

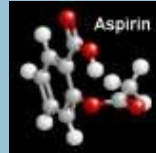
# Routes of administration

Harald H Sitte, MD

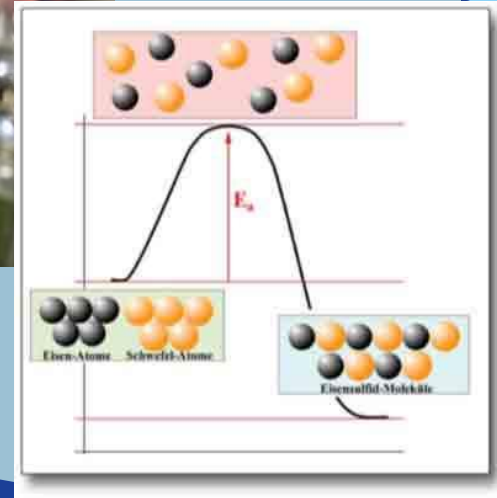
Medical University of Vienna, Austria

# Learning outcomes

- Protein delivery
- Alternative routes of administration
- Rate-controlled and site-specific delivery
- Issues with biosimilars



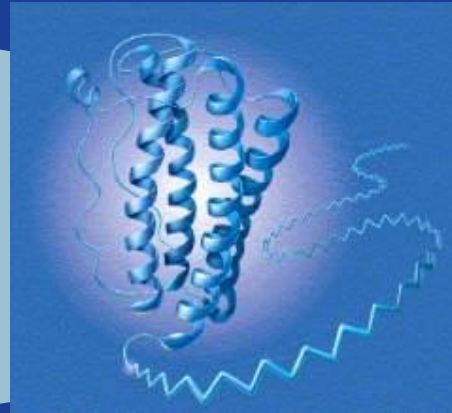
Acetyl-Salicylsäure



[www.chemischereaktionen.de/einf02.html](http://www.chemischereaktionen.de/einf02.html)



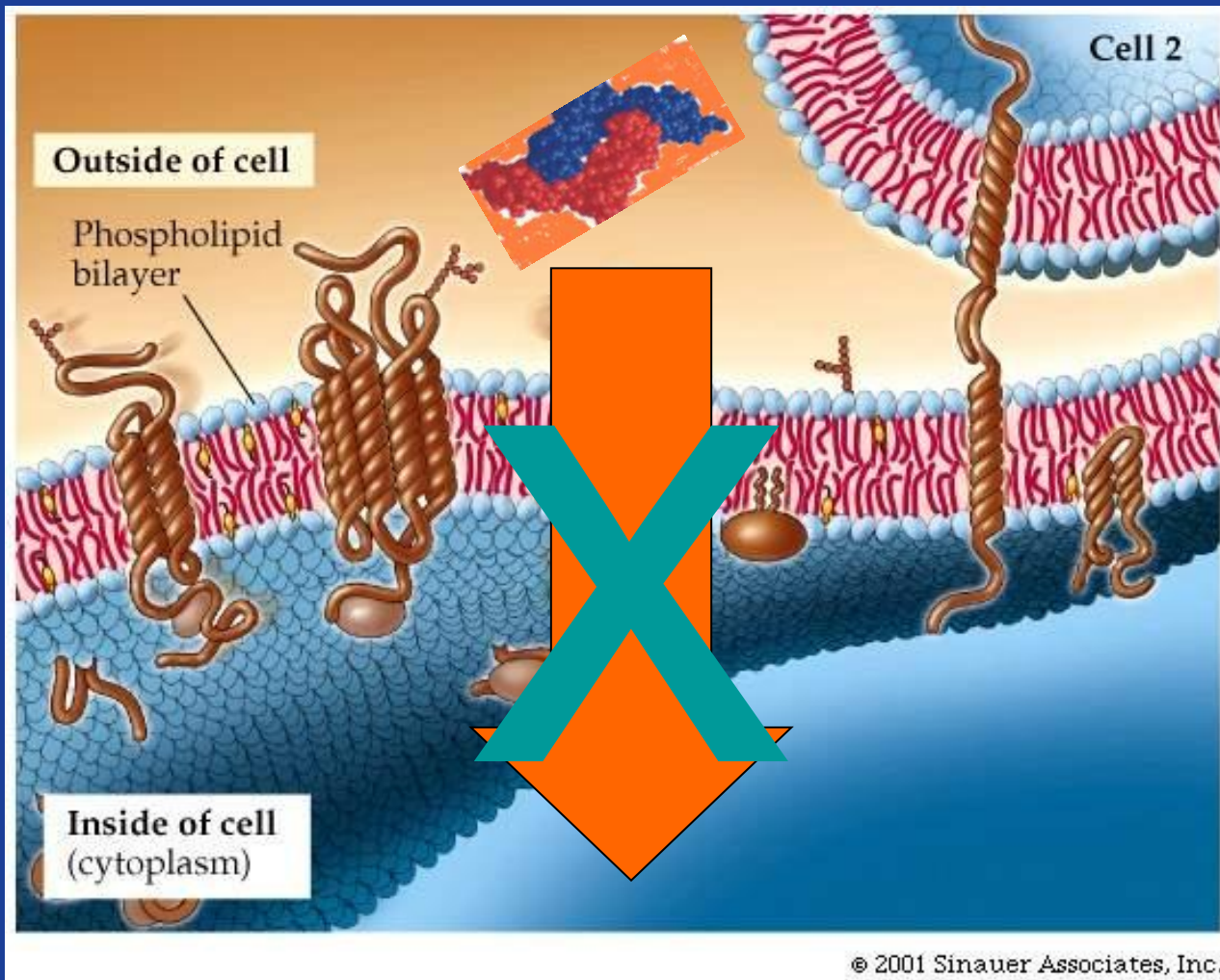
G-CSF = Filgrastim



PEG-Filgrastim

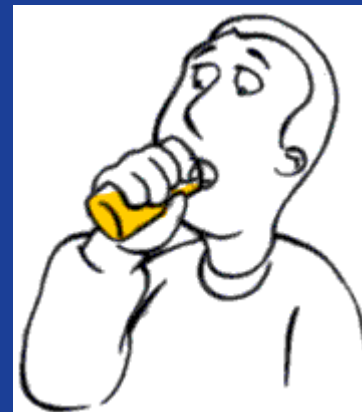


# Facing the problem: drug delivery



# The oral route of administration

- Low bioavailability:
  - Protein degradation
  - Poor permeability of the wall of the GI tract



# The parenteral routes of administration

- Intravenous
- Intramuscular
- Subcutaneous
- Intraperitoneal

# Short half-life proteins

- Prolongation of their action by site-specific application
- Differences in disposition

# Alternative routes of administration

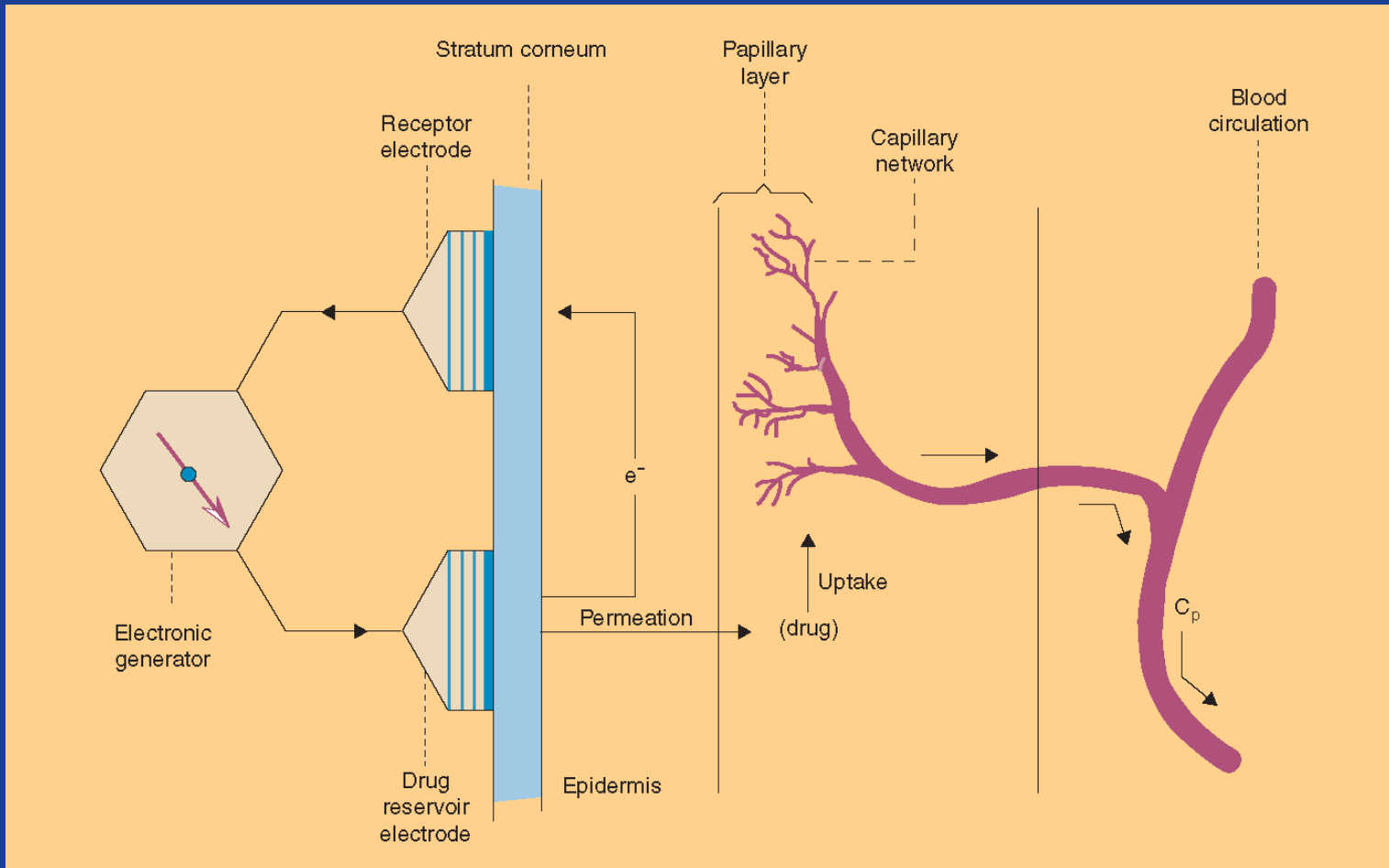
- Nasal (Edman and Bjork, 1992)
- Pulmonary (Patton and Platz, 1992)
- Buccal (Zhou and Li Wan Po, 1991)
- Rectal (Zhou and Li Wan Po, 1991)
- Transdermal (Cullander and Guy, 1992)



# Enhancement of drug absorption

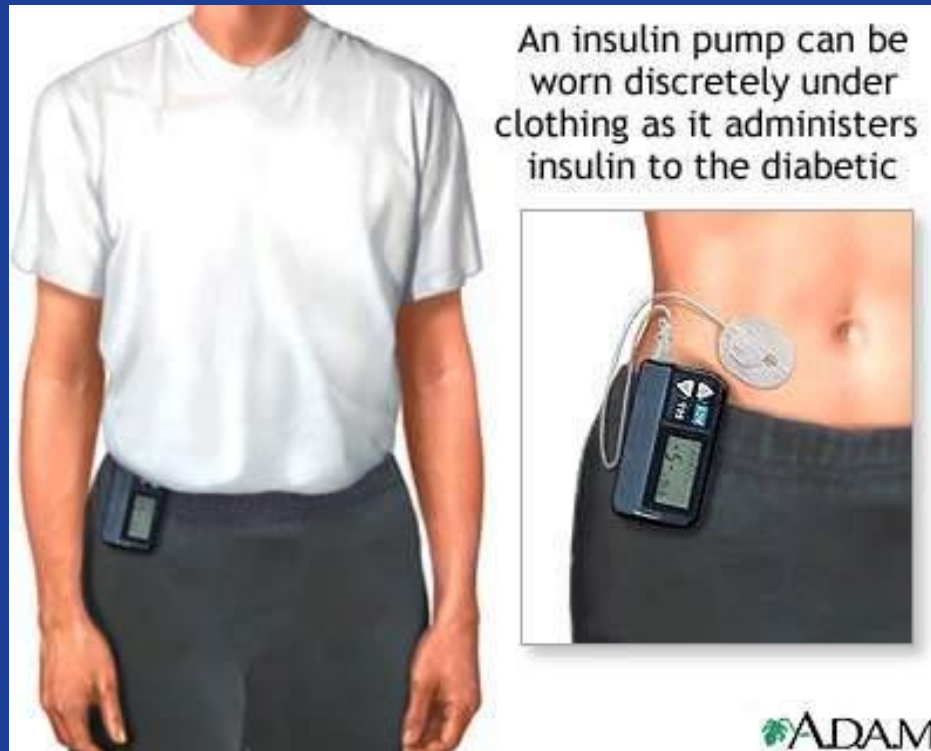
- Increase permeability
- Decrease degradation at adsorption site
- Enhance resistance against degradation
- Prolonged exposure

# Example: iontophoretic drug delivery



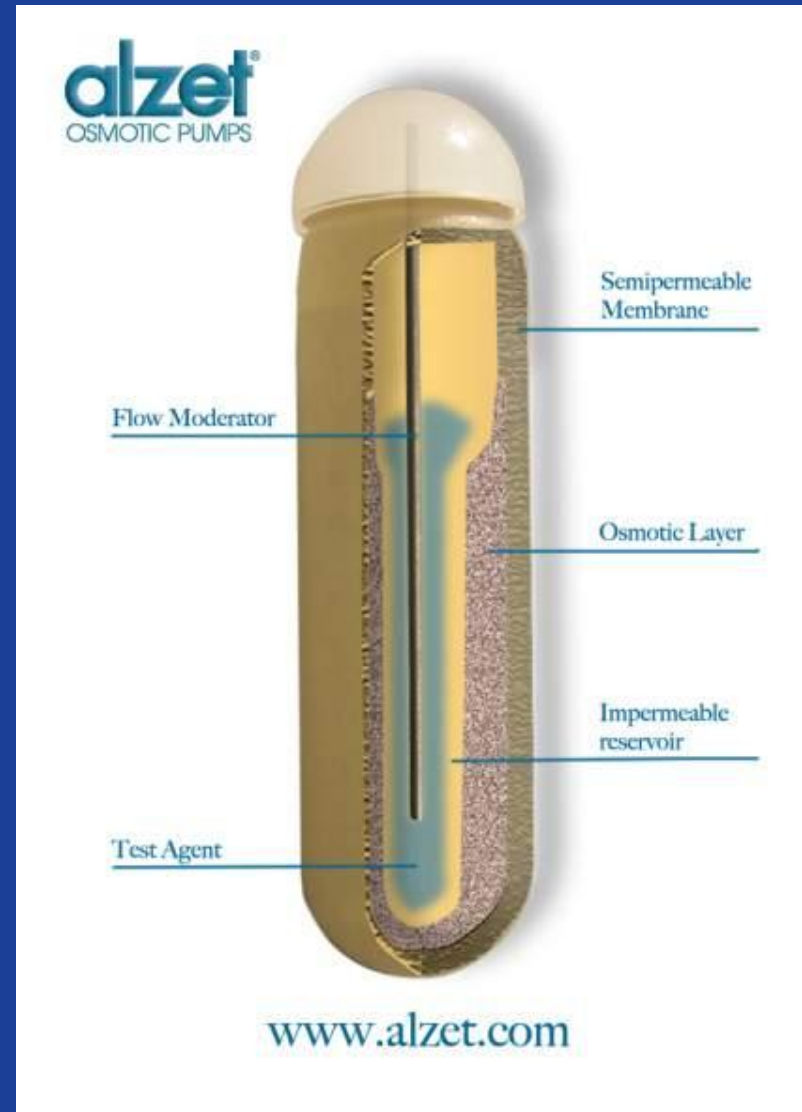
# Rate-controlled delivery

- Open loop systems: mechanical pumps



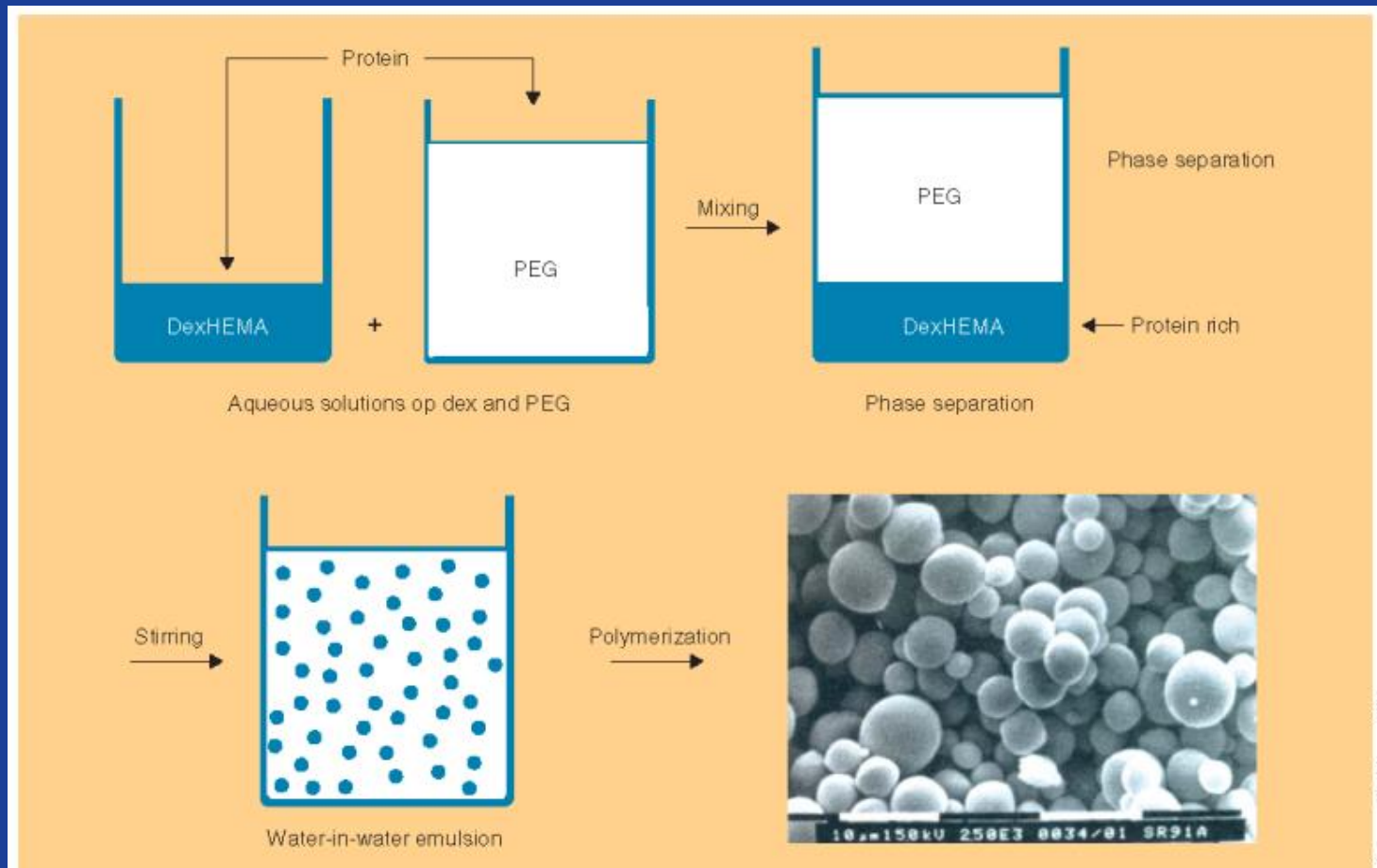
# Rate-controlled delivery

- Open loop systems:  
osmotical pumps



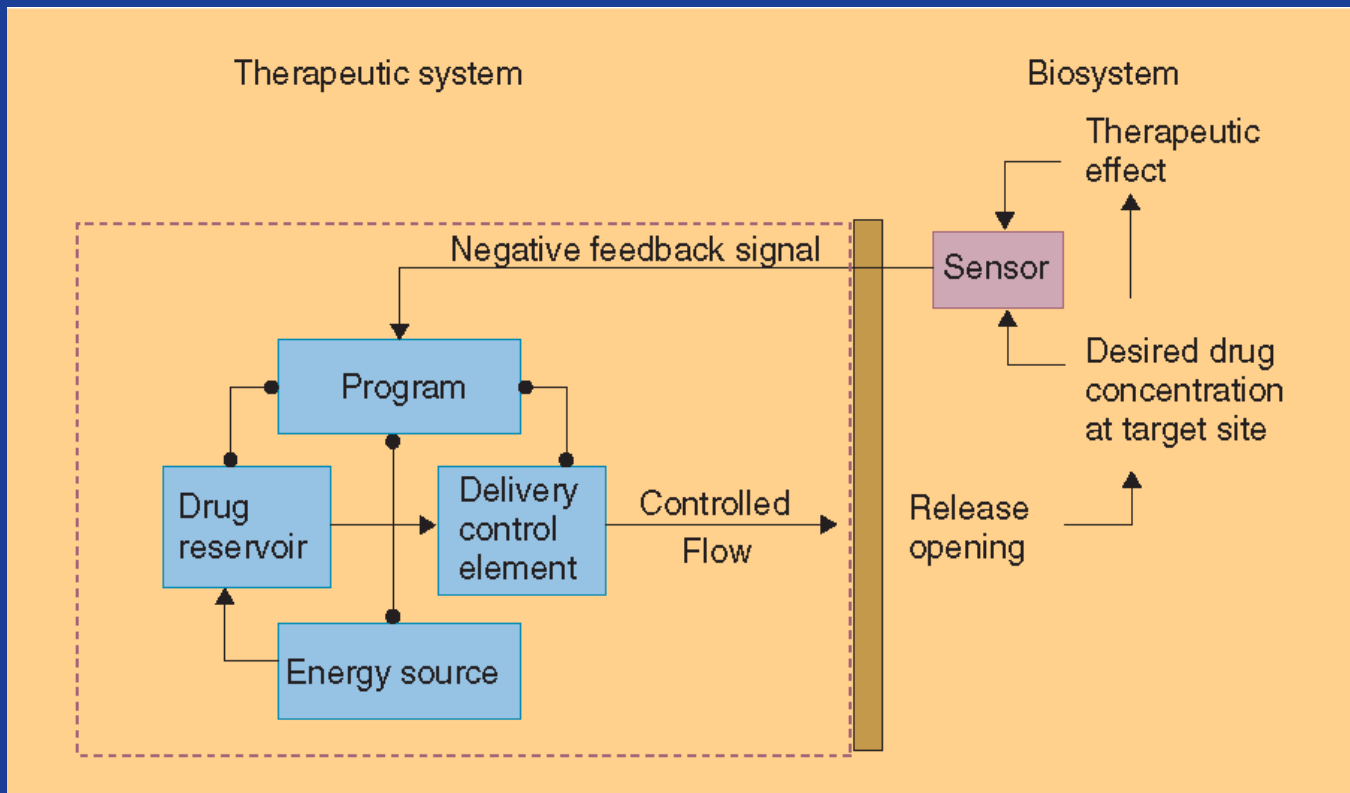
# Rate-controlled delivery

- Open loop systems: microspheres



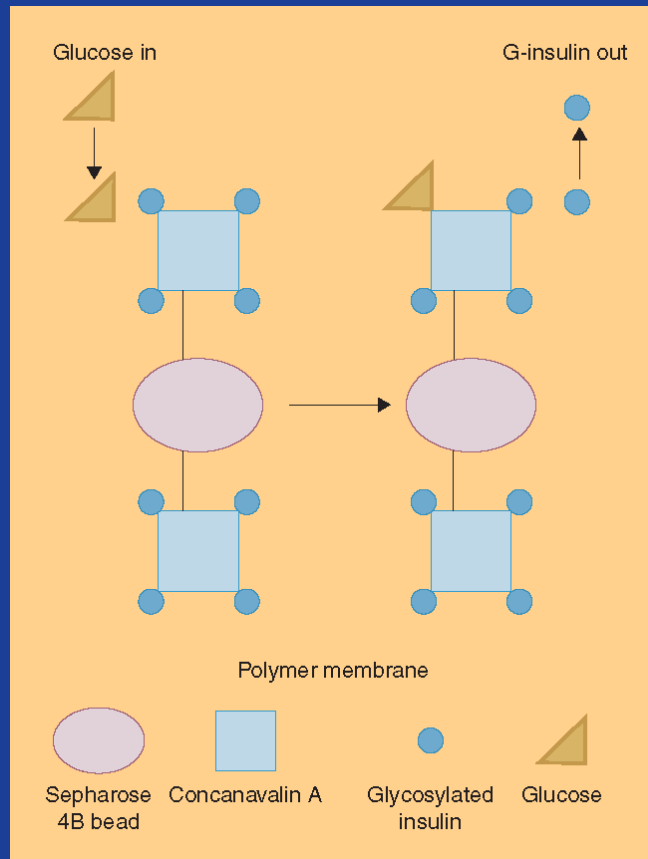
# Rate-controlled delivery

- Closed loop systems: biosensor-pump combinations



# Rate-controlled delivery

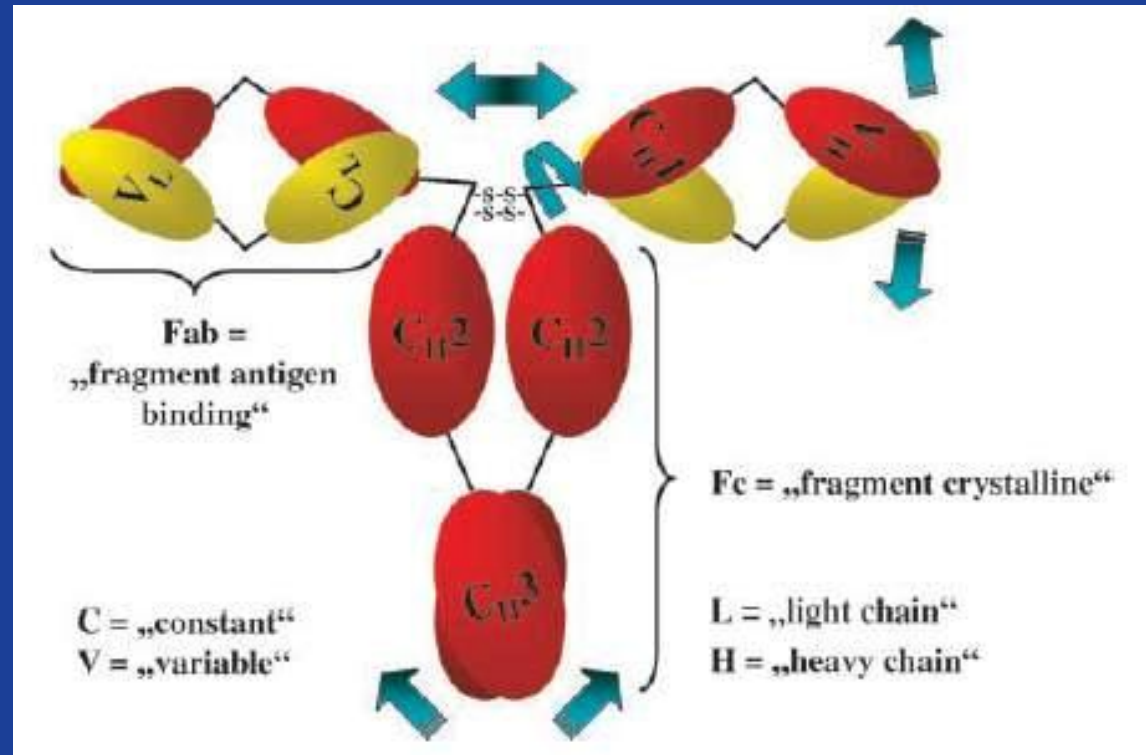
- Self-regulating systems



# Site-specific (targeted) delivery

- Why is this difficult?

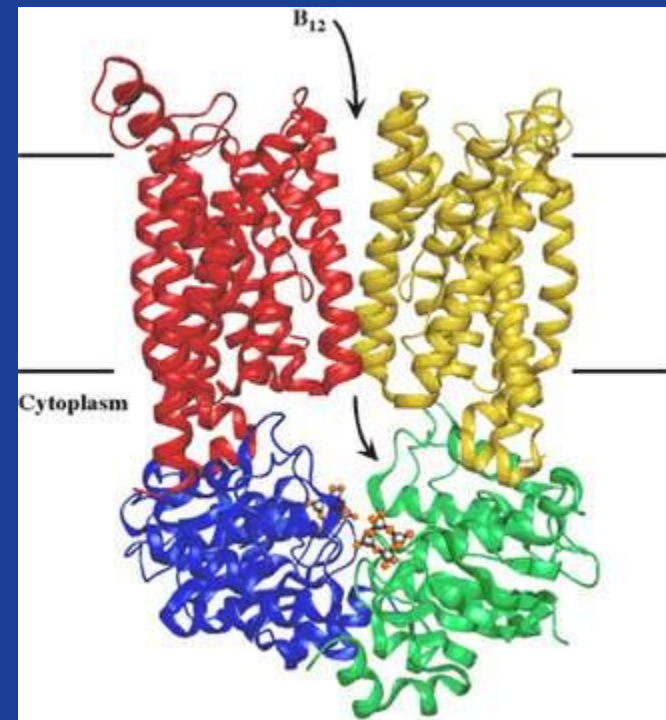
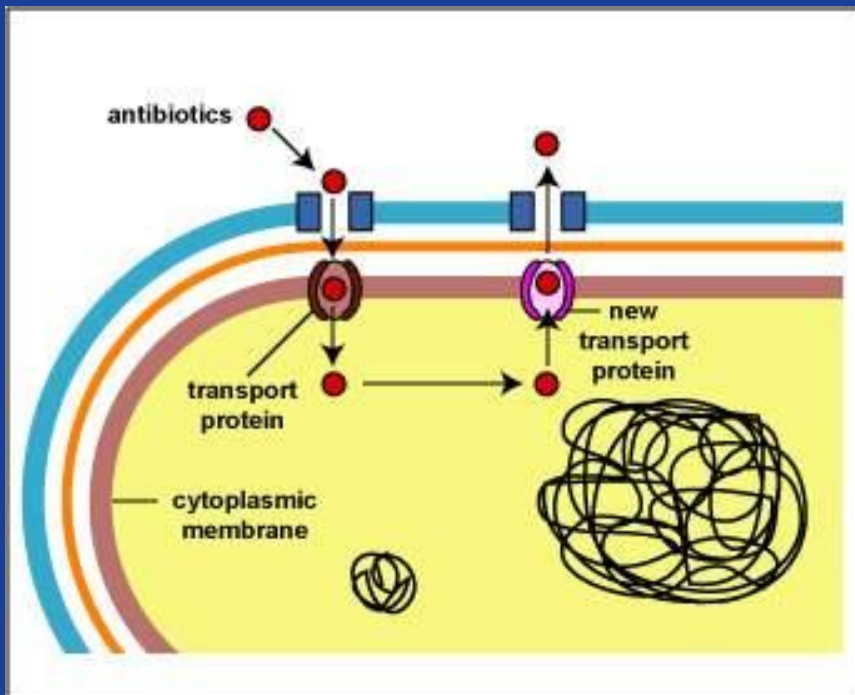
- → *Possibility:  
the use of  
antibodies!*





# Site-specific (targeted) delivery

- → *Second possibility: transporters/carrier proteins deliver*



# Issues with biosimilars

- Differences between originator biological product and biosimilar and/or different biological product
- → *Potential problems*

# Conclusion slide

- Protein delivery
  - *How can we get the product to its site of action?*
- Alternative routes of administration
  - *Nasal, buccal, rectal, transdermal*
- Rate-controlled and site-specific delivery
  - *Possible improvements on their way*
- Issues with biosimilars
  - *What can go wrong?*