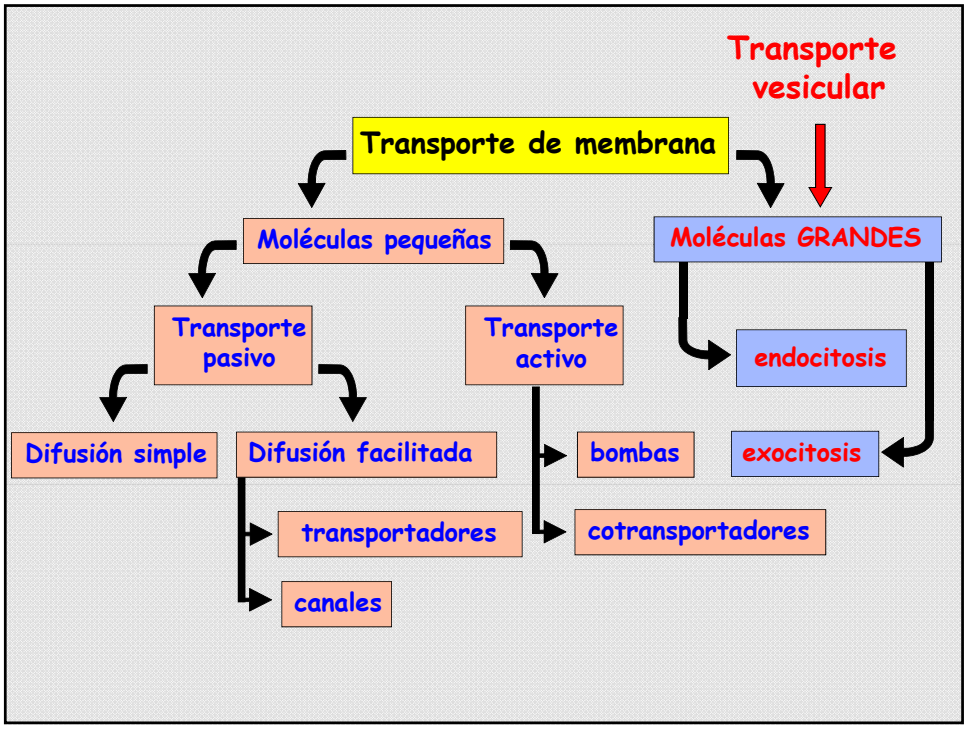
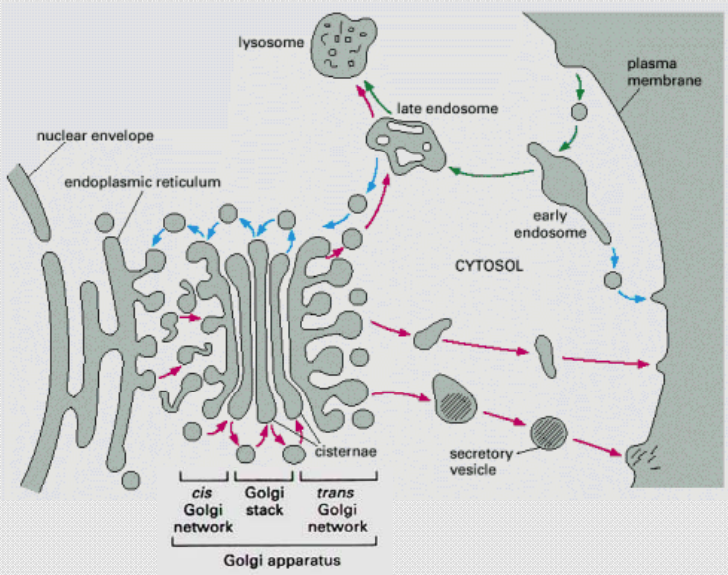
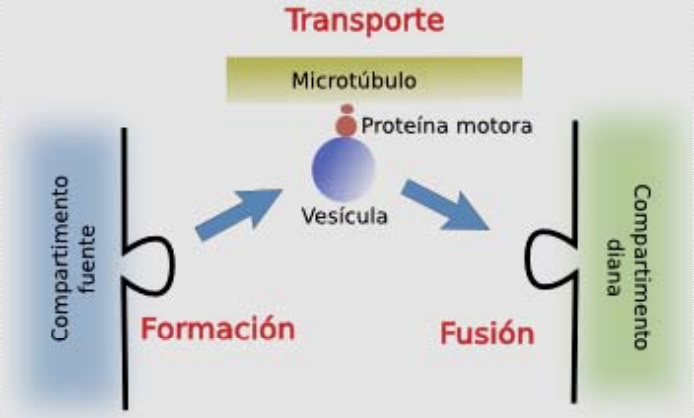


Transporte vesicular



Etapas del transporte vesicular



Transporte vesicular

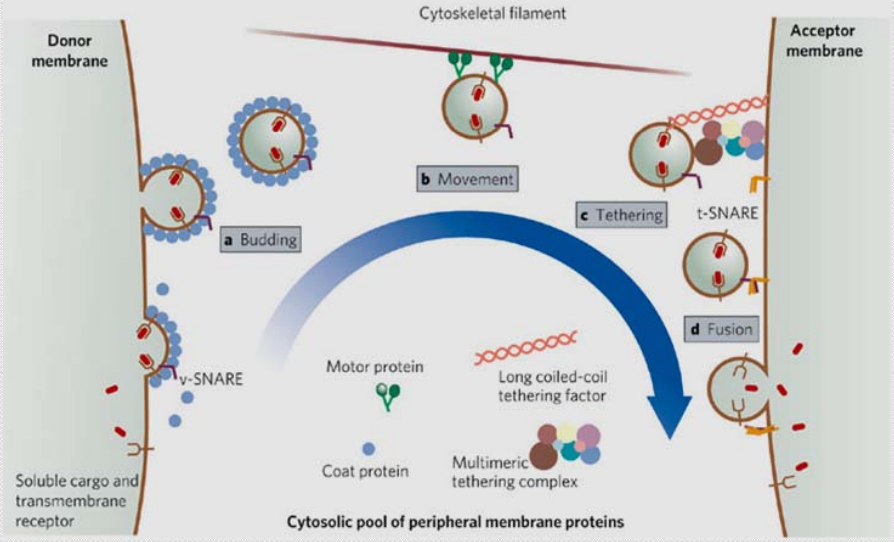
Formación → Transporte → Fusión

Tipos de cubiertas
- -Clatrina
- -COPI
- -COPII

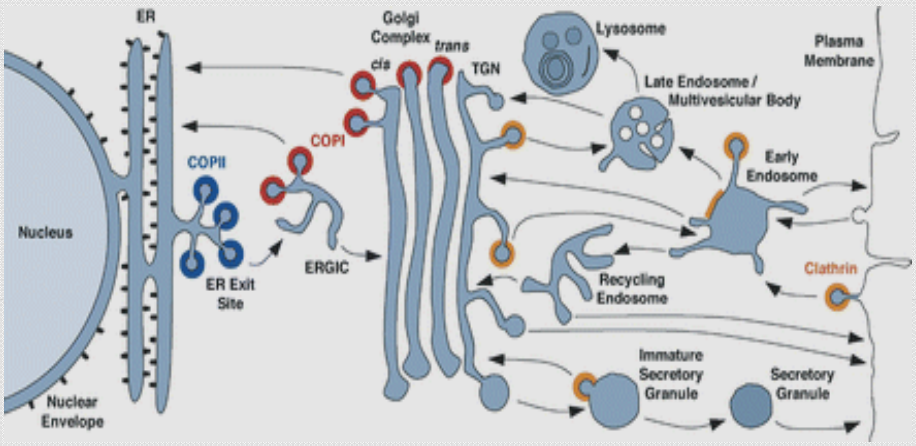
Compartimientos
- - PM y TGN
- - ERGIC-CG al ER (transporte retrógrado)
- - ER al ERGIC (transporte anterógrado)

SNAREs

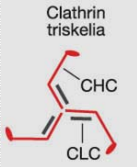
Etapas del transporte vesicular

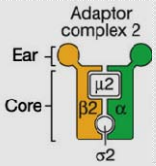


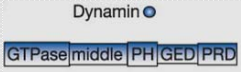
Transporte vesicular entre compartimientos intracelulares



Vesículas cubiertas con clatrina





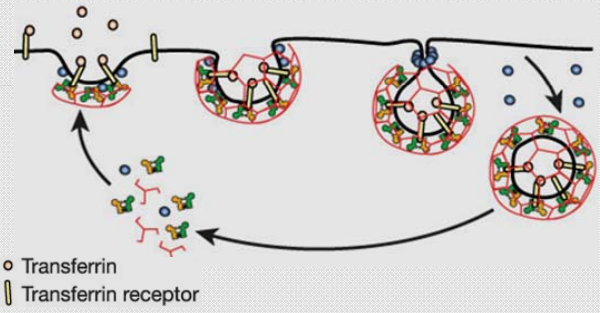


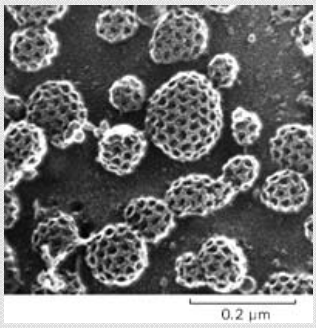
Clatrina (cadenas pesada y liviana)

Complejos de adaptadores (AP1, AP2, AP3)

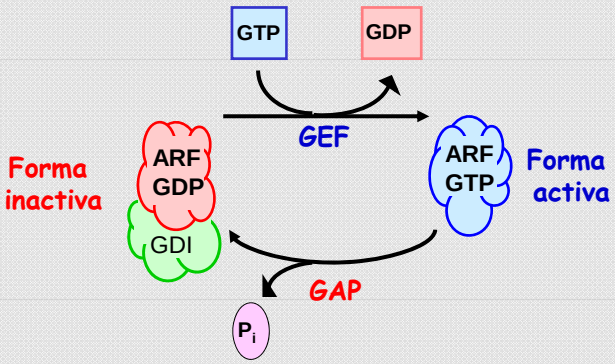
Dinamina

Endocitosis



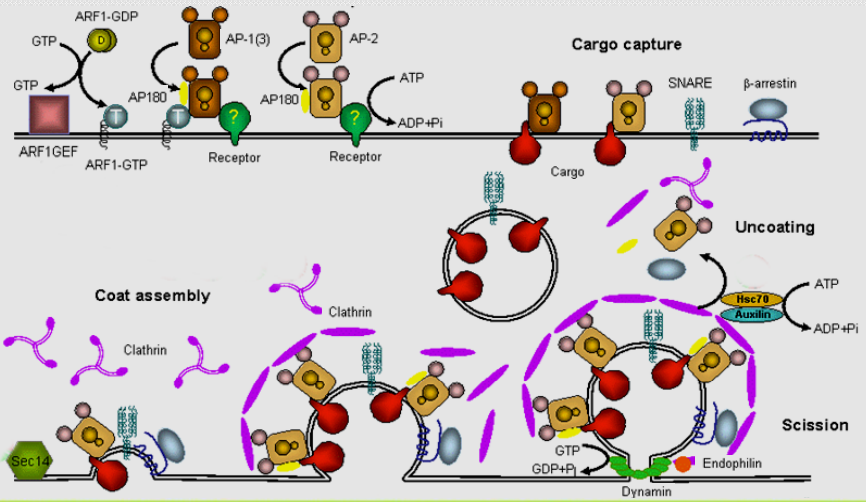


Las Arf son GTP-proteínas



Classical clathrin-mediated vesicular transport

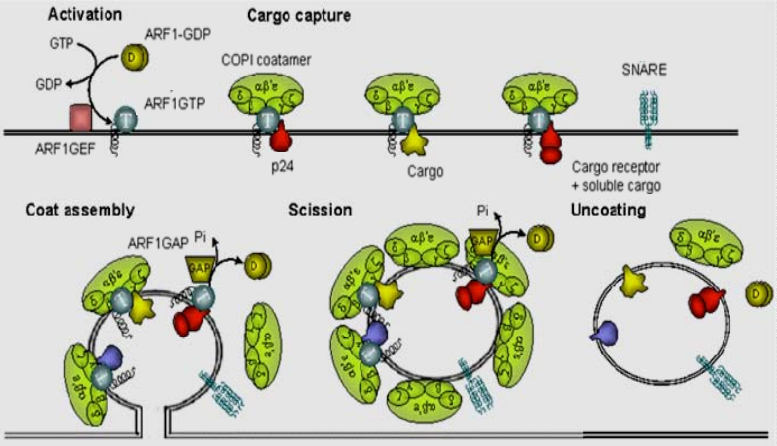
Clathrin-dependent traffic occurs between the plasma membrane to endosomes and from trans-Golgi network to endosomes



At TGN, coat assembly is is initiated by recruitment of ARF1 to the membrane. One end of adaptor protein binds to cargo and the other end to coat components, including clathrin. Clathrin triskelion assemble to hexagons and pentagons, forming a cage that causes membrane deformation. Dynamic pinches the coated vesicle off. Uncoating requires ATO hydrolysis by Hsc70 and auxilin. (AP- adaptor protein; ARF1(3) – ADP ribosylation factor1 (or 3); ARF1GEF – ARF1guanine exchange factor).

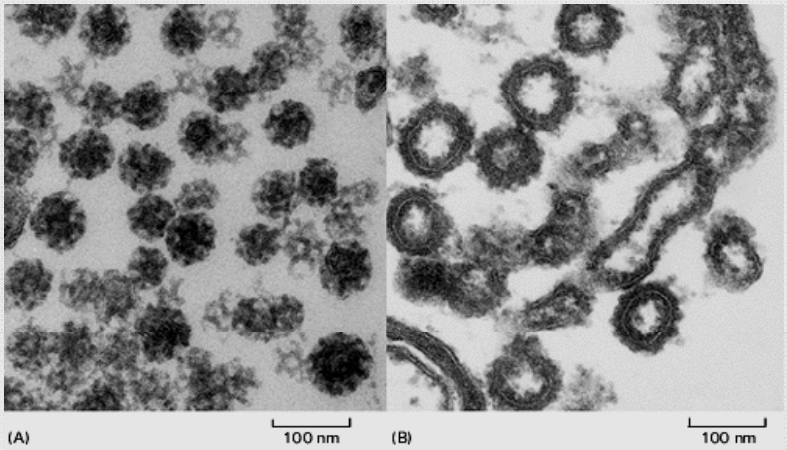
Classical COPI-mediated vesicular transport

COPI-coated vesicles function primarily in retrograde transport from the ER-Golgi intermediate compartment to the ER but are also important in forward transport within the cisternae of the Golgi

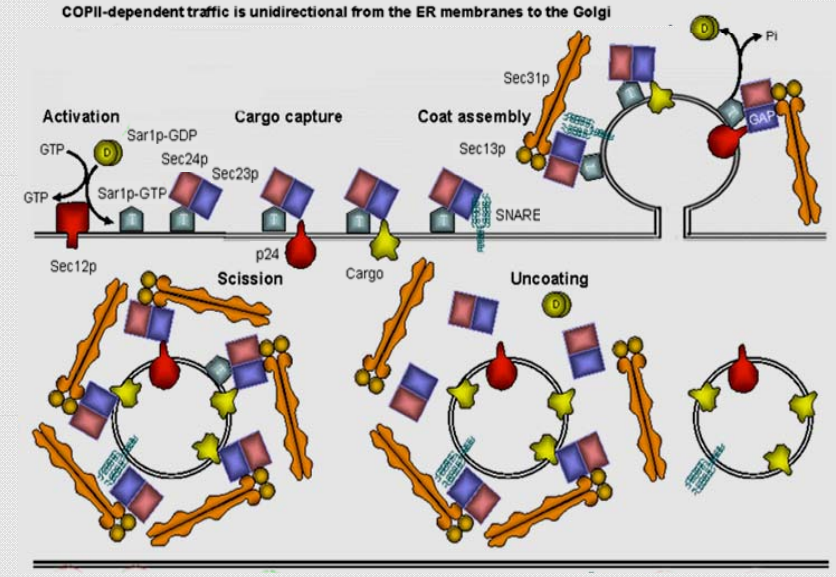


Coat assembly starts by the recruitment of ARF1-GTP to the membrane. This allows binding of the COPI coatamer and cargo in parallel with membrane deformation. Once the coat is complete, the vesicle buds and detaches. The GTPase activity of ARF1 is enhanced by ARF1GAP that acts as a timer, leading to inactivation of ARF1 and uncoating. (ARF1 – ADP-ribosylation factor 1; ARF1GAP – ARF1 GTPase activating protein. ARF1GEF – ARF1 guanine exchange factor.

Vesículas cubiertas con COPI



Classical COPII-mediated vesicular transport



Sar1p-GTP is recruited to the membrane thus allowing the binding of the Sec23p-Sec24p complex and cargo to be recruited. Sec13p-Sec31p the binds causing membrane deformation and eventually to vesicle budding. The GTPase activity of Sar1p is enhanced by Sec23p, which acts as a timer, causing the inactivation of Sar1p and uncoating.

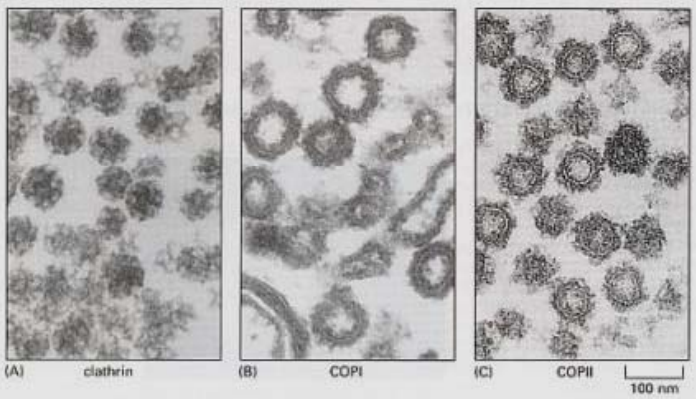
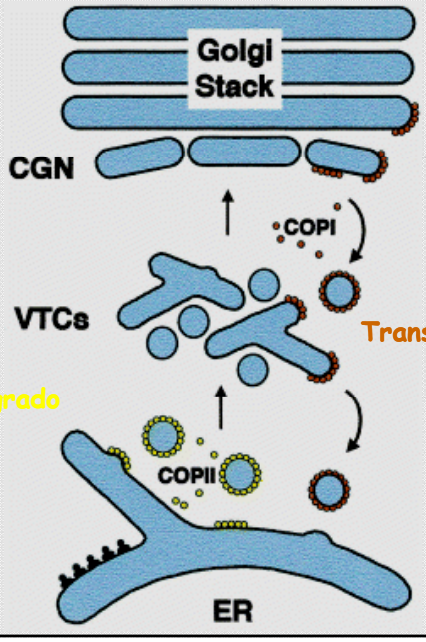


Figure 13–4 Electron micrograph of clathrin-coated, COPI-coated, and COPII-coated vesicles. All are shown in electron micrographs at the same scale. (A) Clathrin-coated vesicles. (B) Golgi cisternae from a cell-free system in which COPI-coated vesicles bud in the test tube. (C) COPII-coated vesicles. Note that the vesicles with clathrin coats have a more regular structure. (A and B, courtesy of Lelio Orci, from L. Orci, B. Glick, and J. Rothman, *Cell* 46:171–184, 1986. © Elsevier; C, courtesy of Charles Barlowe and Lelio Orci.)

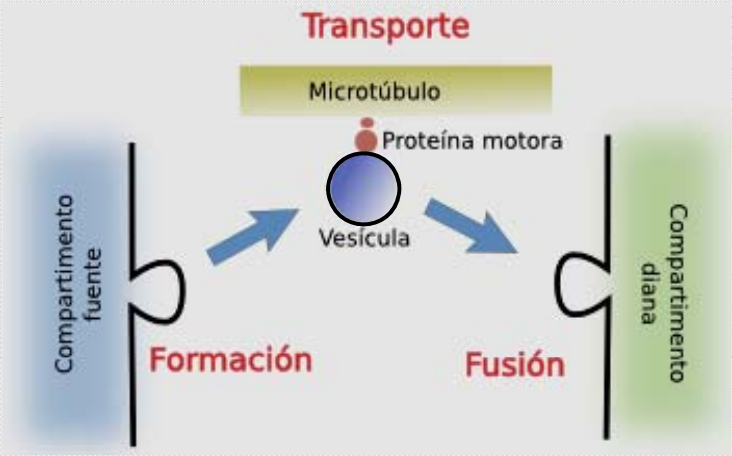
Transporte mediado por vesículas COPI y COPII



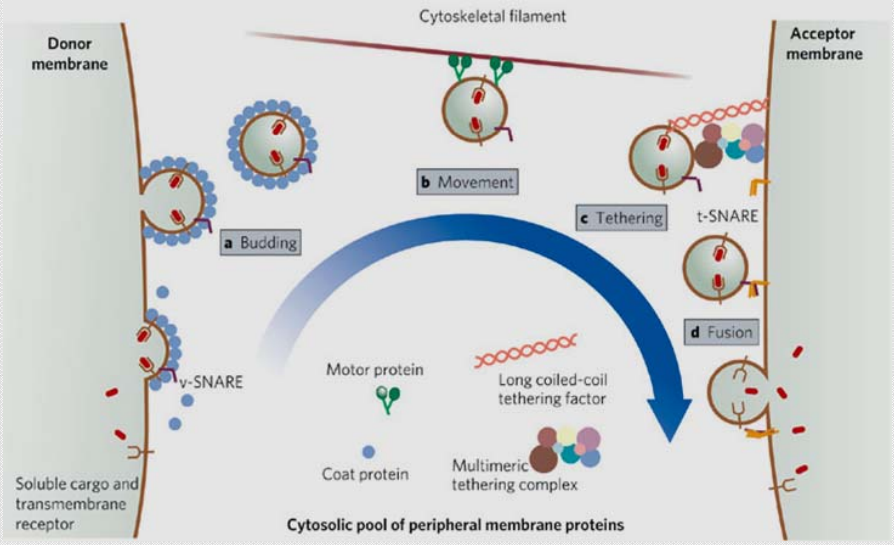
COPI
Transporte retrógrado
Golgi-ER

COPII
Transporte anterógrado
ER-Golgi

Etapas del transporte vesicular



Etapas del transporte vesicular



Principales proteínas que participan en la unión y fusión de vesículas

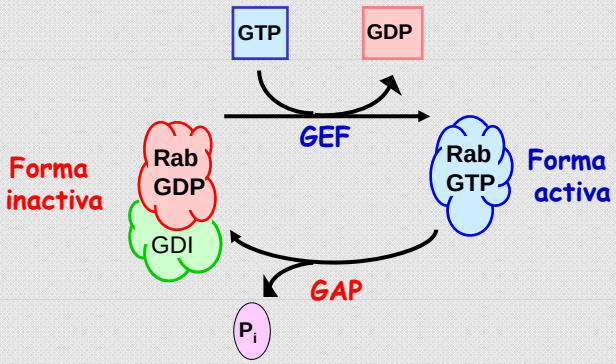
- **Rabs**: pequeñas proteínas que unen GTP
- **SNAREs**: v-SNAREs y t-SNAREs
- **NSF**: proteína con actividad ATPasa
- **α-SNAP**: proteína que une NSF

SNAREs: "SNAP Soluble NSF Attachment Protein Receptor"

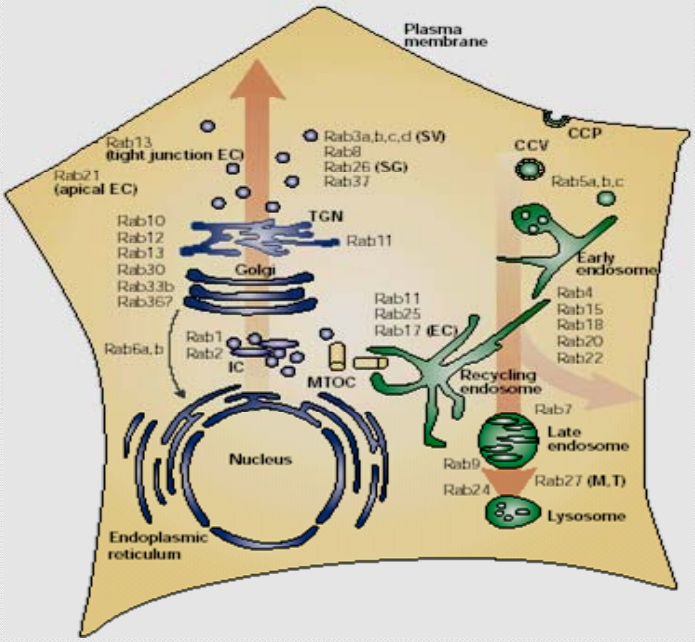
SNAP: Soluble NSF Attachment Protein

NSF: N-Ethylmaleimide-Sensitive Fusion protein

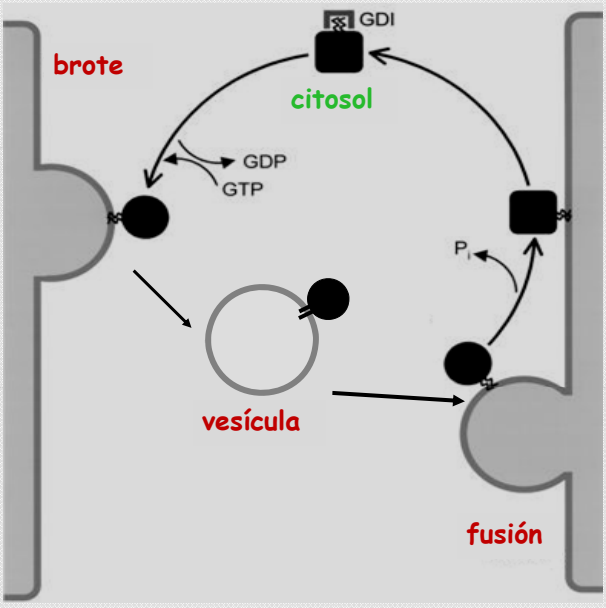
Las Rab son GTP-proteínas



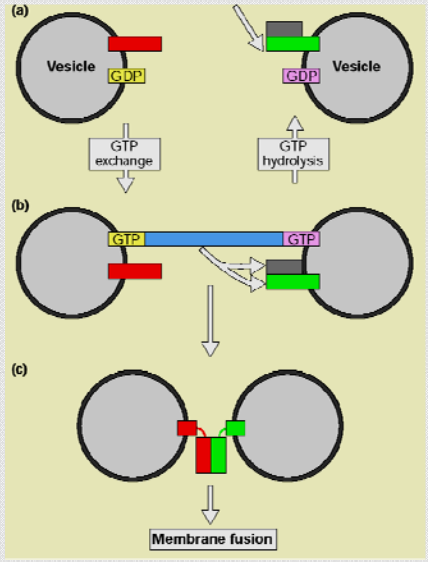
GTPasas Rabs

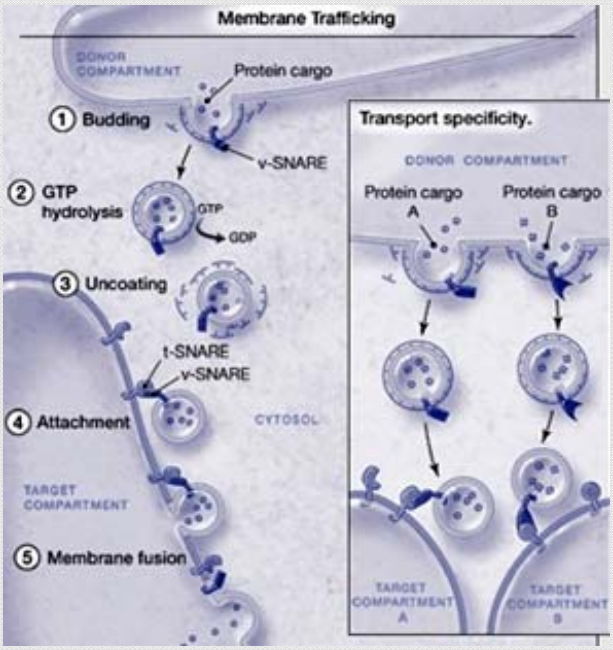


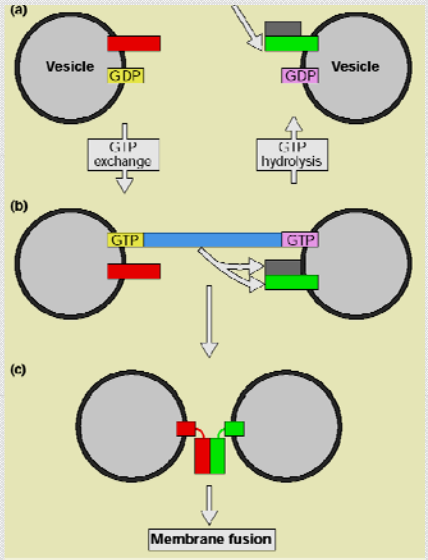
Ciclo de las proteínas Rab



Función de las Rabs: enlace ("tethering") de las vesículas







Activación de la Rab

Unión de otras proteínas
Enlace de las vesículas

Formación del complejo SNAREs

Fusión de las membranas

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SNAREs: "SNAP Soluble NSF Attachment Protein Receptor"

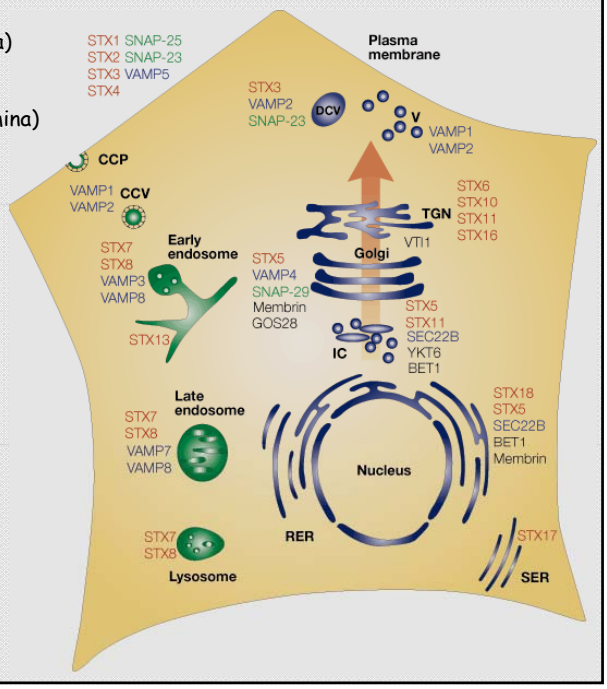
SNAP: Soluble NSF Attachment Protein

NSF: N-Ethylmaleimide-Sensitive Fusion protein

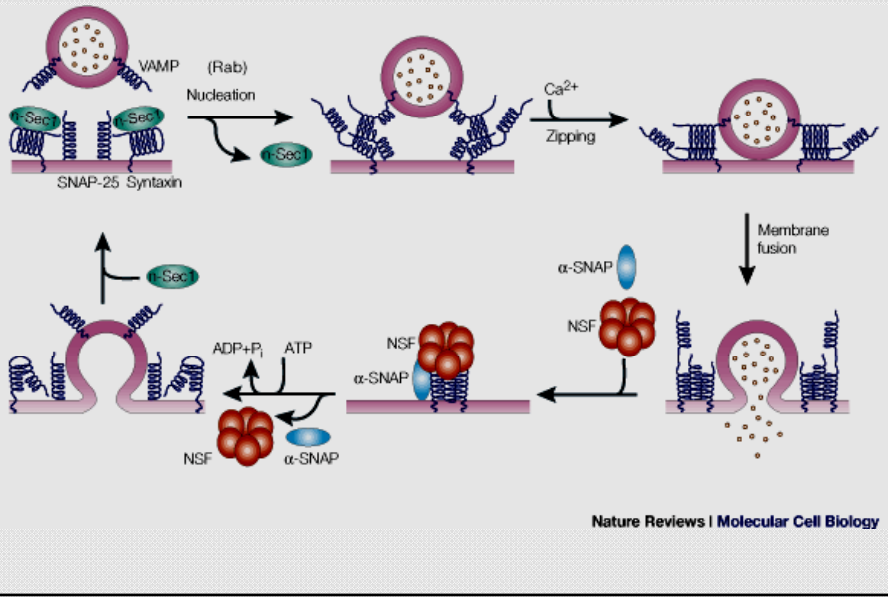
SNAREs

v- SNAREs: R-SNAREs (R. arginina)
- ✓ sinaptobrevina

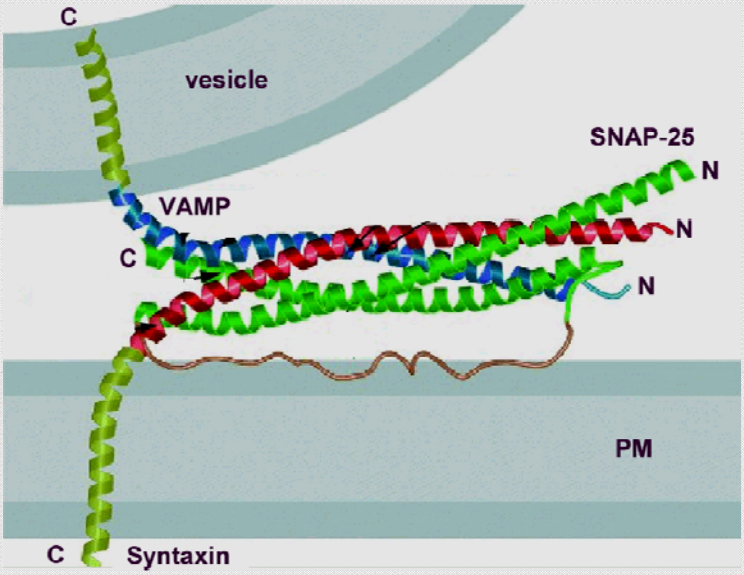
t- SNAREs: Q-SNAREs (Q: glutamina)
- ✓ sintaxina y SNAP-25



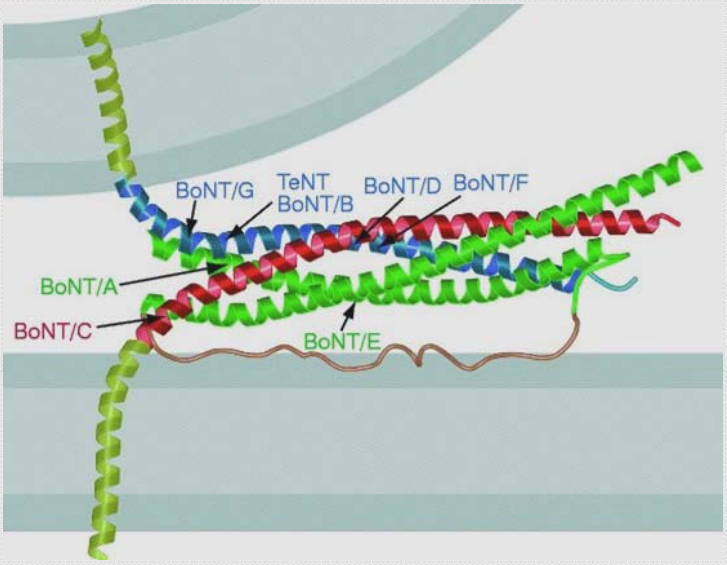
Etapas del transporte vesicular

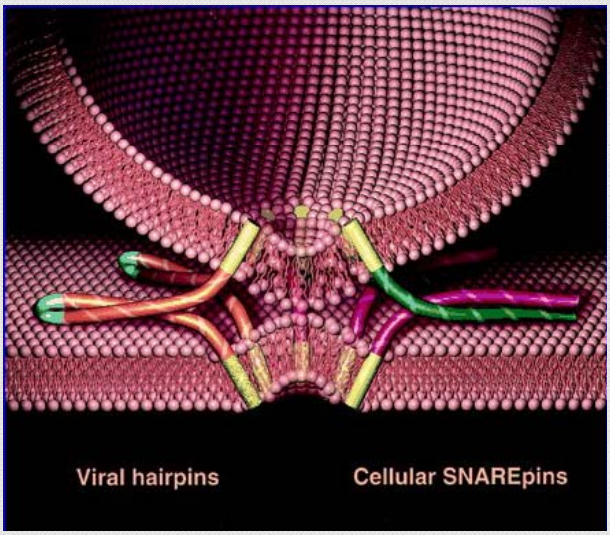


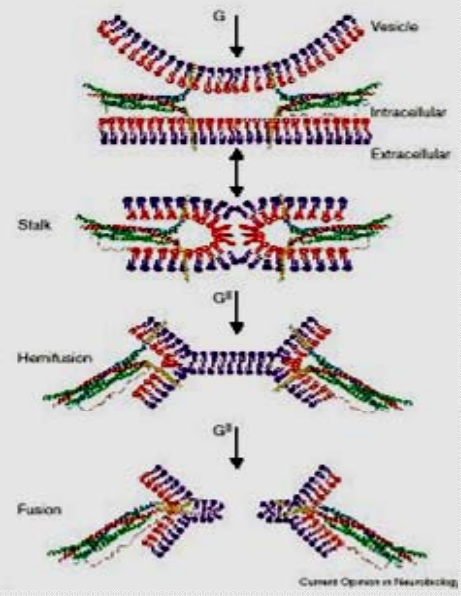
SNAREs



Acción de las toxinas botulínica y tetánica




Viral hairpins
Cellular SNAREpins


G
Vesicle
Intracellular
Extracellular
Stalk
G
Hemifusion
G
Fusion

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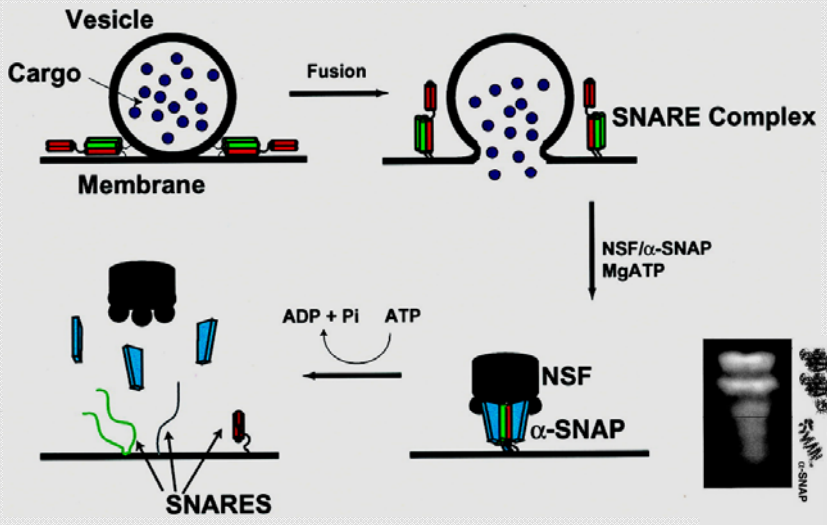
SNAREs: "SNAP Soluble NSF Attachment Protein Receptor"

SNAP: Soluble NSF Attachment Protein

NSF: N-Ethylmaleimide-Sensitive Fusion protein

Roles de NSF y α–SNAP en la fusión



From May et al, JBC 276, 21991-21994, 2001

Transporte vesicular