

Autocoids

Autocoids: Introduction

- Autocoids (from "autos" = self, "acos" = remedy) are **locally acting bioactive substances** that are produced in tissues and act near their site of synthesis.
- They are **rapidly inactivated**, acting in a **paracrine or autocrine manner**, and play roles in inflammation, allergy, neurotransmission, and smooth muscle function.

Major Types:

- Histamine**
- Serotonin (5-HT)**
- Prostaglandins**
- Others: Leukotrienes, Bradykinin, Angiotensin, etc.

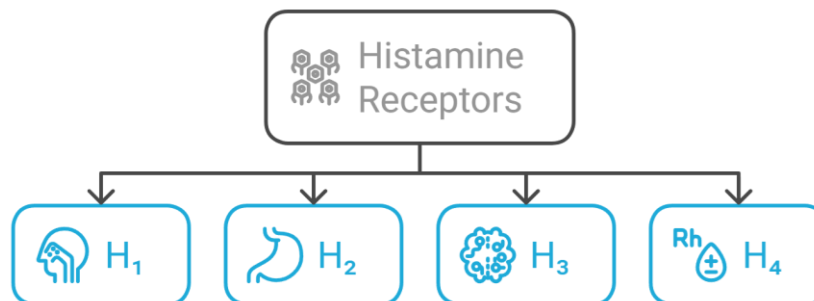
Physiological role of Histamine

Source:

- Stored primarily in **mast cells** and **basophils**.
- Also found in **enterochromaffin-like cells** in the stomach and **neurons** in the brain.

Receptors:

- There are **4 histamine receptors**: H₁, H₂, H₃, and H₄.



- **H₁**: Found in smooth muscle, endothelium, brain
- **H₂**: Stomach parietal cells, heart, mast cells
- **H₃**: CNS, presynaptic neurons
- **H₄**: Hematopoietic cells, immune system

Physiological Roles:

- **Inflammation/Allergy:** H_1 receptor activation causes vasodilation, increased vascular permeability (leading to edema), itching, and bronchoconstriction.
- **Gastrointestinal:** H_2 receptor activation stimulates gastric acid secretion by parietal cells.
- **Central Nervous System (CNS):** Acts as a neurotransmitter; regulates sleep-wake cycle and appetite.
- **Cardiovascular:** Causes vasodilation and hypotension via endothelial nitric oxide release.

Physiological role of 5-HT (Serotonin)

Source:

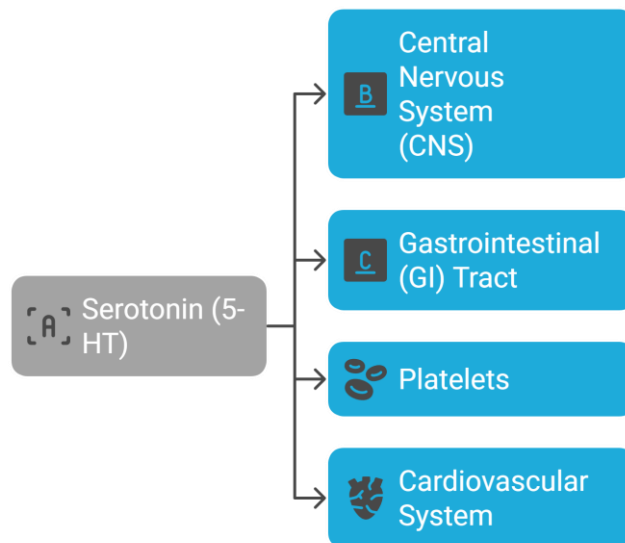
- Synthesized from **tryptophan**.
- Found in **enterochromaffin cells** (GI tract), **platelets**, and **CNS neurons**.

Receptors:

- There are **7 families of 5-HT receptors** ($5-HT_1$ to $5-HT_7$), with multiple subtypes.
- They are G-protein coupled receptors except $5-HT_3$, which is a ligand-gated ion channel.

Physiological Roles:

Physiological Roles of Serotonin



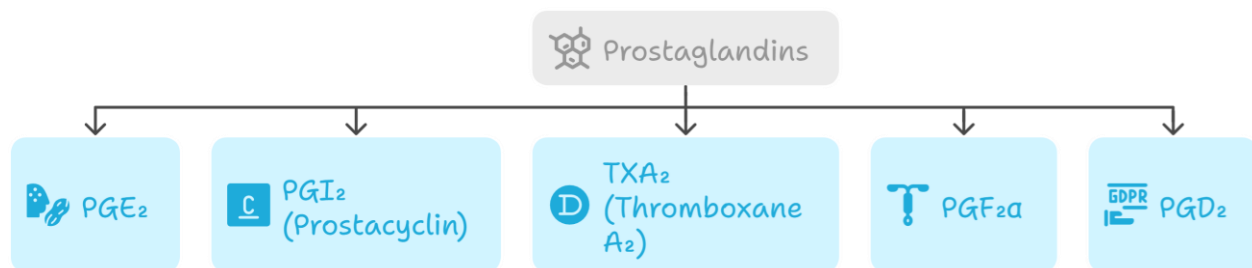
- **Central Nervous System (CNS):** Regulates mood, anxiety, sleep, cognition, and perception. Low levels are linked to depression.
- **Gastrointestinal (GI) Tract:** Increases motility and secretion (major role in peristalsis).
- **Platelets:** Released during aggregation → promotes vasoconstriction and clotting.
- **Cardiovascular:** $5-HT_2$ receptor stimulation may cause vasoconstriction or vasodilation, depending on the vascular bed.

Physiological role of Prostaglandins

Source:

- Derived from **arachidonic acid** through the **cyclooxygenase (COX)** pathway.
- Two main isoforms of COX:
 - COX-1**: Constitutive; physiological functions.
 - COX-2**: Inducible; inflammation-related.

Major Types of Prostaglandins and Their Roles:



1. PGE₂

- **Functions:** Vasodilation, fever, pain sensitization, inhibits gastric acid secretion, promotes mucus production.

2. PGI₂ (Prostacyclin)

- **Functions:** Vasodilation, inhibits platelet aggregation.

3. TXA₂ (Thromboxane A₂)

- **Functions:** Promotes platelet aggregation and vasoconstriction.

4. PGF₂α

- **Function:** Uterine contraction (important in labor).

5. PGD₂

- **Functions:** Involved in allergic response, sleep regulation.

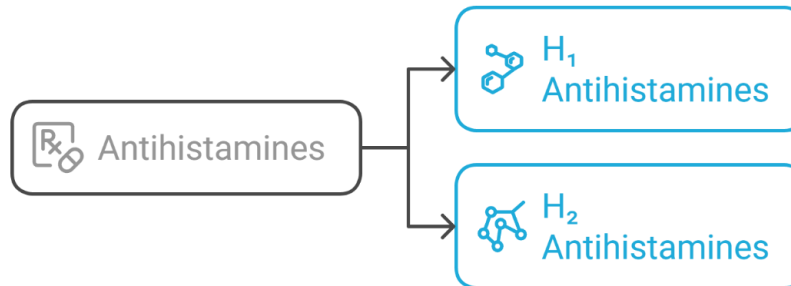
Physiological Roles:

- Inflammation:** PGE₂ and PGI₂ cause redness, swelling, and pain.
- GI protection:** PGE₂ protects the gastric mucosa.
- Reproduction:** PGF₂α helps in ovulation and parturition.
- Platelet Function:** Balance between PGI₂ and TXA₂ regulates thrombosis.

Antihistamines

- These are drugs that **block histamine receptors**.

Classification (Based on Receptor Blockade):



1. H₁ Antihistamines:

- **First generation:** Diphenhydramine, Chlorpheniramine, Hydroxyzine, Promethazine
- **Second generation:** Loratadine, Cetirizine, Fexofenadine

2. H₂ Antihistamines:

- Ranitidine, Famotidine, Nizatidine, Cimetidine

Clinical Uses:

H₁ Antihistamines:

- **Allergic conditions:** Used for urticaria, allergic rhinitis, hay fever, and conjunctivitis.
- **Anaphylaxis adjunct:** Used along with epinephrine.
- **Motion sickness & Nausea:** First-generation agents like promethazine block central H₁ and muscarinic receptors.
- **Insomnia:** First-generation agents are used due to their sedative effects.
- **Common cold:** Help reduce sneezing and rhinorrhea due to anticholinergic action.

H₂ Antihistamines:

- **Peptic ulcer:** Decrease gastric acid secretion.
- **GERD:** Reduce reflux symptoms.
- **Zollinger-Ellison syndrome:** Treat acid hypersecretion caused by a gastrin-producing tumor.

Adverse Effects:

H₁ Antihistamines:



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