Sec13/31 coat complex
COPII vesicle outer coat
Provides scaffolding

ER to Golgi
Partners:
Sec23/24 adapter complex
Sar1 GTPase
Sec12 GEF

Sec23/24 adapter complex
COPII vesicle inner coat; recruits cargo into the vesicle; GAP for Sar1 (turns off Sar1 to Sar1-GDP to limit coat assembly)

ER to Golgi
Partners:
Sec13/31 coat complex
Sar1 GTPase
Sec12 GEF

Sec12 GEF
Turns on Sar1 GTPase (i.e. makes Sar1-GTP) activating vesicle formation

Sar1 GTPase
Regulates COPII vesicle formation Sar1-GTP = on, Sar1-GDP = off when on, recruits coat and helps with membrane bending

ER to Golgi
Partners:
Sec13/31 coat complex
Sec23/24 adapter complex
Sec12 GEF

Golgi to ER
Partners:
Sec21/26/Ret2/Ret3 adapter
Arf1 GTPase
Gea1 GEF, Glo3 GAP

intra-Golgi
Partners:
Sec21/26/Ret2/Ret3 adapter
Arf1 GTPase
Sec7 GEF, Age2 GAP

Sec21/Sec26/Ret2/Ret3 adapter complex
COPII vesicle inner coat; recruits cargo into the vesicle

Golgi to ER
Partners:
Cop1/Sec27/Sec28 coat
Arf1 GTPase
Gea1 GEF, Glo3 GAP

intra-Golgi
Partners:
Cop1/Sec27/Sec28 coat
Arf1 GTPase
Sec7 GEF, Age2 GAP

Arf1 GTPase
Regulates vesicle coat formation; helps with membrane bending

Golgi to ER
Partners:
Cop1/Sec27/Sec28 coat
Sec21/26/Ret2/Ret3 adapter
Arf1 GTPase
Gea1 GEF, Glo3 GAP

intra-Golgi
Partners:
Cop1/Sec27/Sec28 coat
Sec21/26/Ret2/Ret3 adapter
Sec7 GEF, Age2 GAP

Golgi to endosome
Partners:
Sec7 GEF, Age2 GAP
Prerequisite: clathrin-coated vesicles

Arf1 GTPase
Regulates vesicle coat formation; helps with membrane bending

Golgi to ER
Partners:
Cop1/Sec27/Sec28 coat
Sec21/26/Ret2/Ret3 adapter
Arf1 GTPase
Gea1 GEF, Glo3 GAP

intra-Golgi
Partners:
Cop1/Sec27/Sec28 coat
Sec21/26/Ret2/Ret3 adapter
Sec7 GEF, Age2 GAP

Golgi to endosome
Partners:
Sec7 GEF, Age2 GAP
Prerequisite: clathrin-coated vesicles
**COP vesicle inner coat; recruits cargo into the vesicle**

**Golgi to ER**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Arf1 GTPase
  - Gea1 GEF, Glo3 GAP

**intra-Golgi**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Arf1 GTPase
  - Sec7 GEF, Age2 GAP

**Arf1 GTPase**
- Regulates vesicle coat formation; helps with membrane bending

**Golgi to ER**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Sec21/26/Ret2/Ret3 adapter
  - Gea1 GEF, Glo3 GAP

**intra-Golgi**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Sec21/26/Ret2/Ret3 adapter
  - Sec7 GEF, Age2 GAP

**Golgi to endosome**
- **Partners:**
  - Sec7 GEF, Age2 GAP
  - Prerequisite: clathrin-coated vesicles

**Sec7 GEF, Age2 GAP**
- Regulate Arf1 GTPase
  - Sec7 GEF turns Arf1 on
  - Age2 GAP turns Arf1 off

**intra-Golgi**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Sec21/26/Ret2/Ret3 adapter
  - Arf1 GTPase

**Golgi to endosome**
- **Partners:**
  - Arf1 GTPase
  - **Prerequisite:** clathrin-coated vesicles

**GPI-anchored proteins**
- PM-targeted proteins linked to a lipid, glycosylphosphatidylinositol (GPI); these sort into and help stabilize lipid rafts.

**Golgi to plasma membrane**
- **Partners:**
  - lectins
  - sphingolipids
  - cholesterol

**Golgi to plasma membrane**
- **Partners:**
  - GPI-anchored proteins
  - sphingolipids
  - cholesterol

**sphingolipids**
- Form “lipid rafts” with cholesterol. These lipid domains help cluster secretory proteins and form a secretory vesicle.

**Golgi to plasma membrane**
- **Partners:**
  - lectins
  - GPI-anchored proteins
  - cholesterol

**Golgi to plasma membrane**
- **Partners:**
  - GPI-anchored proteins
  - sphingolipids

**GGAs**

**Golgi to endosome**
- **Partners:**
  - None
  - Prerequisites: clathrin-coated vesicles
  - Arf1 GTPase
**Partners:**

### Cop1/Sec27/Sec28 coat
- Sec21/26/Ret2/Ret3 adapter
- Arf1 GTPase

### Gea1 GEF, Glo3 GAP
Regulate Arf1 GTPase
Gea1 GEF turns Arf1 on (Arf1-GTP)
Glo3 GAP turns Arf1 off (Arf1-GDP)

### ER to Golgi

**Partners:**
- Cop1/Sec27/Sec28 coat
- Sec21/26/Ret2/Ret3 adapter
- Arf1 GTPase

**Prerequisite:**
- Golgi to ER COPI vesicles

### KDEL receptor
Binds proteins with an ER retention signal (“KDEL”); packs them into COPI vesicles to be returned to the ER.

### ER to Golgi

**Partners:**
- none

**Prerequisite:**
- Golgi to ER COPI vesicles

### AP1 adapter complex
Golgi-specific inner coat for clathrin-coated vesicles.
Recruits cargo into the vesicle.
Has four subunits: Beta, Gamma, Mu and Sigma.

### dynamin GTPase
Large polymeric GTPase.
Helps regulate vesicle formation and promotes vesicle release (membrane scission).

### EpsinR
Helps with clathrin coat formation by binding together AP1, clathrin, PI(4)P, and GGAs.
Helps with membrane bending.

### Golgi to endosome

**Partners:**
- clathrin coat
- dynamin GTPase
- PI(4)P

### Golgi to endosome

**Partners:**
- clathrin coat
- AP1 adapter complex
- PI(4)P

### Golgi to endosome

**Partners:**
- EpsinR

**Prerequisite:**
- clathrin-coated vesicles

### clathrin coat
Clathrin heavy chain and clathrin light chain together make an outer coat that scaffolds the vesicle.

### PI(4)P
Signalling phospholipid.
Marks the trans-Golgi; recruits AP1 and GGA adapters.

### Golgi to endosome

**Partners:**
- AP1 adapter complex
- dynamin
- PI(4)P

### Golgi to endosome

**Partners:**
- clathrin coat
- AP1 adapter complex
- PI(4)P

### Golgi to endosome

**Partners:**
- EpsinR

**Prerequisite:**
- clathrin-coated vesicles
**Gea1 GEF, Glo3 GAP**
Regulate Arf1 GTPase
Gea1 GEF turns Arf1 on (Arf1-GTP)
Glo3 GAP turns Arf1 off (Arf1-GDP)

**KDEL receptor**
Binds proteins with an ER retention signal (“KDEL”); packs them into COPI vesicles to be returned to the ER.

**ER to Golgi**
**Partners:**
Cop1/Sec27/Sec28 coat
Sec21/26/Ret2/Ret3 adapter
Arf1 GTPase

**ER to Golgi**
**Partners:**
none

**Prerequisite:**
Golgi to ER COPI vesicles

**AP1 adapter complex**

**Partners:**
clathrin coat
dynamin GTPase
PI(4)P

**Golgi to endosome**

**Partners:**
clathrin coat
dynamin GTPase
PI(4)P

**dynamin GTPase**

Large polymeric GTPase. Helps regulate vesicle formation and promotes vesicle release (membrane scission).

**EpsinR**

Helps with clathrin coat formation by binding together AP1, clathrin, PI(4)P, and GGAs. Helps with membrane bending.

**Golgi to endosome**

**Partners:**
clathrin coat
AP1 adapter complex
PI(4)P

**Eps15**

Helps with clathrin coat formation by binding together AP1, clathrin, and ubiquitinated cargo proteins.

**Golgi to endosome**

**Partners:**
EpsinR

**clathrin coat**

Clathrin heavy chain and clathrin light chain together make an outer coat that scaffolds the vesicle.

**PI(4)P**

Signalling phospholipid. Marks the trans-Golgi; recruits AP1 and GGA adapters.

**Golgi to endosome**

**Partners:**
AP1 adapter complex
dynamin
PI(4)P

**Golgi to endosome**

**Partners:**
AP1 adapter complex
cratulin coat
PI(4)P

**Golgi to endosome**

**Partners:**
EpsinR

**Prerequisite:**
clathrin-coated vesicles
**COPI vesicle inner coat; recuits cargo into the vesicle**

**Arf1 GTPase**
Regulates vesicle coat formation; helps with membrane bending

**Golgi to ER**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Arf1 GTPase
  - Gea1 GEF, Glo3 GAP

**Golgi to plasma membrane**
- **Partners:**
  - lectins
  - sphingolipids
  - cholesterol

**Golgi to plasma membrane**
- **Partners:**
  - GPI-anchored proteins
  - sphingolipids
  - cholesterol

**GGAs**

**Glo47/55/64/67**

**Golgi to endosome**
- **Partners:**
  - None

**Sec7 GEF, Age2 GAP**
Regulate Arf1 GTPase
- Sec7 GEF turns Arf1 on
- Age2 GAP turns Arf1 off

**intra-Golgi**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Sec21/26/Ret2/Ret3 adapter
  - Arf1 GTPase
  - Sec7 GEF, Age2 GAP

**Sec7 GEF, Age2 GAP**
Regulate Arf1 GTPase
- Sec7 GEF turns Arf1 on
- Age2 GAP turns Arf1 off

**Golgi to plasma membrane**
- **Partners:**
  - lectins
  - GPI-anchored proteins
  - cholesterol

**Golgi to plasma membrane**
- **Partners:**
  - GPI-anchored proteins
  - sphingolipids
  - cholesterol

**GPI-anchored proteins**
PM-targeted proteins linked to a lipid, glycosylphosphatidylinositol (GPI); these sort into and help stabilize lipid rafts.

**Golgi to ER**
- **Partners:**
  - Cop1/Sec27/Sec28 coat
  - Sec21/26/Ret2/Ret3 adapter
  - Arf1 GTPase
  - Gea1 GEF, Glo3 GAP

**Golgi to plasma membrane**
- **Partners:**
  - lectins
  - sphingolipids
  - cholesterol

**sphingolipids**
Form “lipid rafts” with cholesterol. These lipid domain helps cluster secretory proteins and form a secretory vesicle.

**Golgi to plasma membrane**
- **Partners:**
  - GPI-anchored proteins
  - sphingolipids
  - cholesterol

**cholesterol**
Forms “lipid rafts” with sphingolipids. These lipid domains helps cluster secretory proteins and form a secretory vesicle.
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**Arf1 GTPase**

Regulates vesicle coat formation; helps with membrane bending

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<td><strong>Partners:</strong>&lt;br&gt;Sec7 GEF, Age2 GAP <strong>Prerequisite:</strong> clathrin-coated vesicles</td>
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**Sec21/26/Ret2/Ret3 adapter complex**

COPII vesicle inner coat; recruits cargo into the vesicle; GAP for Sar1 (turns off Sar1 to Sar1-GDP to limit coat assembly)

**Sec12 GEF**

Turns on Sar1 GTPase (i.e. makes Sar1-GTP) activating vesicle formation