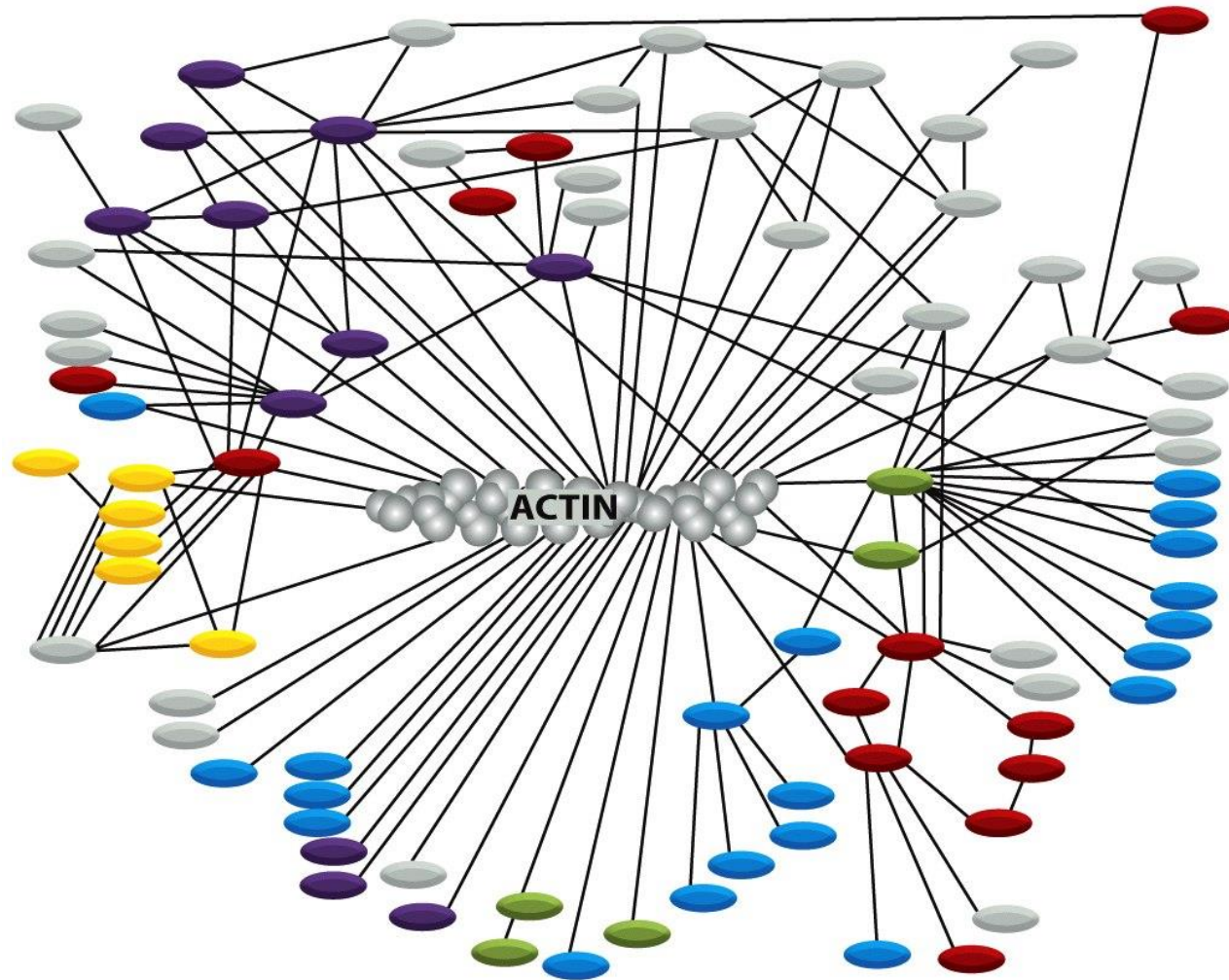



# El citoesqueleto

*Parte II*

Flavio Zolessi

# Proteínas asociadas al citoesqueleto



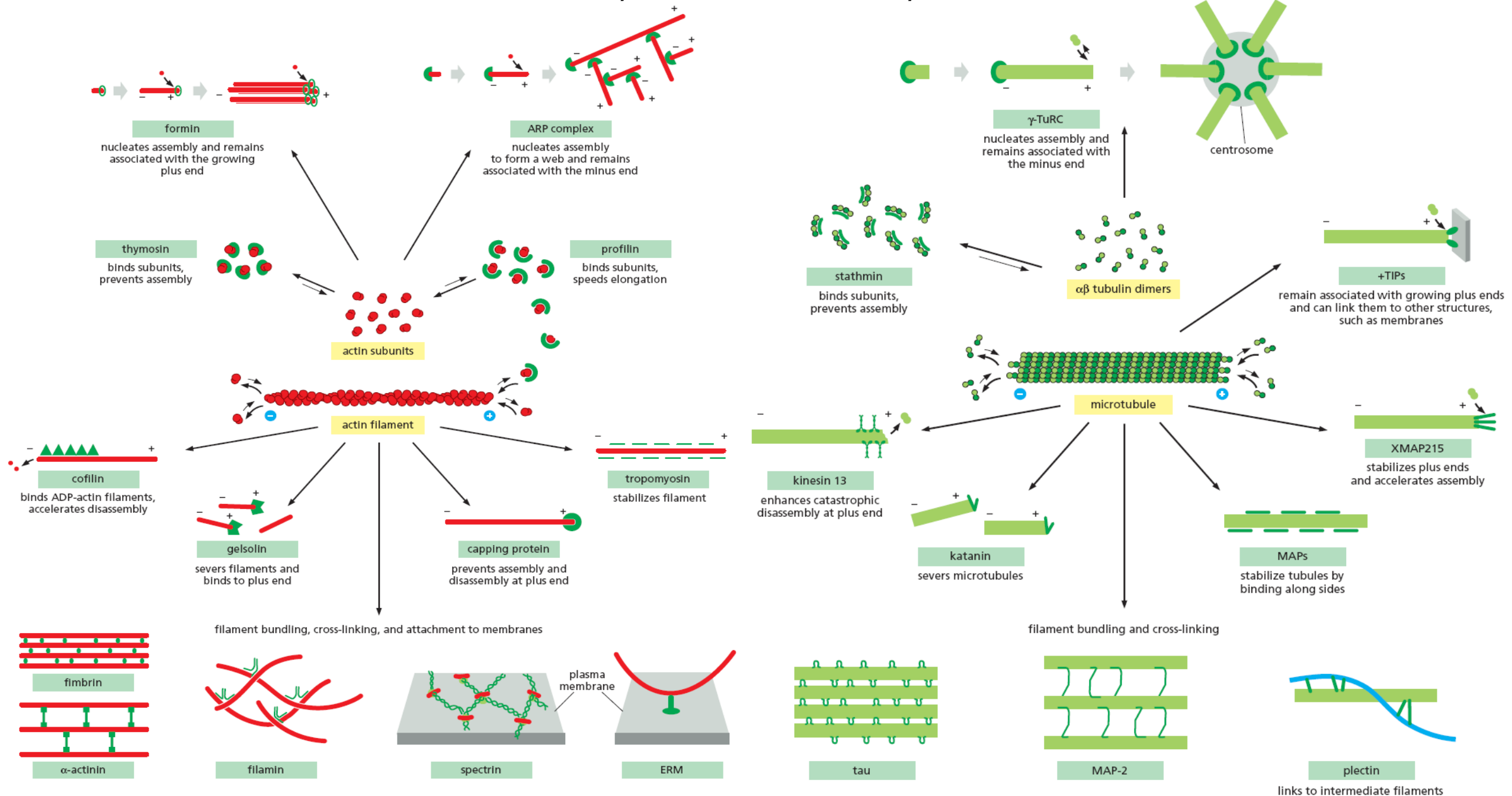
- KEY:**
- |  |   |
|--|---|
|  Proteínas motoras (miosina)  |  Síntesis de lípidos    |
|  División y polaridad celular |  Dinámica del filamento |
|  Secreción, endocitosis       |  Otras                  |

Trabajo  
extra 2:

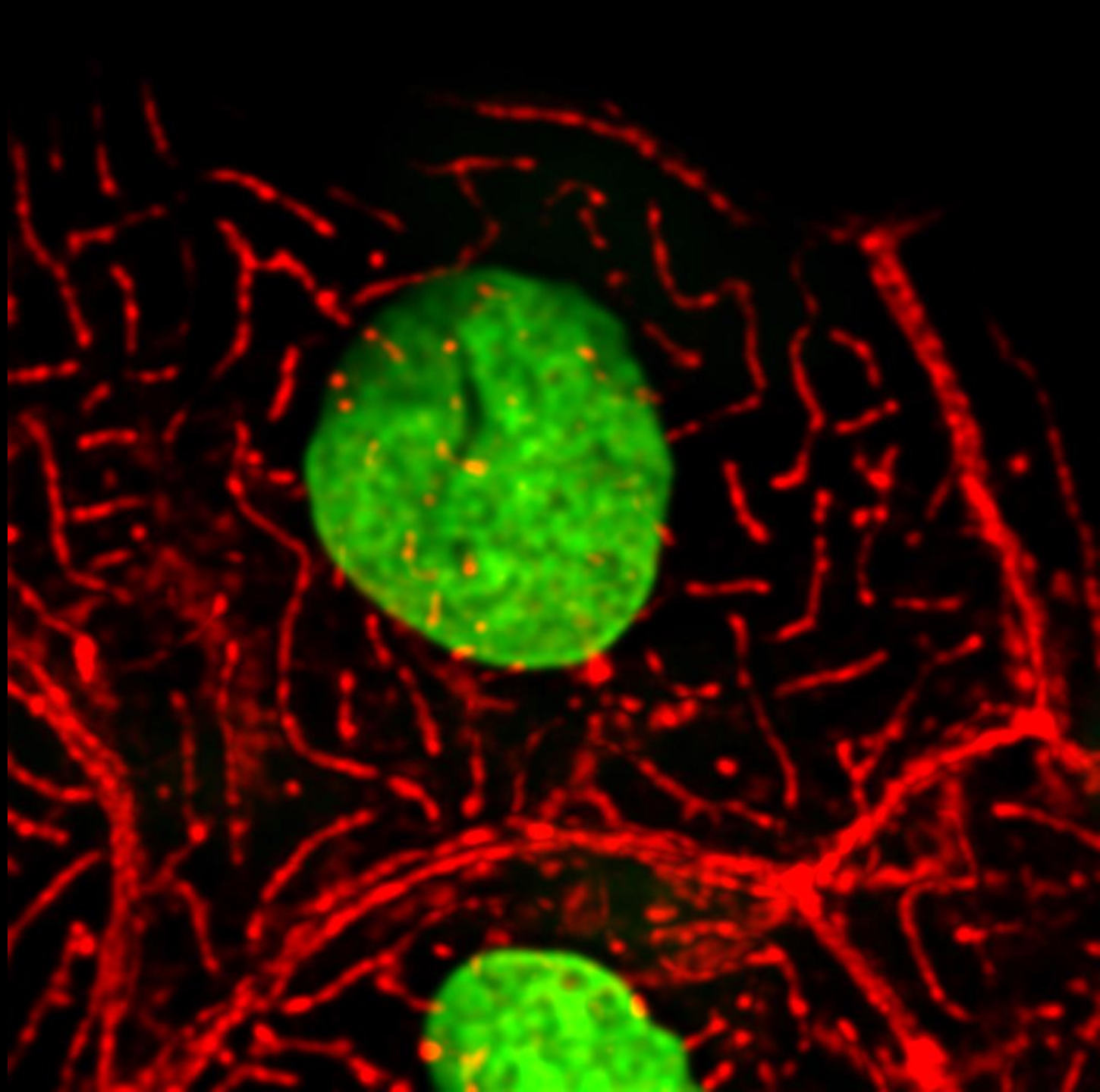
[string-db.org](http://string-db.org)

[www.uniprot.org](http://www.uniprot.org)

# Microfilamentos y microtúbulos, y sus interactores



Regulación y función  
de los microfilamentos



# Proteínas que entrecruzan microfilamentos

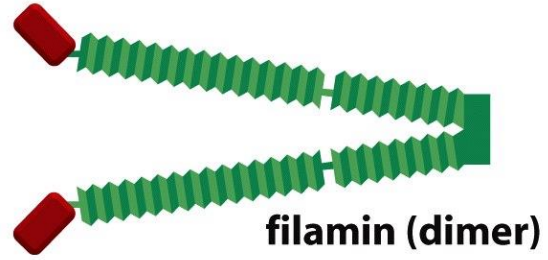
spectrin (tetramer)



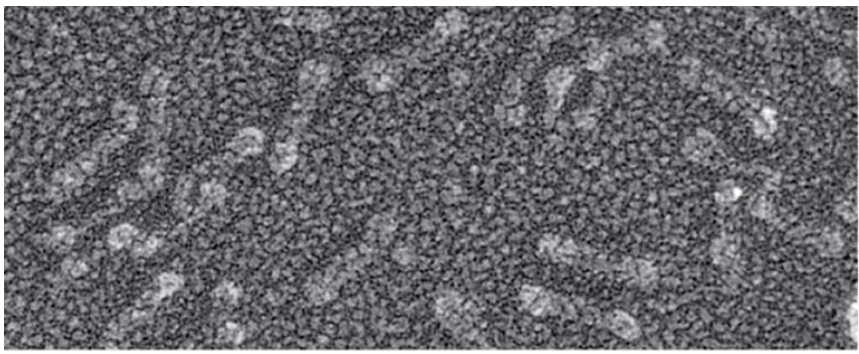
fimbrin (monomer)



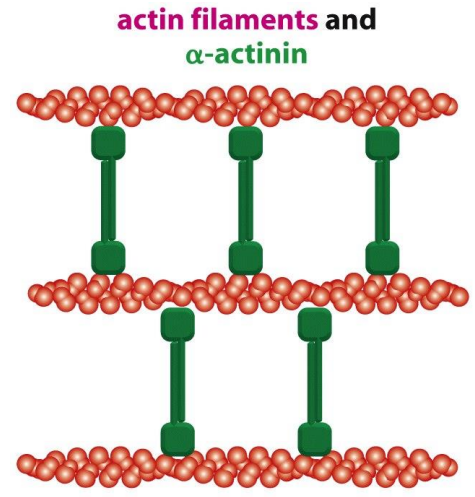
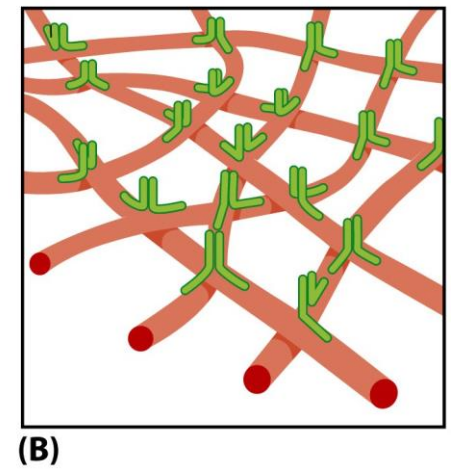
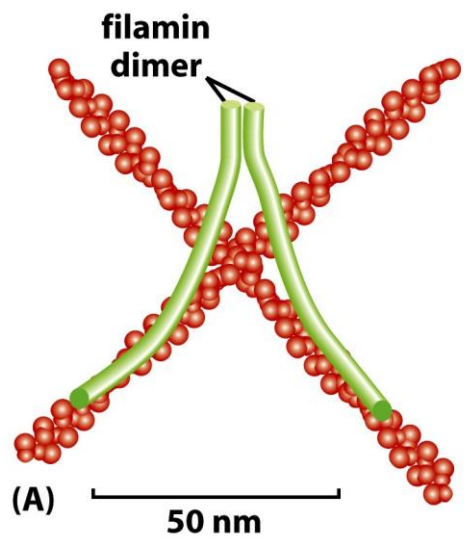
$\alpha$ -actinin (dimer)



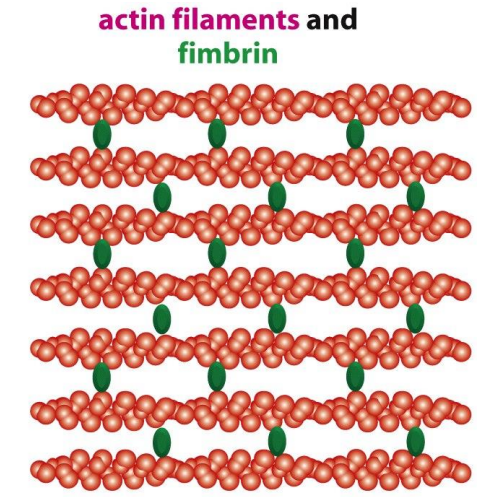
50 nm



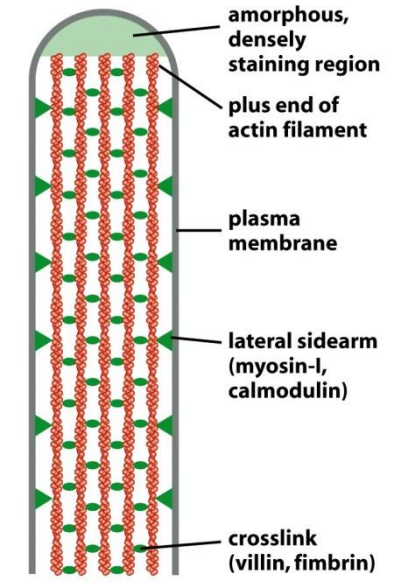
100 nm



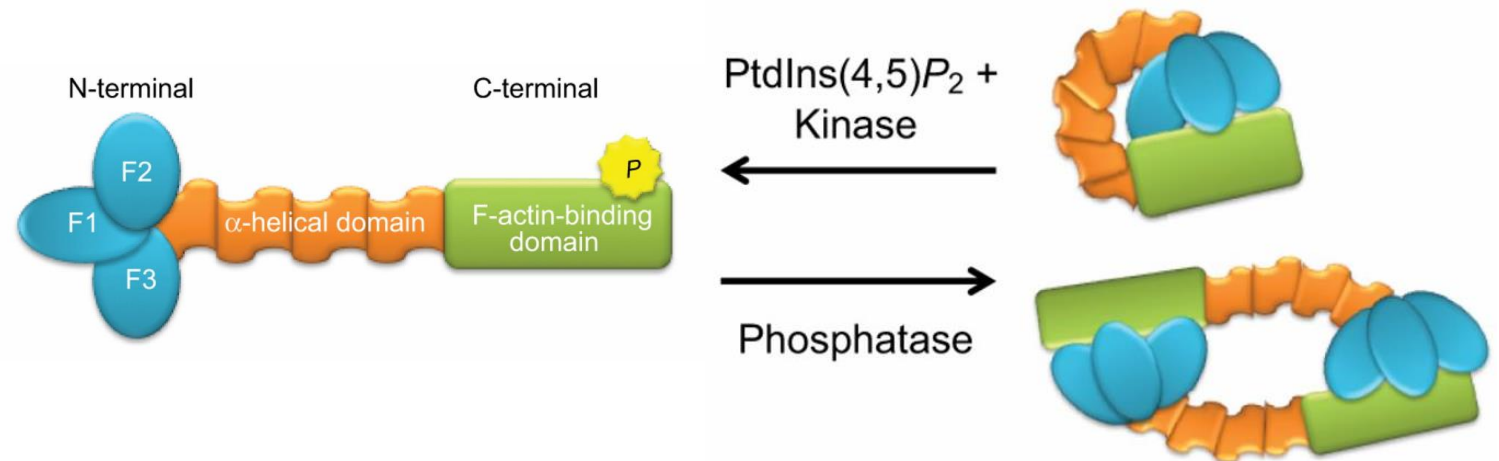
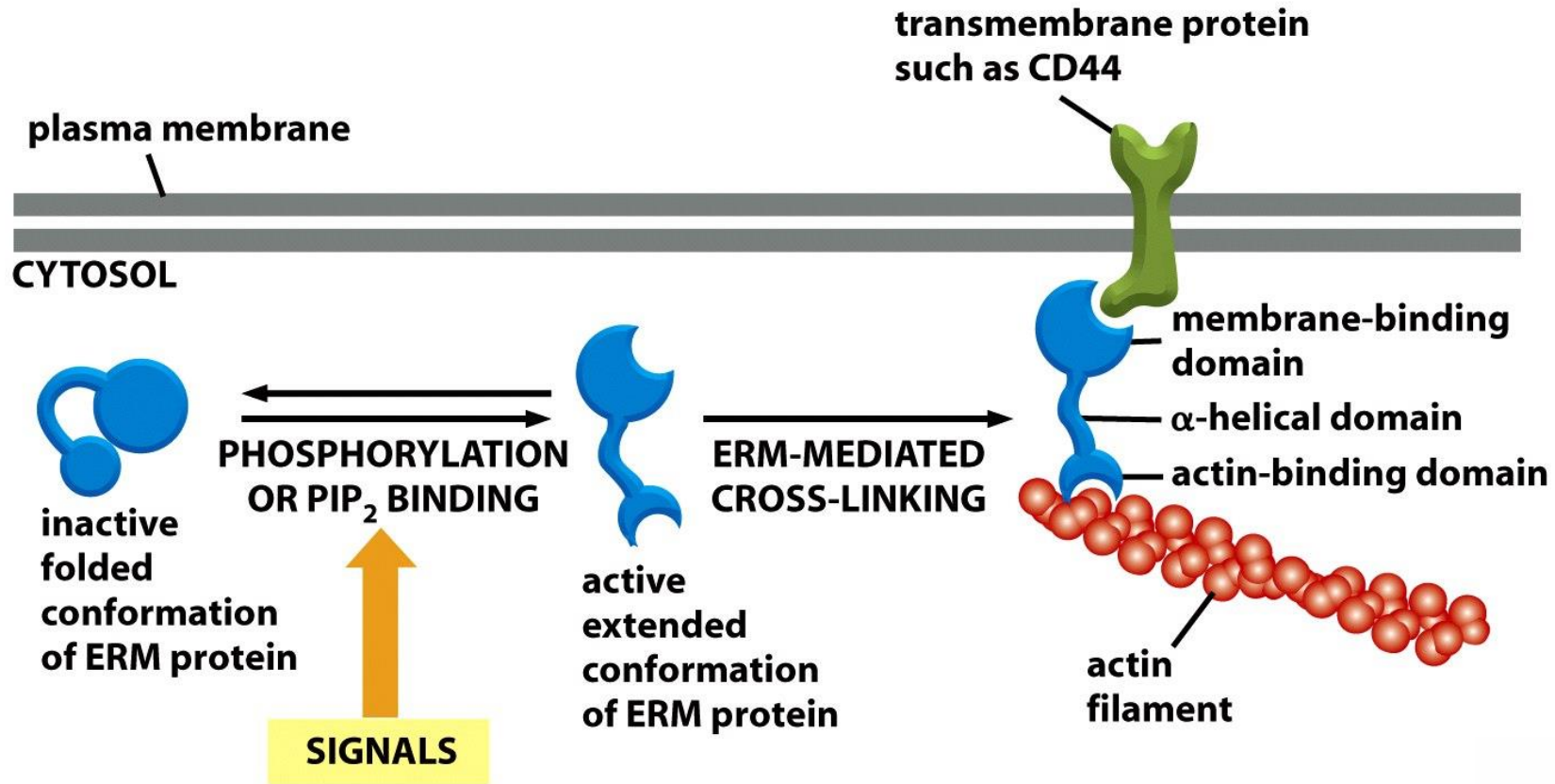
**contractile bundle**  
loose packing allows myosin-II to enter bundle



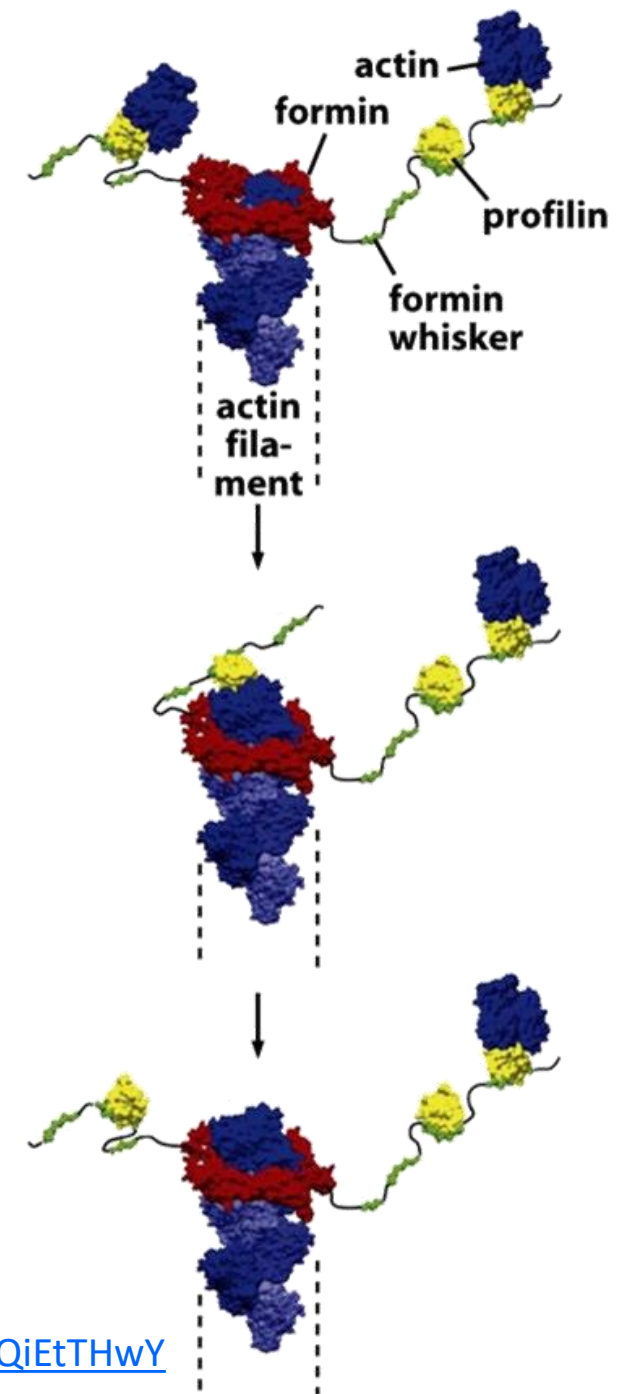
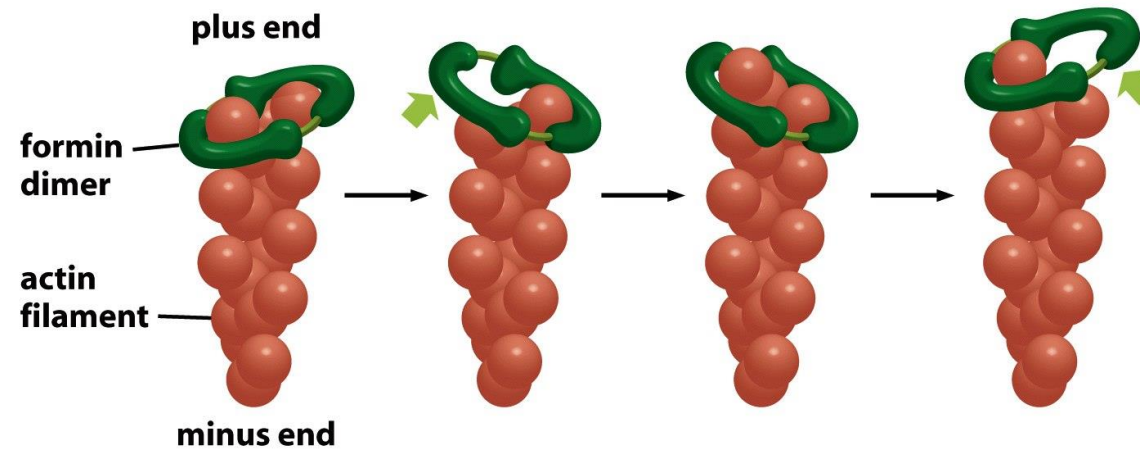
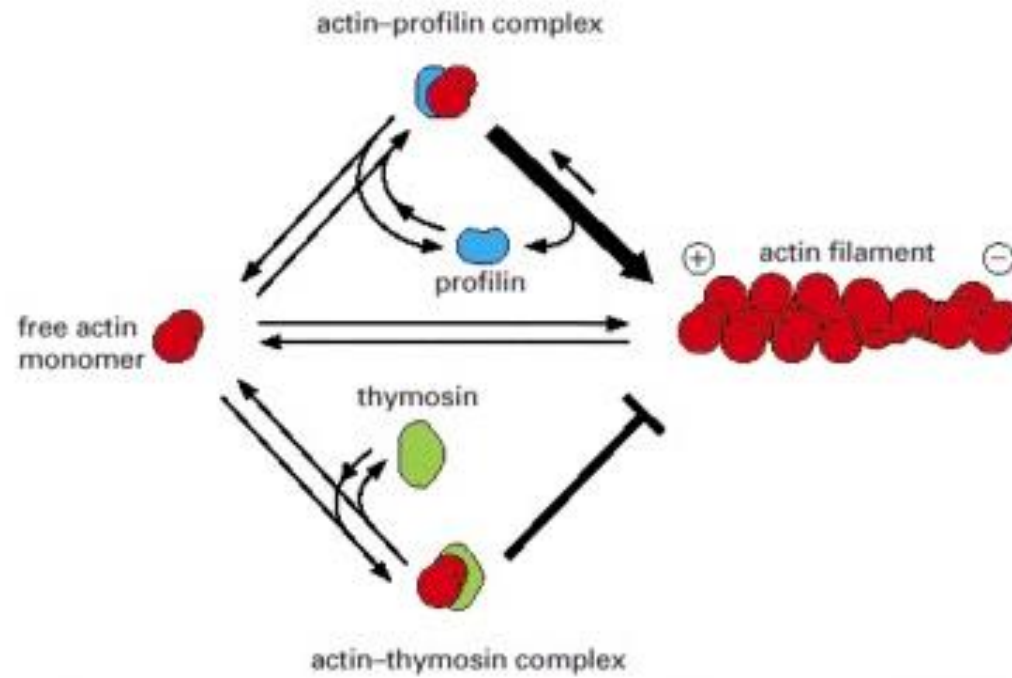
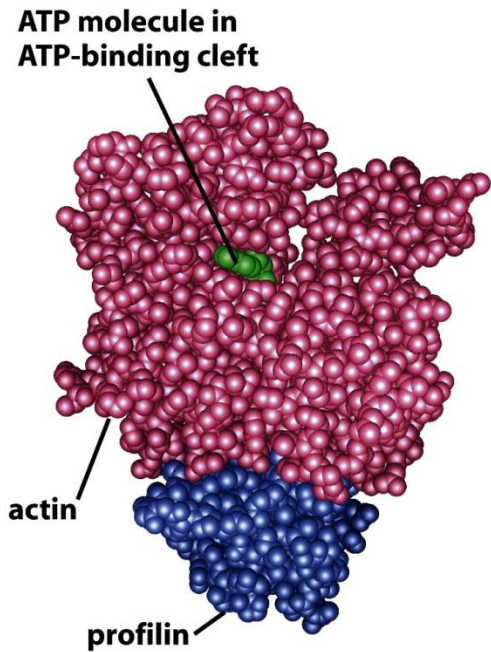
**parallel bundle**  
tight packing prevents myosin-II from entering bundle



# Proteínas que unen microfilamentos a la membrana: ERM



# Polimerización de actina en las células: Formina, profilina, timosina

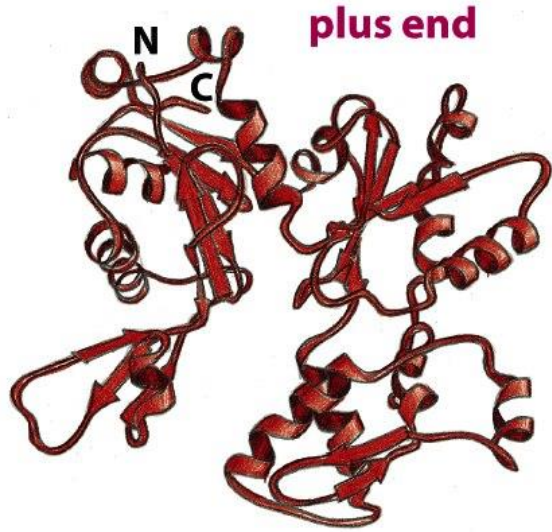


Video siguiente: <https://youtu.be/jonQiEtTHwY>

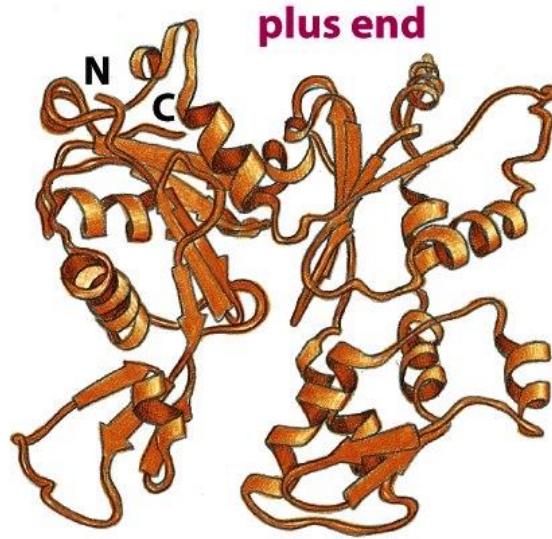




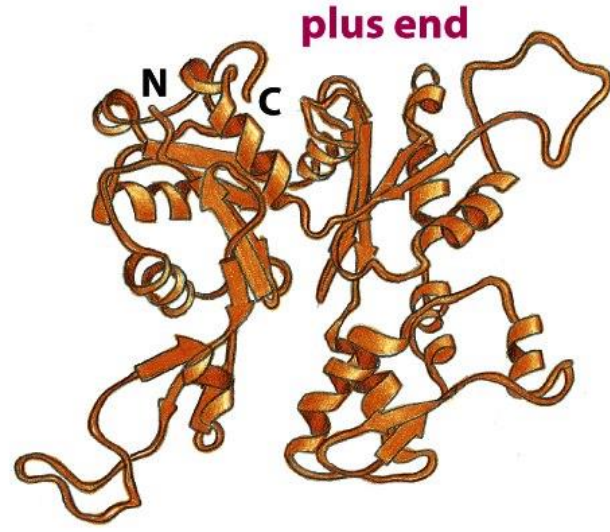
# Complejo ARP



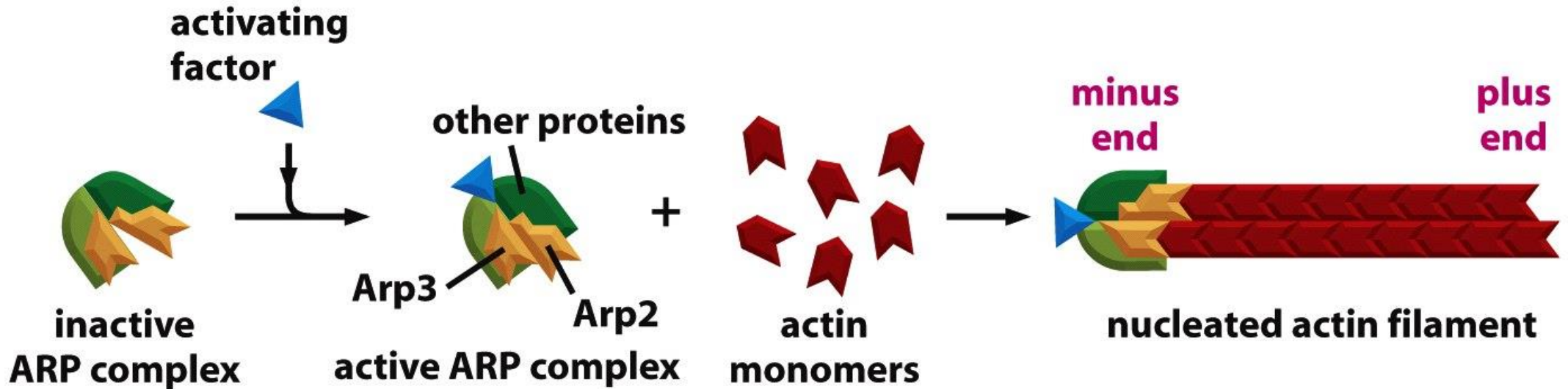
actin [  ]



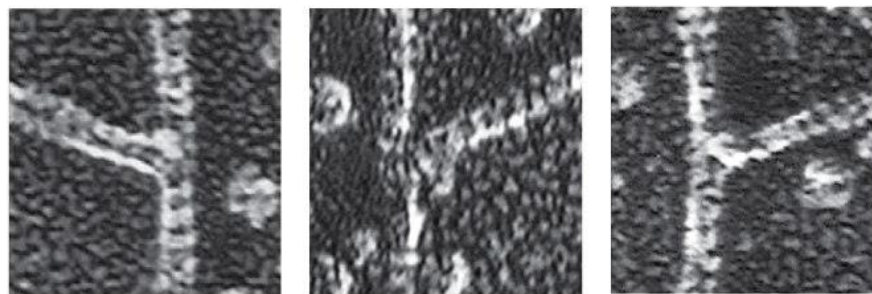
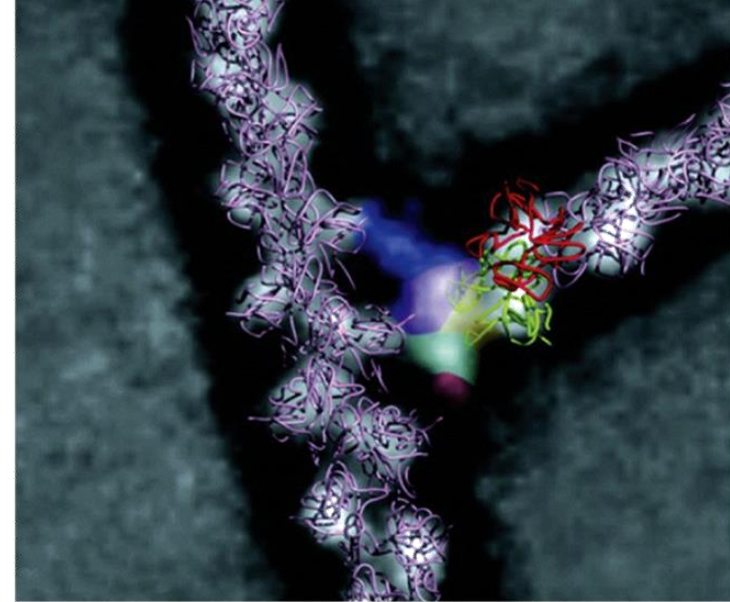
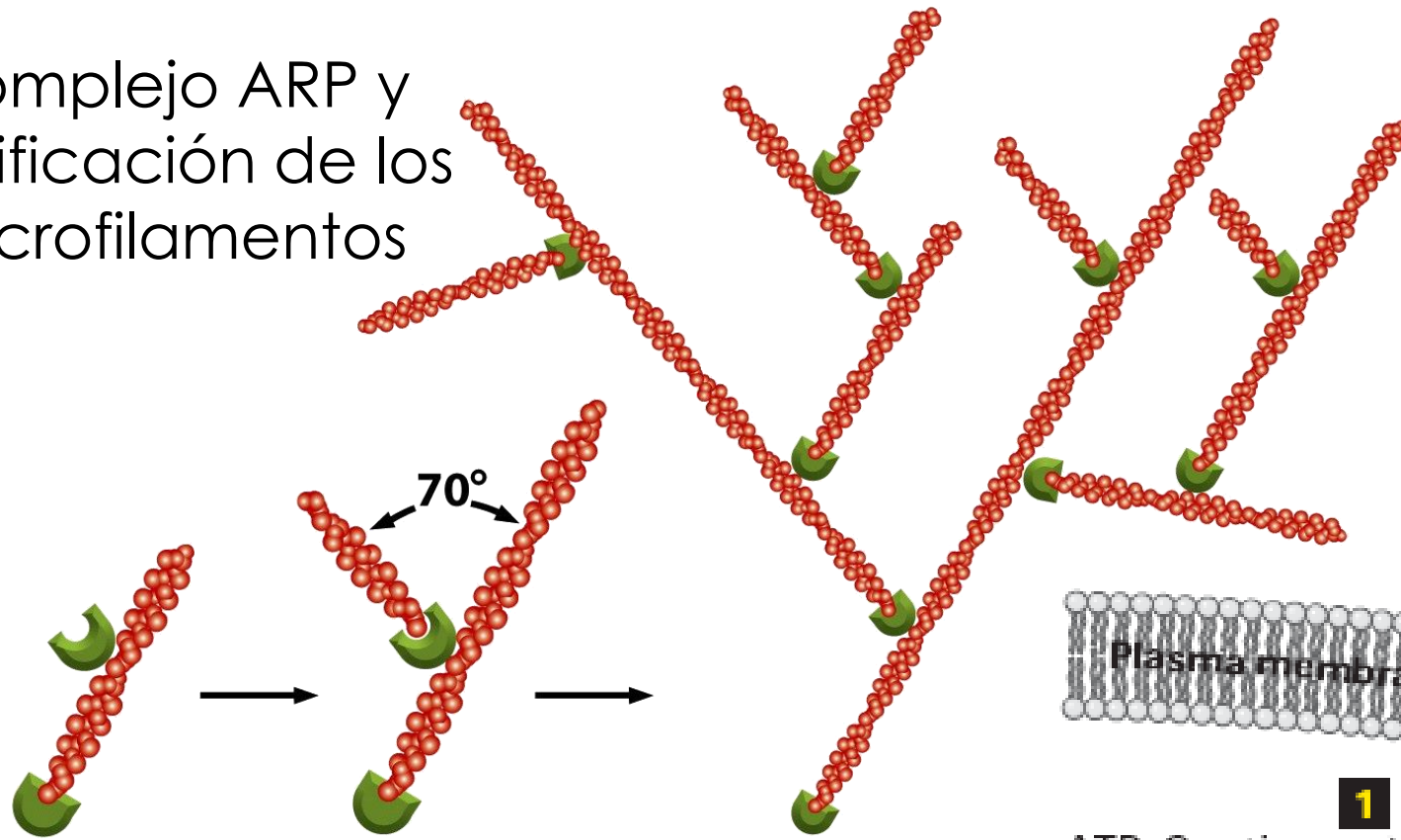
Arp2 [  ]



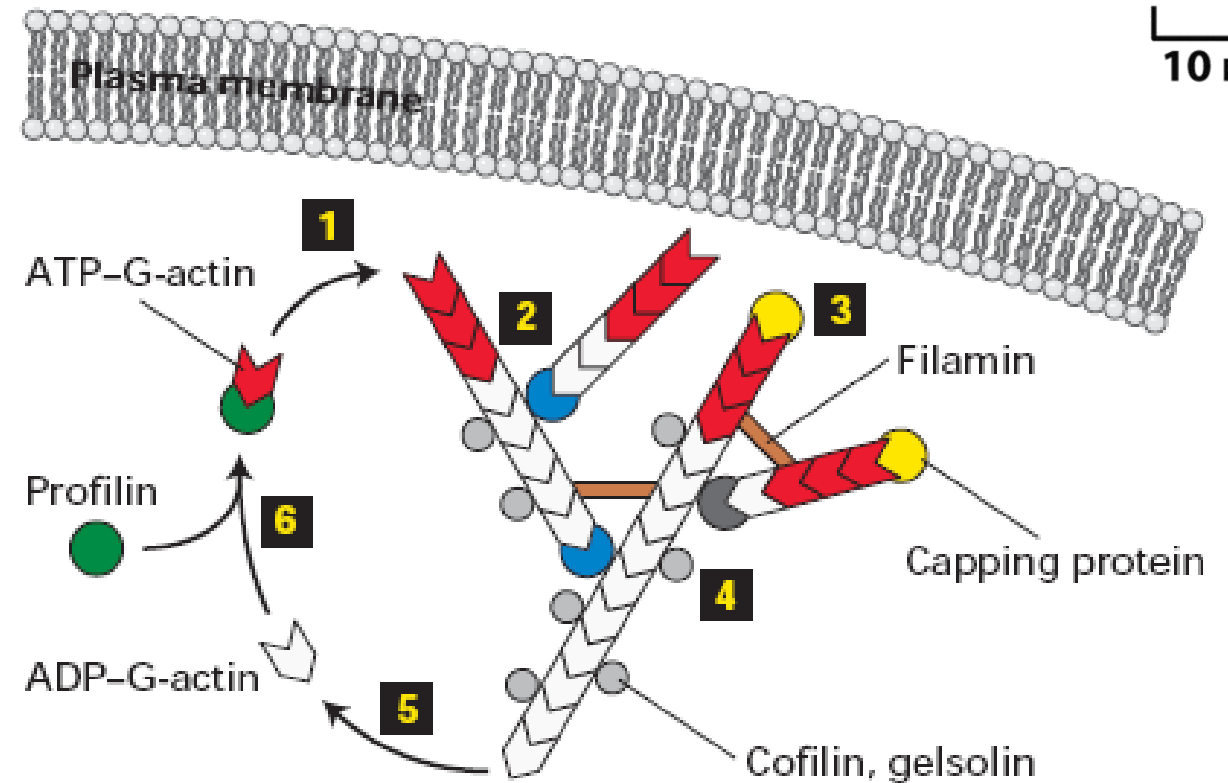
Arp3 [  ]



# Complejo ARP y ramificación de los microfilamentos



100 nm

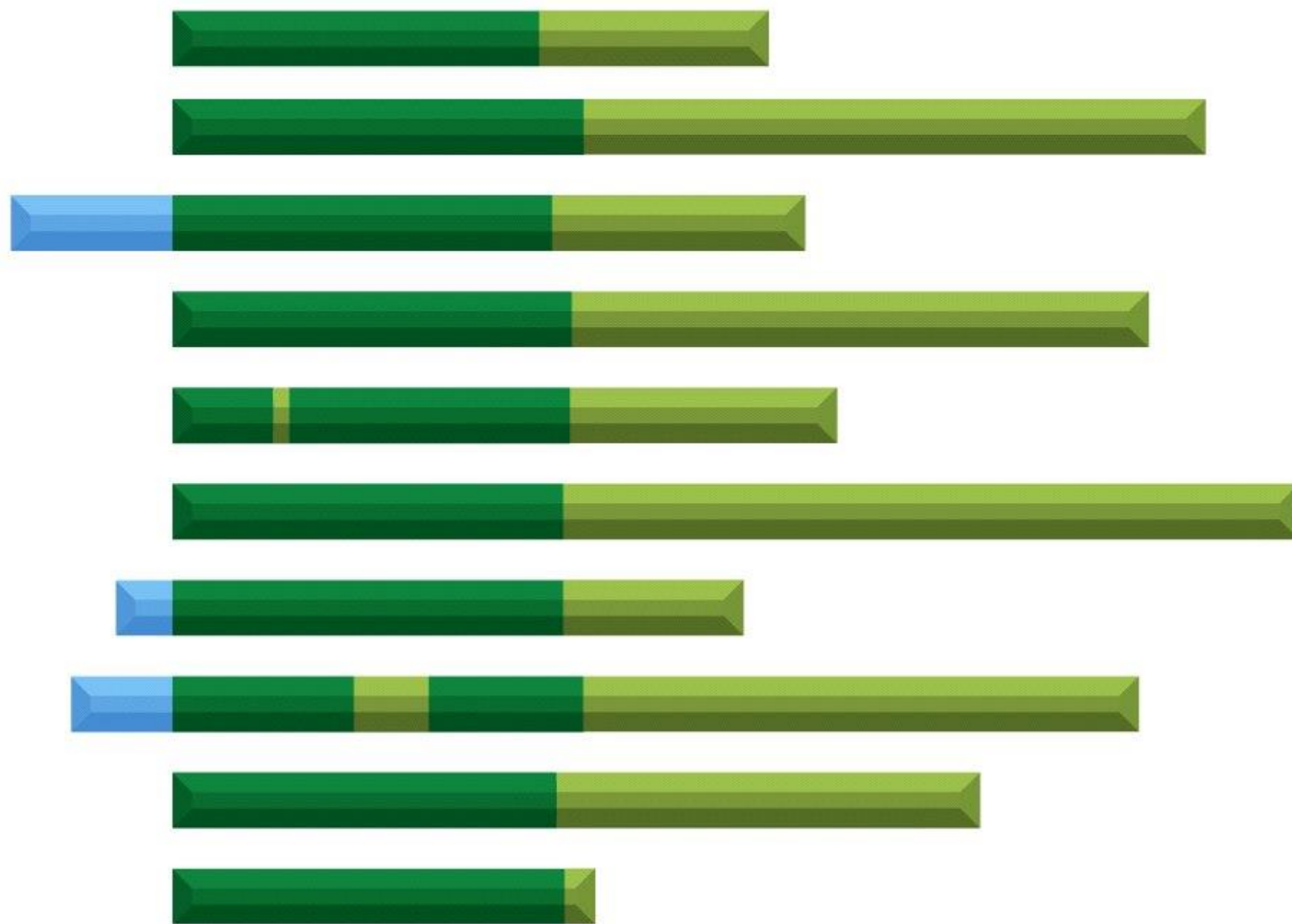


Video recomendado:

[https://youtu.be/d\\_uWtjyNb-Y](https://youtu.be/d_uWtjyNb-Y)

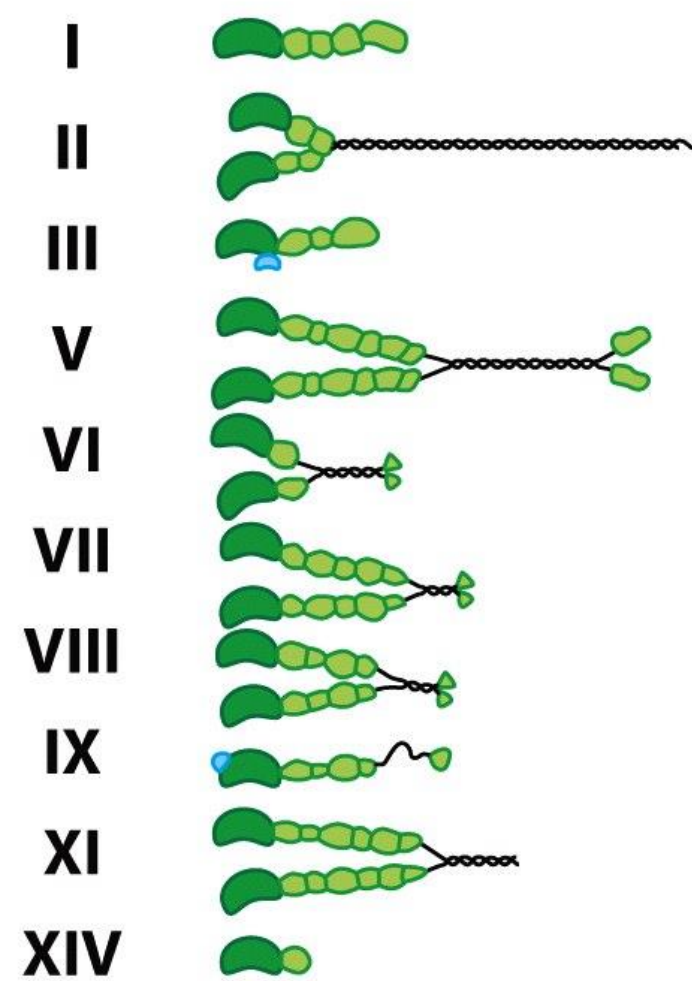
# Miosinas

motor domain



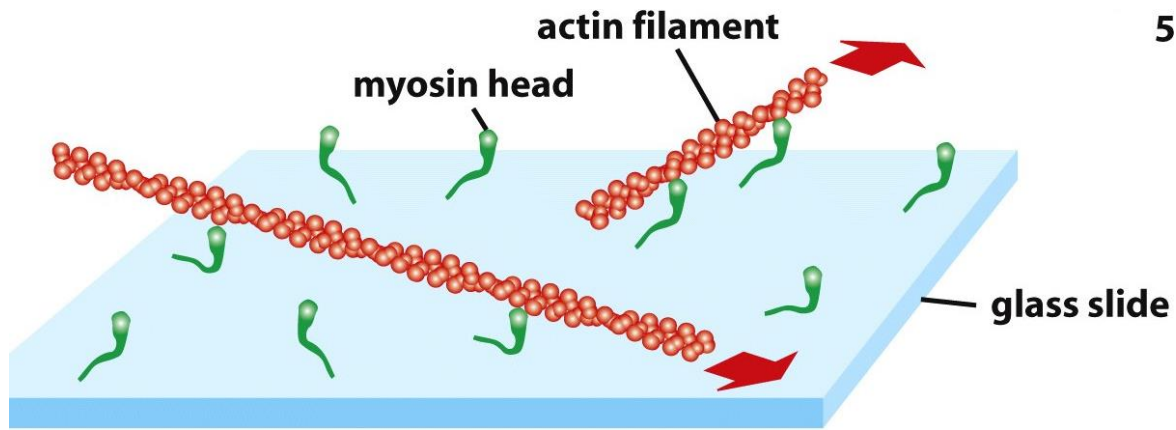
myosin type

overall structure

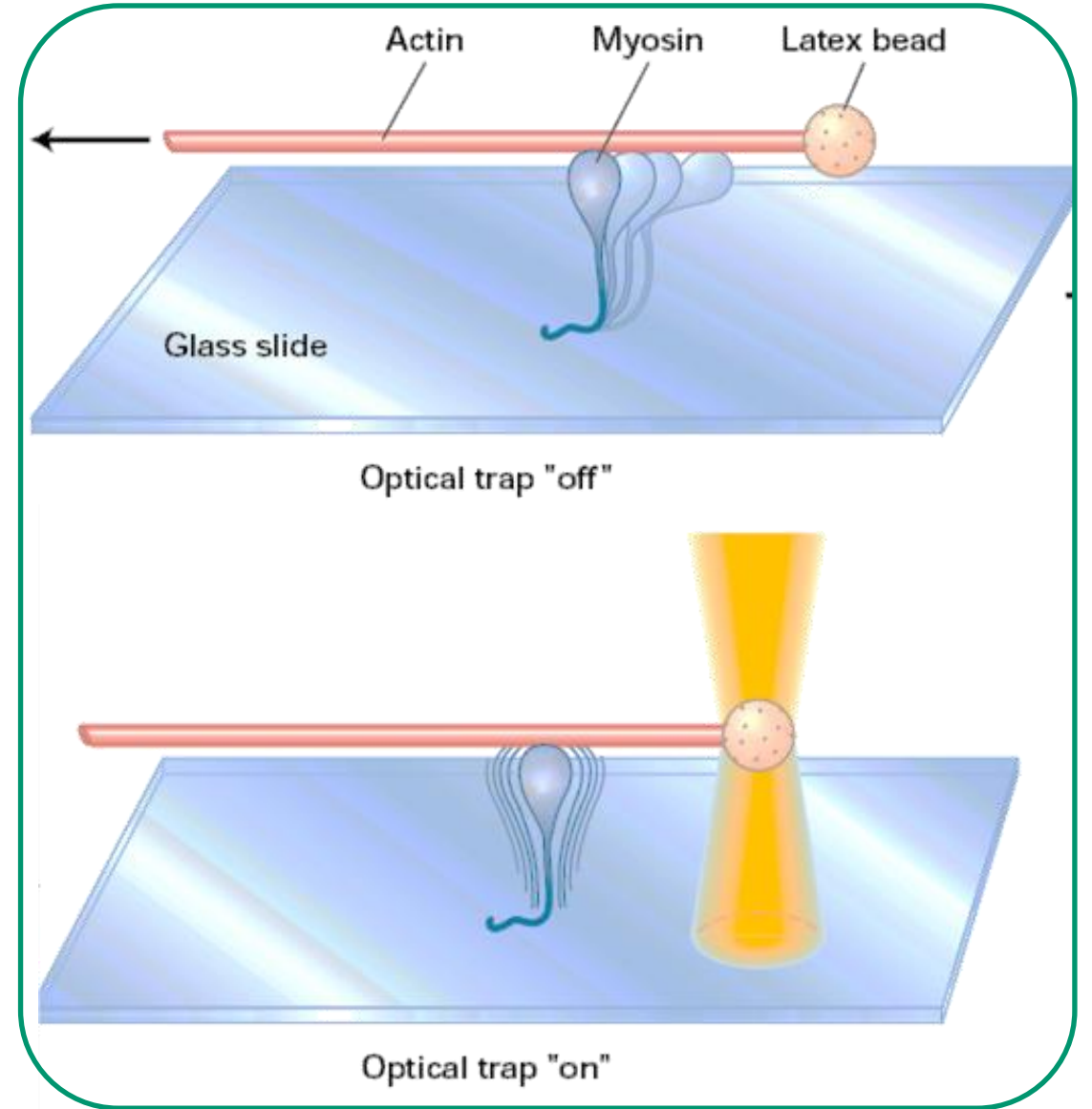


1000 amino acids

# Modos de estudio del movimiento generado por miosina

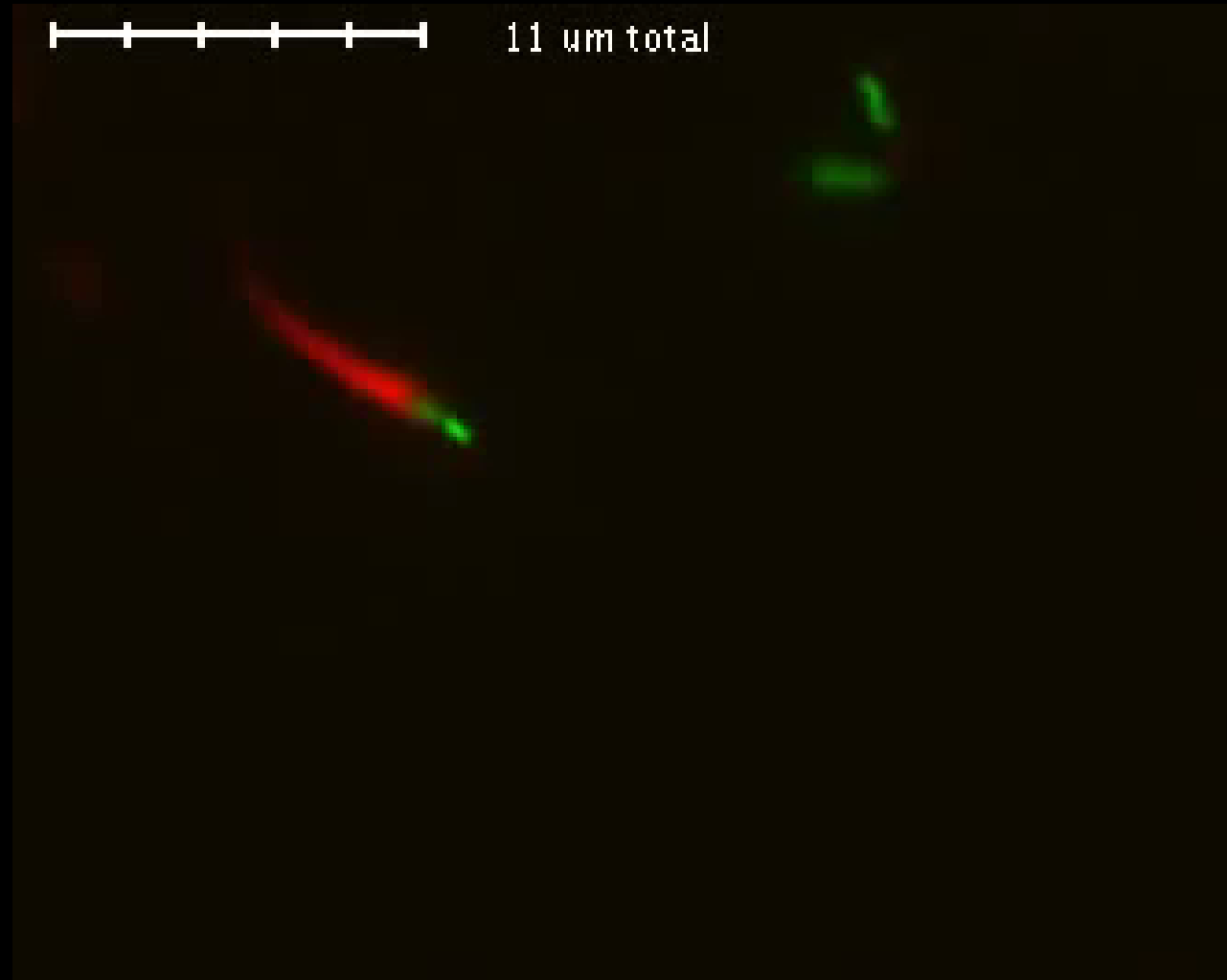


5



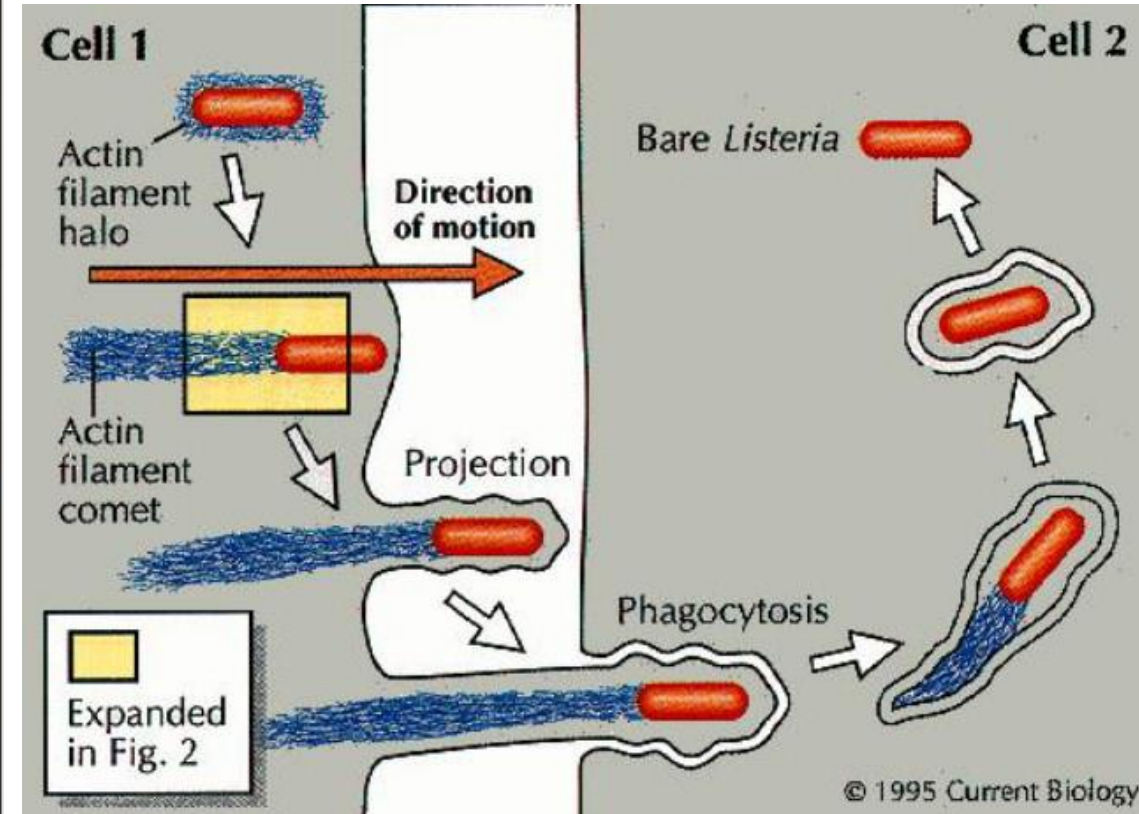
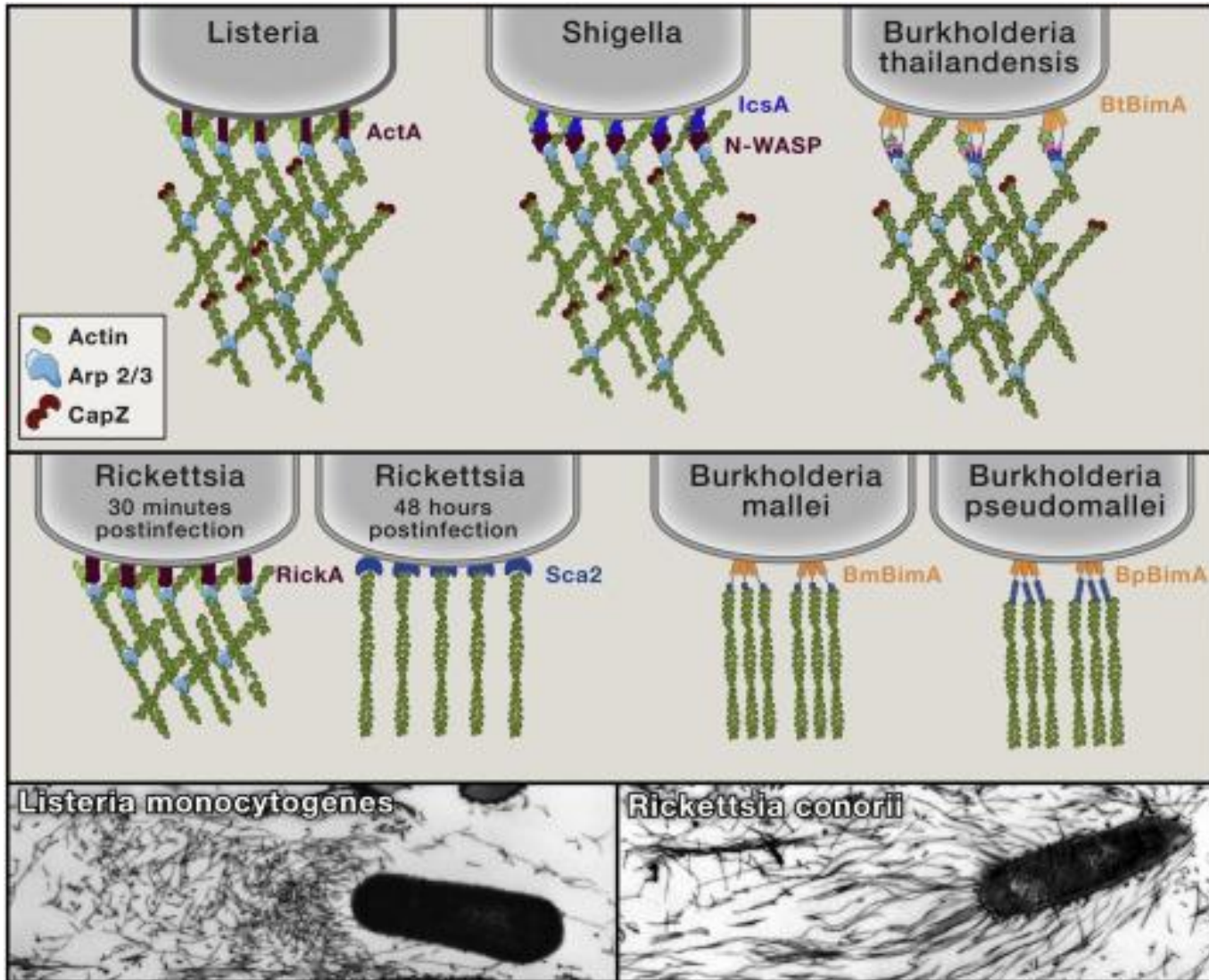


<https://youtu.be/NxgGHHK3BmE>



<https://youtu.be/NxgGHHK3BmE>

# Bacterias intracelulares y el citoesqueleto de actina



Gouin et al, 2015

<https://www.sciencedirect.com/science/article/pii/S0092867415003554>

Pollard, 1995

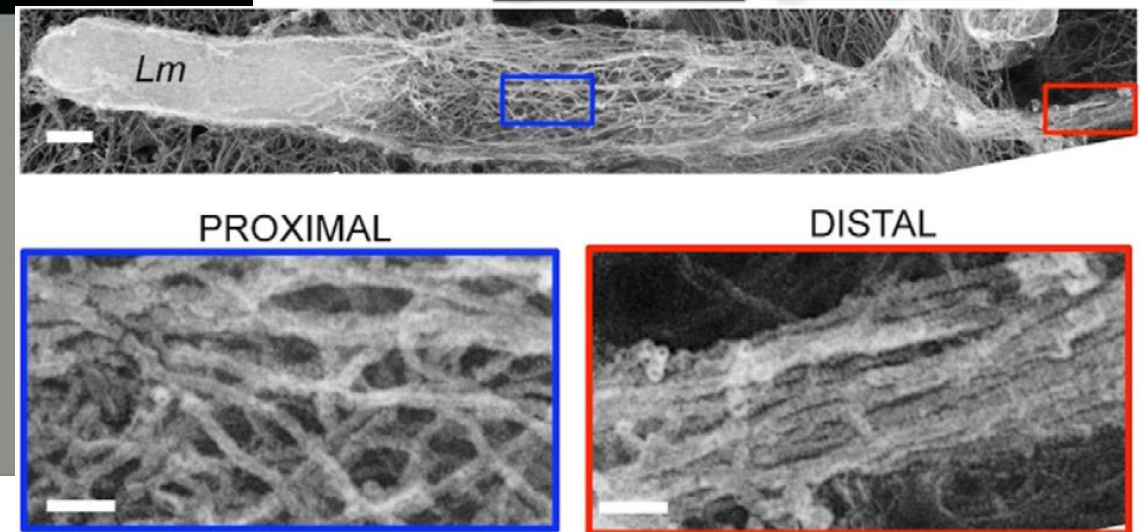
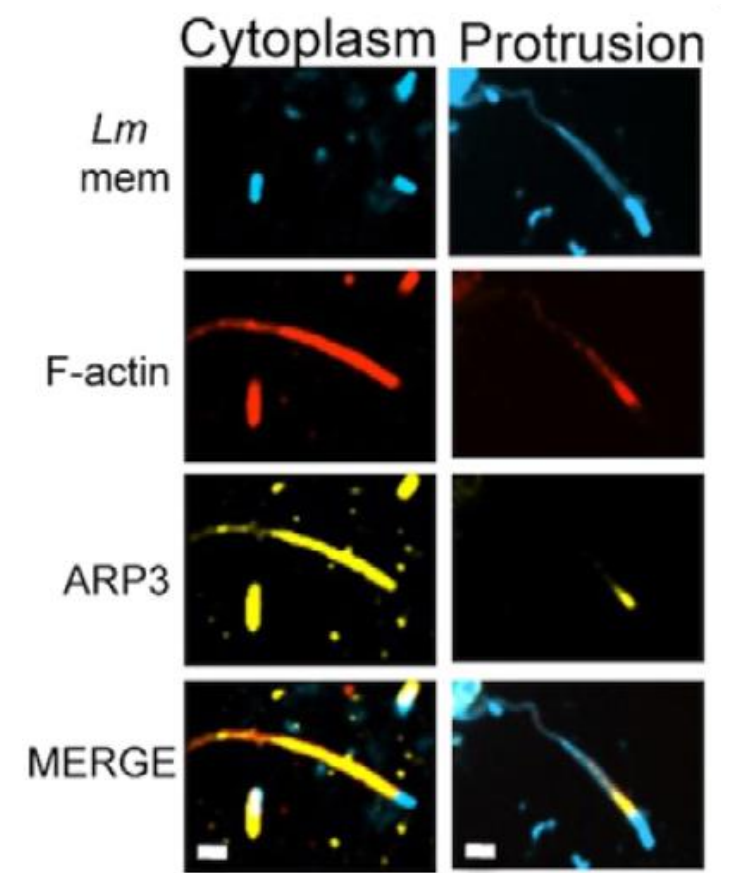
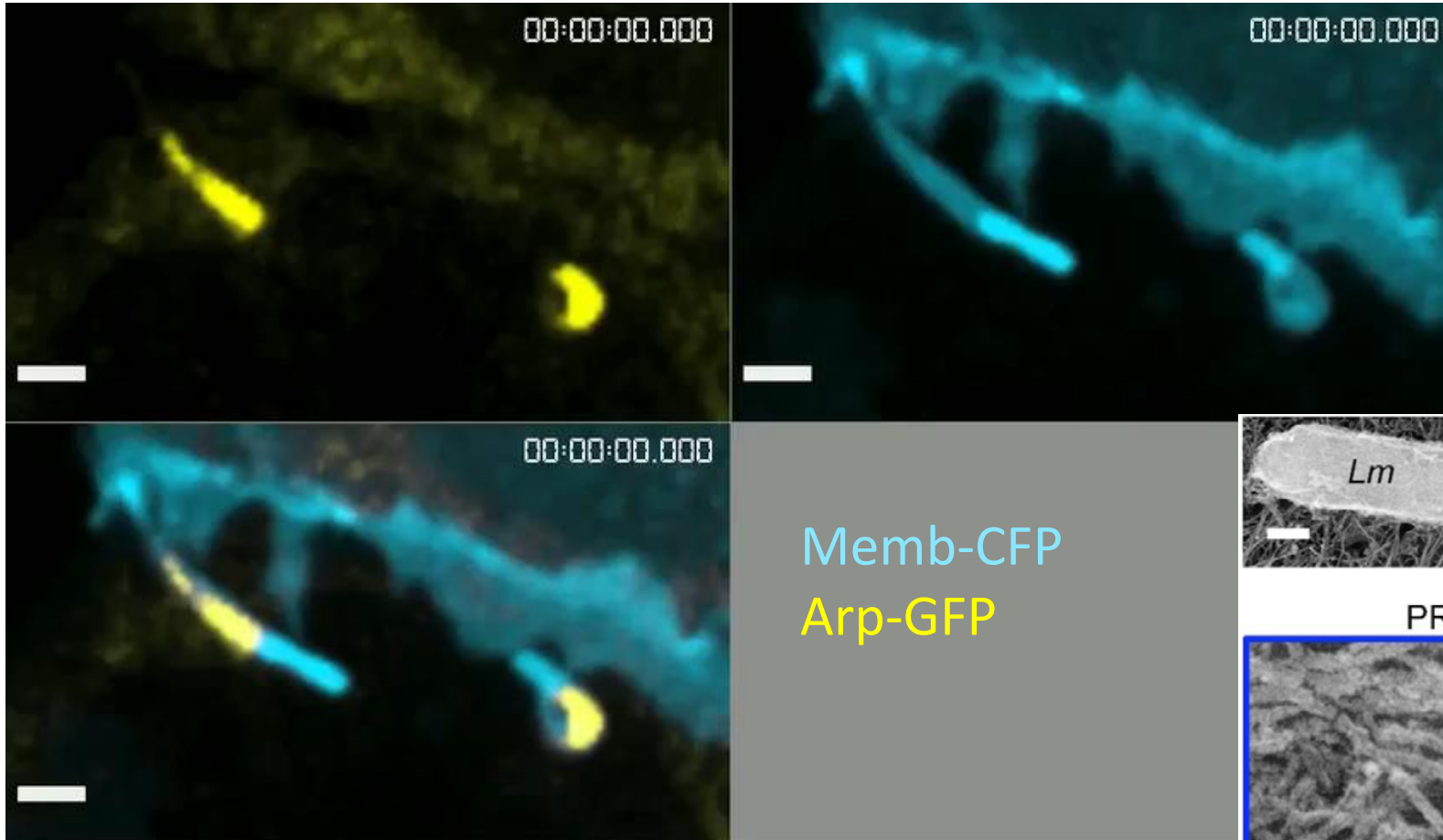
<https://www.sciencedirect.com/science/article/pii/S0960982295001679>

RESEARCH ARTICLE

# Actin network disassembly powers dissemination of *Listeria monocytogenes*

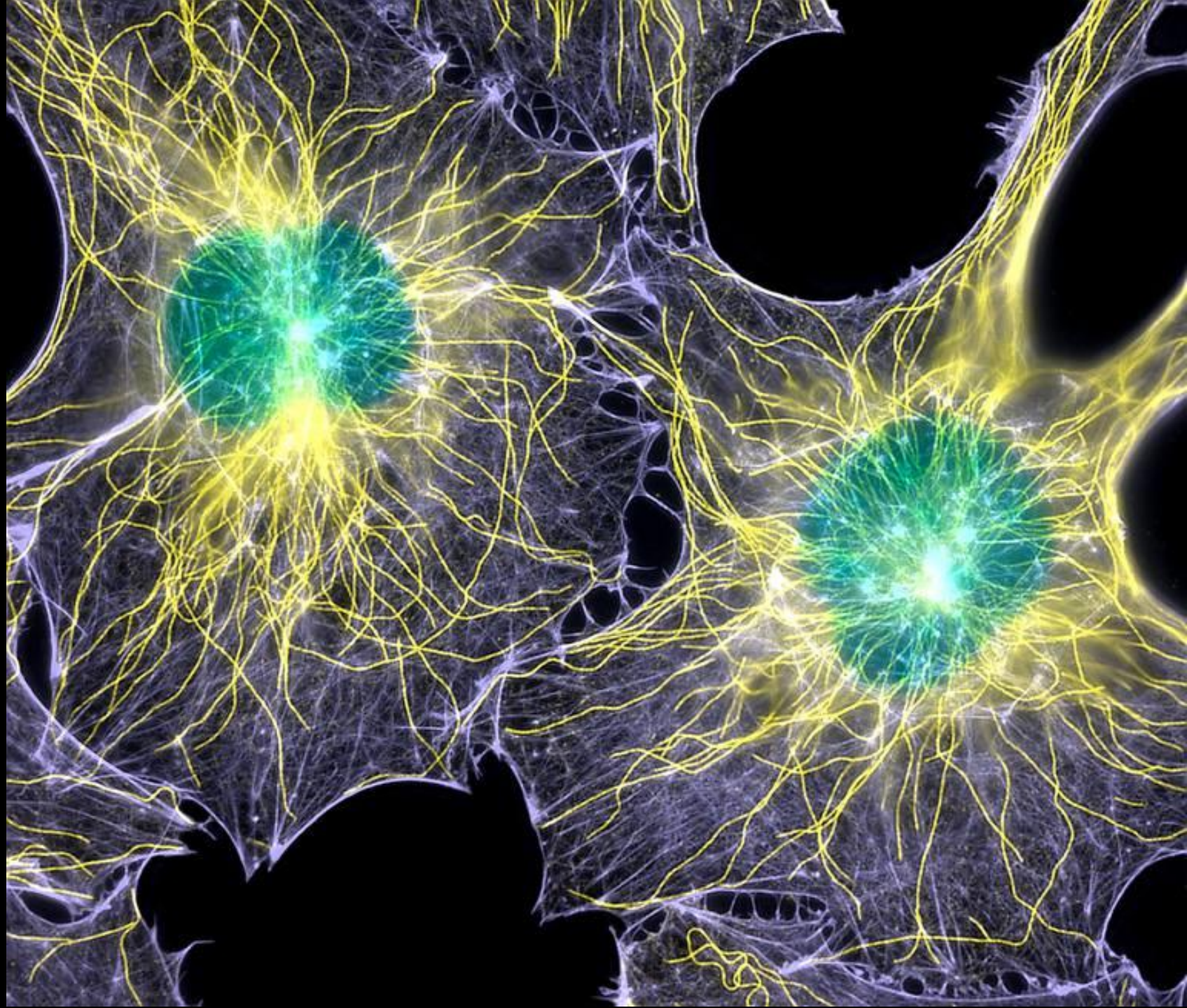
Arthur M. Talman<sup>1</sup>, Ryan Chong<sup>1</sup>, Jonathan Chia<sup>2</sup>, Tatyana Svitkina<sup>2</sup> and Hervé Agaisse<sup>1,\*</sup>

<https://jcs.biologists.org/content/127/1/240>



<http://movie.biologists.com/video/10.1242/jcs.140038/video-2>

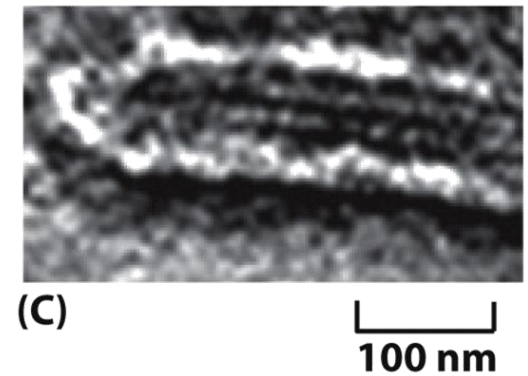
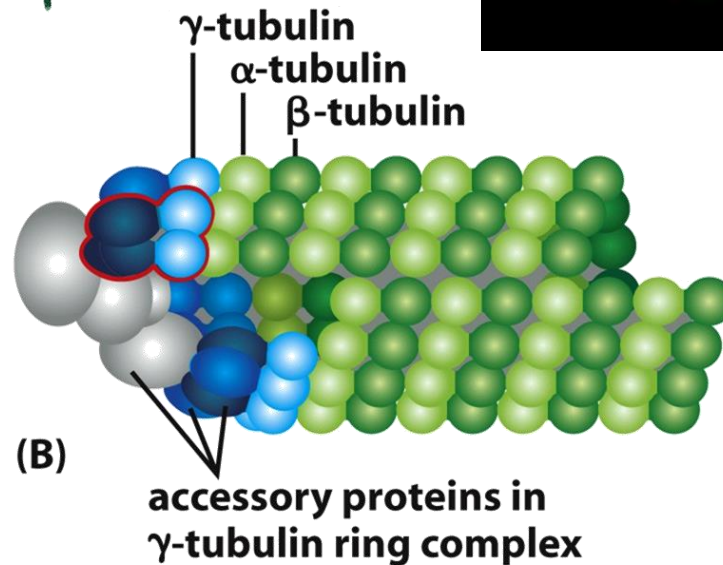
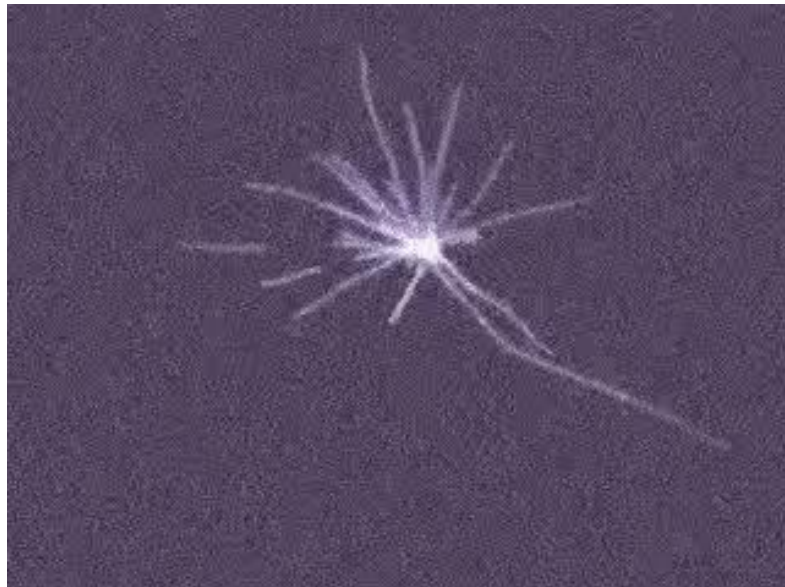
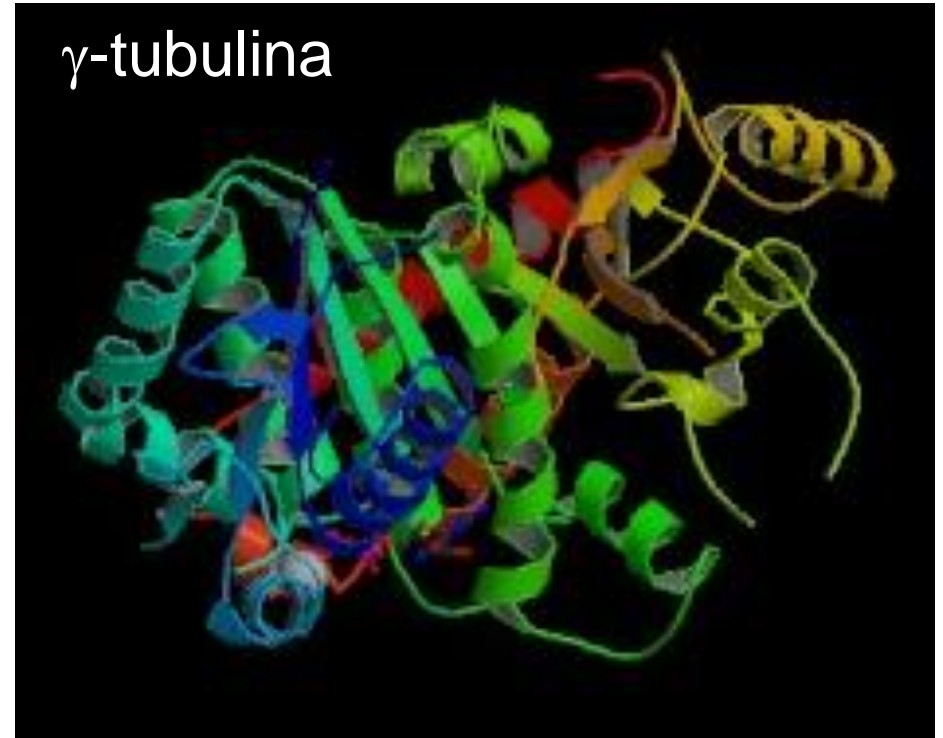
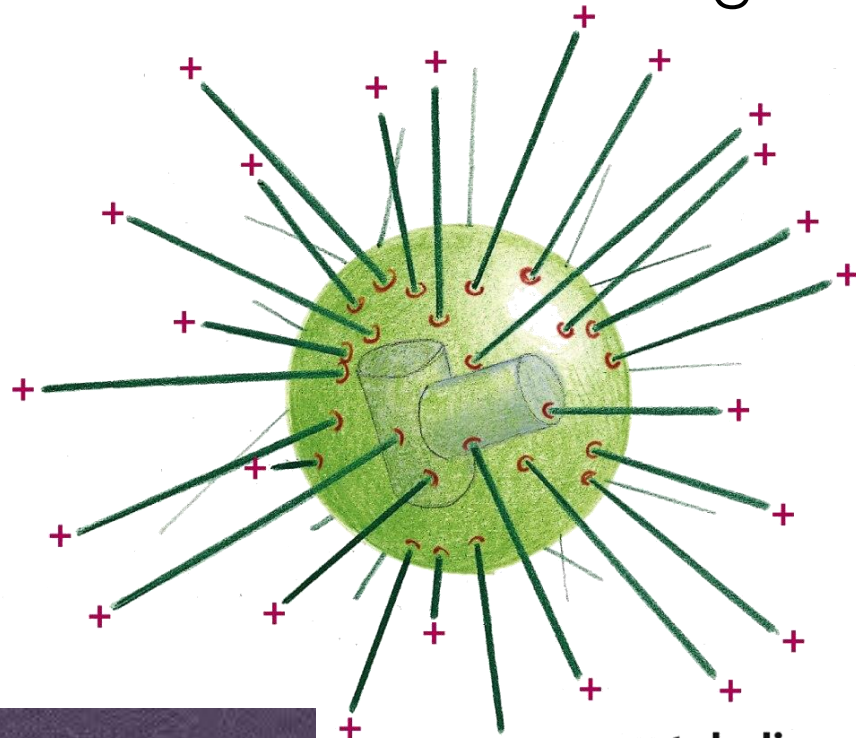
Regulación y función  
de los microtúbulos

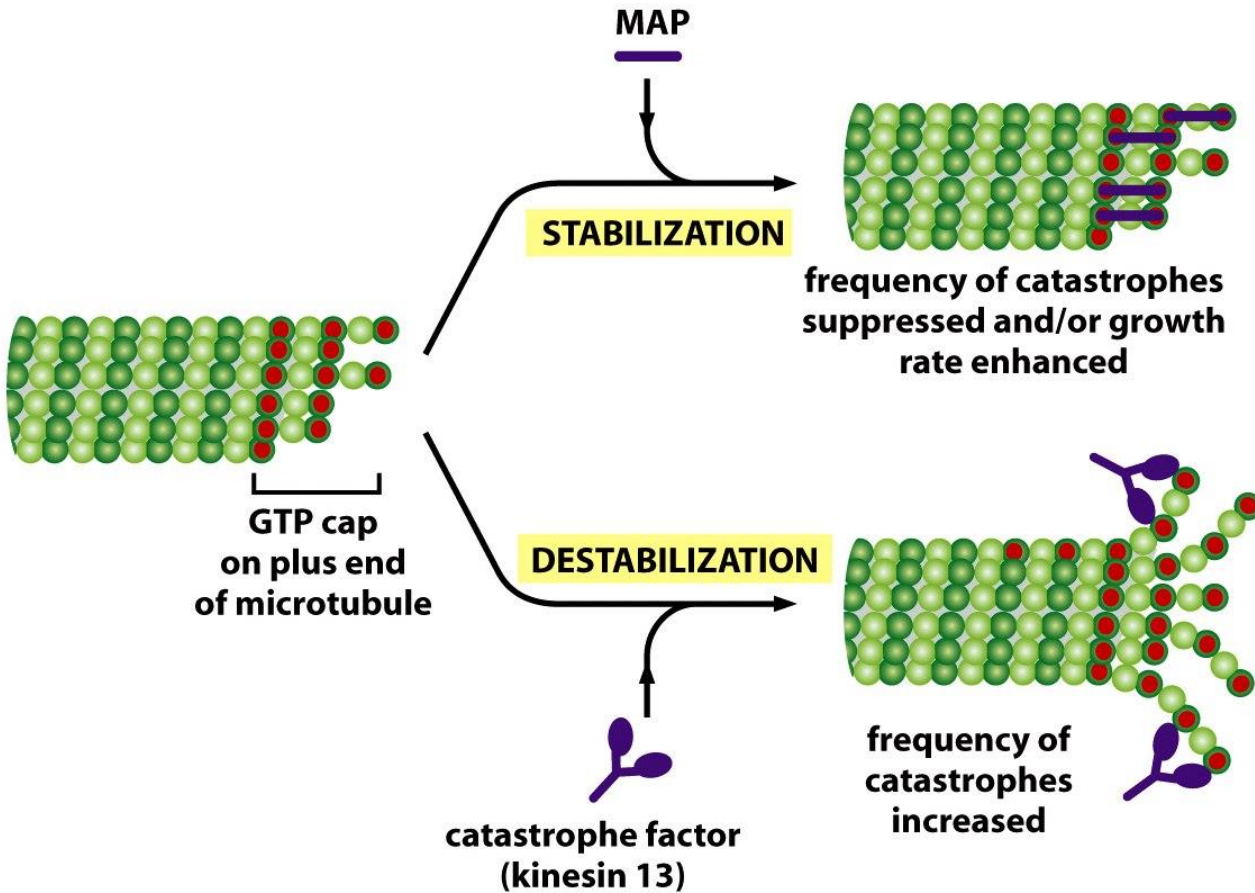




# El centrosoma o centro organizador de microtúbulos

[https://youtu.be/So\\_rUcYfxsfg](https://youtu.be/So_rUcYfxsfg)





# Modulación de la dinámica de los microtúbulos

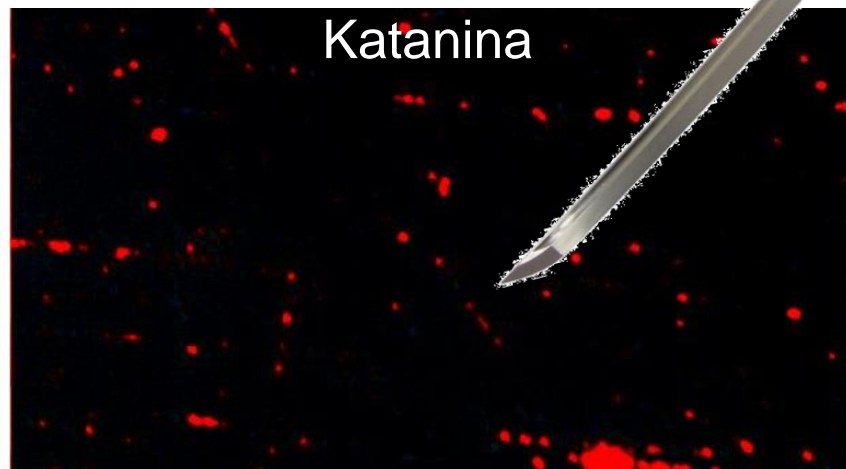
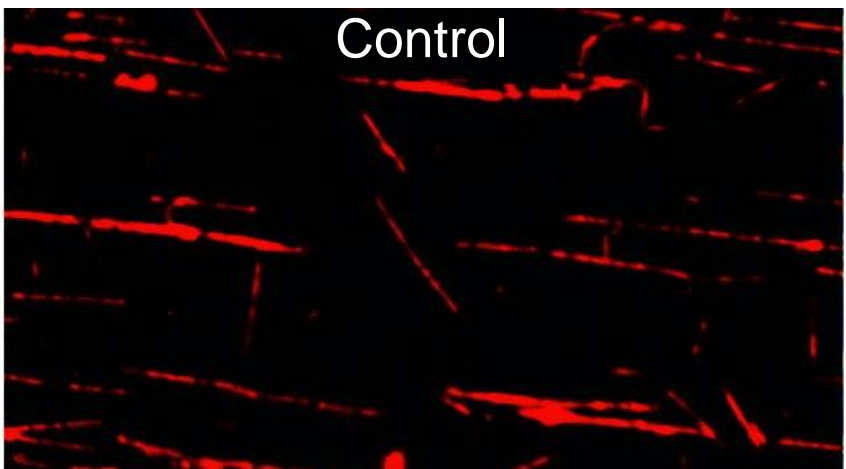
Acetilación

<https://www.sciencedirect.com/science/article/pii/S2211124719300294>

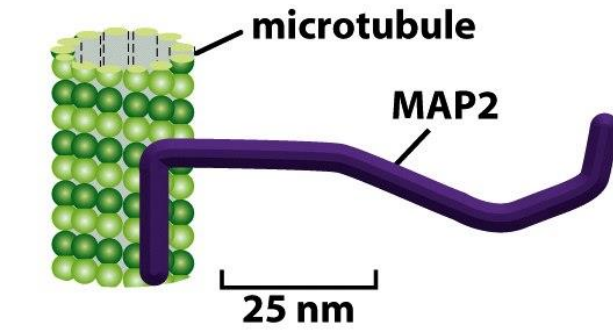
Glutamilación



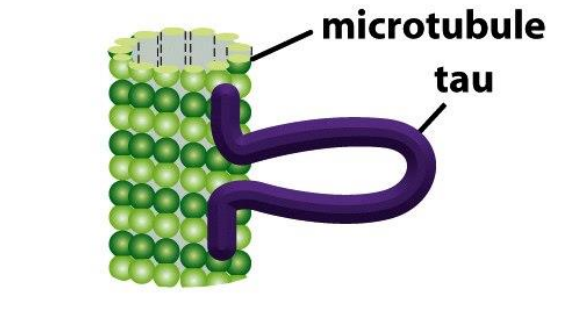
Microtúbulos



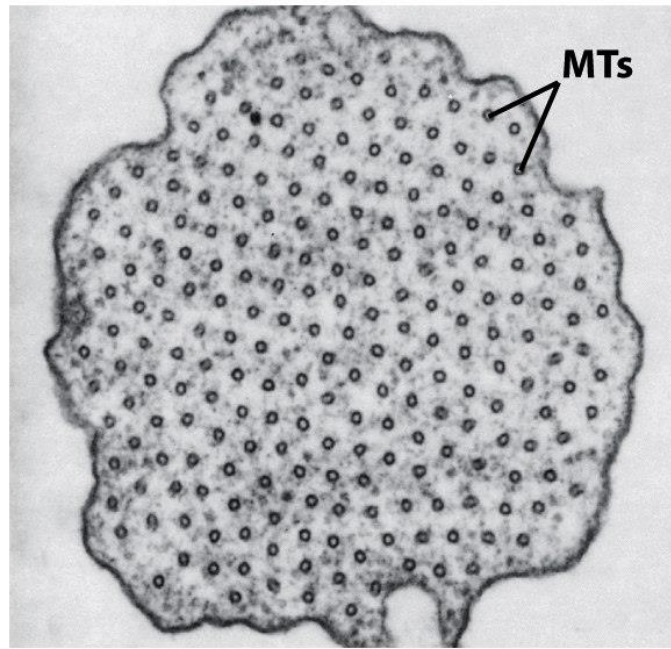
# Proteínas asociadas a microtúbulos (MAPs)



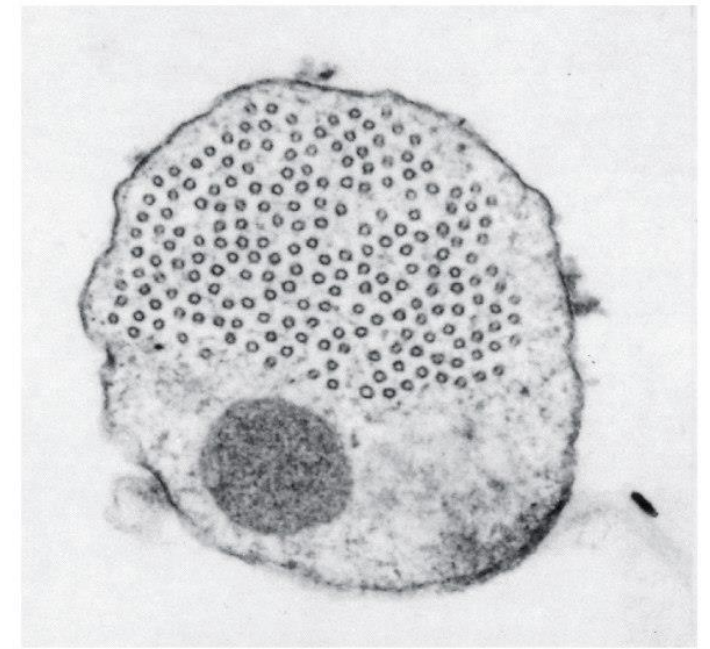
(A)



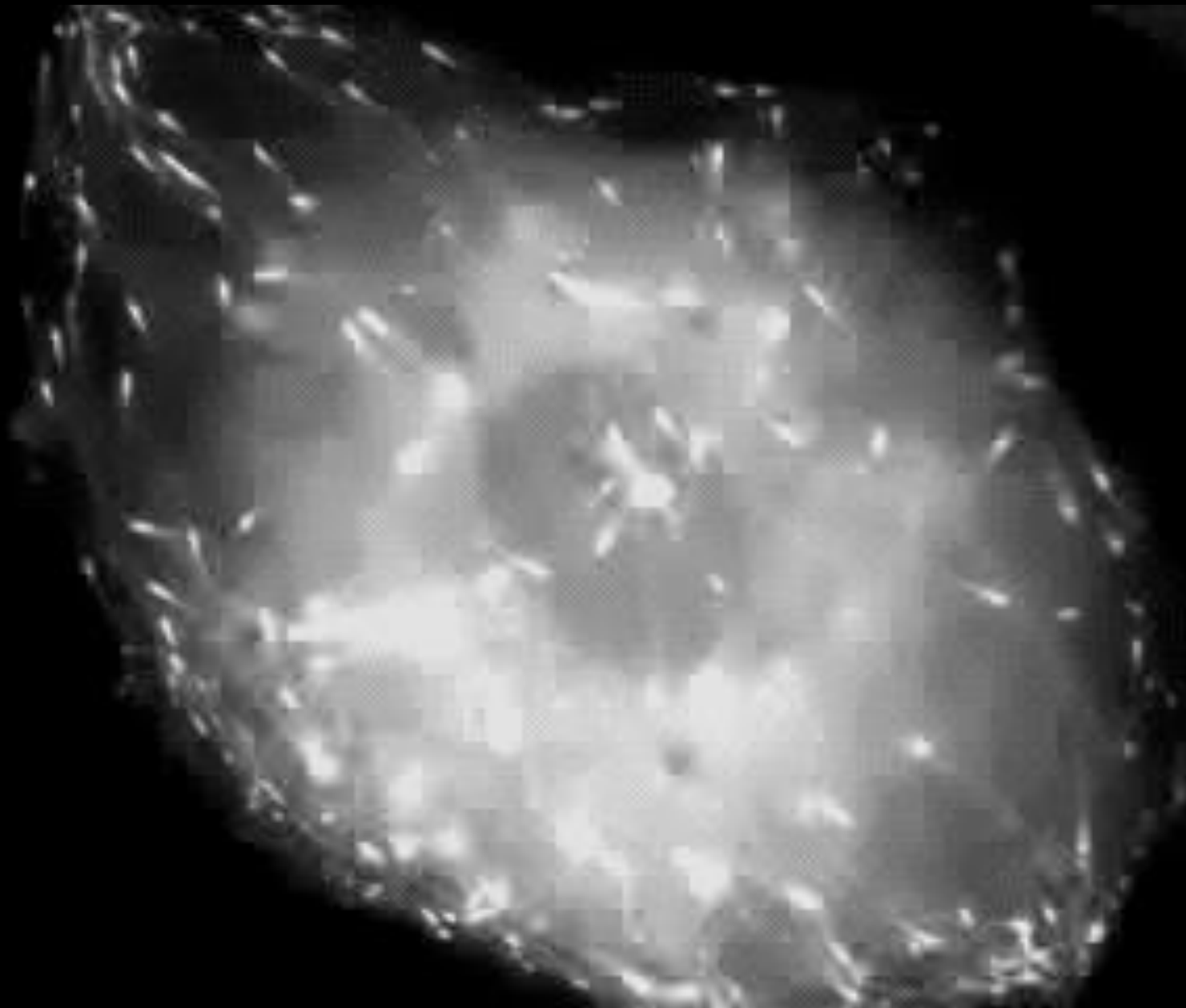
(B)



(C)

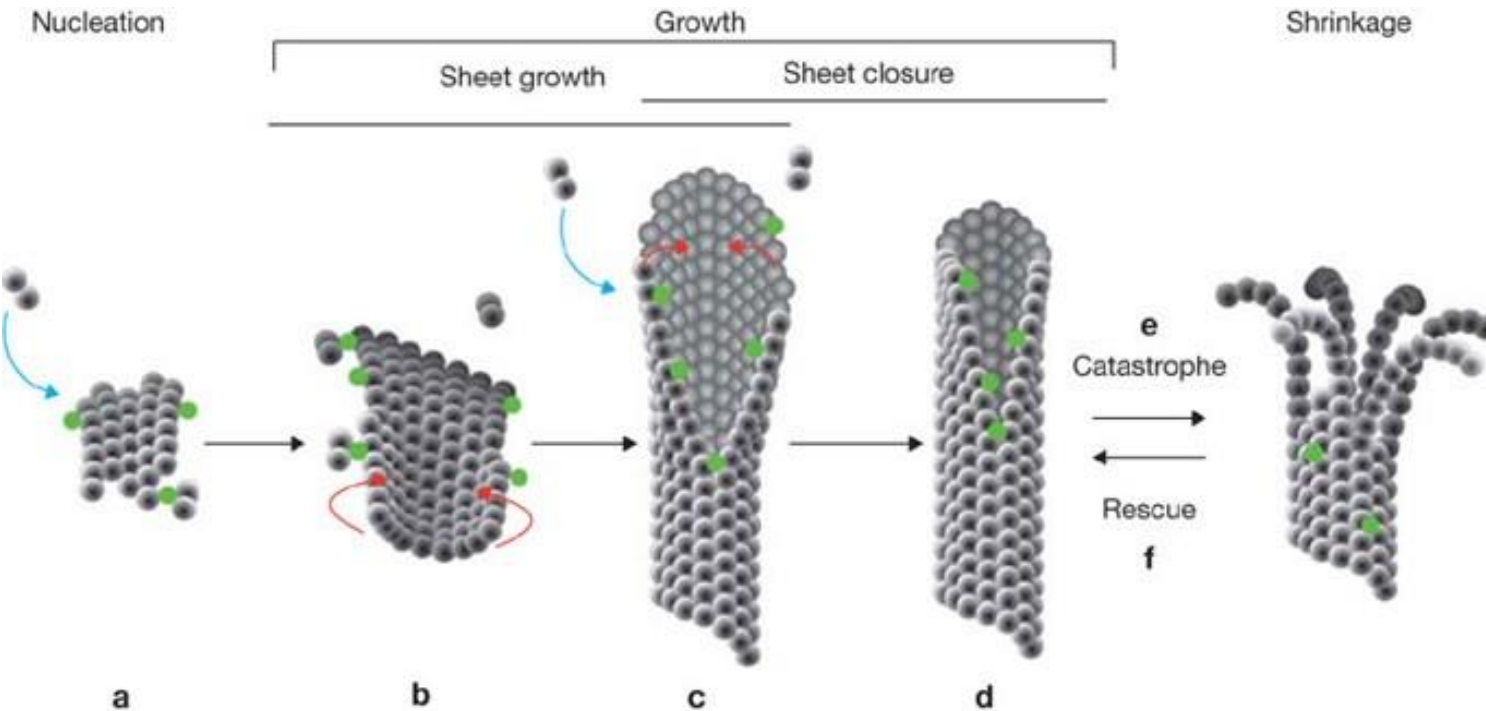


(D)



<https://youtu.be/Kp0B1IfpK3U>

# Proteínas que se unen al extremo + de los microtúbulos: EB1

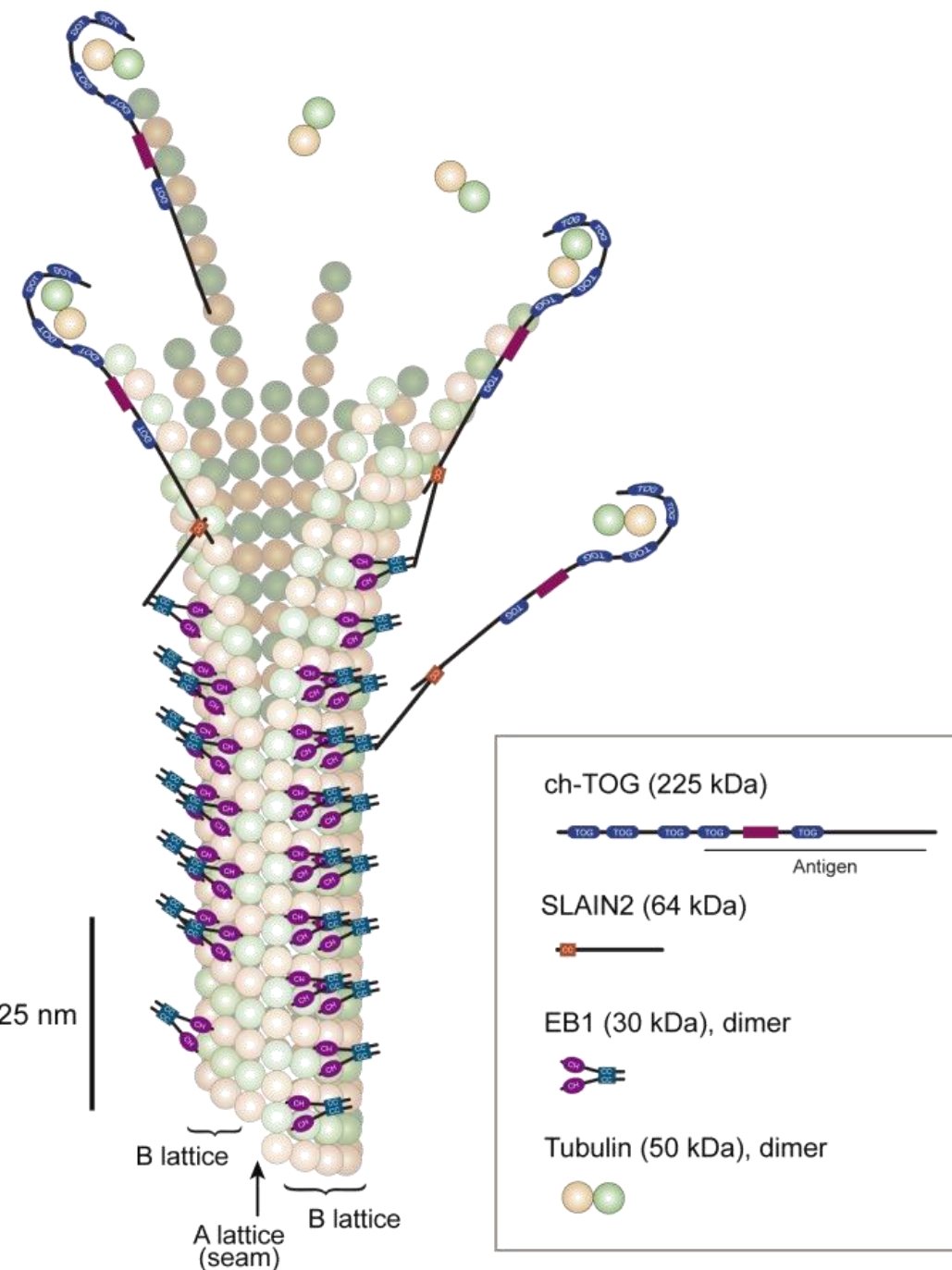


Vitre et al., 2008

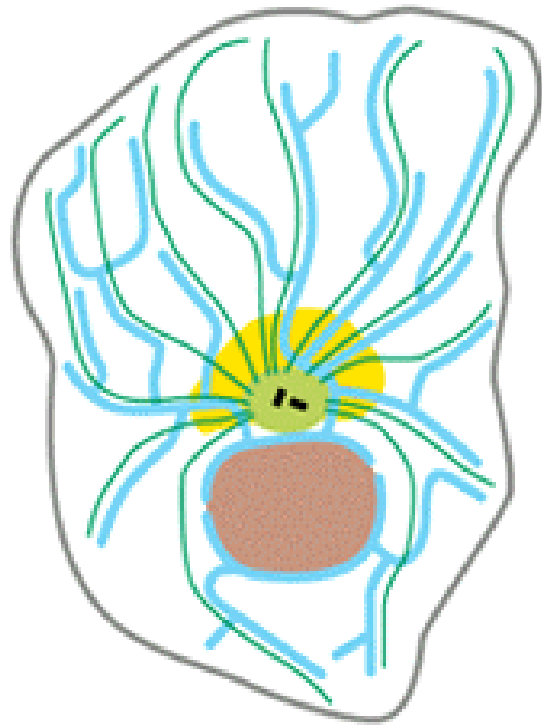
SIM

Nakamura et al., 2012

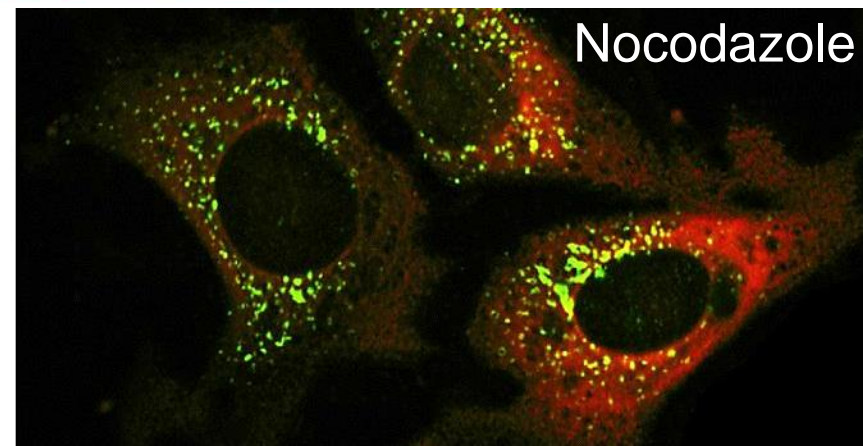
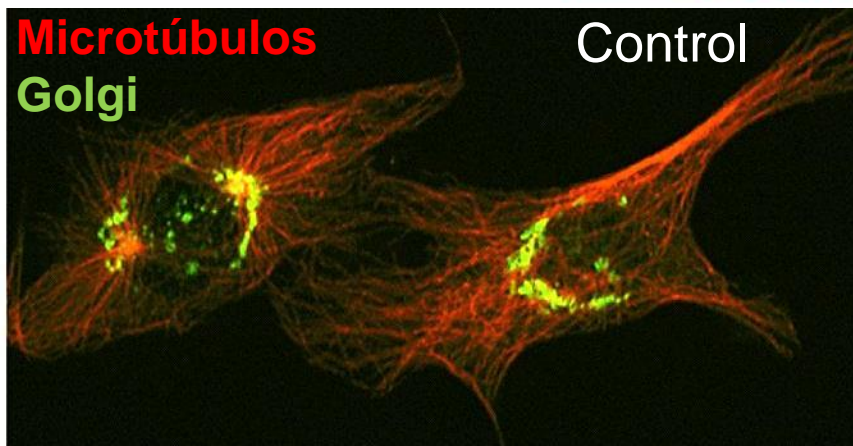
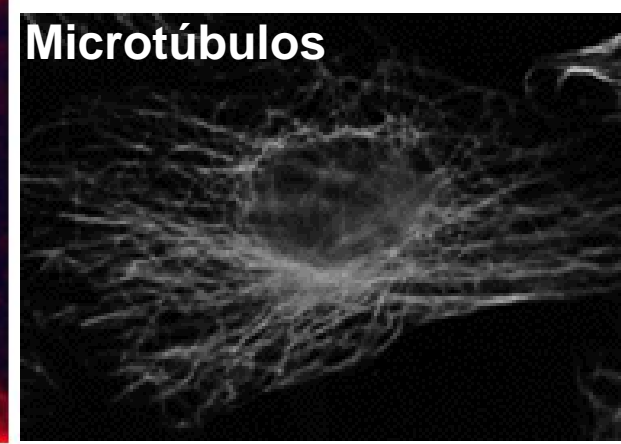
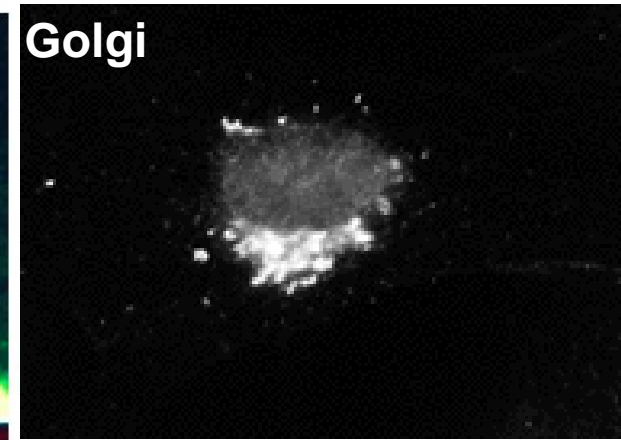
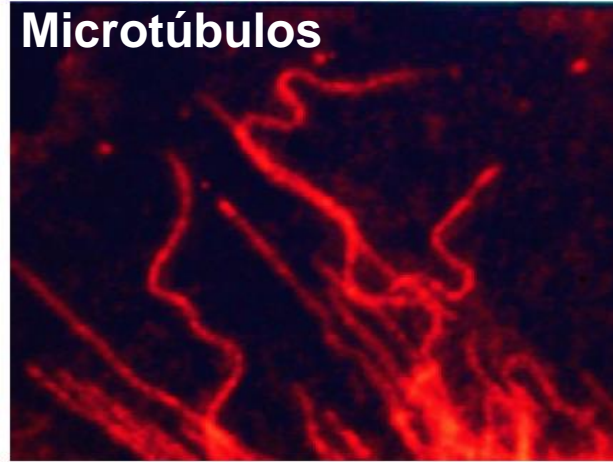
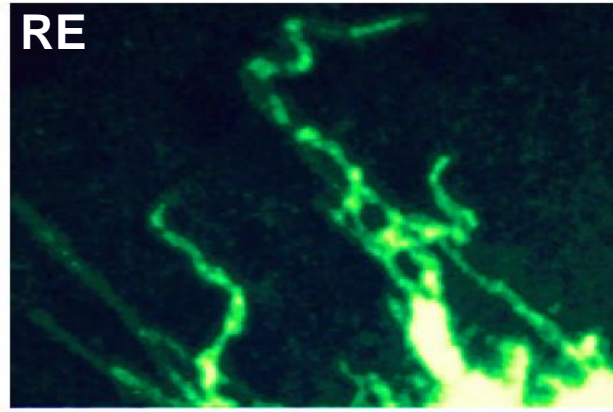
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0051442>



# Microtúbulos y localización subcelular de organelos

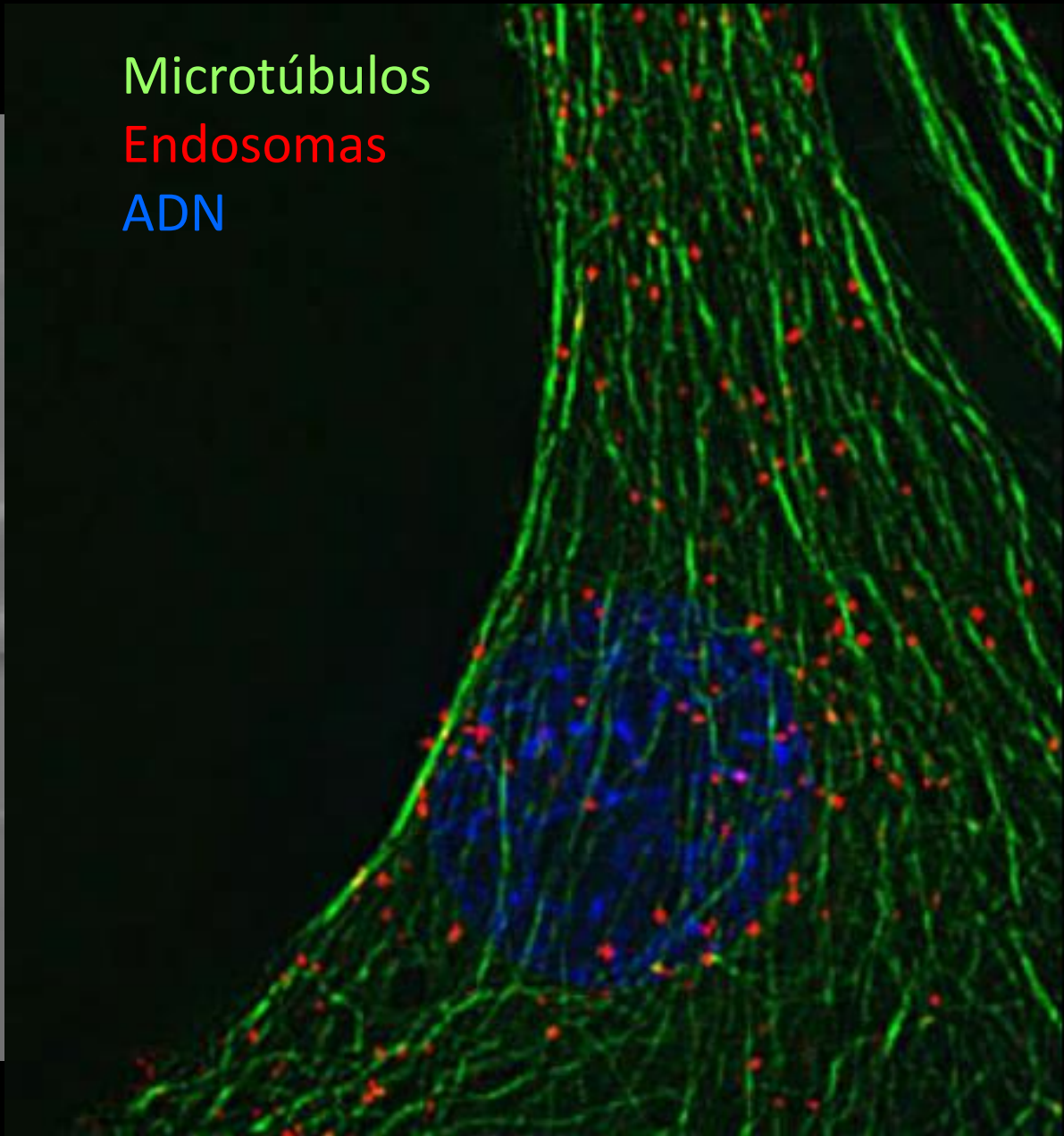


(A)



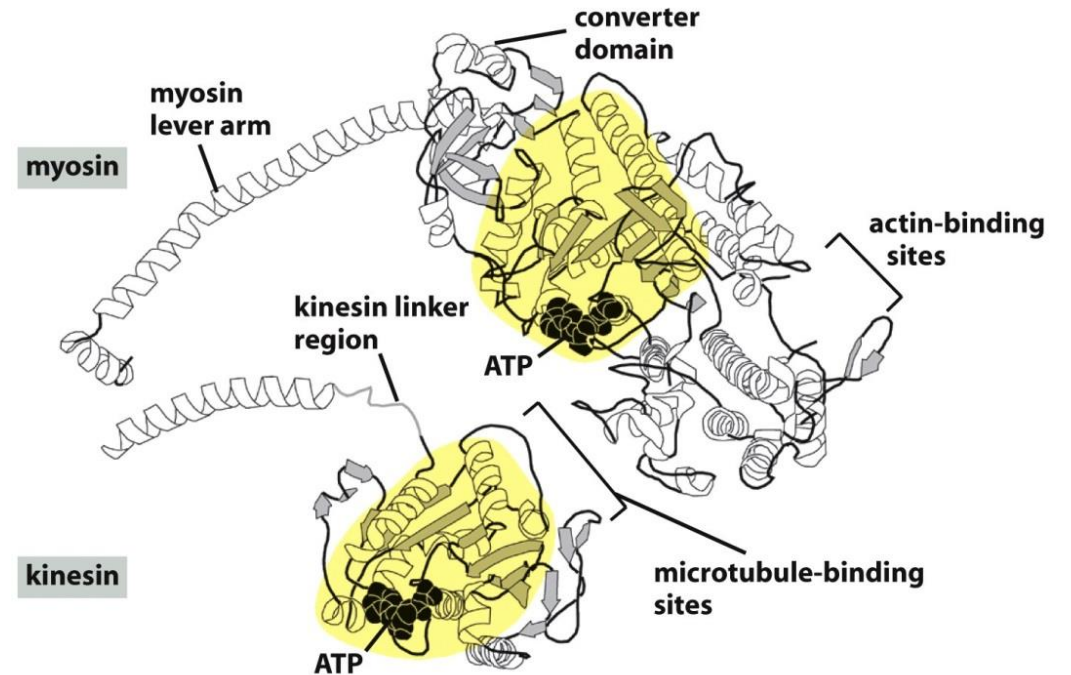
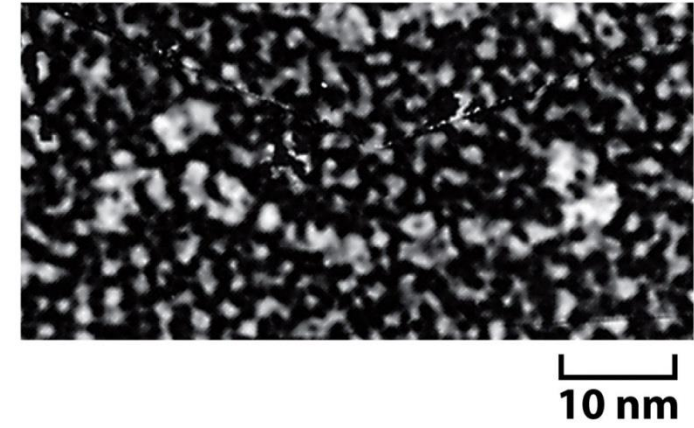
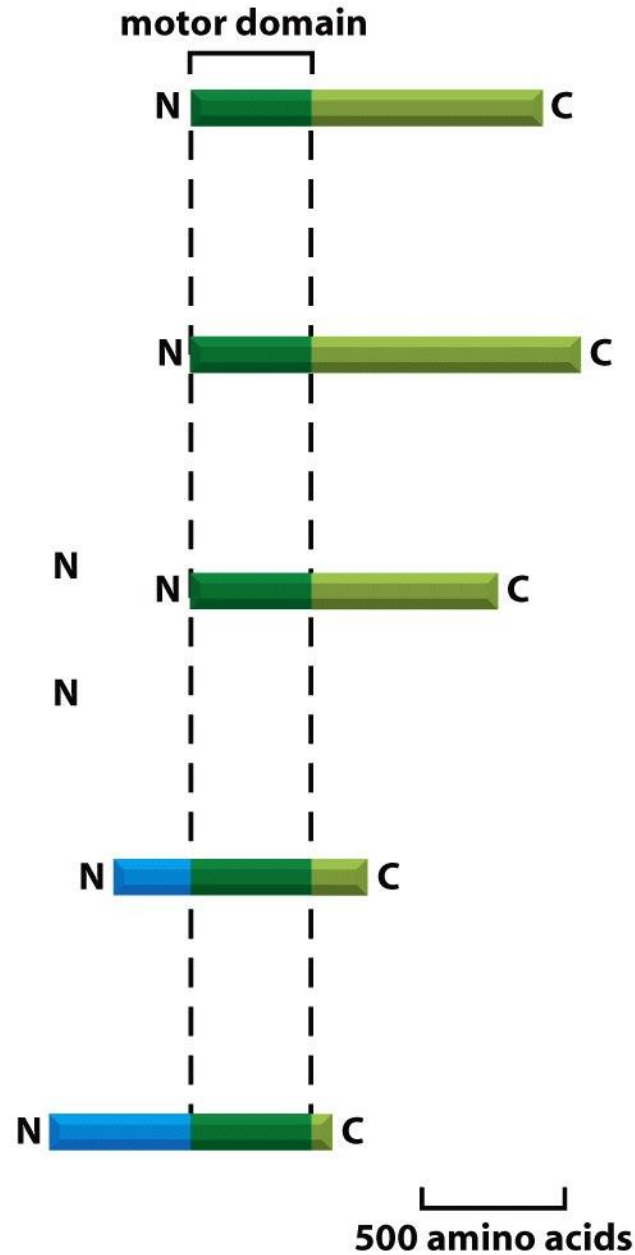
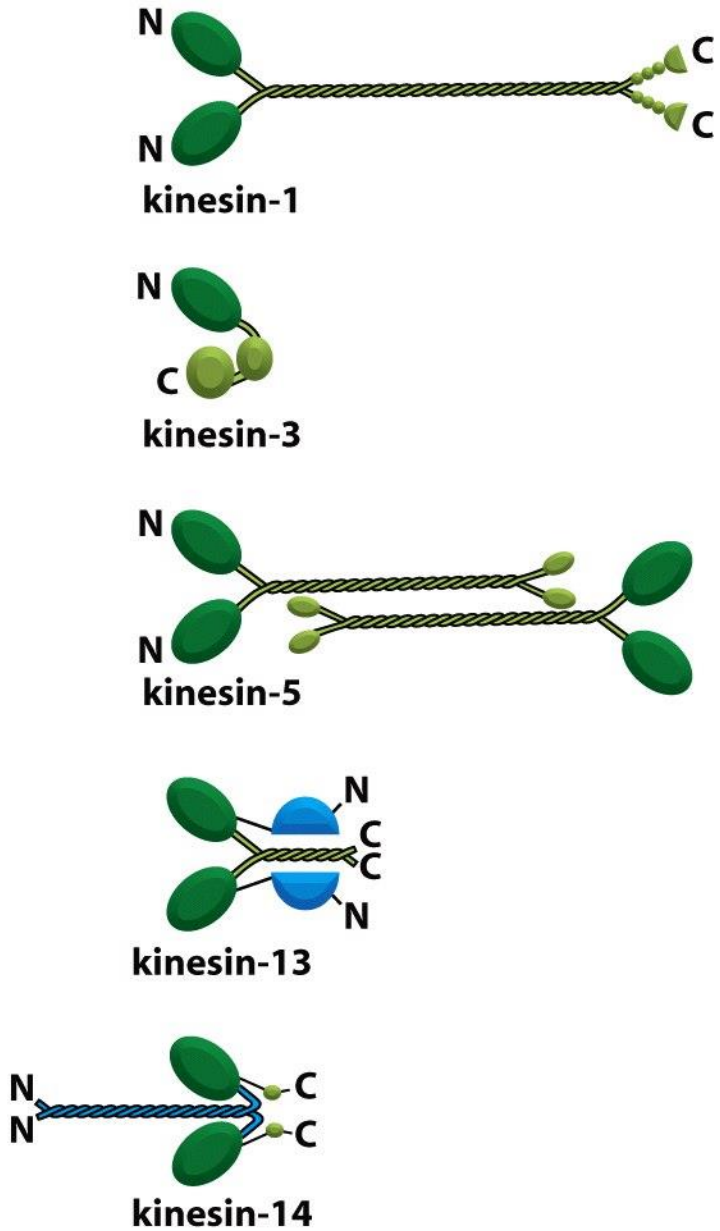


<https://youtu.be/sYM6ZiAj5YE>

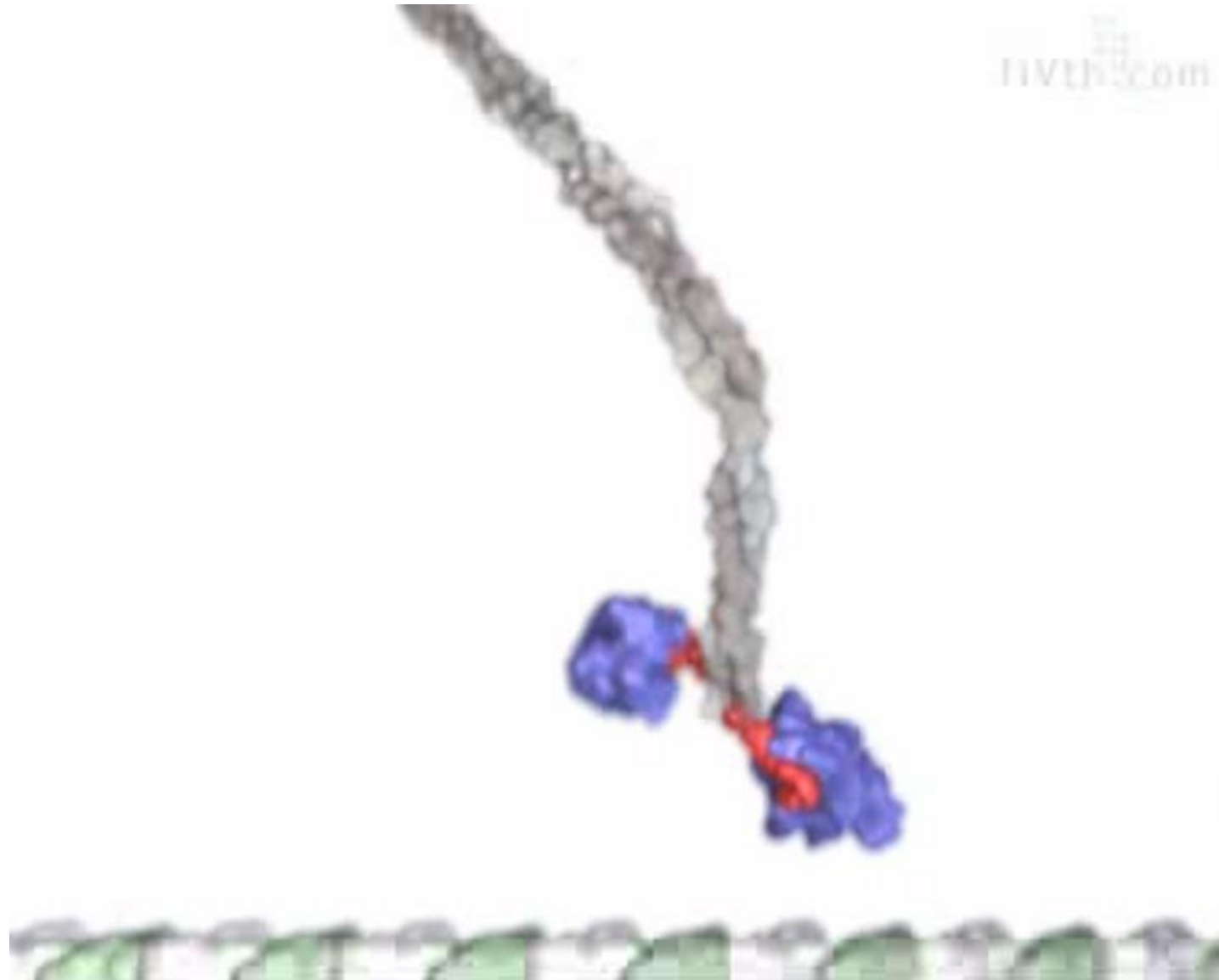


[https://youtu.be/CDWoOOd\\_VHo](https://youtu.be/CDWoOOd_VHo)

# Motores moleculares de microtúbulos: kinesinas

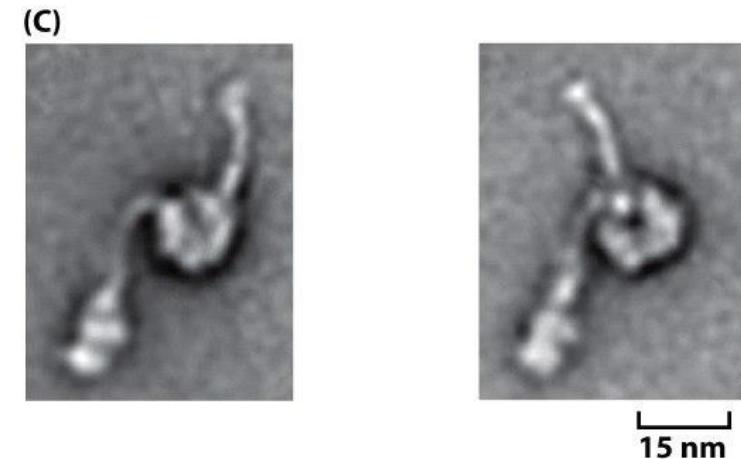
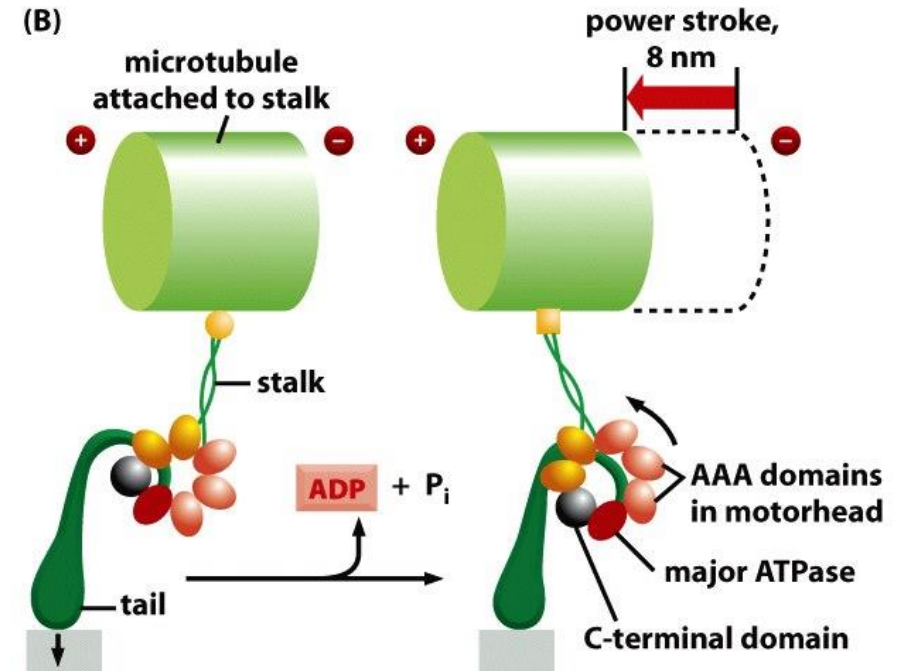
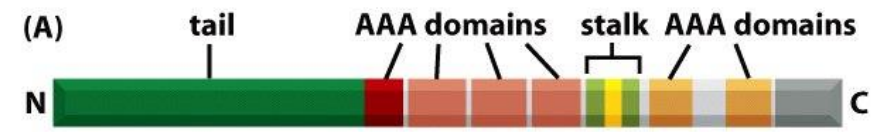
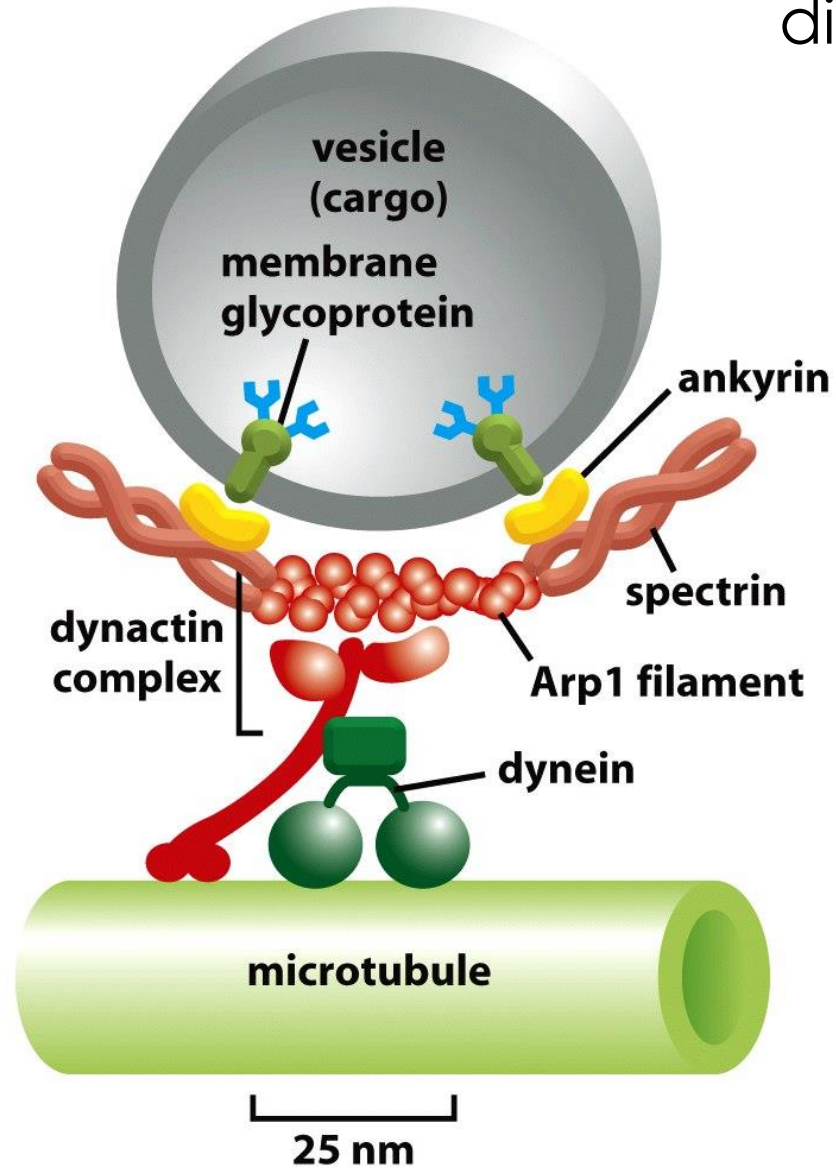






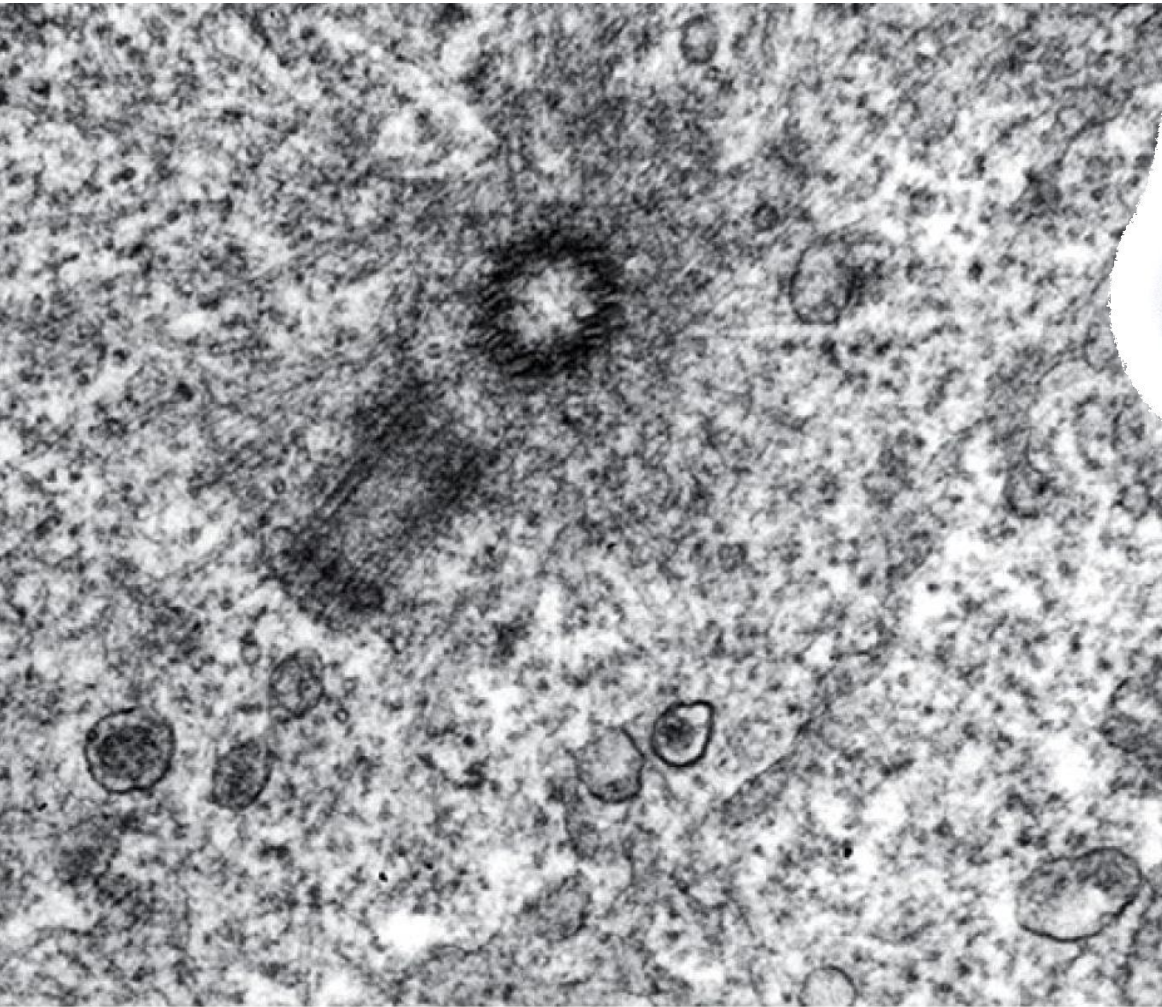
[https://youtu.be/Y8mUUqCYn\\_k](https://youtu.be/Y8mUUqCYn_k)

# Motores moleculares de microtúbulos: dineínas



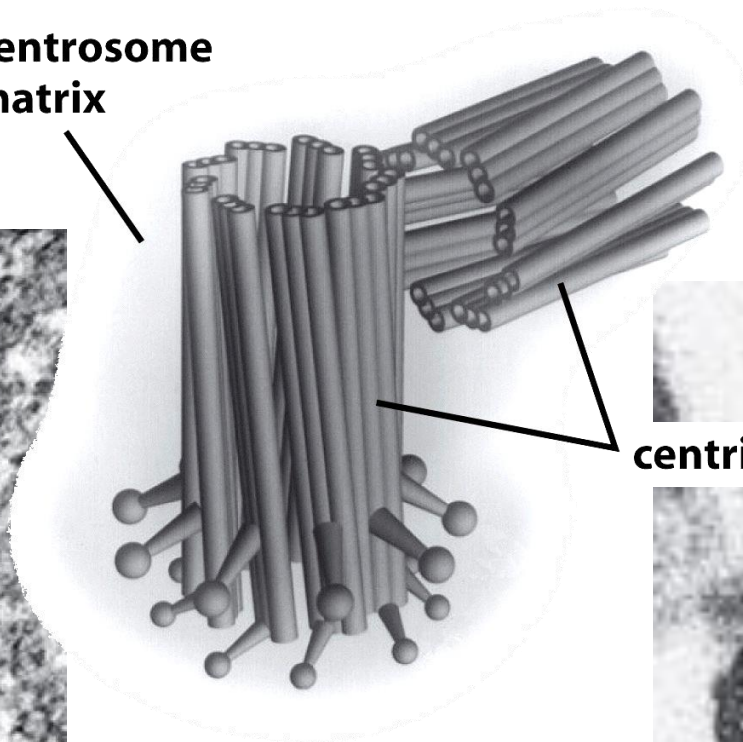
Video recomendado: <https://youtu.be/tO-W8mvBa78>

# Centríolos



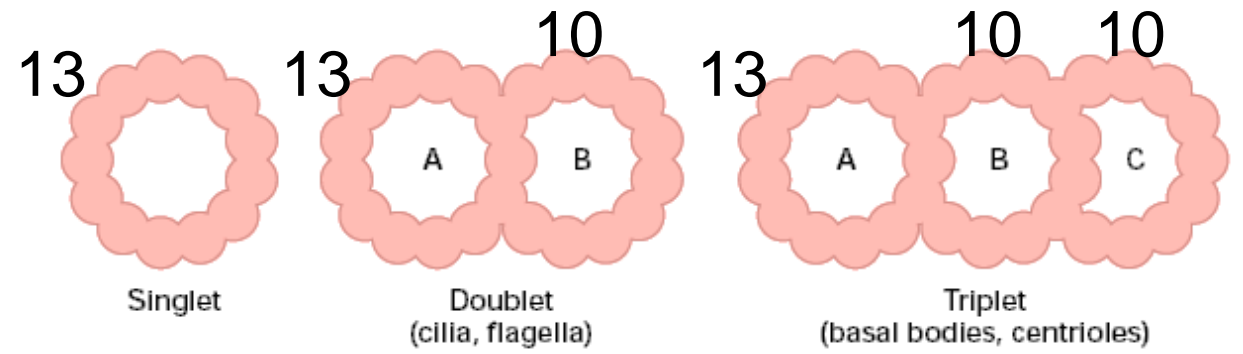
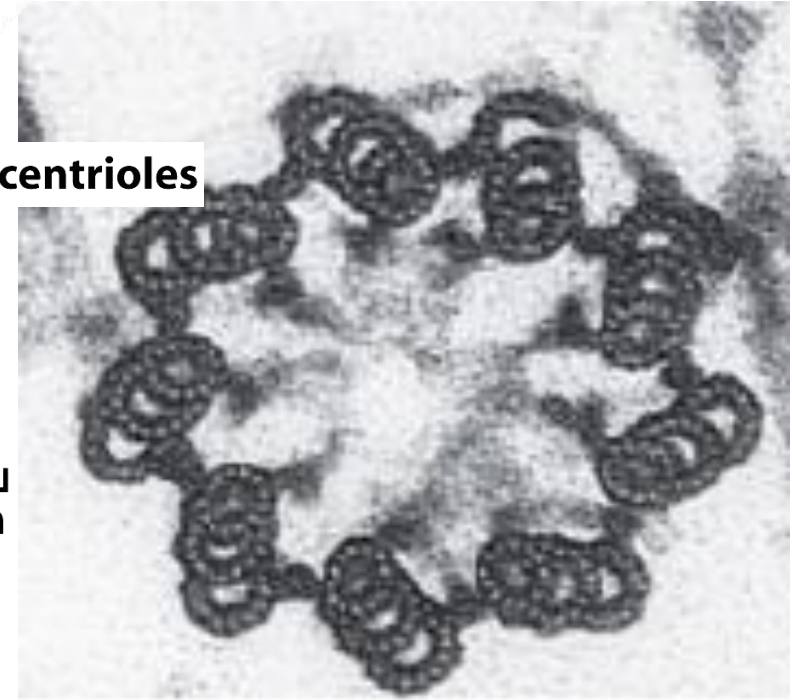
0.5 μm

centrosome matrix

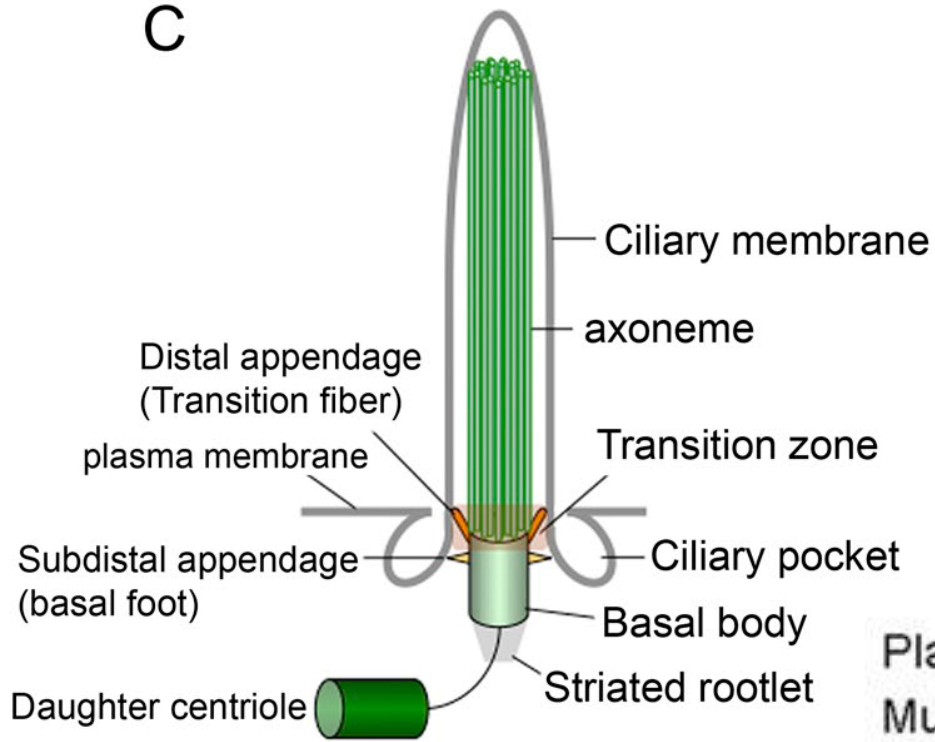


centrioles

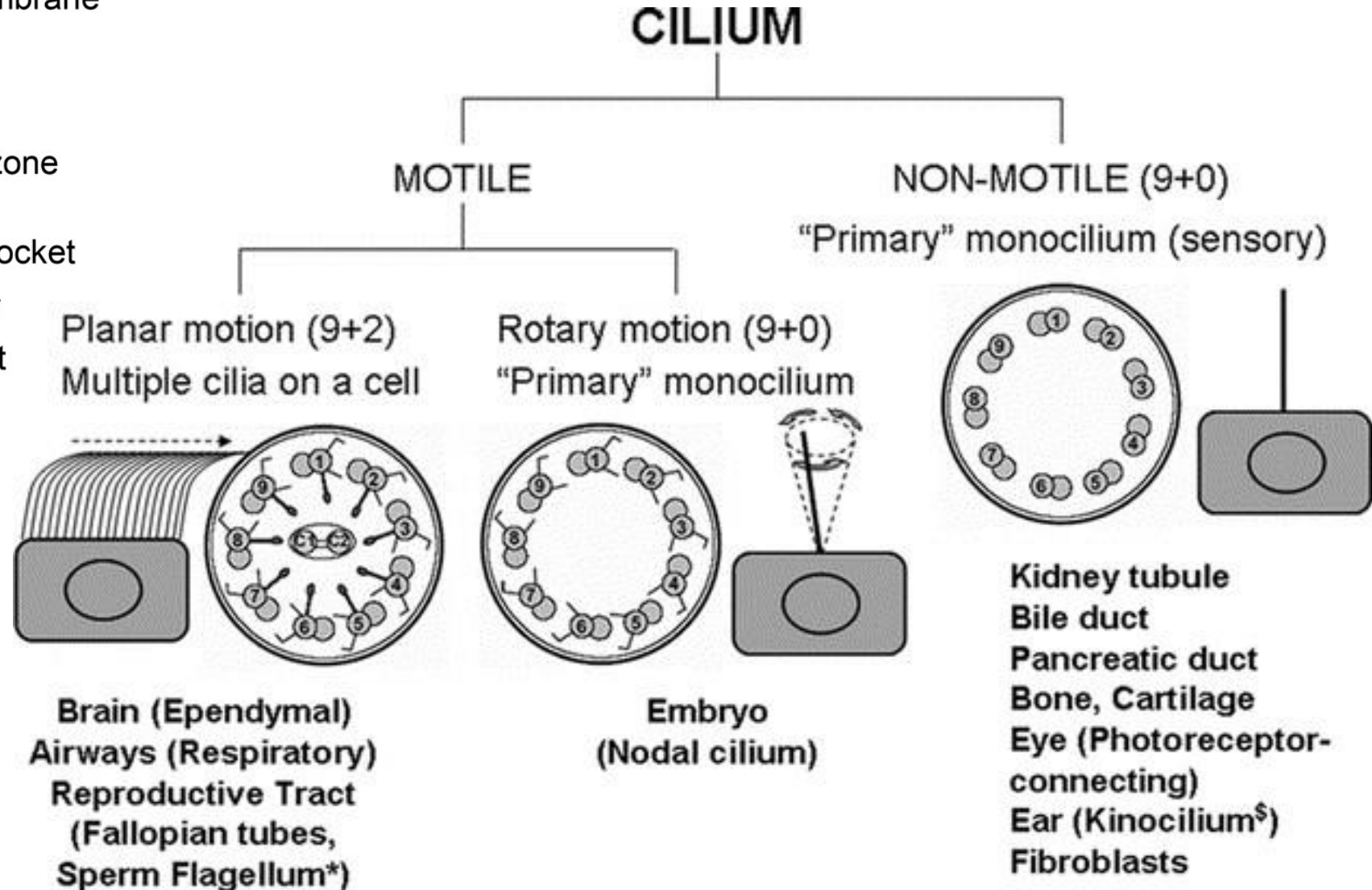
200 nm



C



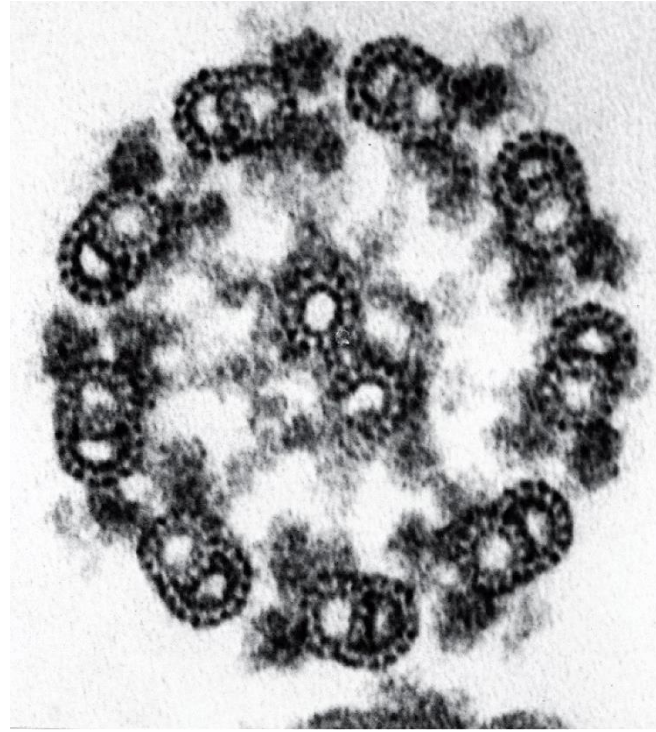
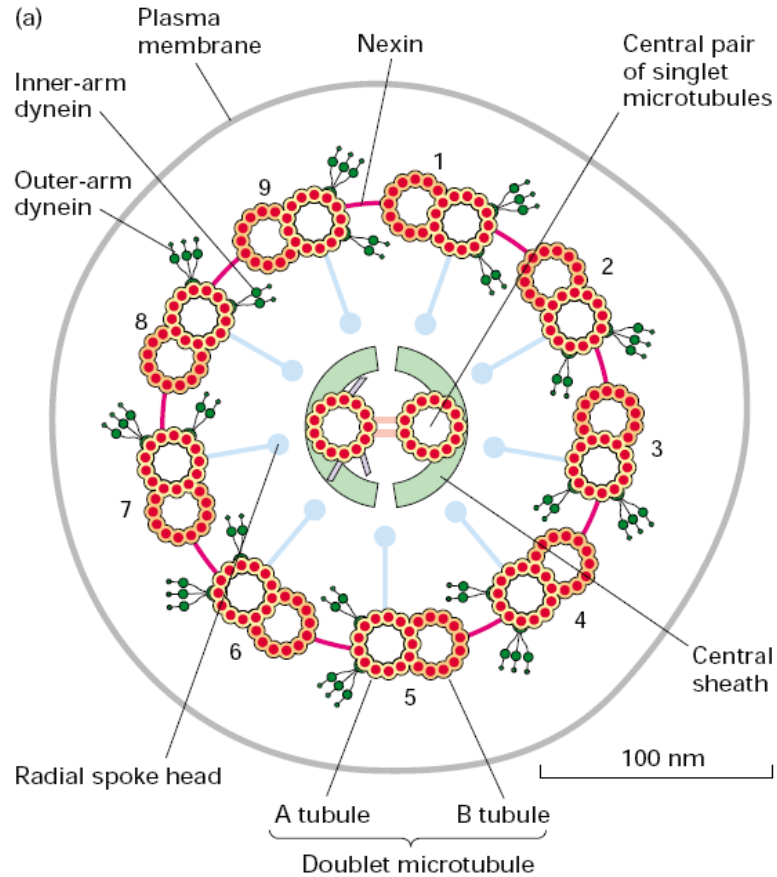
# Cilias



Leigh et al., 2009

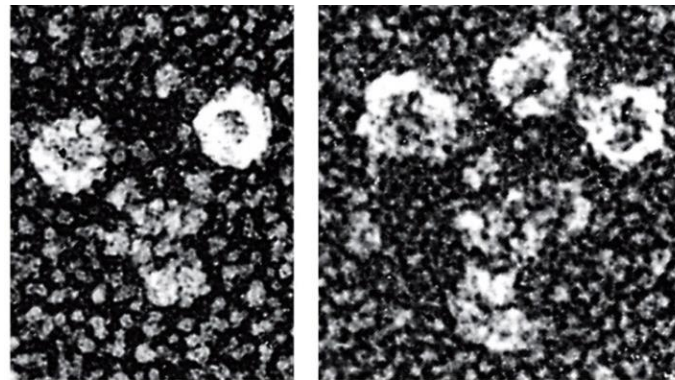
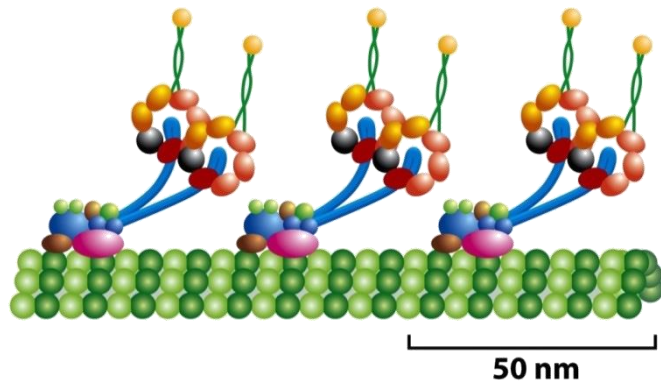
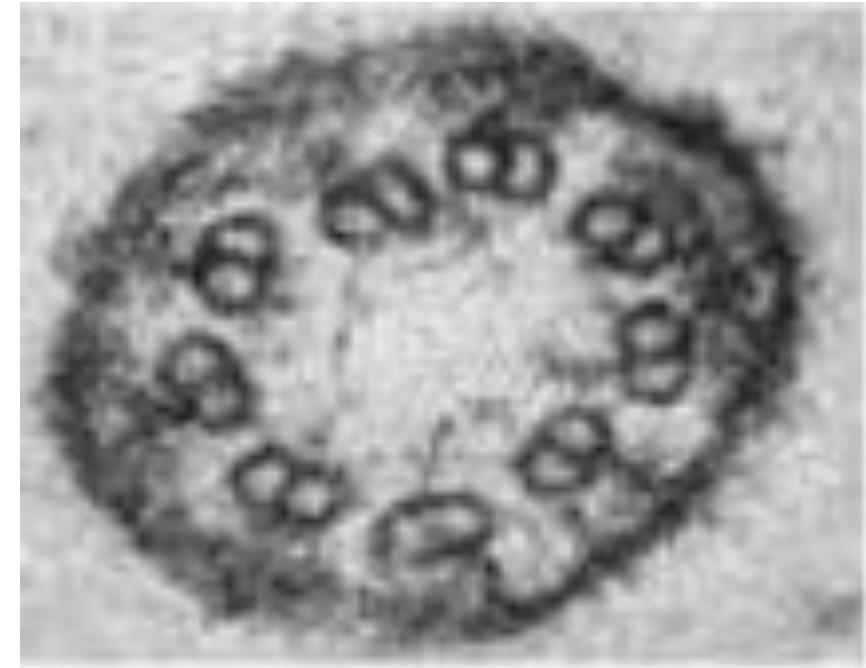
<https://www.nature.com/articles/gim200967>

# Cilias móviles y cilias primarias

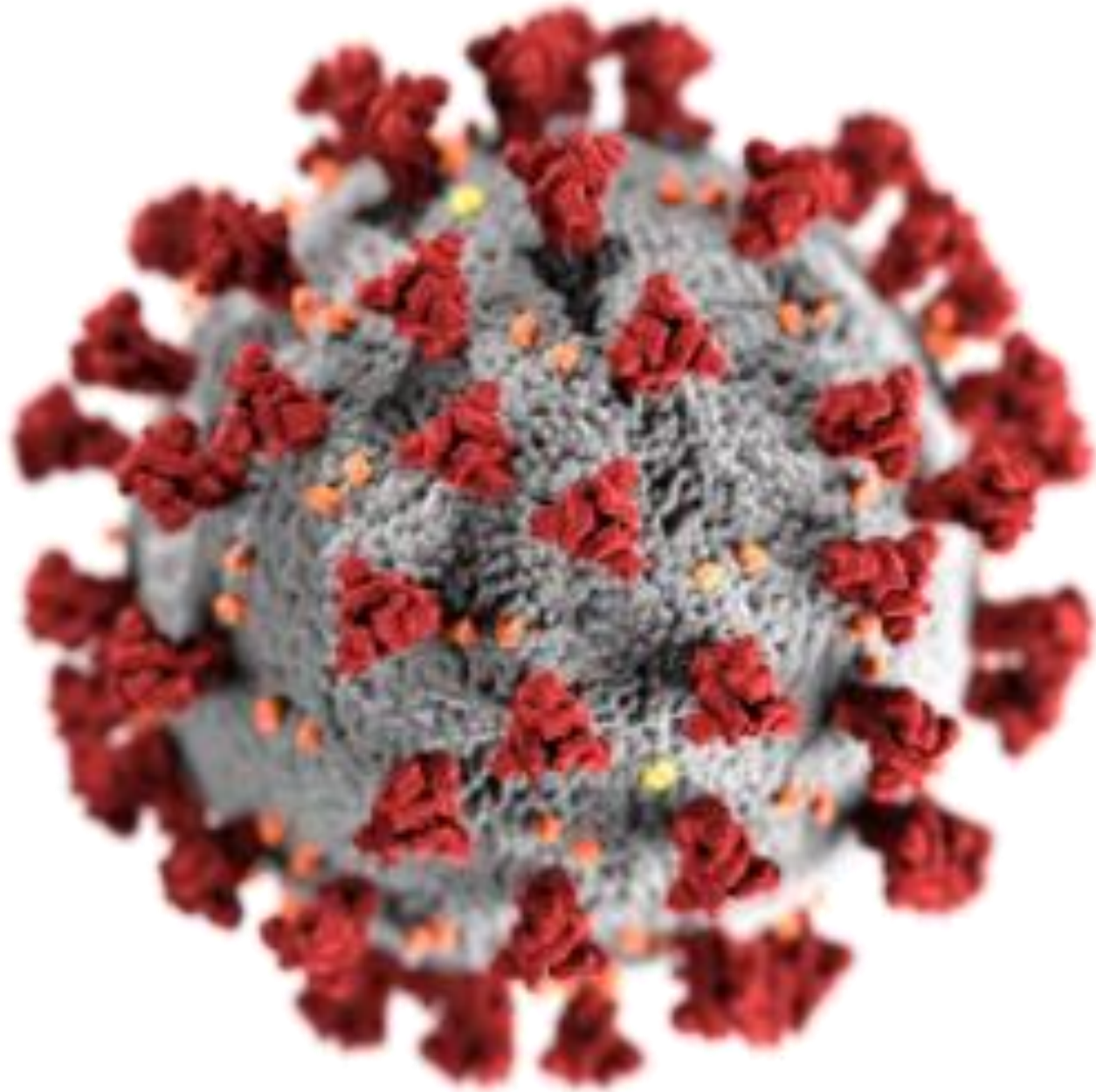


Cilia móvil: 9+2

Cilia primaria: 9+0



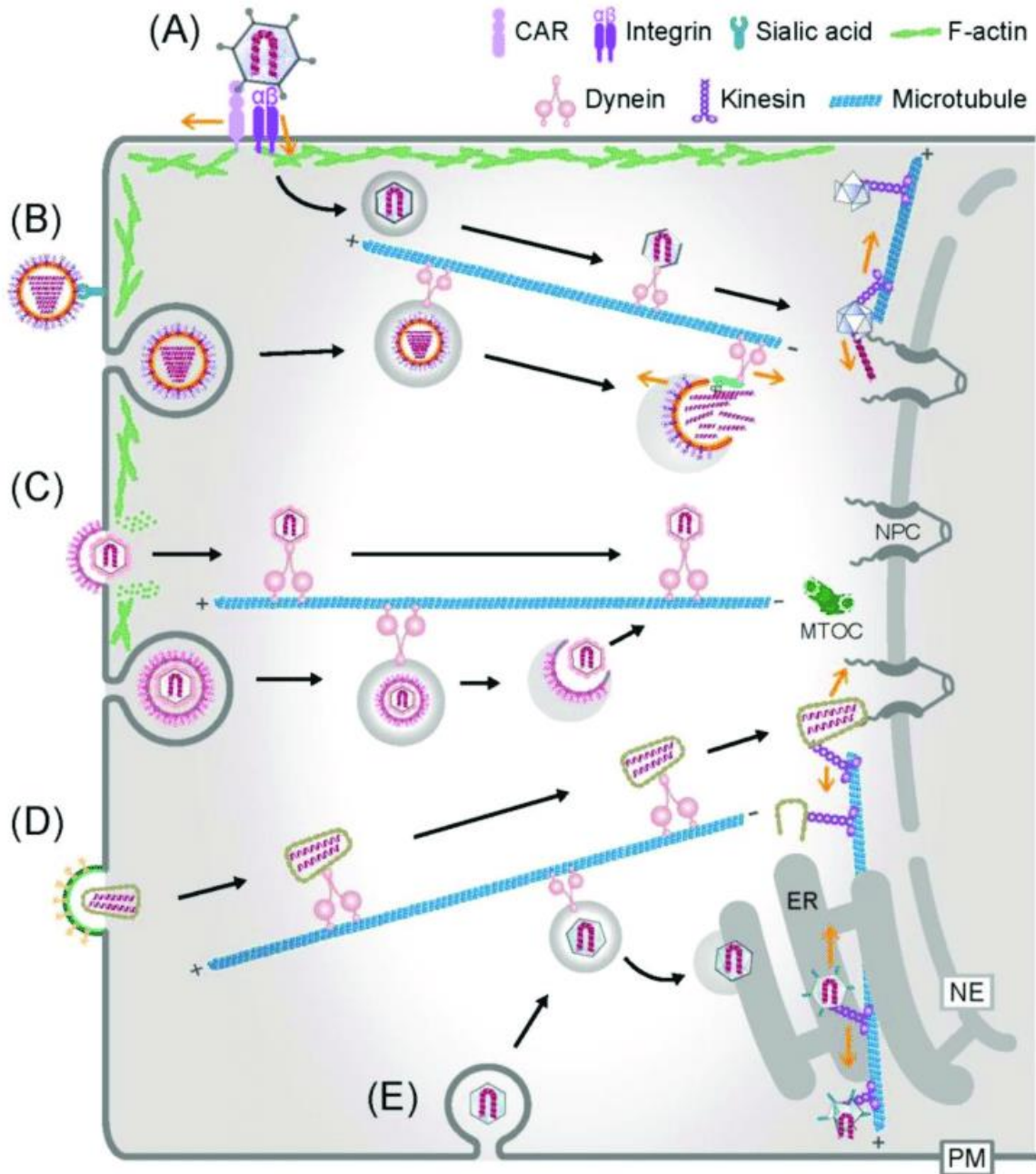
¿FUNCIÓN?



Trabajo extra 3:

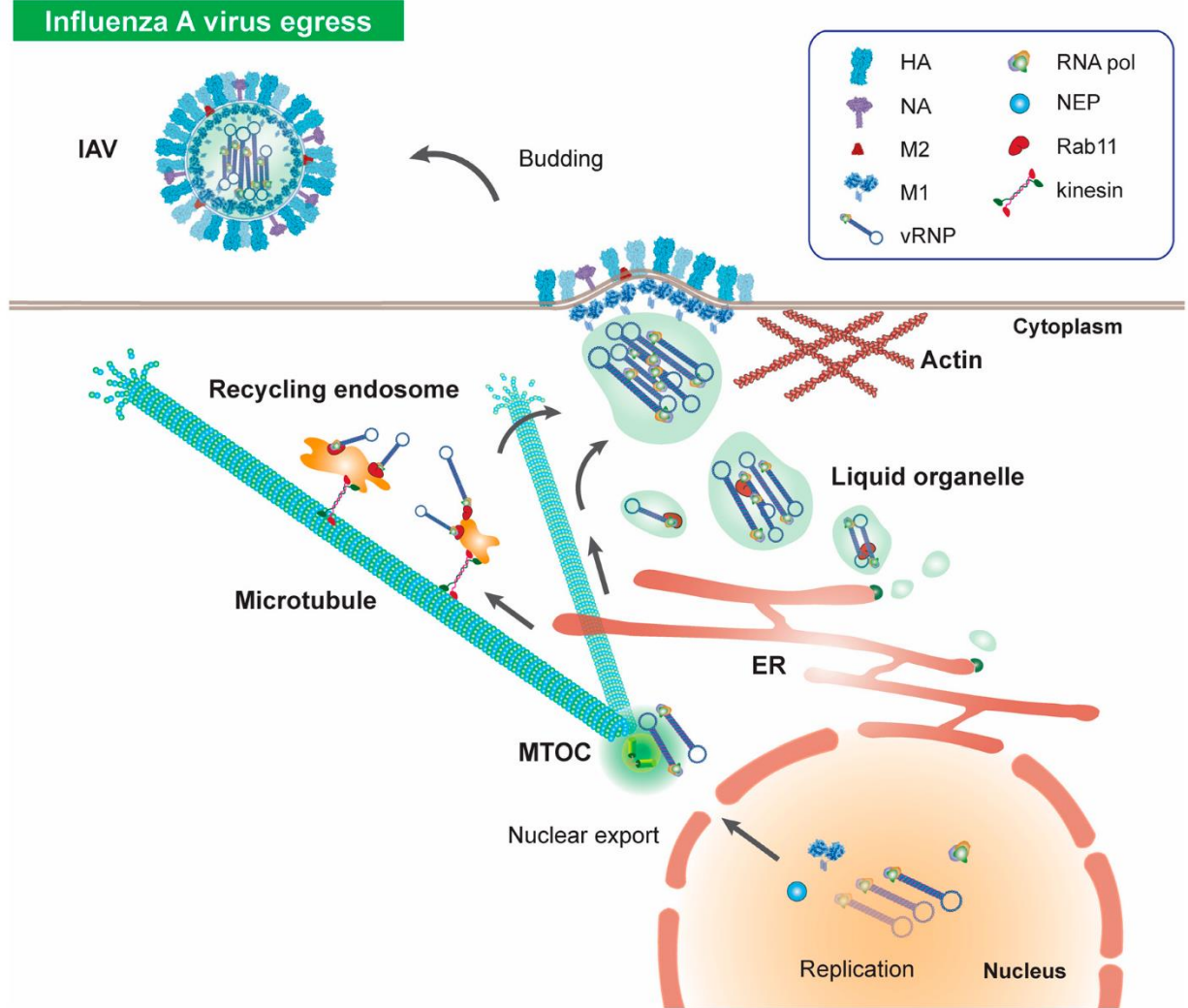
¿Relación entre  
infección por  
coronavirus y  
citoesqueleto?

# Los virus y el citoesqueleto



Wang et al., 2018

<https://www.mdpi.com/1999-4915/10/4/166>



Simpson & Yamauchi, 2020

<https://www.mdpi.com/1999-4915/12/1/117>

**FINN**