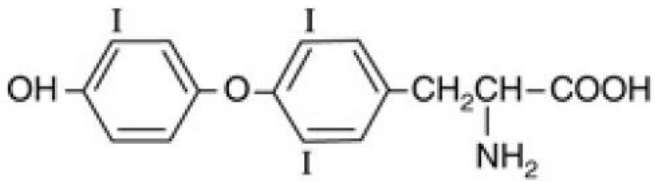
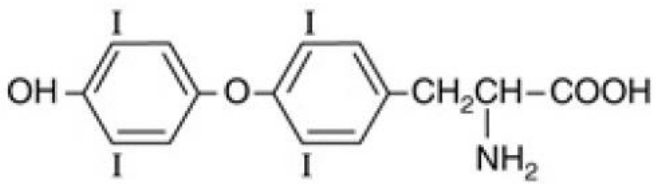
Structure of Hormones

- Amino Acid-Derived Hormones

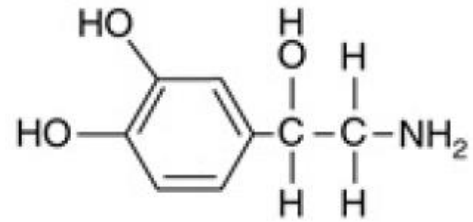
Tyrosine derivatives



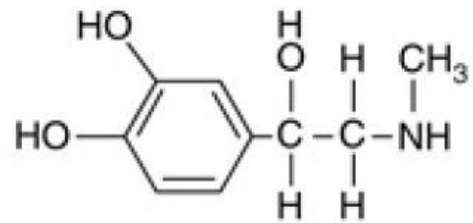
T_3



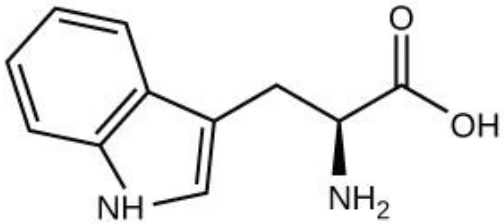
T_4



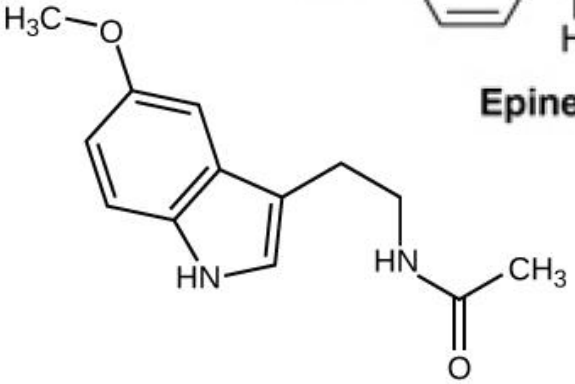
Norepinephrine



Epinephrine



Tryptophan

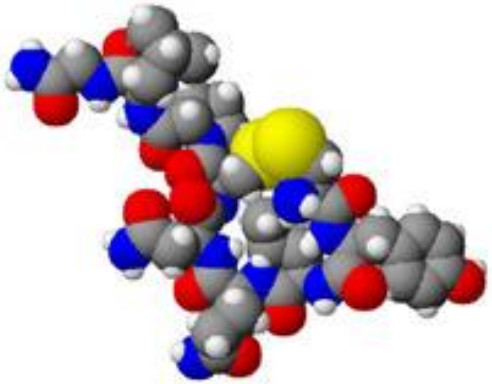


Melatonin

Structure of Hormones

- Peptide & Protein Hormones

FSH

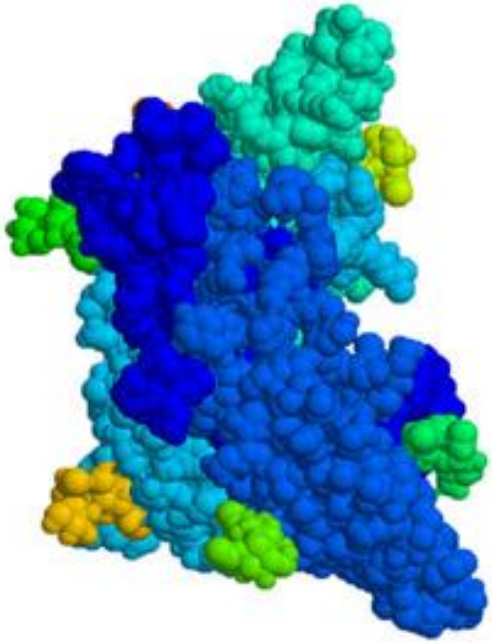


(a)

GH

(b)

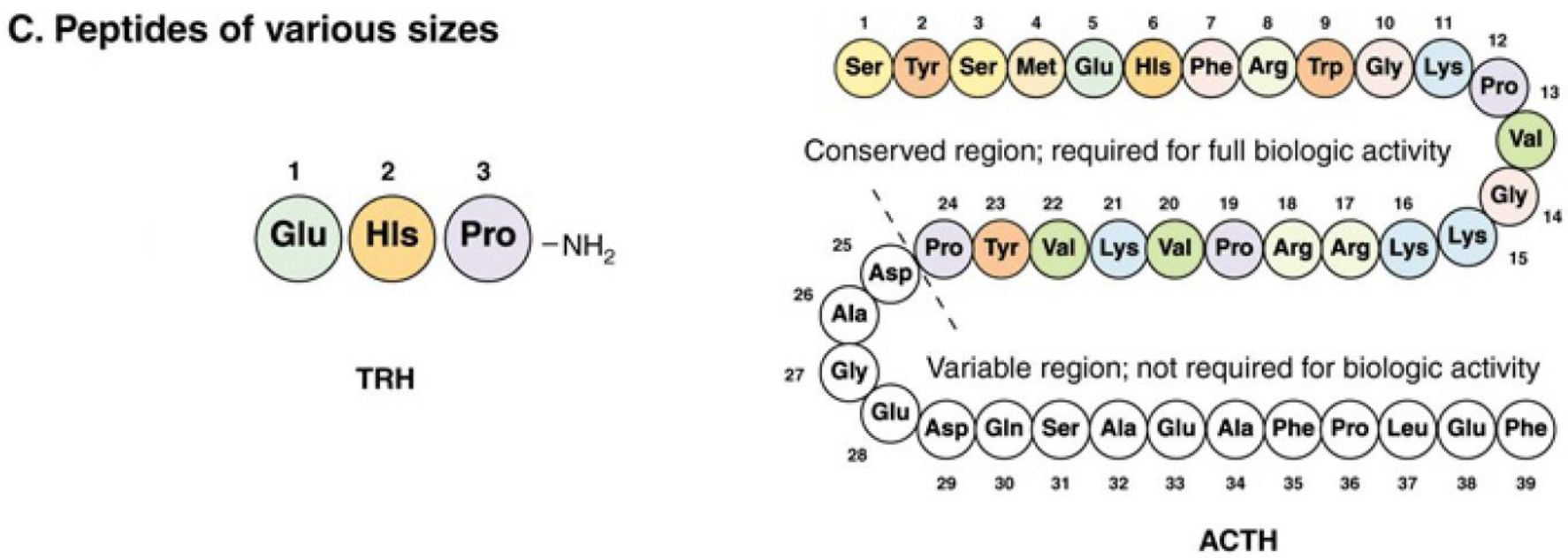
Oxytocin



(c)

Structure of Hormones

- Peptide & Protein Hormones



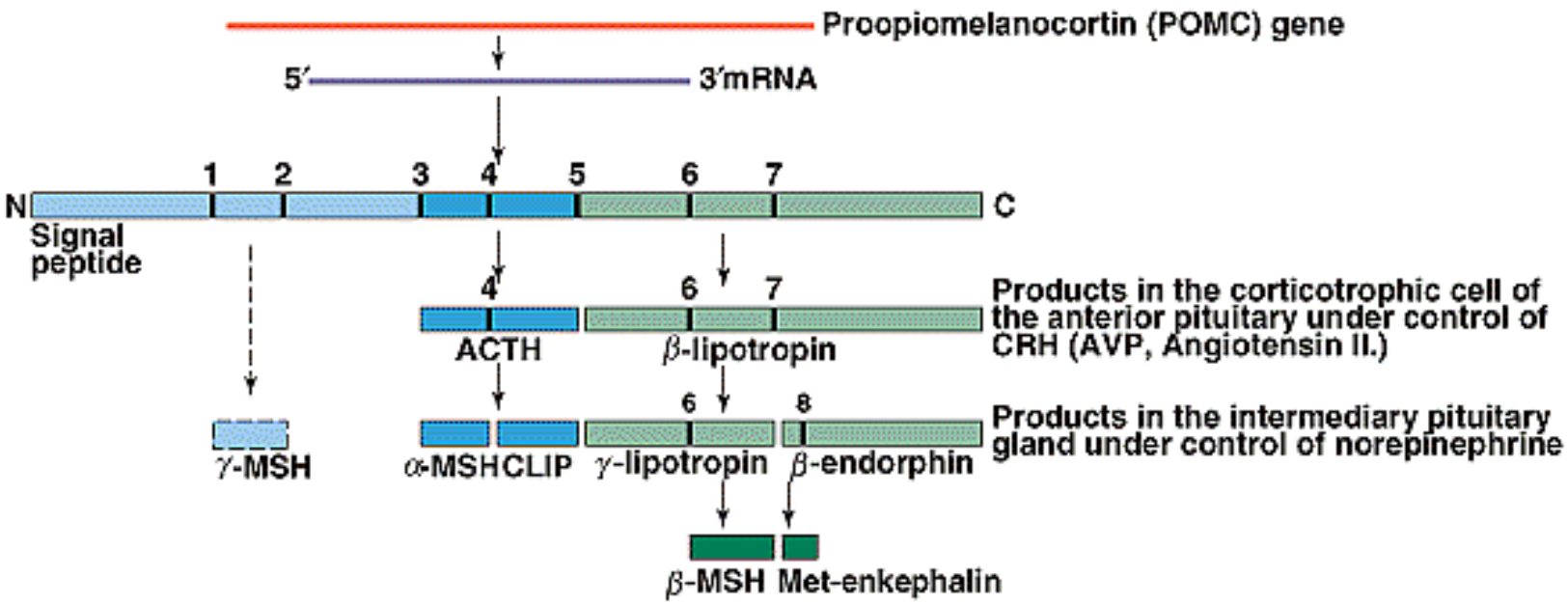
Structure of Hormones

Peptide & Protein Hormones

Hormone	Structure
GHRH	44
TRH	3
GnRH	10
CRH	41
ADH	9
Vasopressin	9
Angiotensin I	10
Angiotensin II	8
Insulin	51
Glucagon	29

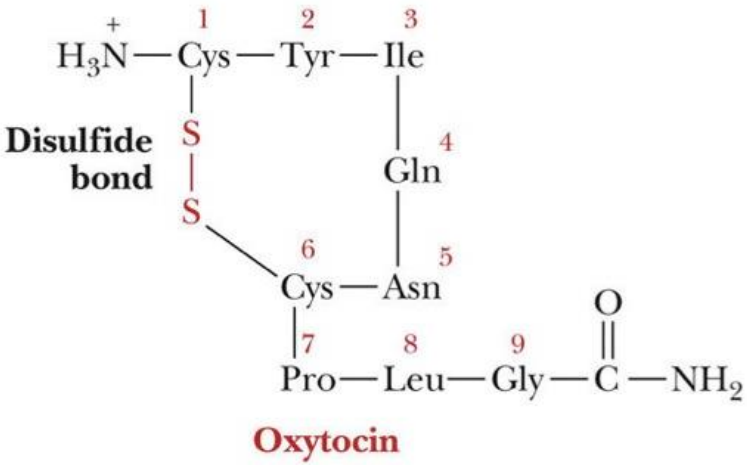
Synthesis of Peptide Hormones

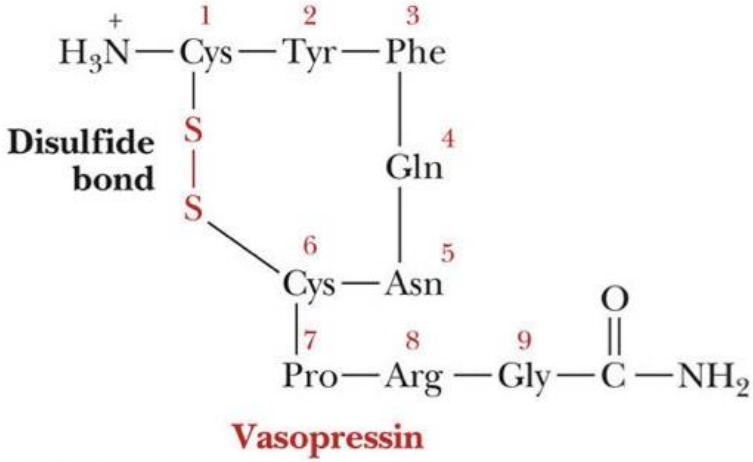
- From precursor polypeptides
  - One gene may code more than one hormone
    - **Proopiomelanocortin** (**POMC**)
  - The cleavage depends on specific enzymes

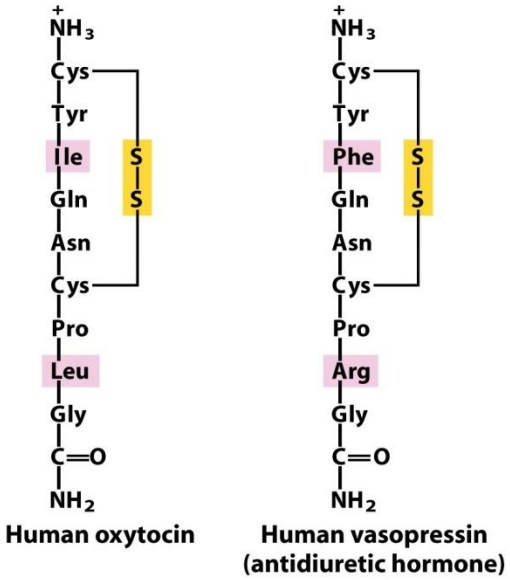


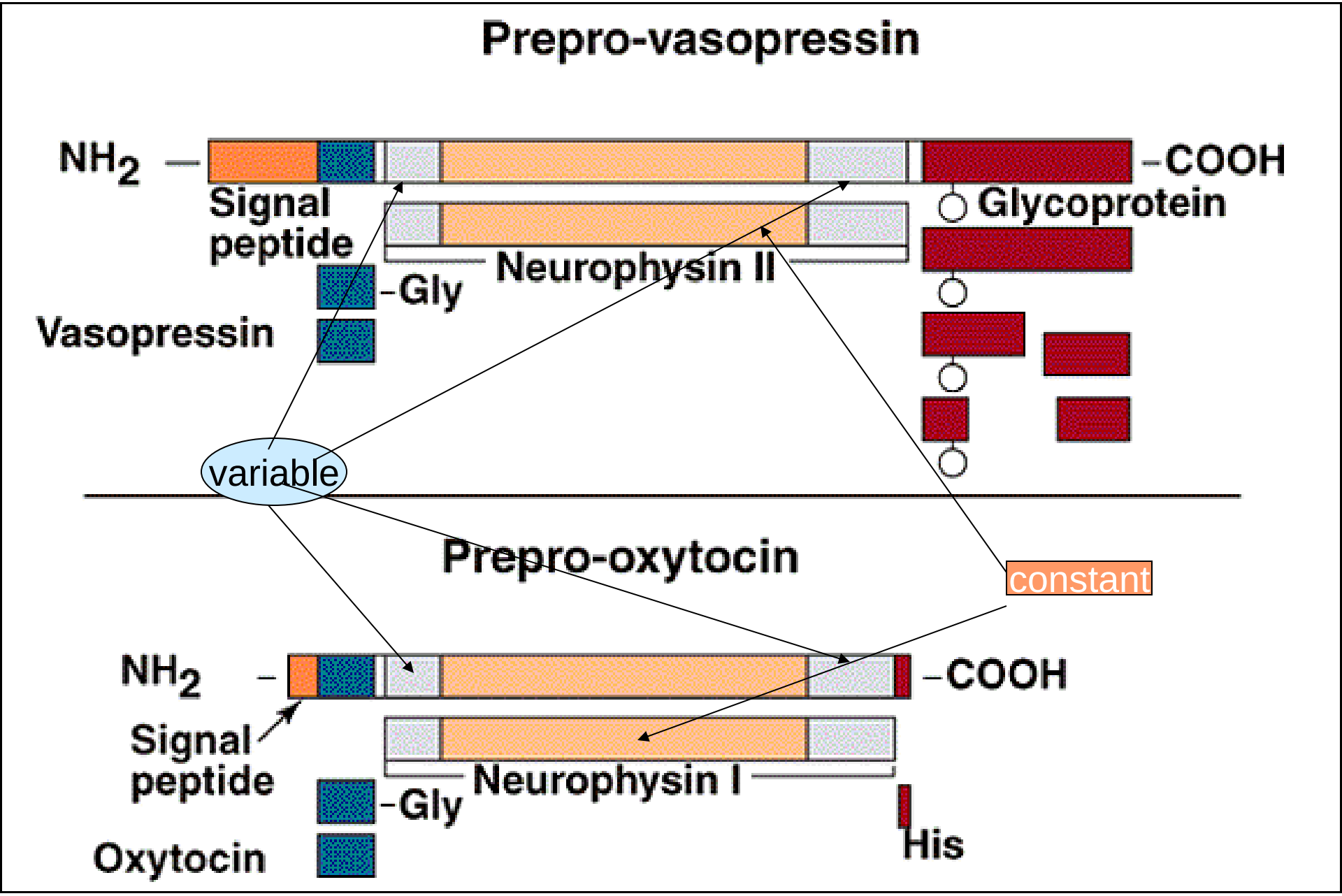
Synthesis of Peptide Hormones

- From precursor polypeptides
  - Vasopressin and oxytocin
  - Synthesis in separate cell bodies of hypothalamic neurons

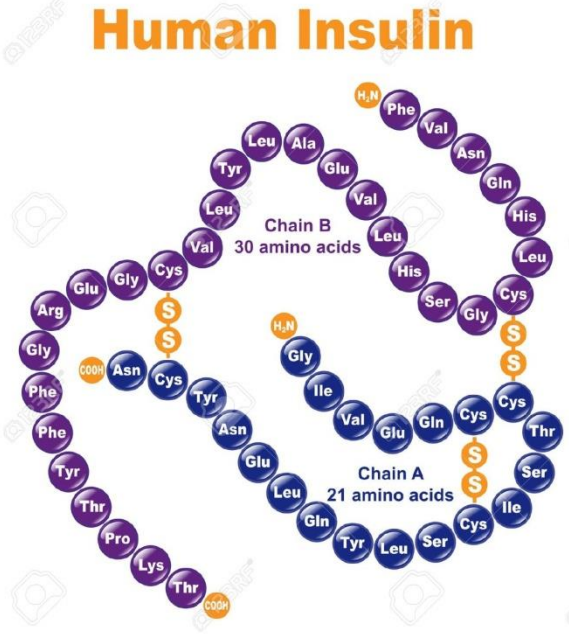







Prepro-vasopressin
NH2
COOH
Signal peptide
Glycoprotein
Neurophysin II
Gly
Vasopressin
variable
Prepro-oxytocin
constant
NH2
COOH
Signal peptide
Neurophysin I
Gly
His
Oxytocin

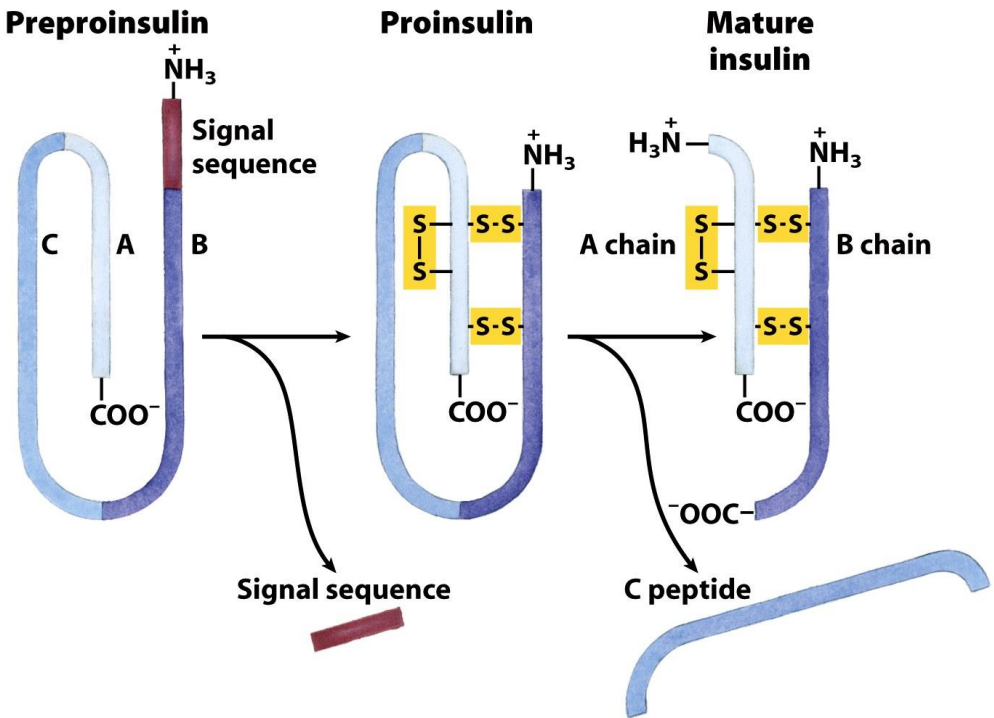
Synthesis of Peptide Hormones



- Peptide & Protein Hormones
- From **Pre-pro-hormones**

- A larger precursor preproinsulin
  - **23 aa signal sequence**
  - **3 disulfide bonds**
- Proinsulin
  - **Remove the C peptide**

- Mature insulin
  - **A and B chains**



Target cells interactive effects

1. **Permissive effects** – one hormone enhances the effect of a later hormone
   - ✓ **Estrogen up-regulates Prog. receptors** in uterus
   - ✓ **Thyroid hormone increases the effect of epinephrine** on breakdown of triglycerides in adipocytes

2. **Integrative effects –** hormones produce complementary effects on different tissues
   - ✓ **PTH and calcitriol** increase ECF **calcium**

Target cells interactive effects

3. **Synergistic effects:**
   - ✓ Both **FSH and estrogen** necessary for **normal oocyte development**
   - ✓ **FSH and testosterone** together increase **spermatogenesis**

4. **Antagonistic effects:**
   - ✓ **Insulin and glucagon**