potential biomarker of potency for S-based vaccines entering the clinic. Overall, although patients who recovered from COVID-19 displayed multiple hallmarks of effective immune recognition of S, the wide spectrum of neutralizing activity observed suggests that vaccines might require strategies to selectively target the most potent neutralizing epitopes.

Immunological memory to SARS-CoV-2 assessed for up to 8 months after infection

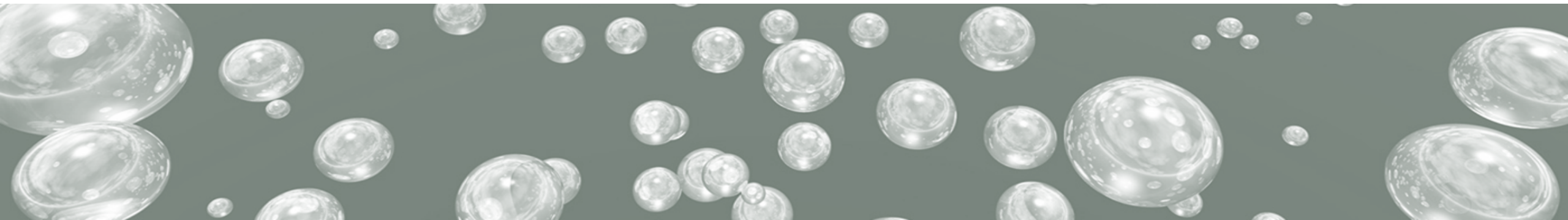
Jennifer M. Dan^{1,3*}, Jose Mateus^{1*}, Yu Kato^{1*}, Kathryn M. Hastie¹, Esther Dawen Yu¹, Caterina E. Faliti¹, Alba Grifoni¹, Sydney I. Ramirez^{1,3}, Sonya Haupt¹, April Frazier¹, Catherine Nakao¹, Vamseedhar Rayaprolu¹, Stephen A. Rawlings³, Bjoern Peters^{1,2}, Florian Krammer⁴, Viviana Simon^{4,5,6}, Erica Ollmann Saphire^{1,3}, Davey M. Smith³, Daniela Weiskopf^{1,3†}, Alessandro Sette^{1,3†}, Shane Crotty^{1,3†}

Understanding immune memory to SARS-CoV-2 is critical for improving diagnostics and vaccines, and for assessing the likely future course of the COVID-19 pandemic. We analyzed multiple compartments of circulating immune memory to SARS-CoV-2 in 254 samples from 188 COVID-19 cases, including 43 samples at ≥ 6 months post-infection. IgG to the Spike protein was relatively stable over 6+ months. Spike-specific memory B cells were more abundant at 6 months than at 1 month post symptom onset. SARS-CoV-2-specific CD4⁺ T cells and CD8⁺ T cells declined with a half-life of 3-5 months. By studying antibody, memory B cell, CD4⁺ T cell, and CD8⁺ T cell memory to SARS-CoV-2 in an integrated manner, we observed that each component of SARS-CoV-2 immune memory exhibited distinct kinetics.



Take-home Messages

- ✓ SARS-Cov-2 induce immunità innata che consente l'innescò della risposta al patogeno
- ✓ La «cytokine storm» indotta da SARS-Cov-2 è ben riconoscibile e può rappresentare una «signature» specifica
- ✓ L'immunità adattativa al SARS-Cov-2 svolge un ruolo rilevante nell' immuno-sorveglianza
- ✓ I livelli di IgG anti-S tendono a comparire dopo 7-10 giorni dall' infezione ed a diminuire progressivamente dopo mesi dall' infezione
- ✓ Cellule B della memoria specifiche per la proteina S (e per RBD) persistono per almeno 8 mesi



Acknowledgements



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Mario De Felice, CNR/IEOS & Federico II University

Thank You!

