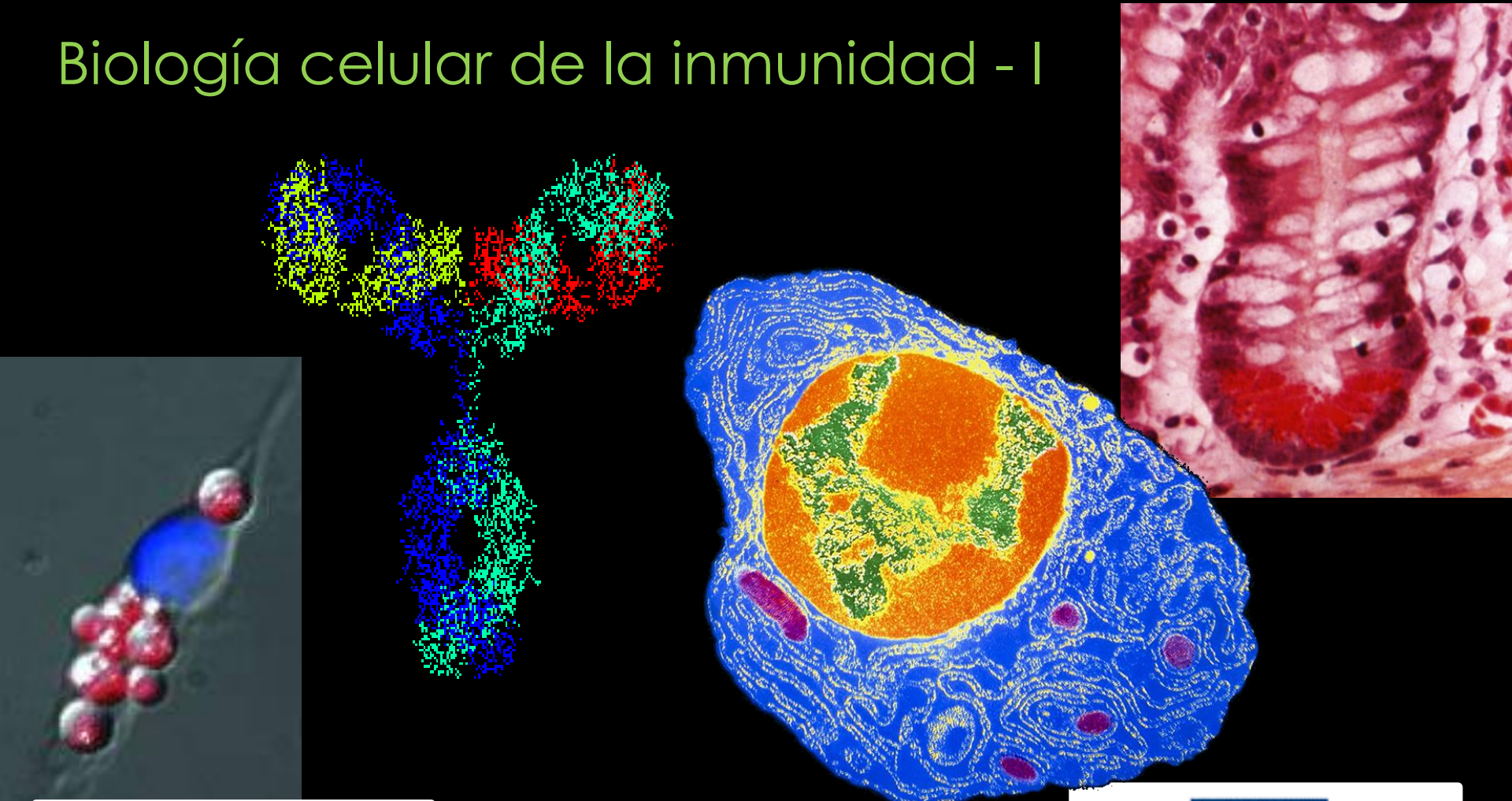


Biología celular de la inmunidad - I



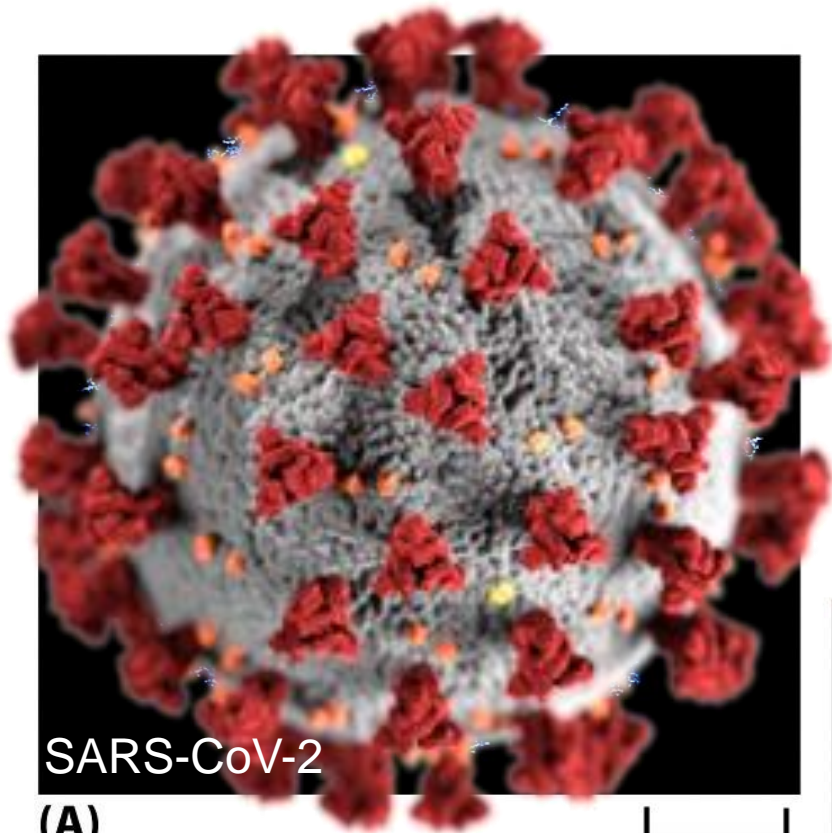
FACULTAD DE
CIENCIAS

UDELAR fcien.edu.uy

Flavio Zolessi
fzolessi@fcien.edu.uy



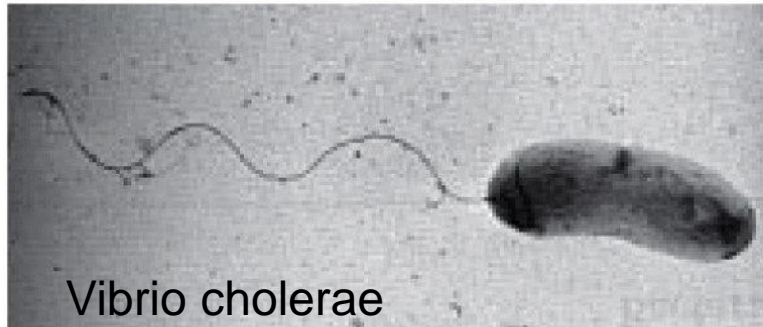
UNIVERSIDAD DE LA REPÚBLICA
URUGUAY



SARS-CoV-2

(A)

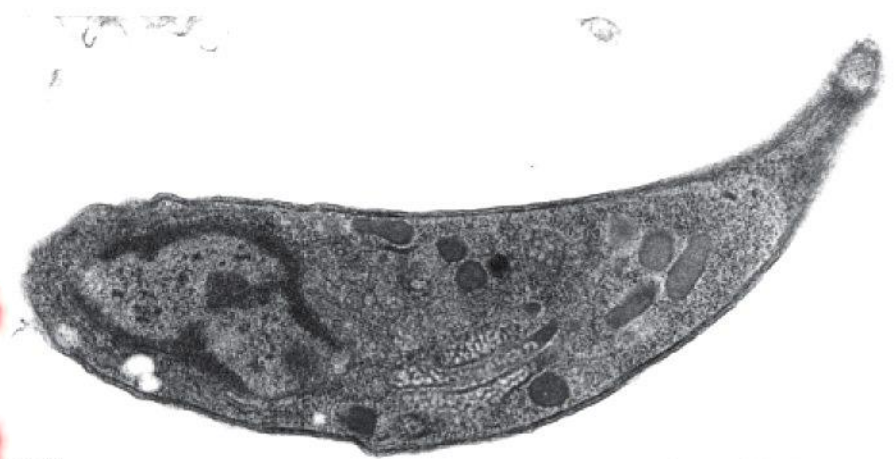
10 nm



Vibrio cholerae

(B)

1 μ m



(C) *Toxoplasma gondii*

1 μ m



Ascaris

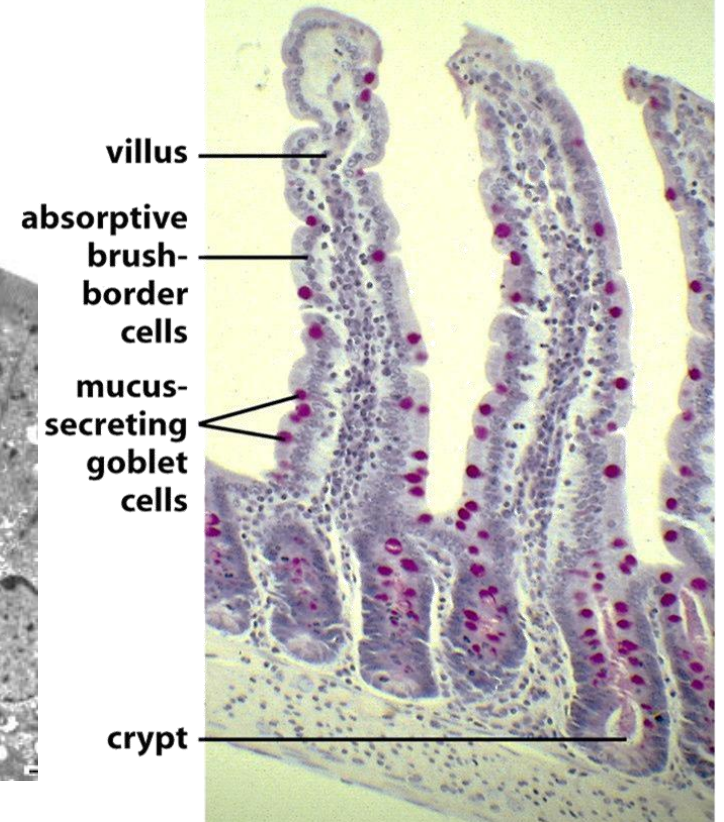
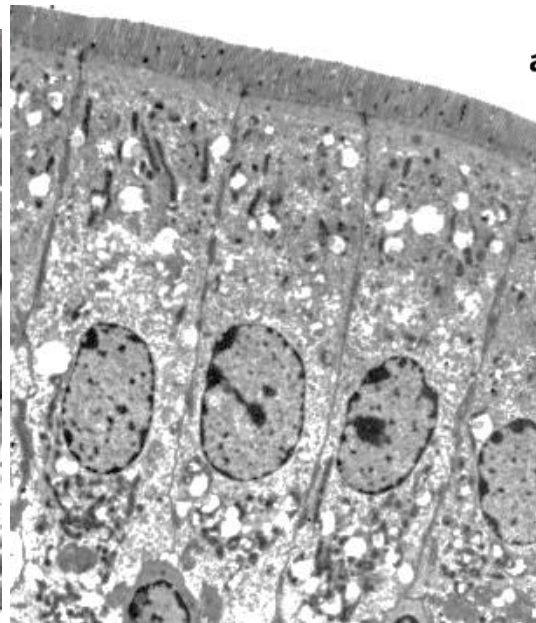
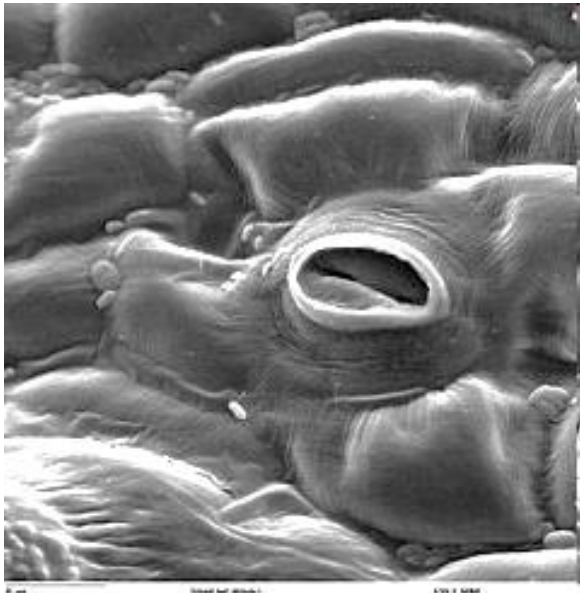
(D)

Mecanismos de defensa en organismos multicelulares

1- Barreras físicas: epitelios

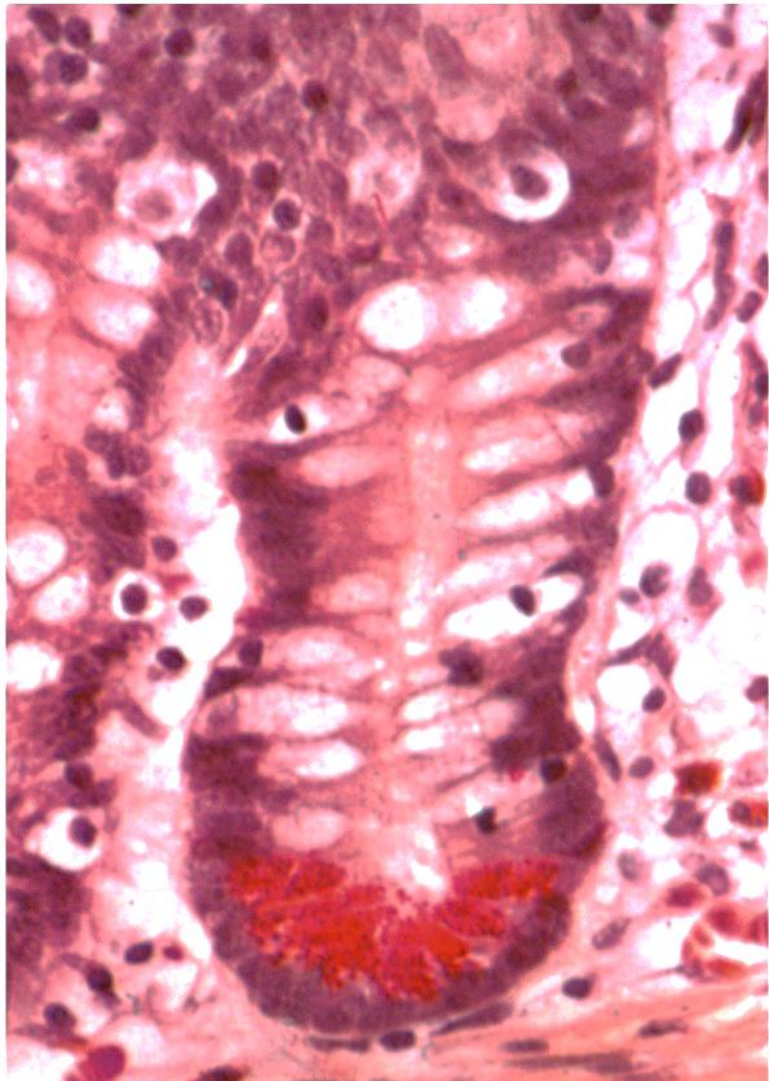
2 - Inmunidad innata

3 - Inmunidad adaptativa



Inmunidad innata

Inmunidad innata: defensinas



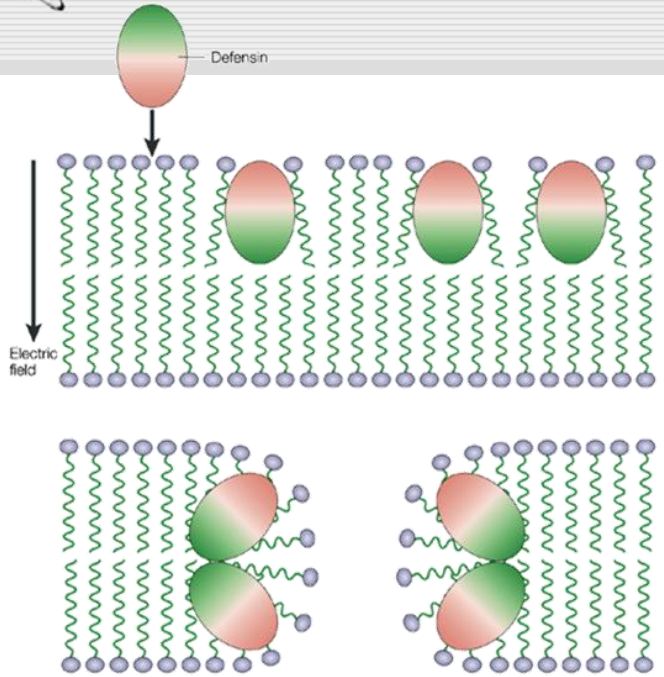
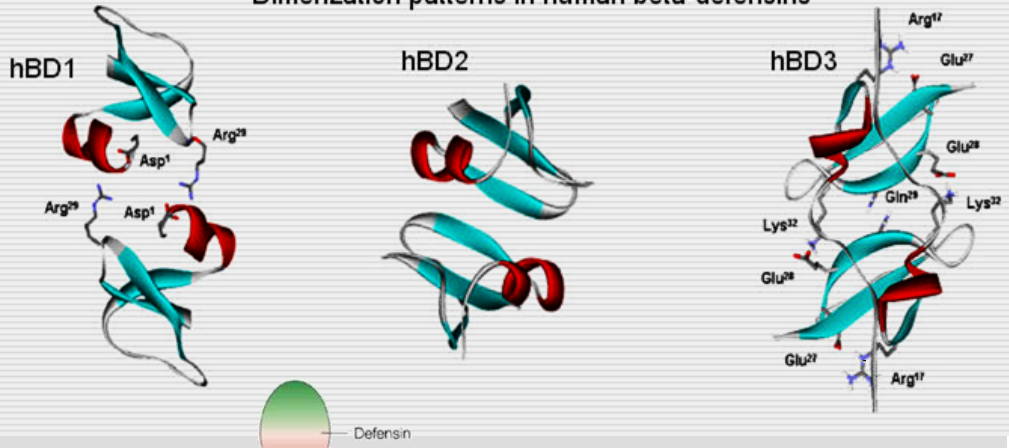
Células de Paneth

50 μm

Sequence variations in primate beta-defensins

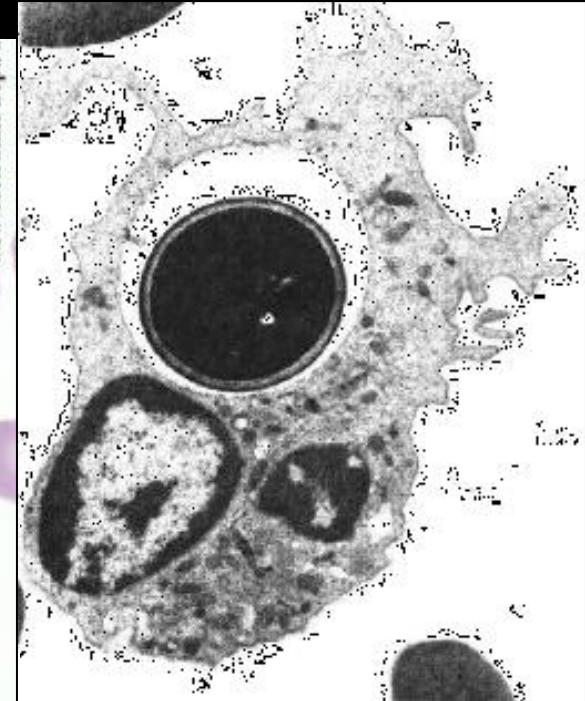
Protein	Sequence	Length
humanBD1	DHYNCVS SGGQCLY SACPIETKI QGTCYR GKAKCKC	+4
rhesusBD1	DHYNCVR SGGQCLY SACPIYTRI QGTCYR HGKAKCK	+4
humanBD2	GIGD PVTCLK SGAIC HEV FCPRRYK QIGT CGLP GT KCCCKP	+6
rhesusBD2	DIRN PVT CVR SGAIC LP FCPRRYK HIGV C VS AIKCCCKP	+7
humanBD3	GI INTLQKY YCRVRG RC AVLSCL PK EEQIGK CSTRGRKCCRRKK	+11
gibbonBD3	GL MNTLQKY YCRVRG WC AVLSCL PK EEQIGK CSTRGRKCCRRKK	+10

Dimerization patterns in human beta-defensins

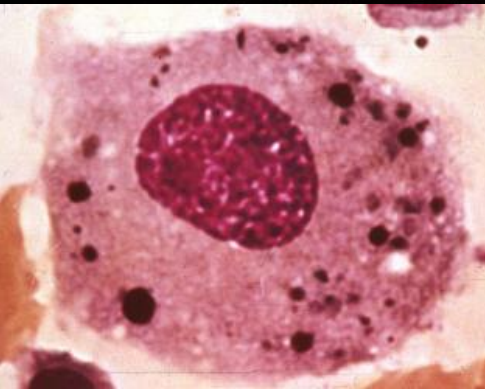
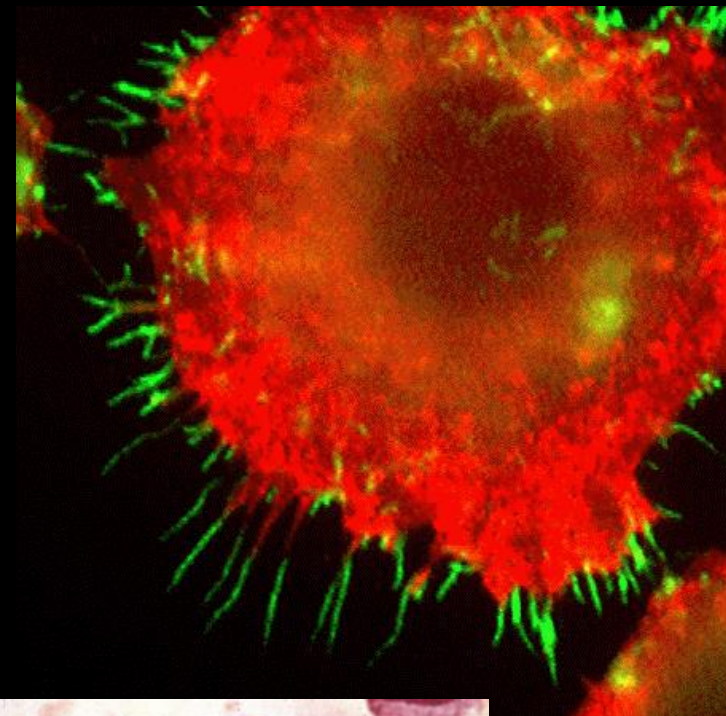


Fagocitos

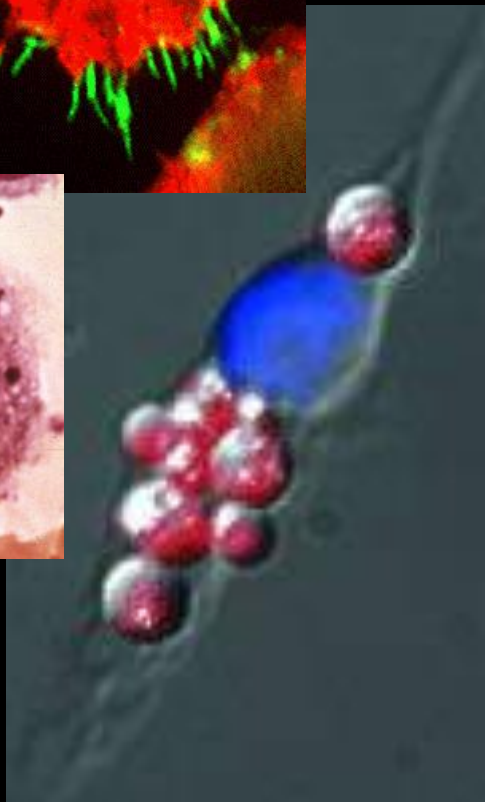
Neutrófilos



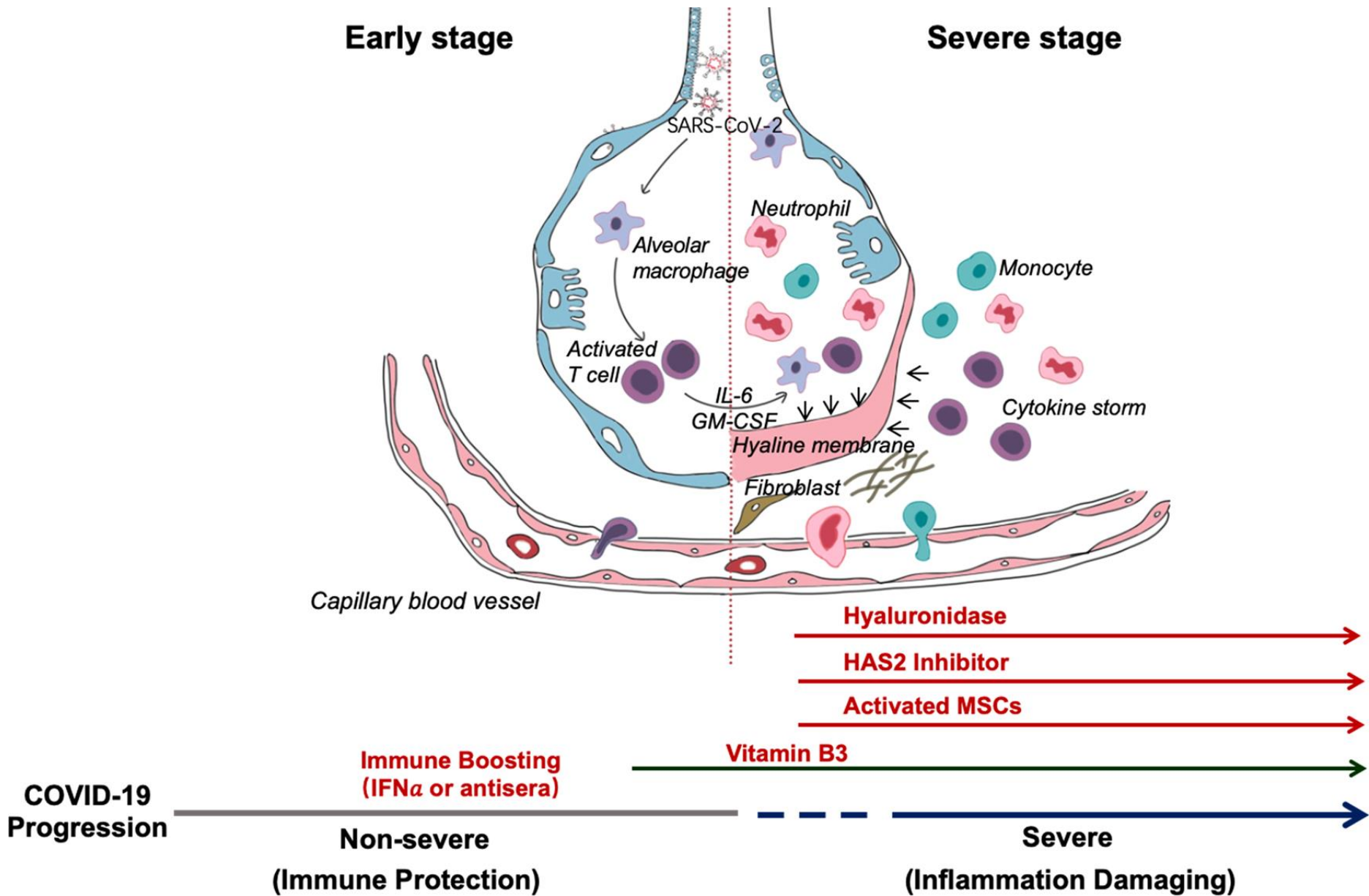
Células dendríticas



Macrófagos

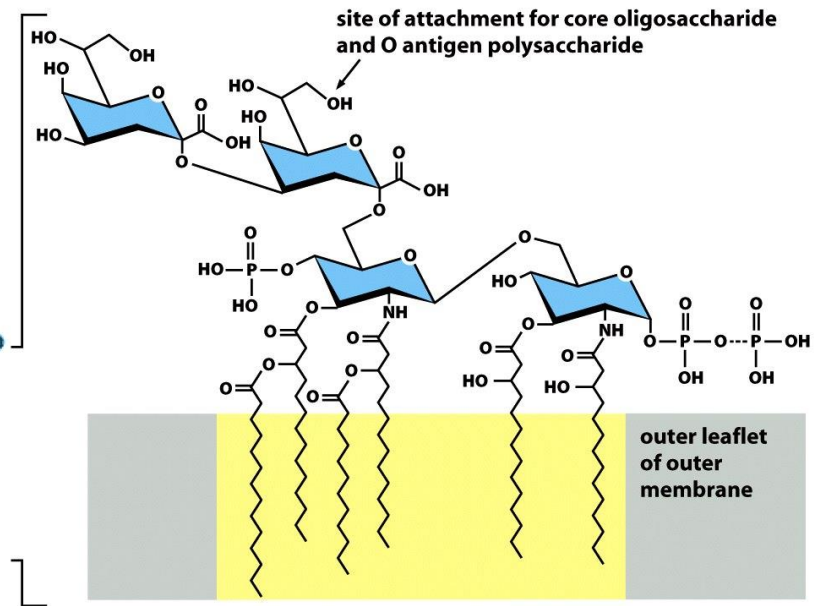
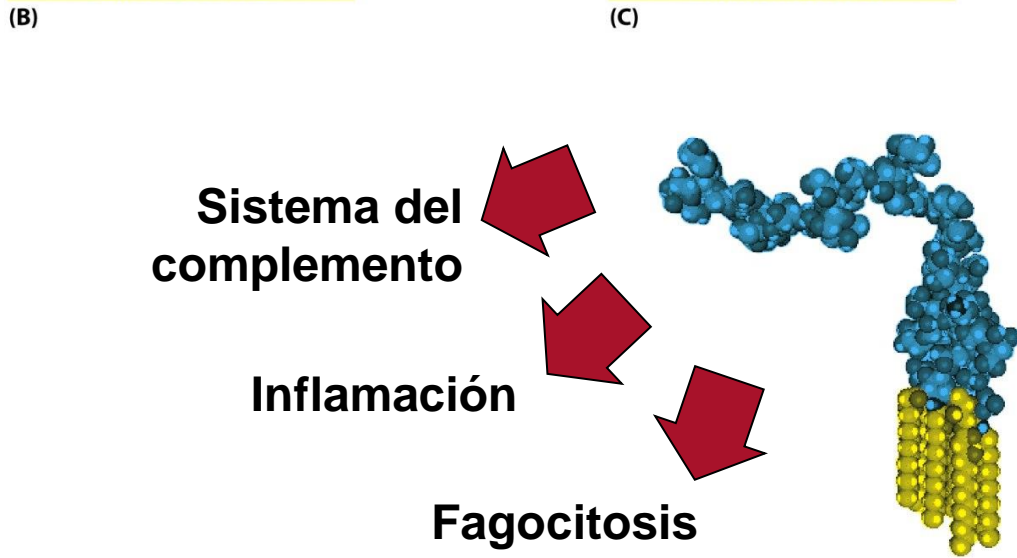
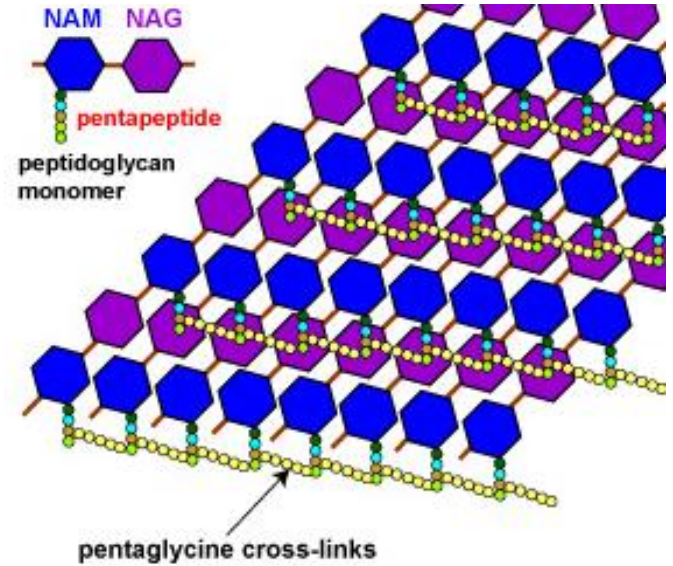
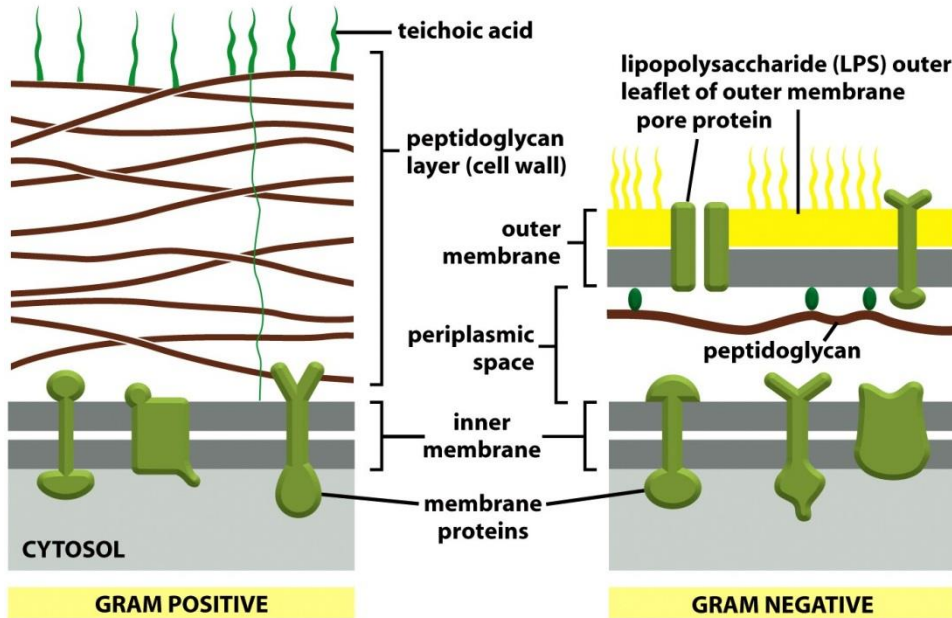


Infección por SARS-CoV-2 en el alveolo pulmonar

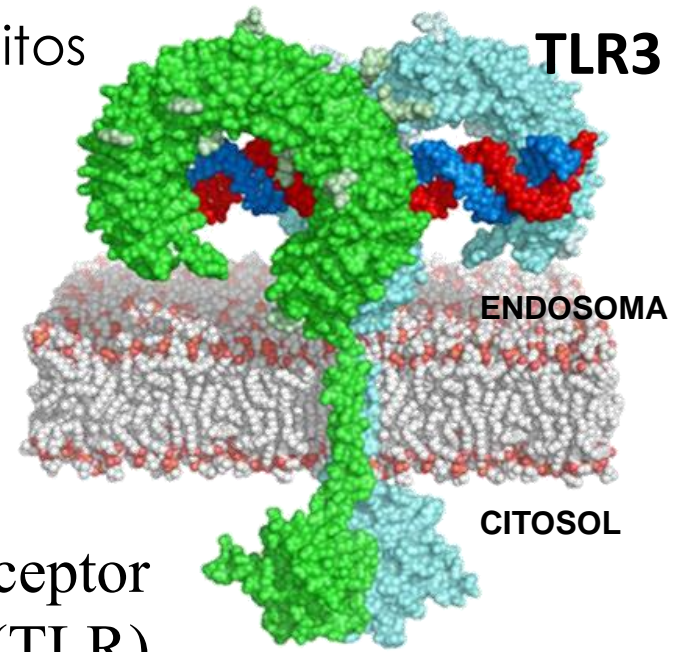
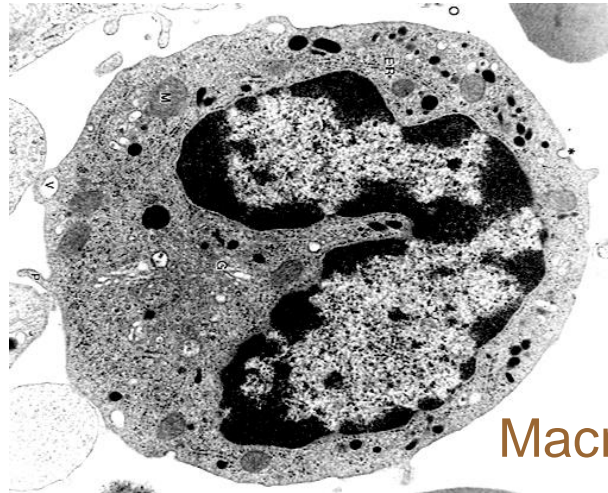
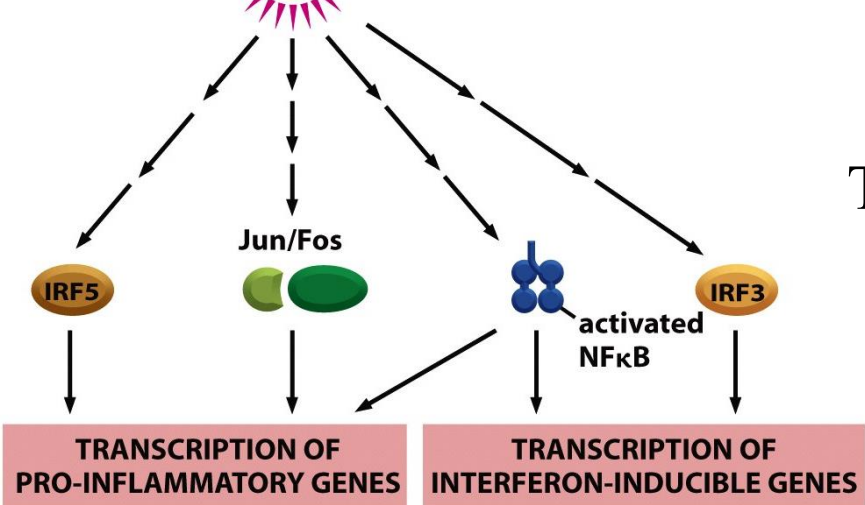
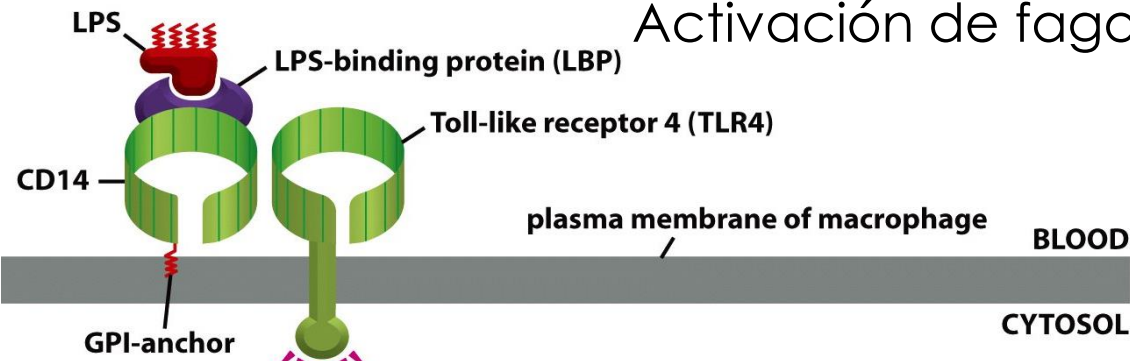


Detección de Arreglos Moleculares Asociados a Patógenos

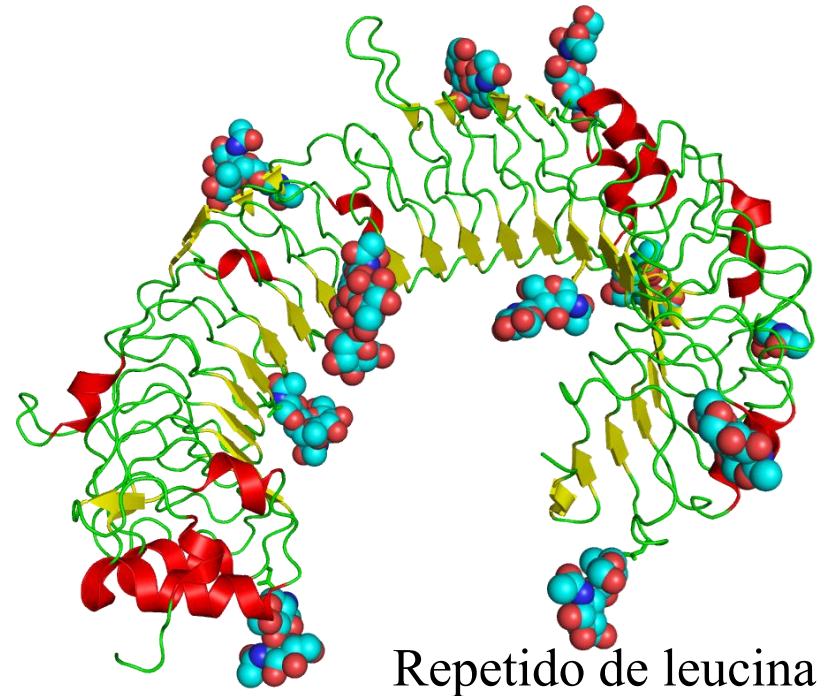
(PAMPs: Pathogen Associated Molecular Patterns)



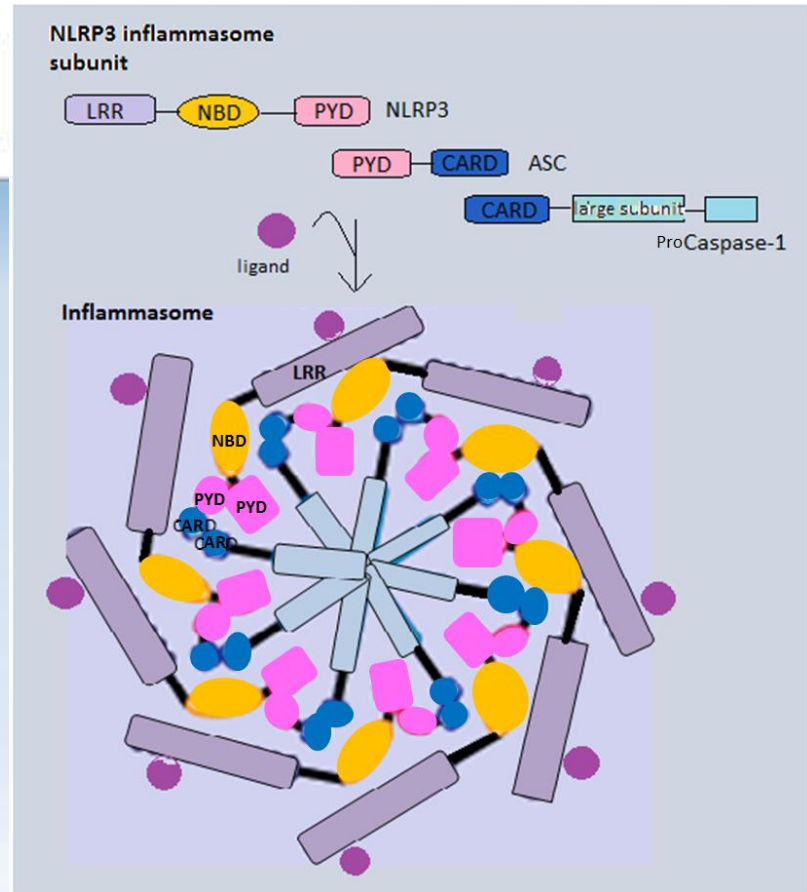
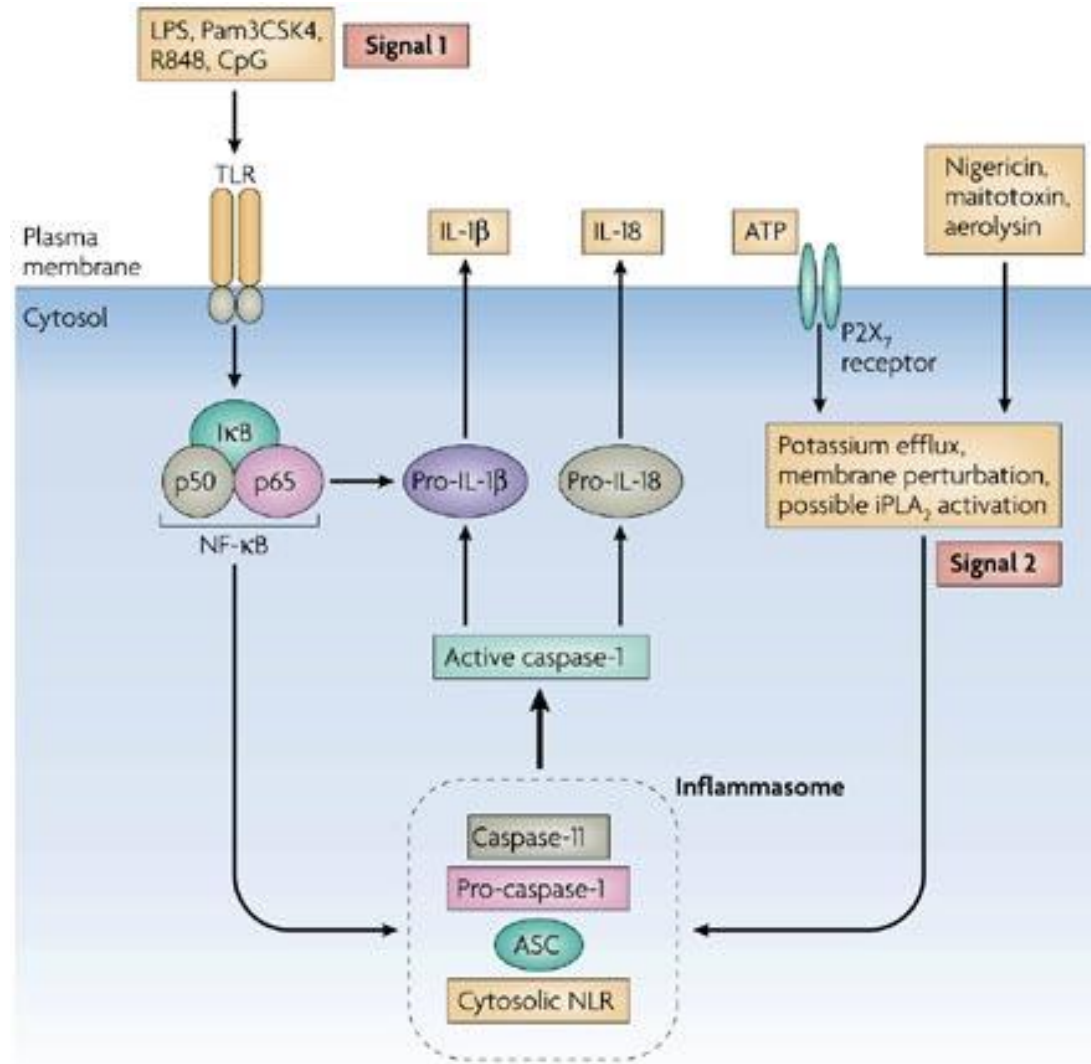
Activación de fagocitos



Toll-like receptor (TLR)

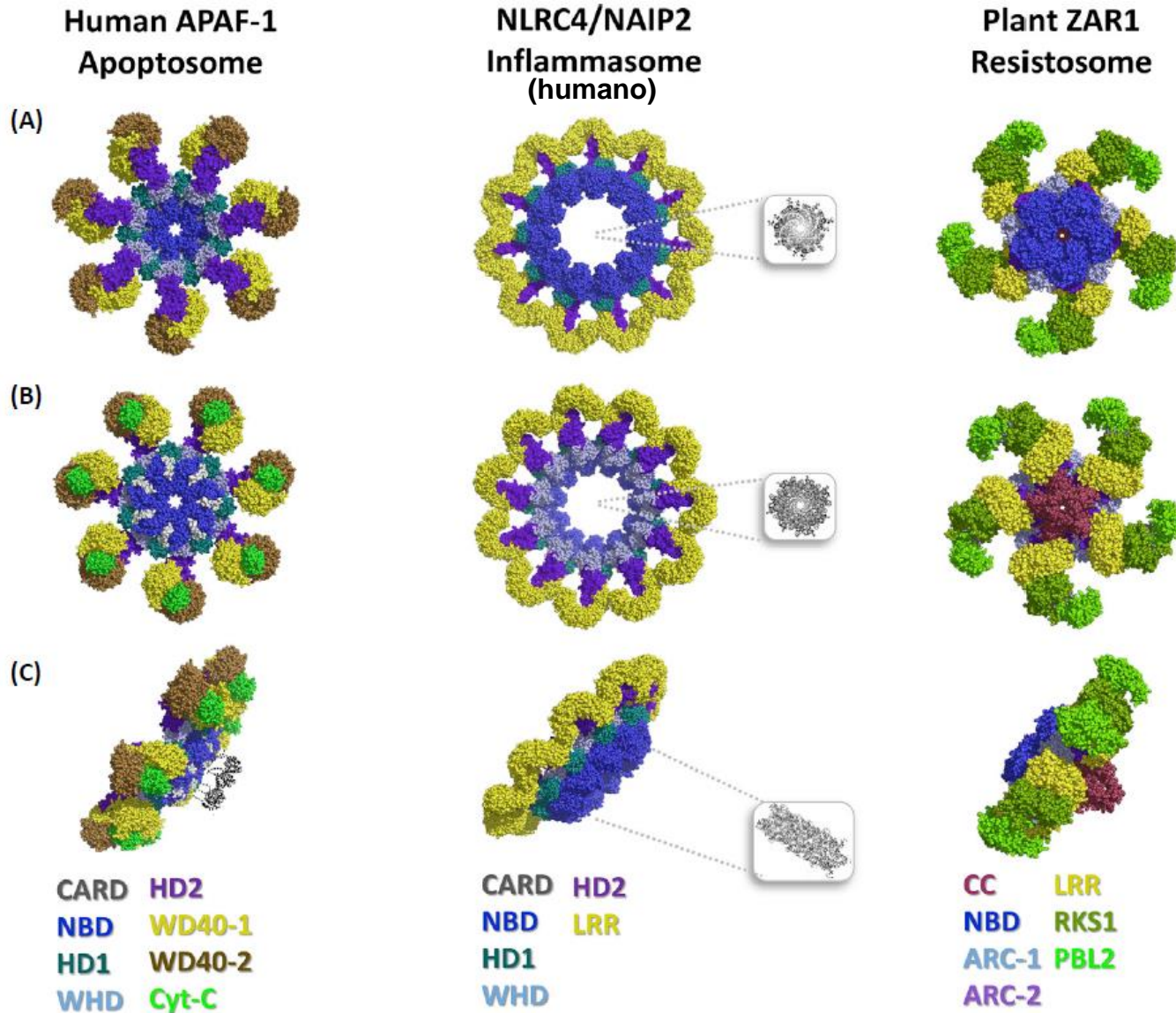


Detección de Arreglos Moleculares Asociados a Patógenos (PAMPs) e inflamasomas

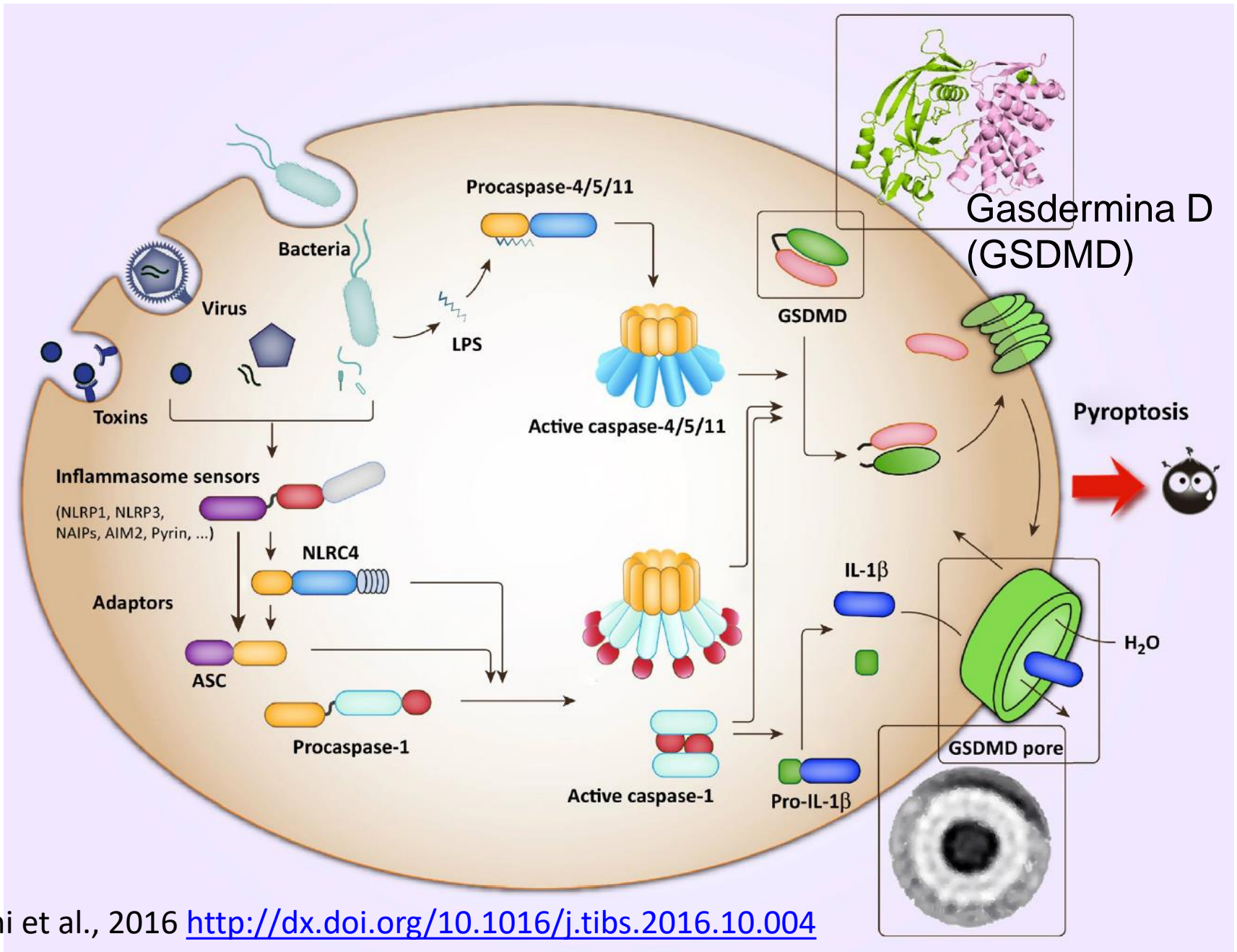


NLR = NOD-Like Receptor

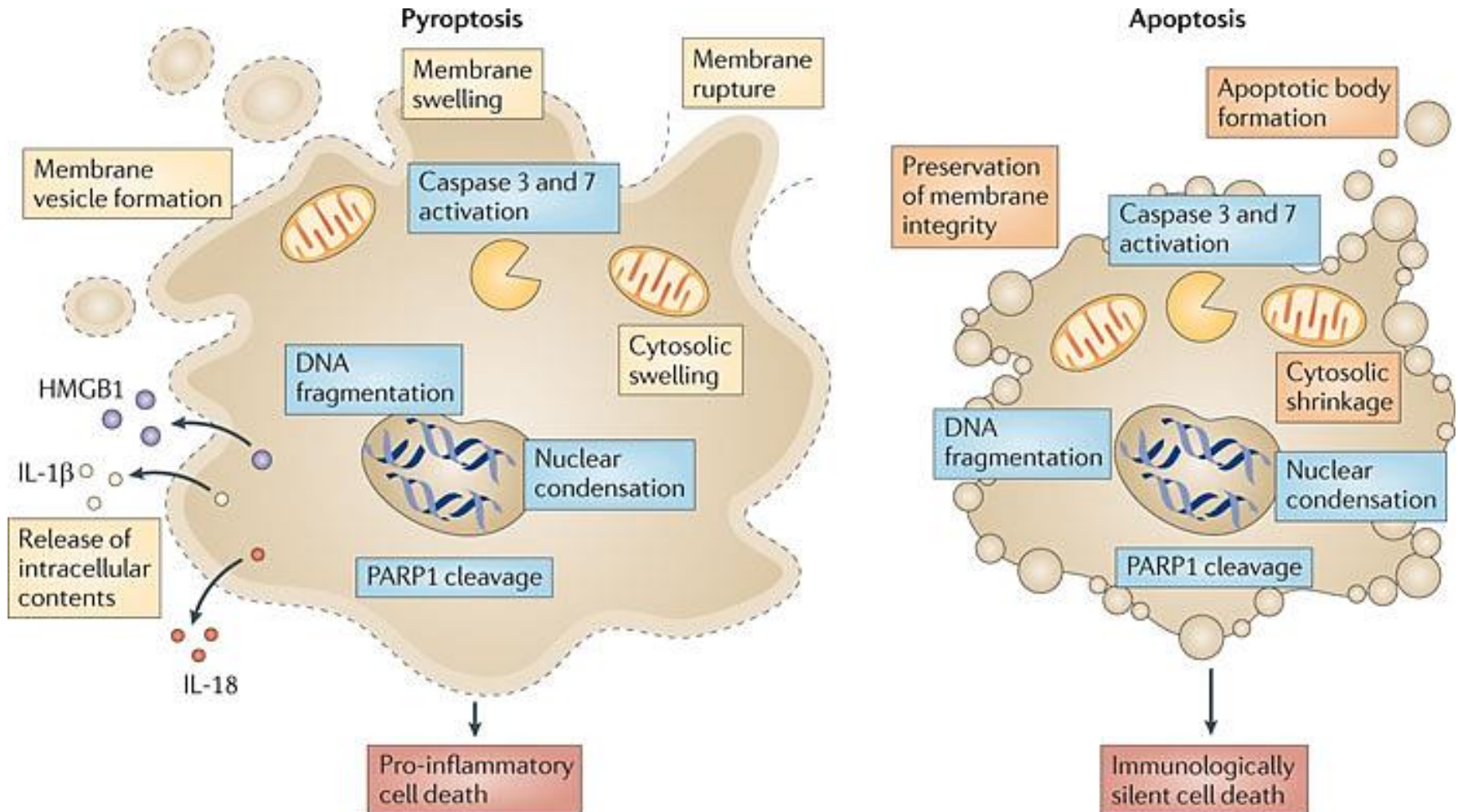
Apoptosomas, inflammasomas y resistosomas: complejos proteicos similares, en distintos reinos



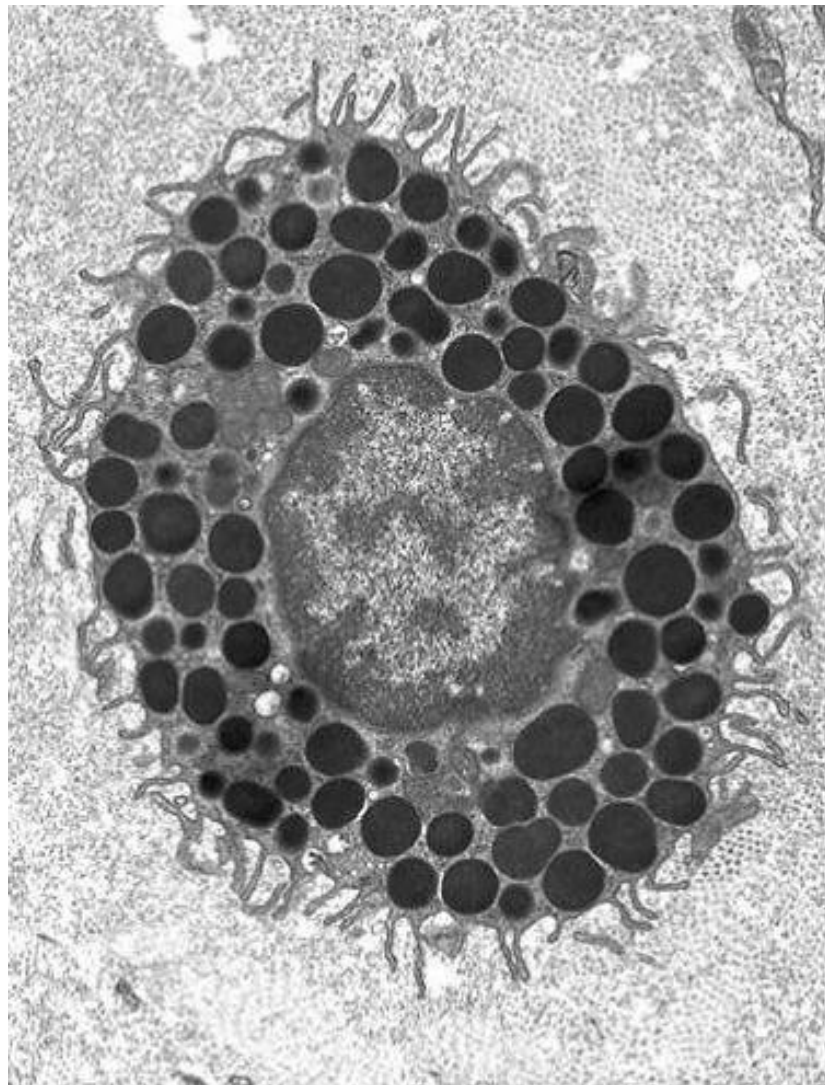
Inflammasoma y piroptosis



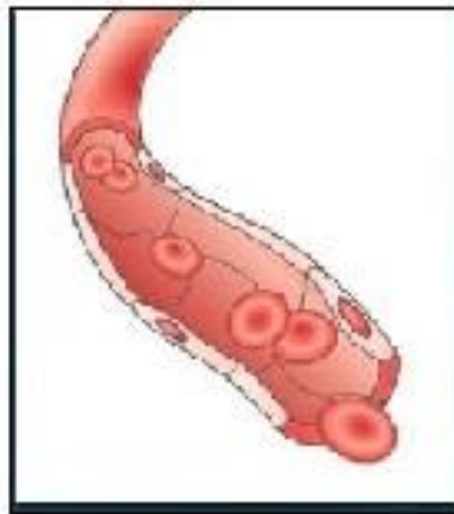
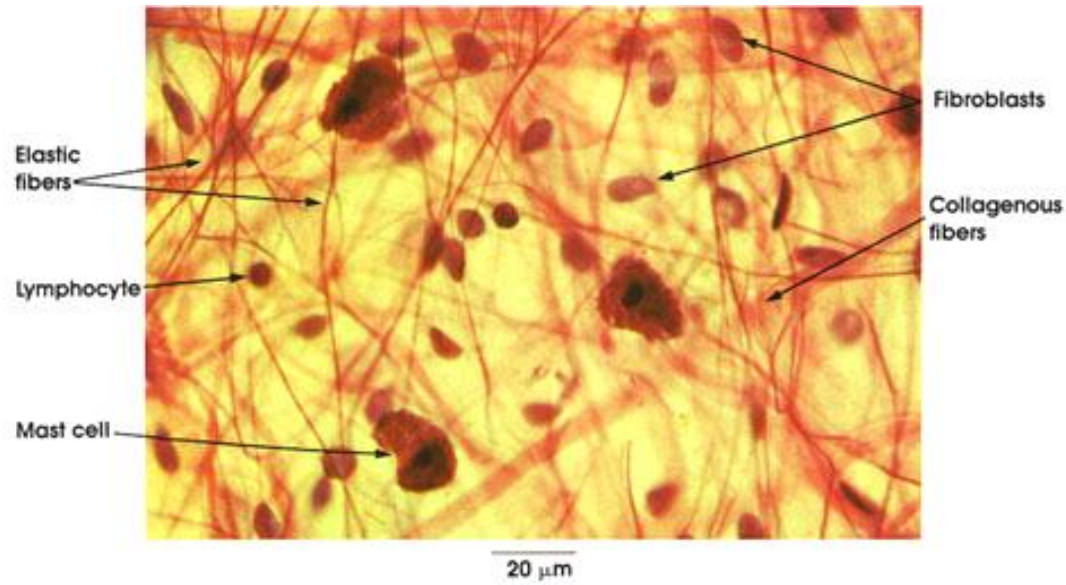
Muerte celular pro-inflamatoria: piroptosis



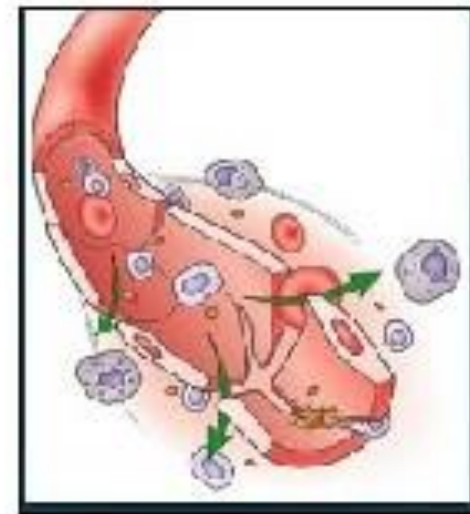
Inflamación



Mastocito

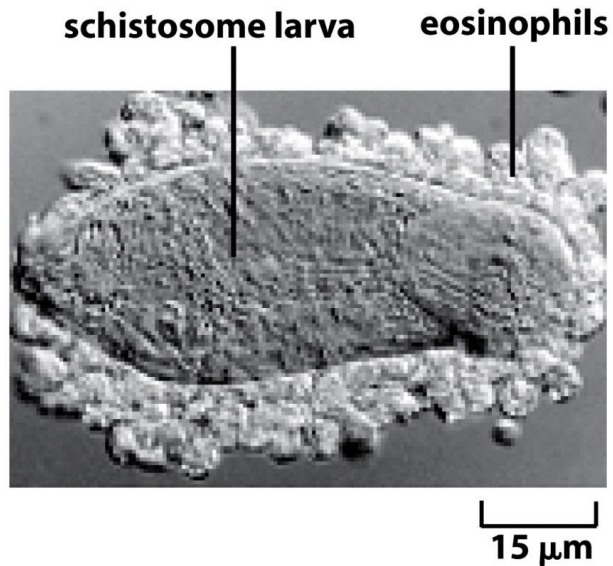
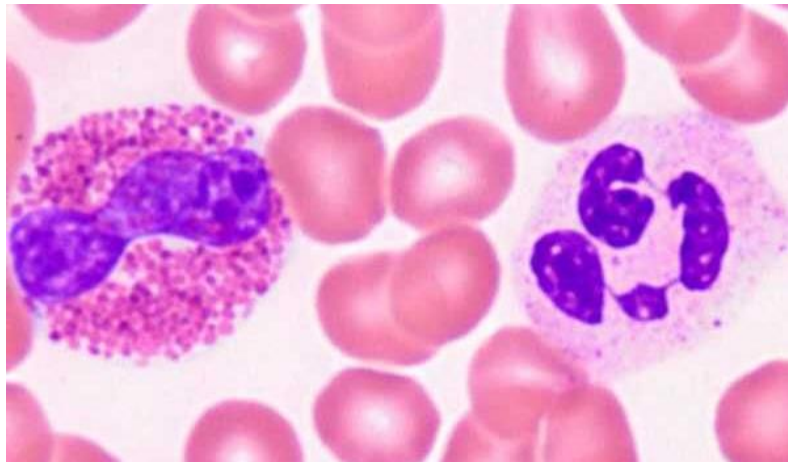


Normal Blood Vessel

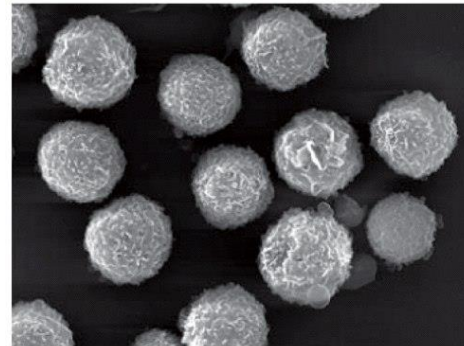


Tissue Inflammation

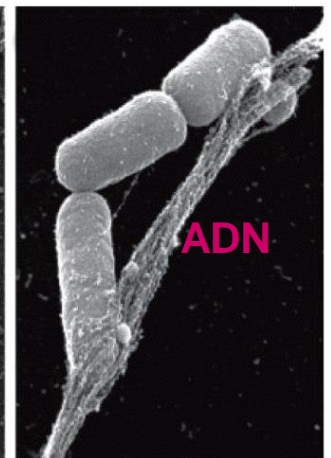
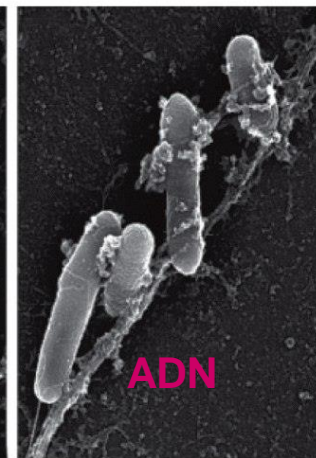
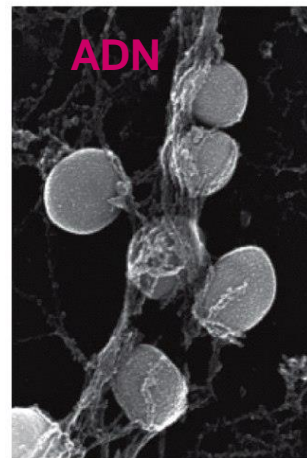
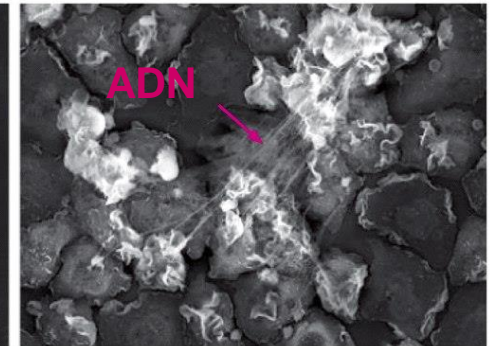
Otros mecanismos para la eliminación de patógenos



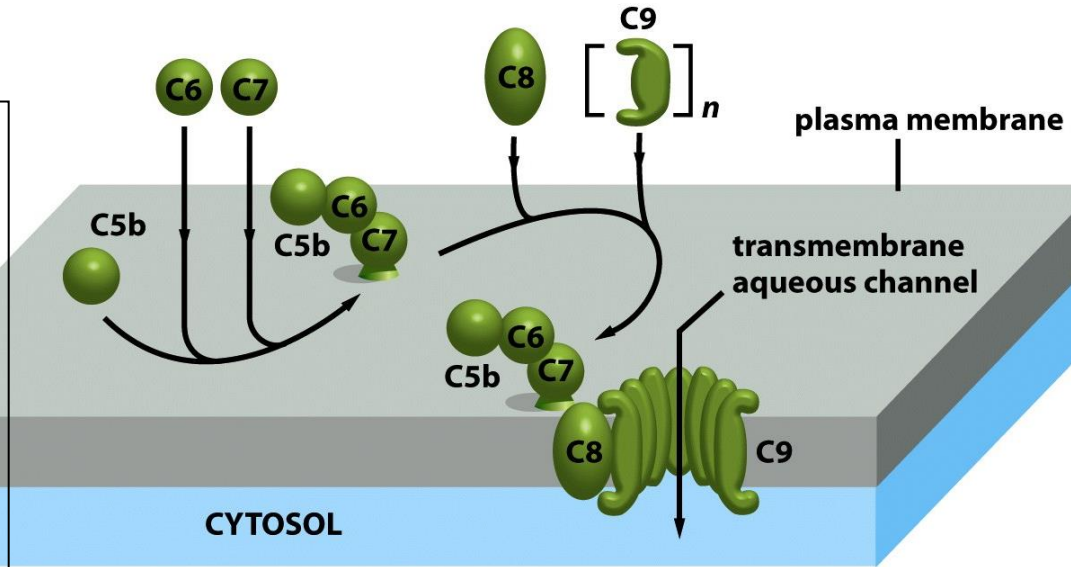
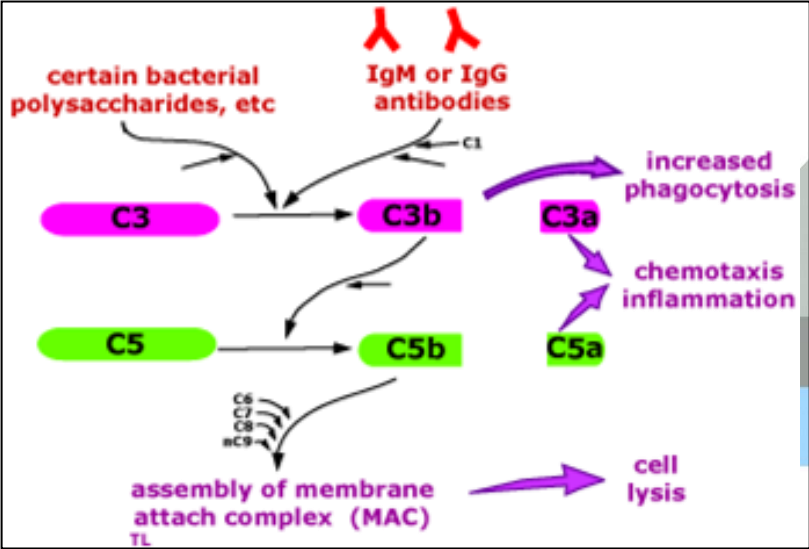
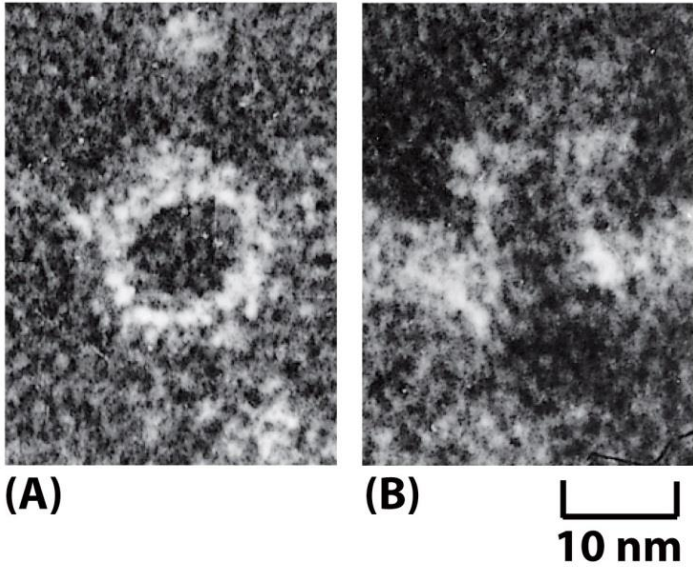
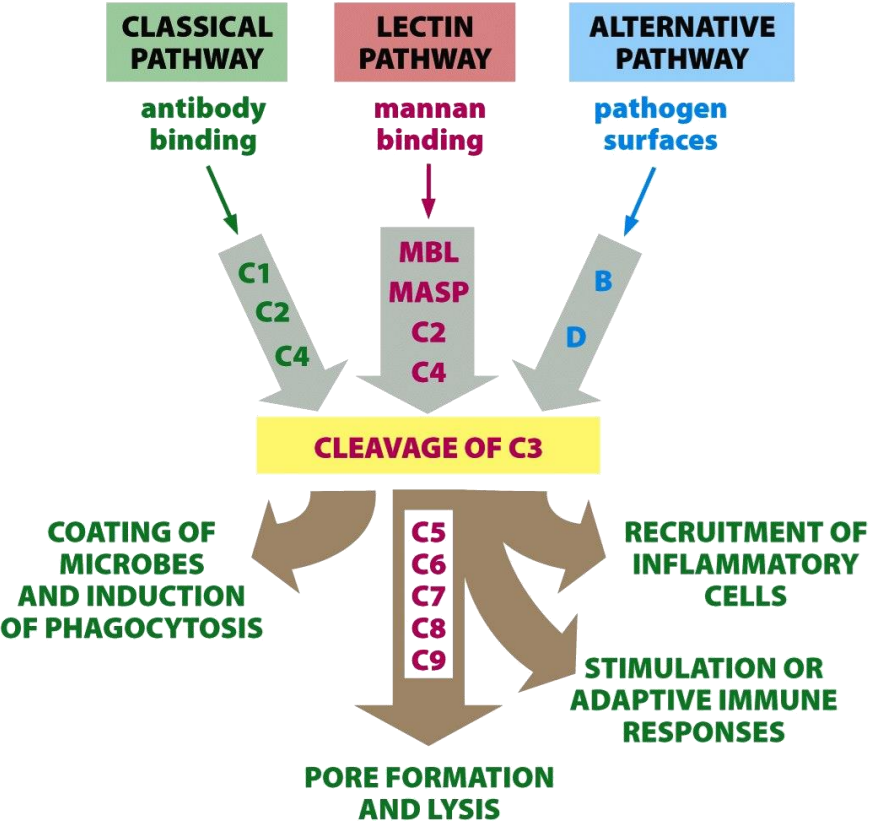
Neutrófilos en reposo



Neutrófilos activados



Sistema del complemento



Complement as a target in COVID-19?

Antonio M. Risitano¹, Dimitrios C. Mastellos², Markus Huber-Lang³,
 Despina Yancopoulos⁴, Cecilia Garlanda^{5,6}, Fabio Cicceri⁷ and John D. Lambris⁸

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<https://www.nature.com/articles/s41577-020-0320-7>

There is an urgent need to develop effective therapies for COVID-19. Here, we urge immunologists and clinicians to consider the potential of targeting the complement system in these patients.

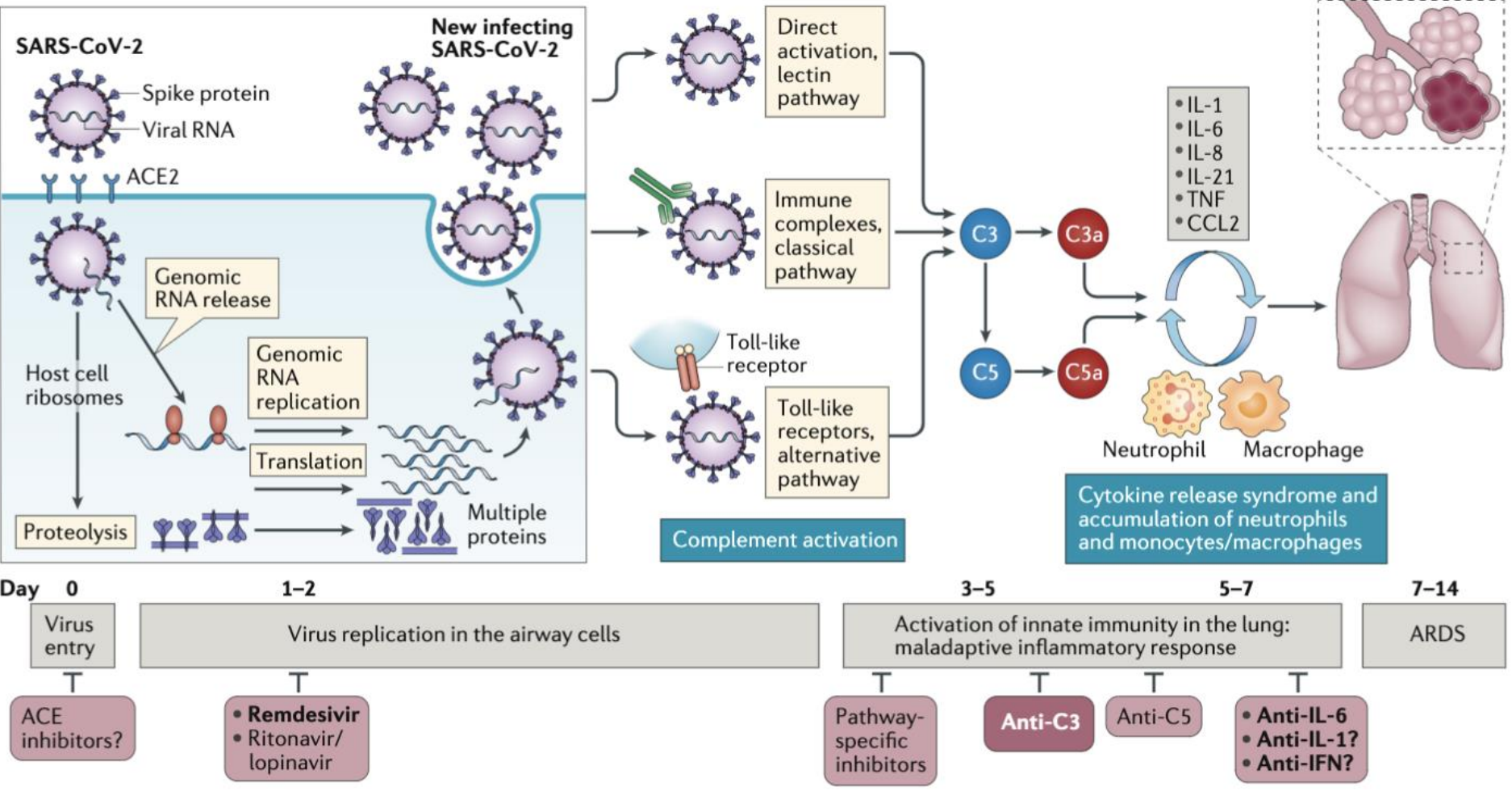
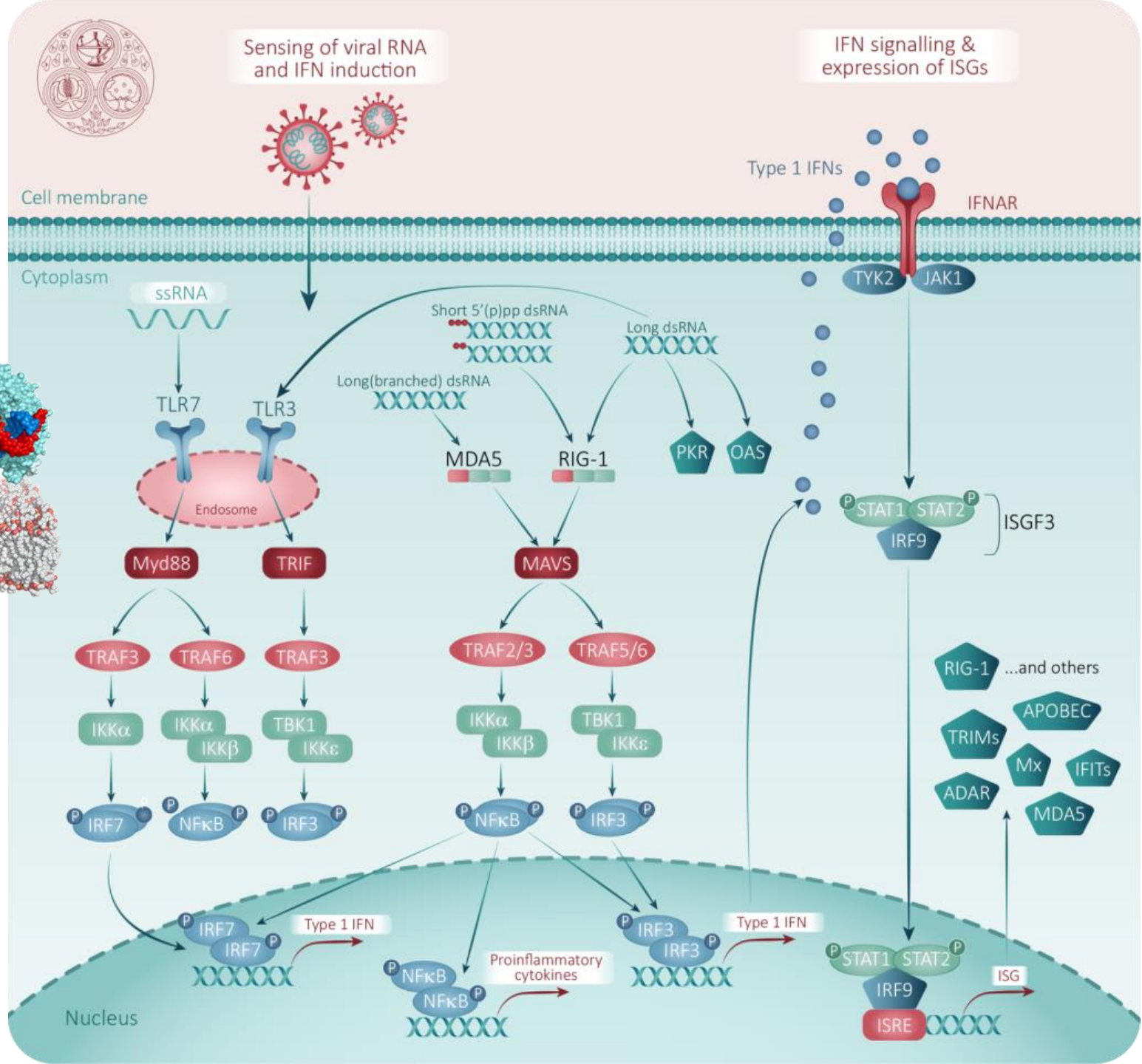
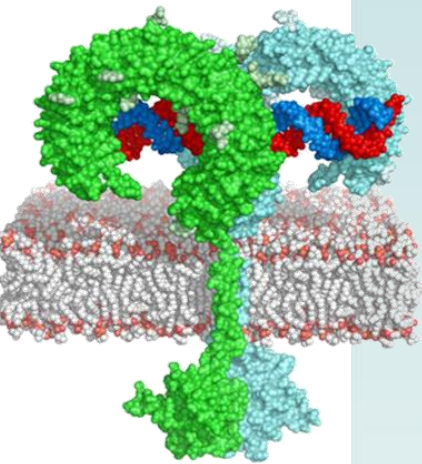
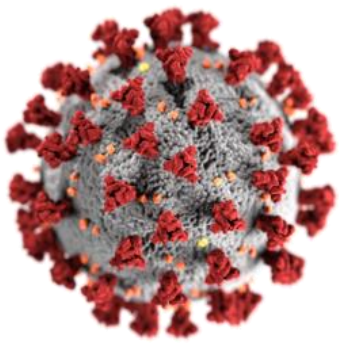
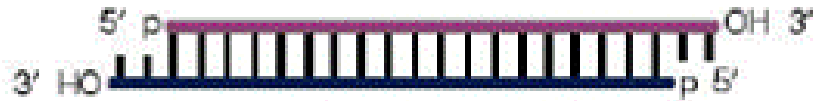


Fig. 1 | Targeting complement in SARS-CoV-2-associated lung injury. Complement activation may contribute to the maladaptive inflammatory response seen in some patients with severe COVID-19. Inhibition of C3 or C5 may have therapeutic potential. ARDS, acute respiratory distress syndrome.

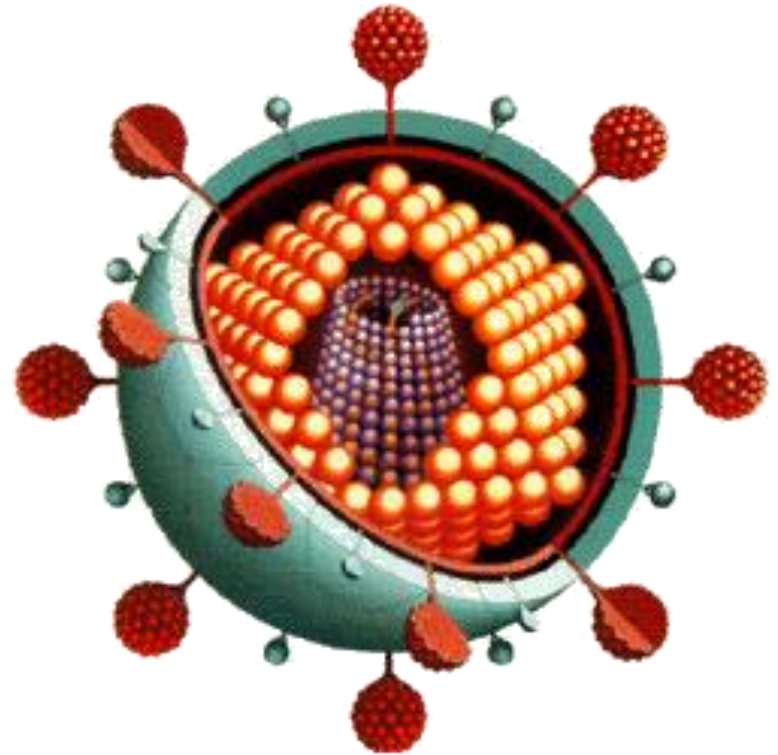
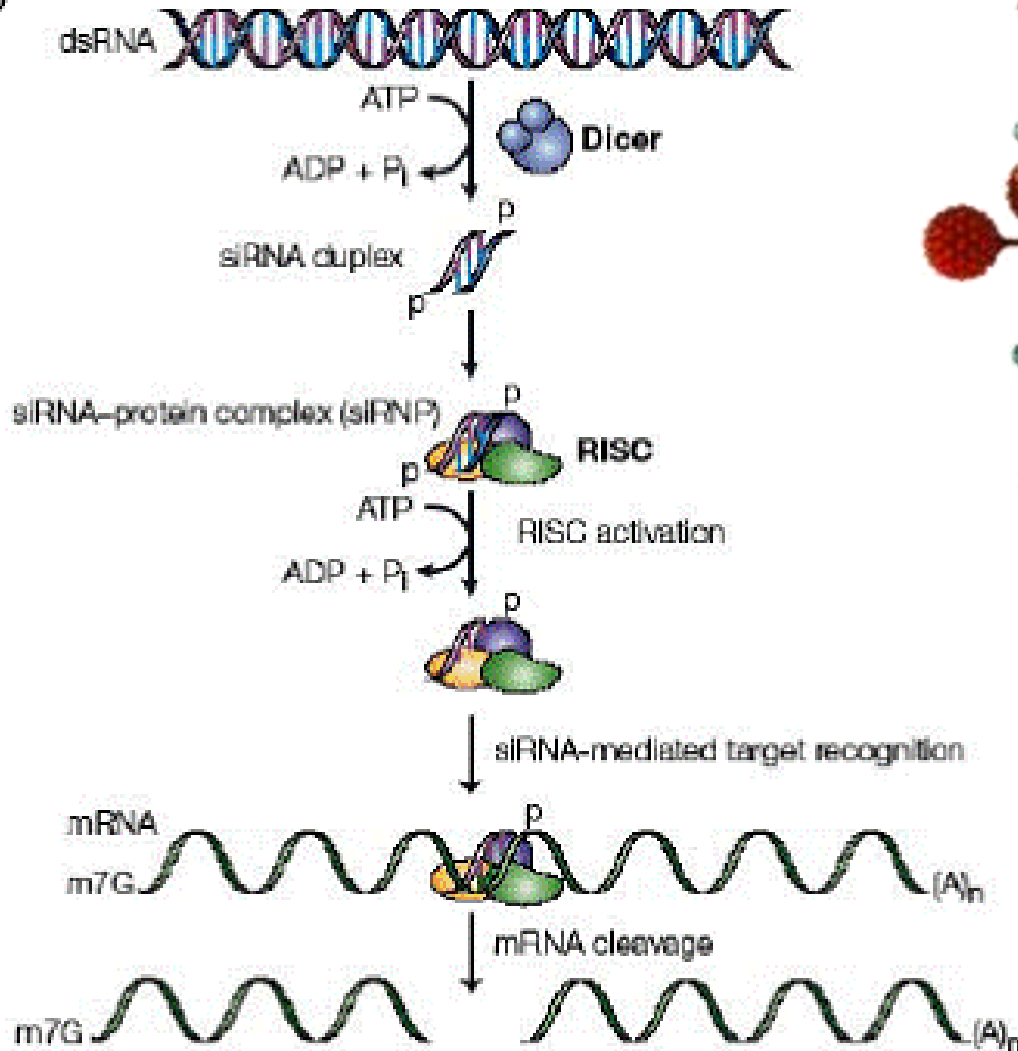


Eliminación de virus del interior celular

(A)

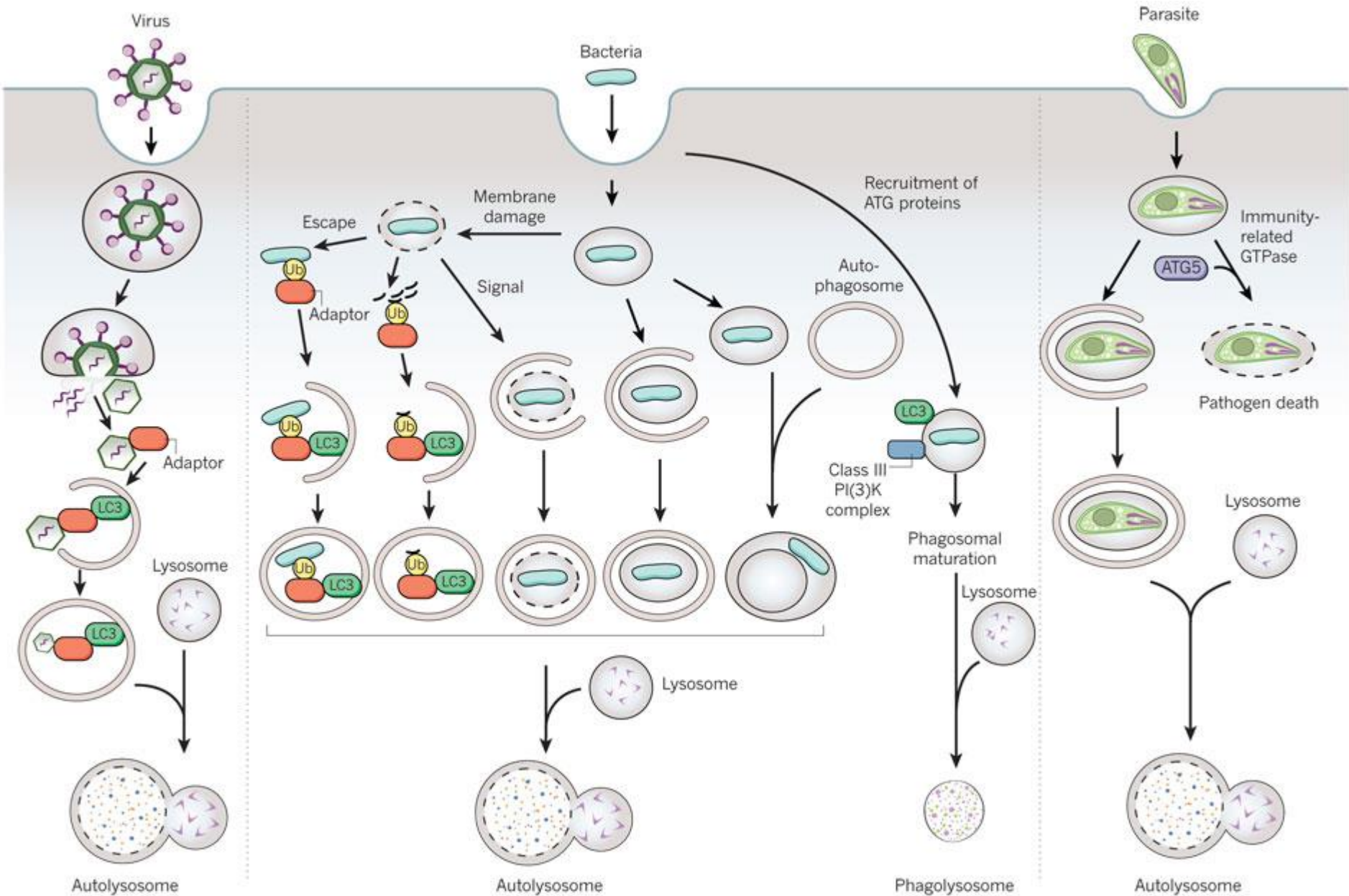


(B)

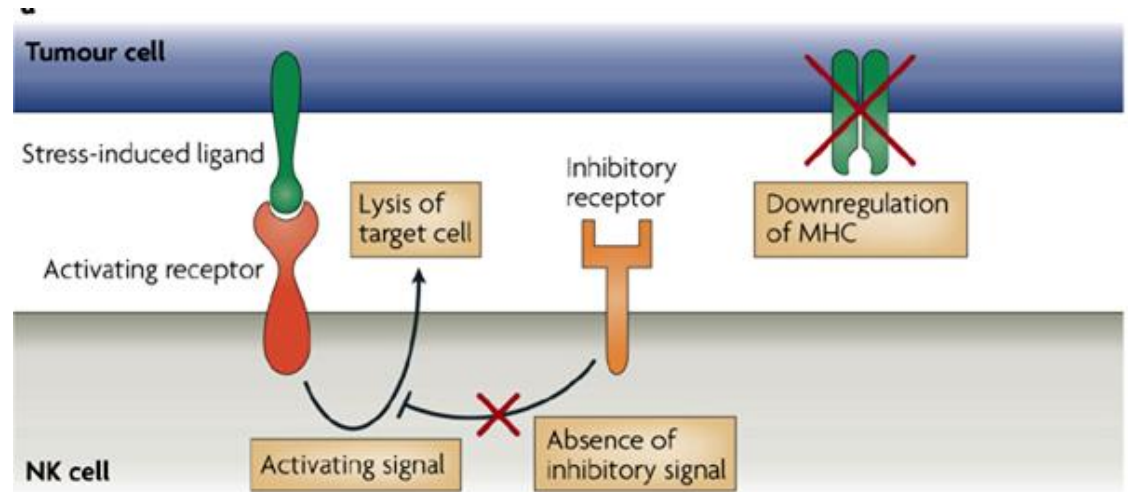
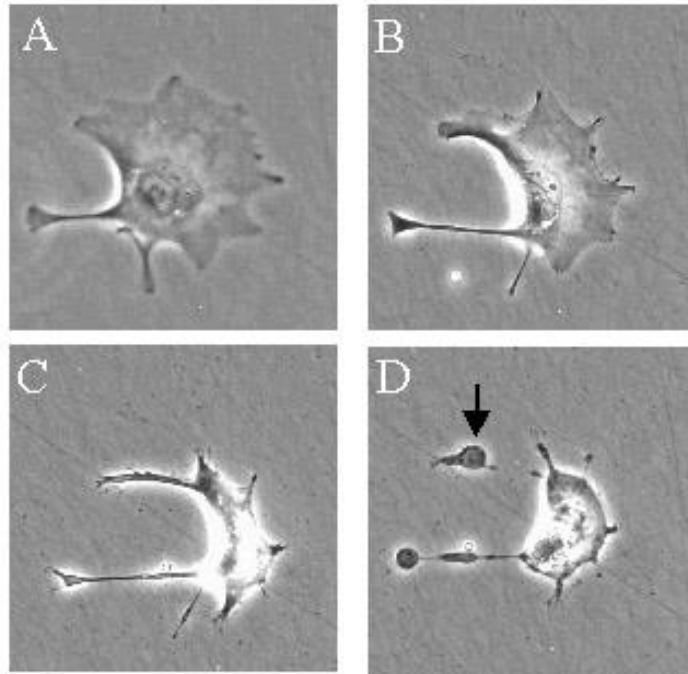


Ante dsRNA, la célula infectada secreta:
interferón α ; interferón β

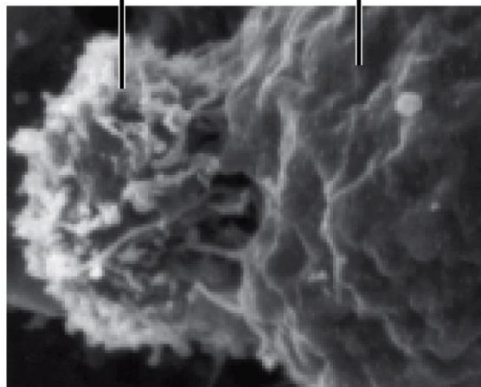
Autofagia como mecanismo de eliminación de patógenos



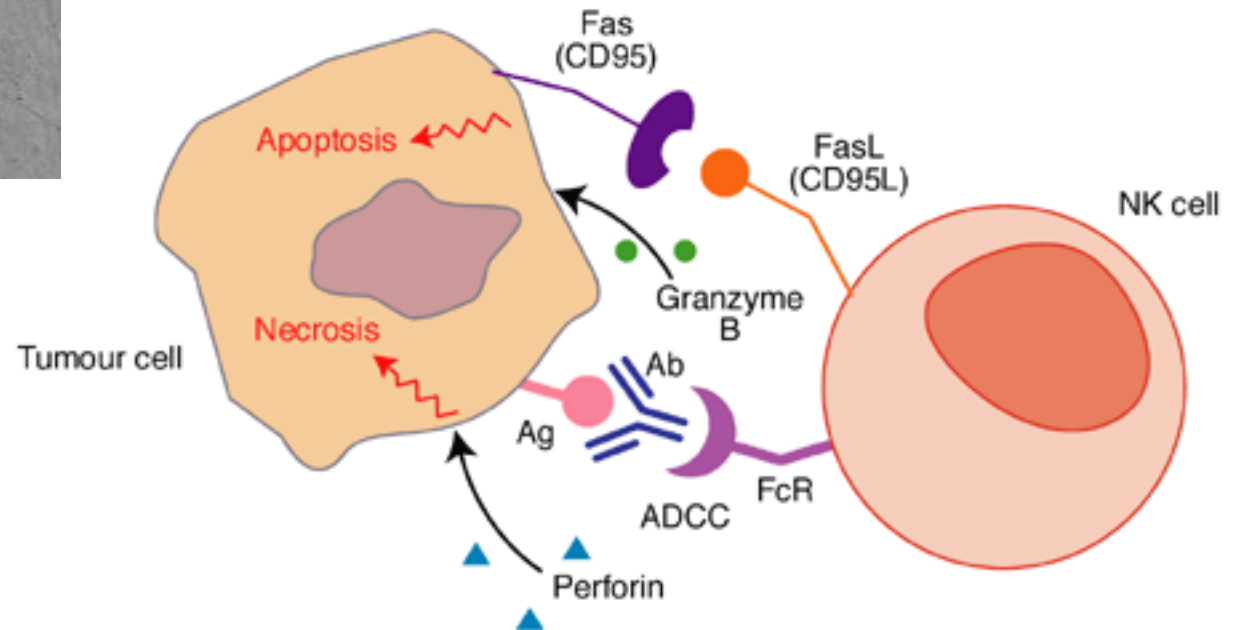
Eliminación de células infectadas por virus y tumorales: **células NK**



natural killer cell cancer cell



5 μ m



The natural killer (NK)-cell response to tumour cells

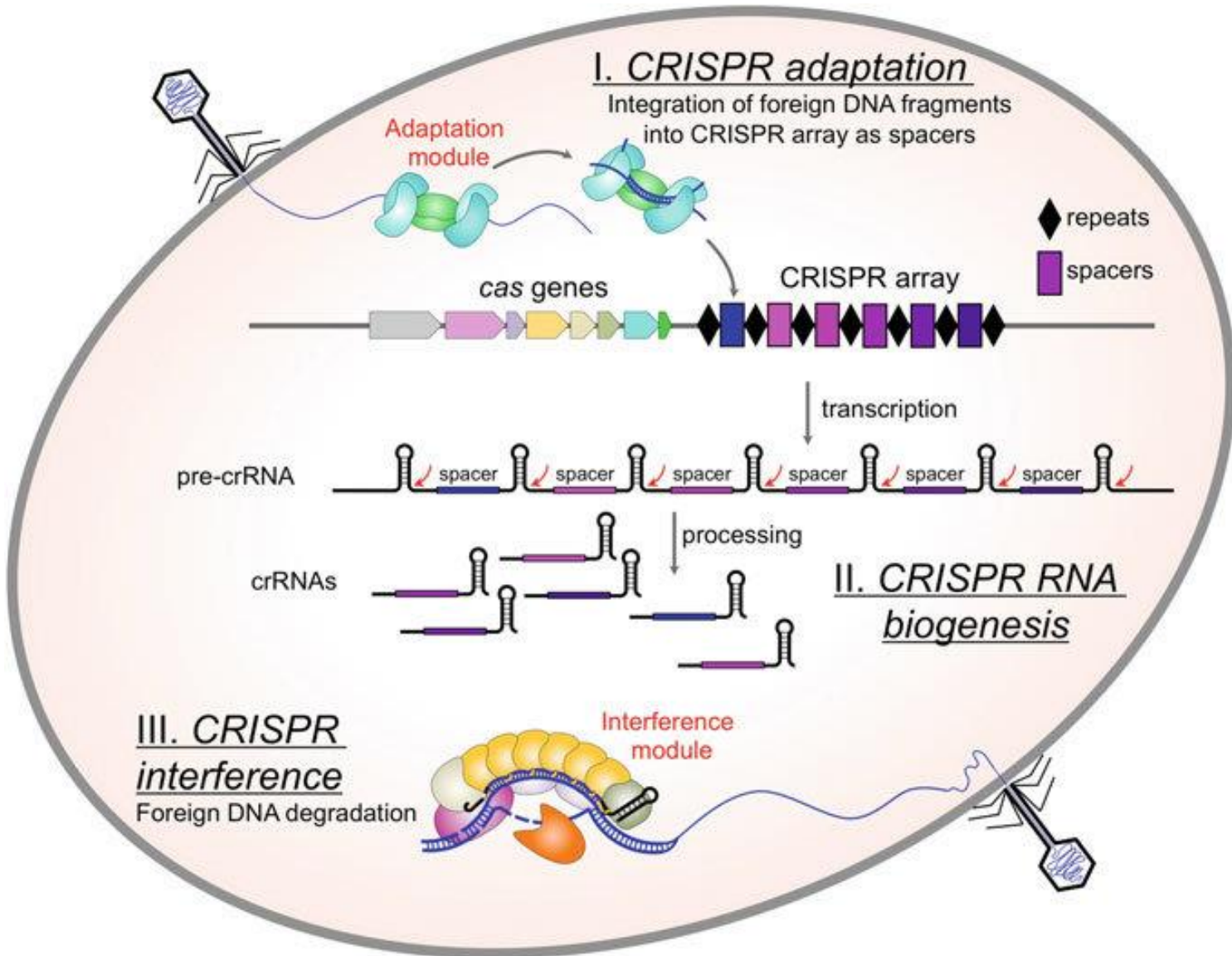
Inmunidad adaptativa



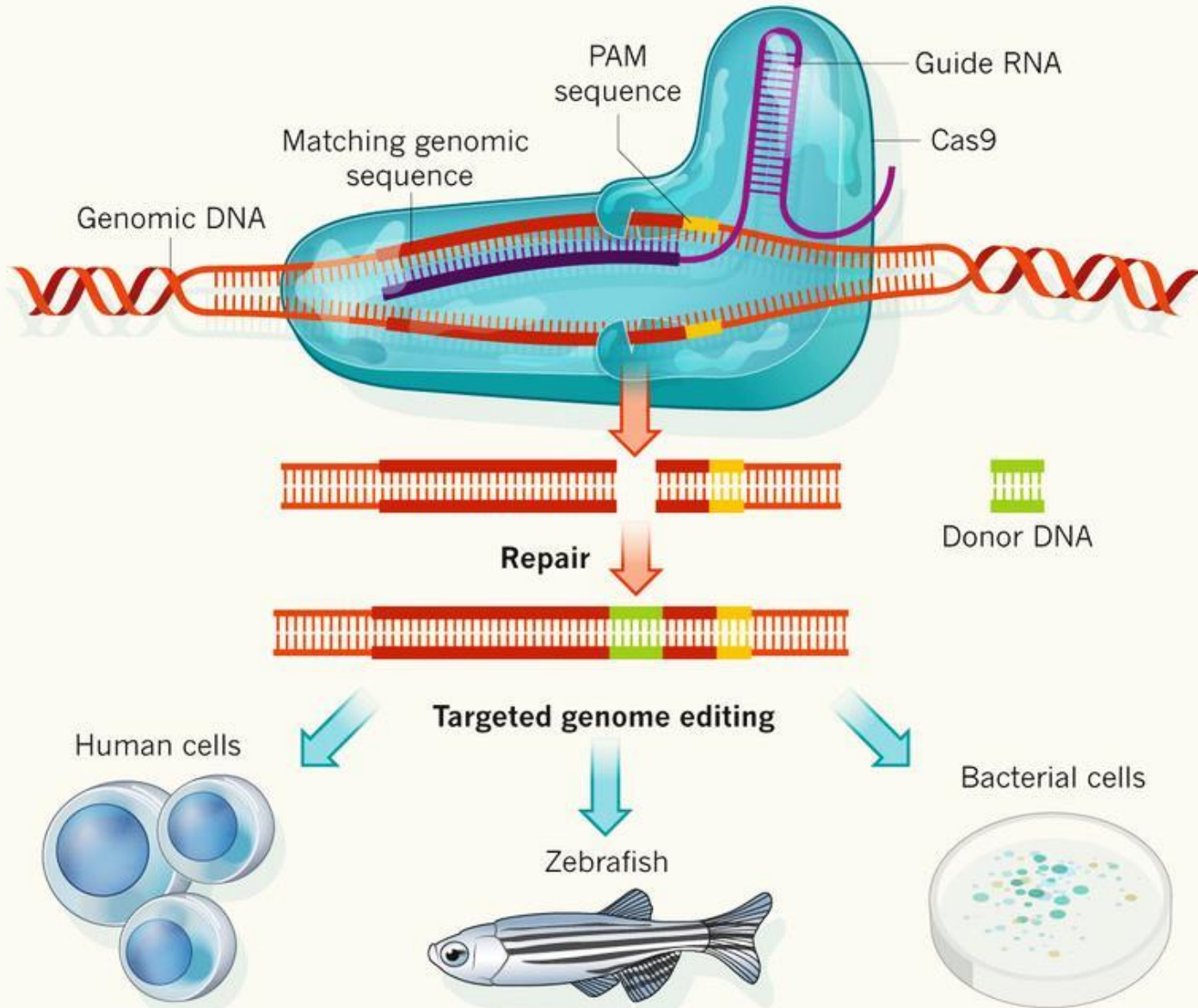
CRISPR

(Clustered Regularly Interspersed Short Palindromic Repeats)

¿Inmunidad adaptativa en bacterias?



CRISPR-Cas9 como herramienta molecular

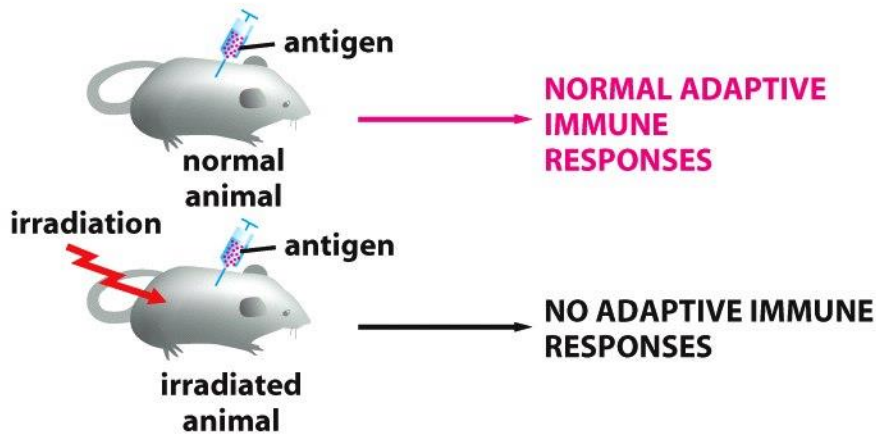
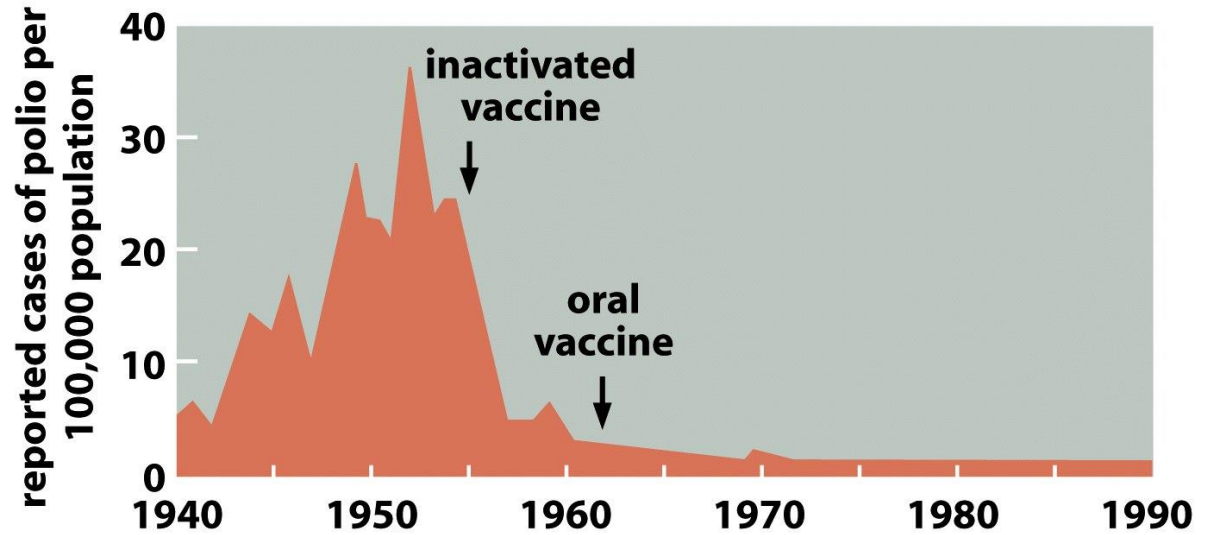


Inmunidad adaptativa en mamíferos

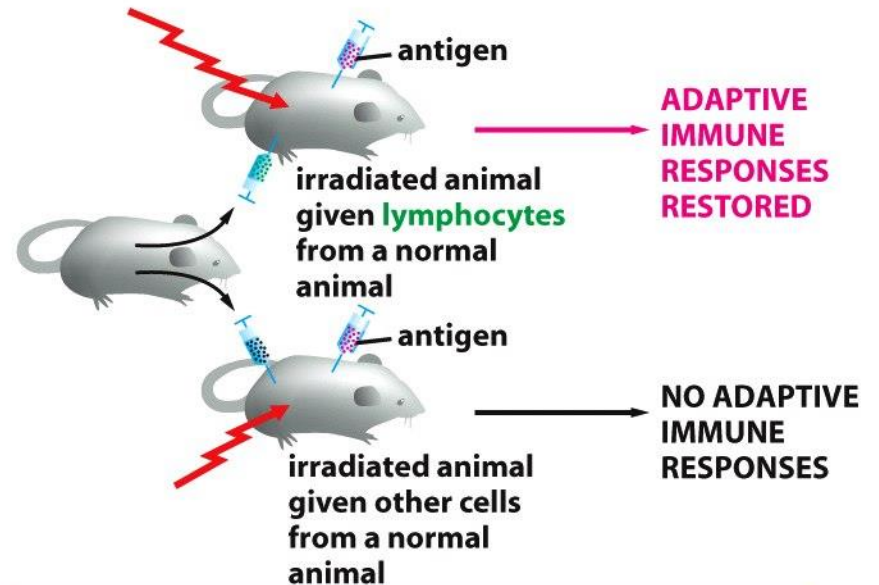
Edward Jenner



1796:
vacuna contra la viruela



CONTROL



EXPERIMENT

Preguntas para responder durante la próxima clase:

1- ¿En qué consisten los tres tipos principales de vacunas para SARS-CoV-2 usadas actualmente?

2- ¿Hay alguna base teórica para que las desarrolladas más recientemente sean más eficientes?