



# Osteoporosis, Diabetes, Thyroid drugs and Oral Contraceptives

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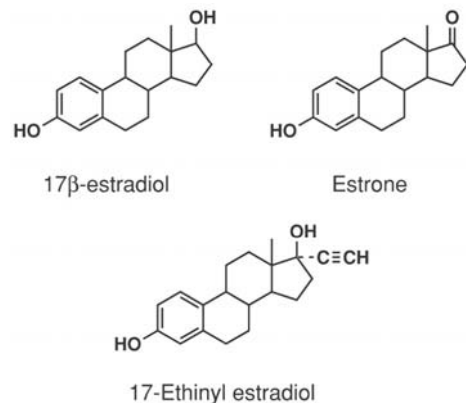
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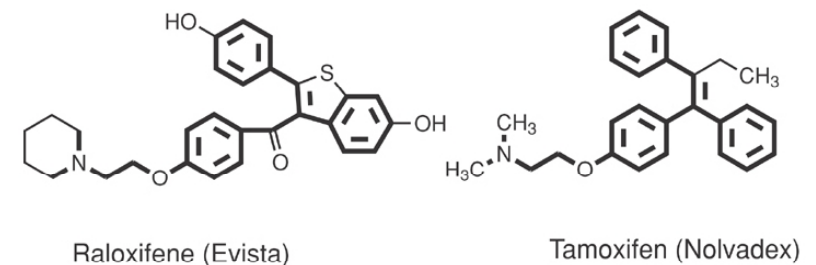
# Osteoporosis

- Anti-resorptive agents
- Bone-forming agents

# Osteoporosis: Anti-resorptive agents Estrogen analogues-Estrogen replacement therapy



# Osteoporosis: Anti-resorptive agents Selective estrogen receptor modulators

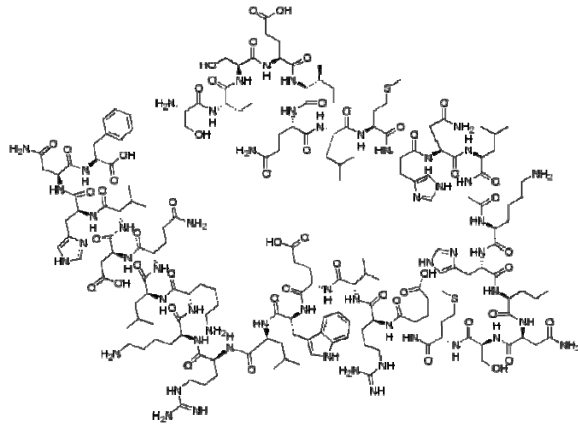


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## Osteoporosis: Bone-Forming agents

### Teriparatide



## Osteoporosis: Bone-Forming agents

### Inorganic salts

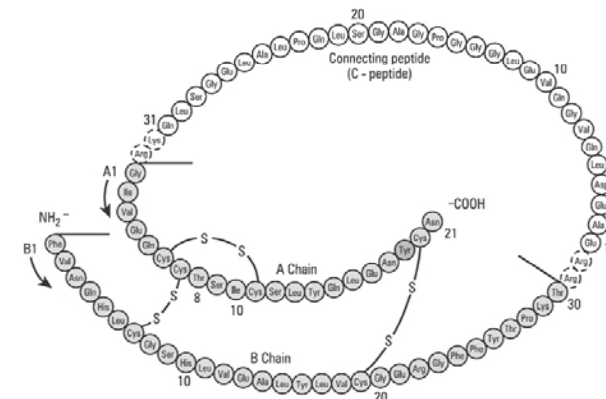
- Calcium salts
- Sodium Fluoride

## Diabetes

- Insuline
- Glucagon
- Somatostatine
- Amylin

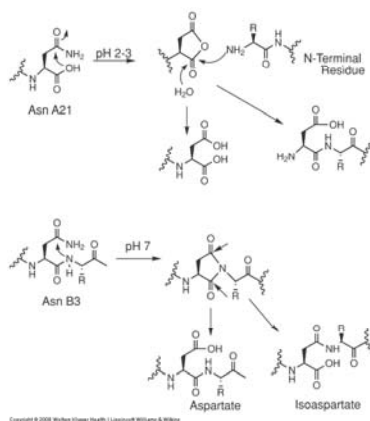
## Diabetes

### Insulin



## Diabetes

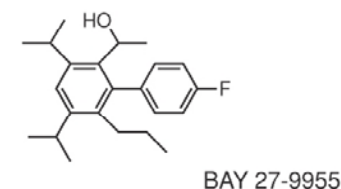
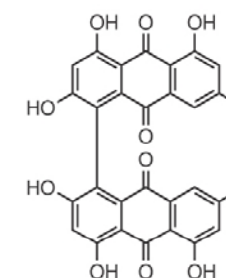
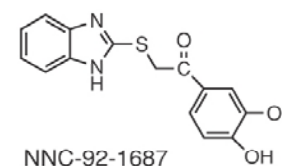
### Insulin



## Diabetes

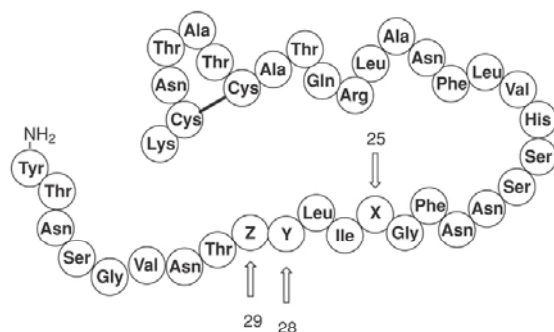
Drug development related to other hormones

Glucagon receptor antagonists



## Diabetes

Drug development related to other hormones



Amylin (human) X = Ala, Y = Z = Ser  
 Pramlintide (Symlin) X = Y = Z = Pro

## Diabetes

Drug development related to other hormones

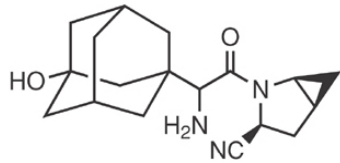
Glucagon-like peptide 1 agonists

H-His-Gly-Glu-Gly-Thr-Phe-Thr-Ser-Asp-Leu-Ser-Lys-Gln-Met-Glu  
 -Glu-Glu-Ala-Val-Arg-Leu-Phe-Ile-Glu-Trp-Leu-Lys-Asn-Gly-Gly-Pro  
 -Ser-Ser-Gly-Ala-Pro-Pro-Ser-NH<sub>2</sub>

Exenatide (Byetta)

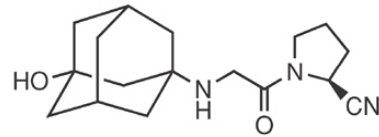
## Diabetes

Drug development related to other hormones



Saxagliptin

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Vildagliptin (Galvus)

## Diabetes

Oral hypoglycemic agents: sulfonylureas

- A class of antidiabetic drugs that are used in the management of diabetes mellitus type 2 ("adult-onset"). They act by increasing insulin release from the  $\beta$ -cells in the pancreas.

## Diabetes

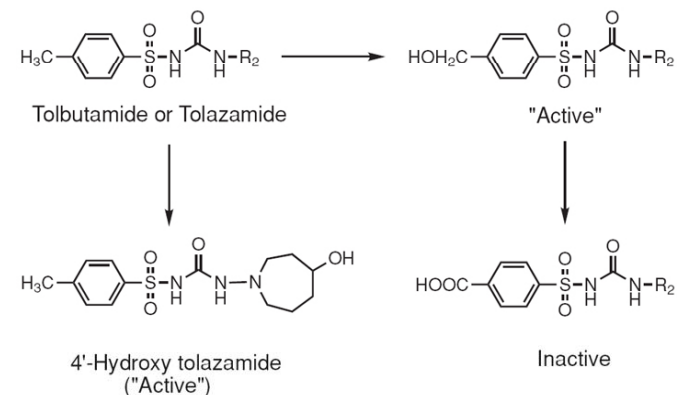
Oral hypoglycemic agents: sulfonylureas

Generic name	Trade name	R <sub>1</sub>	R <sub>2</sub>
1 <sup>st</sup> Generation:			
Tolbutamide	Orinase	CH <sub>3</sub> -	-CH <sub>2</sub> CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Chlorpropamide	Diabinese	Cl-	-CH <sub>2</sub> CH <sub>2</sub> CH <sub>3</sub>
Tolazamide	Tolinase	CH <sub>3</sub> -	-N(CH <sub>2</sub> ) <sub>6</sub>
Acetohexamide	Dymelor	CH <sub>3</sub> -C(=O)-	-C <sub>6</sub> H <sub>11</sub>
2 <sup>nd</sup> Generation:			
Glyburide (Glibenclamide)	Diabeta Micronase Glynase PresTab	Cl- OCH <sub>3</sub>	-C <sub>6</sub> H <sub>11</sub>
Glipizide	Glucotrol	H <sub>3</sub> C- N(CH <sub>2</sub> ) <sub>6</sub>	-C <sub>6</sub> H <sub>11</sub>
Glimepiride	Amaryl	H <sub>3</sub> C- C <sub>6</sub> H <sub>5</sub> -	-C <sub>6</sub> H <sub>4</sub> -CH <sub>3</sub>

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## Diabetes

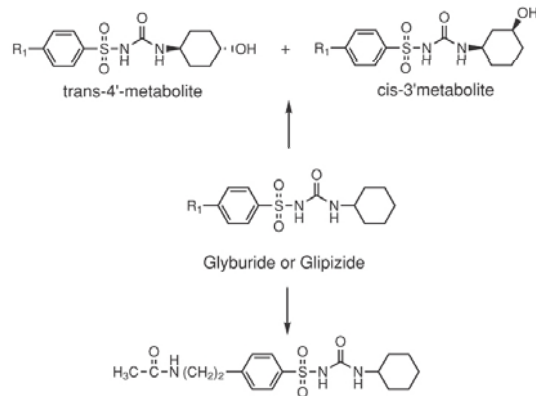
Oral hypoglycemic agents: sulfonylureas



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## Diabetes

### Oral hypoglycemic agents: sulfonylureas



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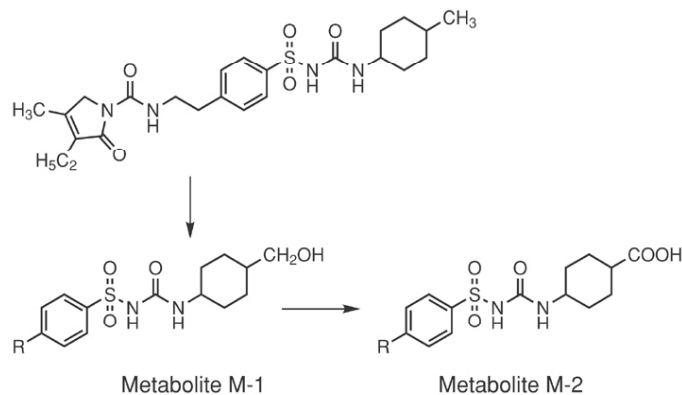
## Diabetes

### Oral hypoglycemic agents: meglitinides

- Class of drugs treat diabetes type 2
- Bind to an ATP-dependent  $\text{K}^+$  ( $\text{K}_{\text{ATP}}$ ) channel on the cell membrane of pancreatic  $\beta$  cells in a similar manner to sulfonylureas but at a separate binding site. They act by increasing insulin release from the  $\beta$ -cells in the pancreas.

## Diabetes

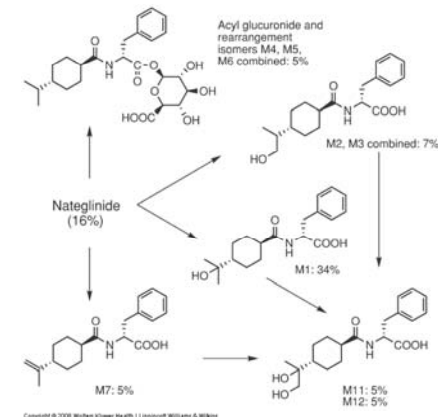
### Oral hypoglycemic agents: meglitinides



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## Diabetes

### Oral hypoglycemic agents: meglitinides



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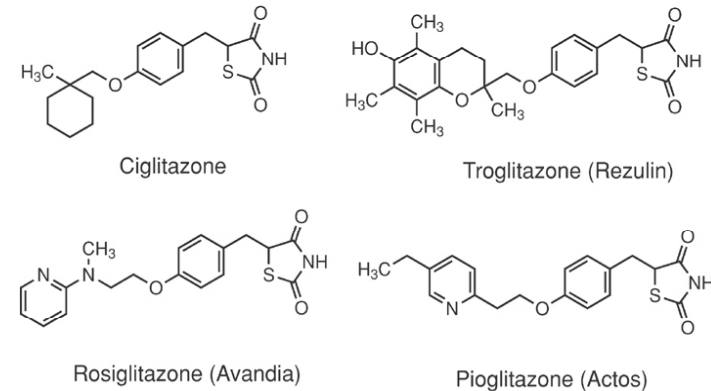
## Diabetes

### Oral hypoglycemic agents: thiazolidinediones

- Thiazolidinediones or TZDs act by binding to PPARs (peroxisome proliferator-activated receptors), a group of receptor molecules inside the cell nucleus, specifically *PPAR $\gamma$*  (gamma). The ligands for these receptors are free fatty acids (FFAs) and eicosanoids. When activated, the receptor migrates to the DNA, activating transcription of a number of specific genes. By activating *PPAR $\gamma$*  Insulin resistance is decreased.

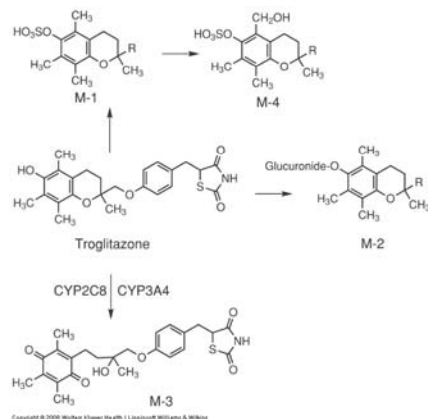
## Diabetes

### Oral hypoglycemic agents: thiazolidinediones



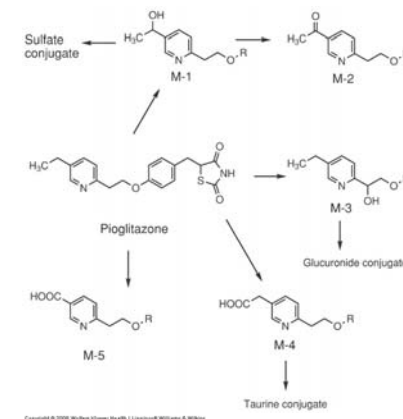
## Diabetes

### Oral hypoglycemic agents: thiazolidinediones



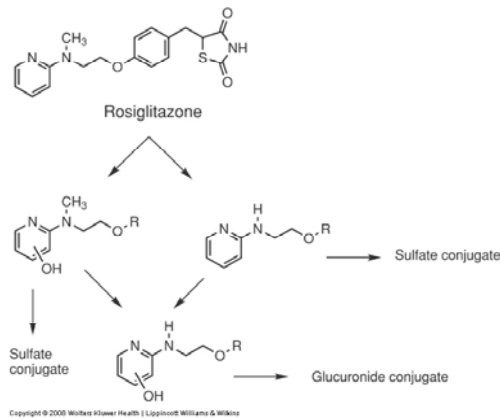
## Diabetes

### Oral hypoglycemic agents: thiazolidinediones



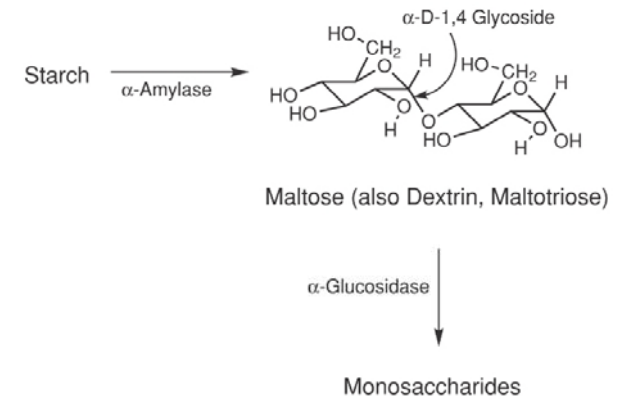
# Diabetes

Oral hypoglycemic agents: thiazolidinediones



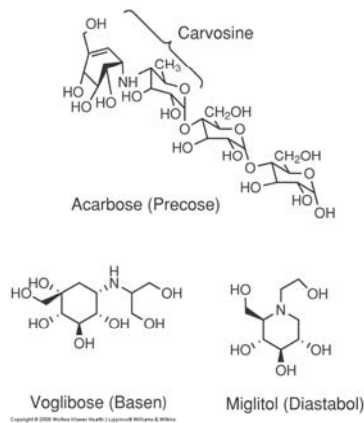
# Diabetes

Oral hypoglycemic agents: Dual PPAR $\alpha$  and PPAR $\gamma$



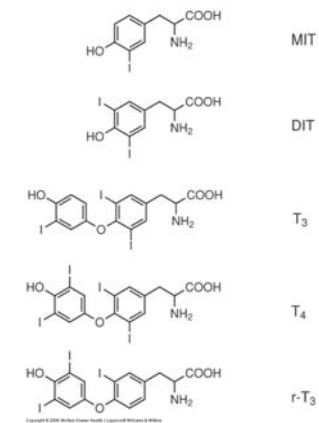
# Diabetes

Oral hypoglycemic agents: Dual PPAR $\alpha$  and PPAR $\gamma$



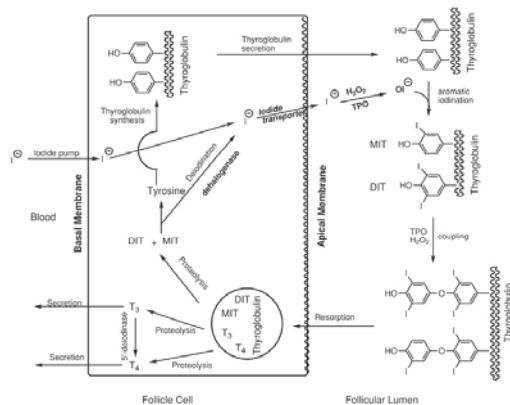
# Tyroid drugs

Hormones of the Thyroid Gland



# Thyroid drugs

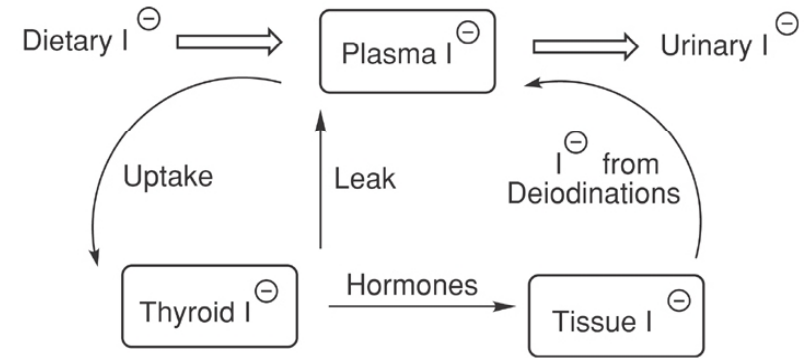
## Biosynthesis of Thyroide Hormones



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# Thyroid drugs

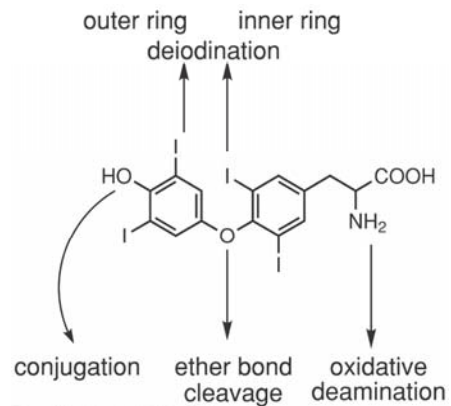
## matabolism



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# Thyroid drugs

## Metabolic pathway of thyroxine

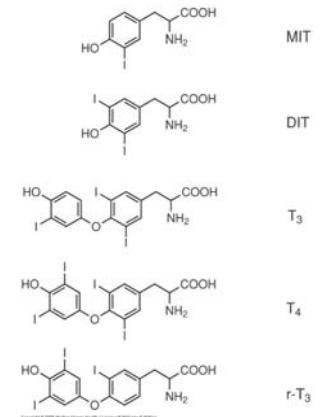


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# Thyroid drugs

## Thyroid replacment therapy

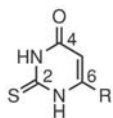
- T<sub>3</sub> and T<sub>4</sub>



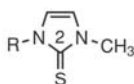
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## Thyroid drugs

Antithyroide drugs for the treatment of hyperthyroidism



Thiouracil; R = H  
Methylthiouracil; R = CH<sub>3</sub>  
Propylthiouracil (PTU); R = n-C<sub>3</sub>H<sub>7</sub>



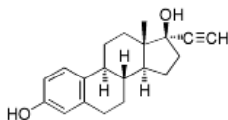
Methimazole (MMI, R = H)  
Carbimazole (R = C<sub>2</sub>H<sub>5</sub>OCO)

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## Oral Contraceptives

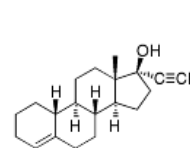
- Since estrogen circulating in the blood can negatively feed-back to reduce circulating levels of Follicle-stimulating hormone and Luteinizing hormone, most oral contraceptives contain a synthetic **estrogen**, along with a synthetic **progestin**.

## Combination oral contraceptives

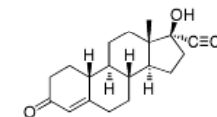


Ethinyl estradiol

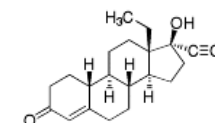
## Combination oral contraceptives



Lynestrenol

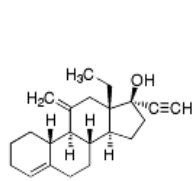


Noretisteron

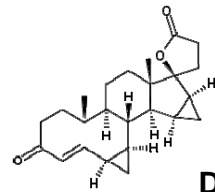


Levonorgestrel

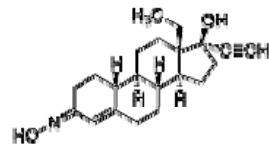
## Combination oral contraceptives



Desogestrel

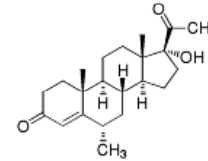


Drospirenon



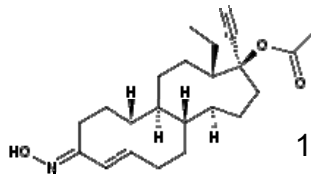
Norelgestromin

## Progestin-only oral contraceptives



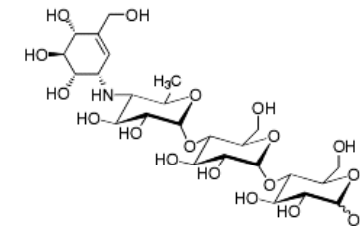
Medroxiprogesteronacetat

## Questions



1 är metaboliseras snabbt till 17-deacetylnorgestimat och norgestrel. Rita båda metaboliter.

## Questions



Describe the expected ADME properties of the compound.