

Antihistaminic Agents

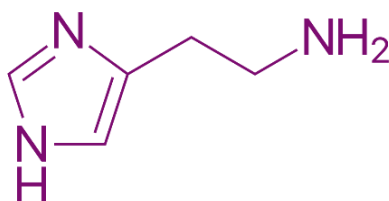
Histamine

Overview:

- **Chemical Nature:** Histamine is an amine compound (hist + amine) released by tissues during allergic and inflammatory reactions, as well as in response to injury.
- **Function:** Acts as a local response against parasite infections and protects cells from foreign substances.

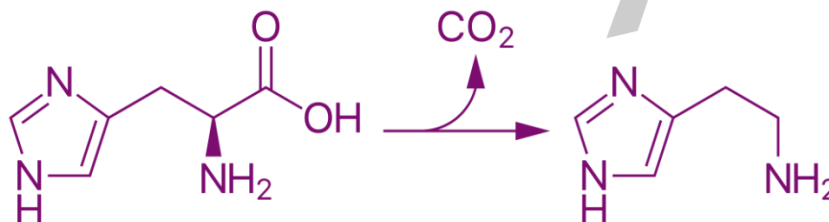
Structure:

- Histamine consists of an amine group (NH_2) attached to an imidazole ring.



Biosynthesis:

- **Precursor:** Histidine
- **Enzyme:** L-histidine decarboxylase catalyzes the decarboxylation of histidine to produce histamine.



Conversion of histidine to histamine by histidine decarboxylase

Storage:

- **Primary Sources:** Basophils and mast cells (types of white blood cells) store most of the body's histamine in granules.
- **Other Locations:**
 - Brain's hypothalamus (acts as a neurotransmitter)
 - Enterochromaffin-like (ECL) cells of the stomach
 - High concentrations in skin, mucosal cells of the lungs, intestine, urinary tract, and cerebrospinal fluid.

Mechanism of Release:

- Histamine is released from mast cells through a process involving:

1. **Sensitization:** Exposure to an allergen leads to the production of Immunoglobulin E (IgE) antibodies.
2. **Binding:** IgE antibodies attach to receptors on the surface of mast cells.
3. **Activation:** Upon re-exposure, the allergen cross-links the bound IgE antibodies.
4. **Degranulation:** This triggers mast cells to release histamine and other inflammatory mediators such as prostaglandins, kinins, and platelet-activating factor.

Common Antigens

- Antigens that can trigger histamine release include proteins and polysaccharides from sources like dust, pollen grains, food substances, venoms, toxins, detergents, and various chemicals.

Physiological Effects:

- **Hypersensitivity Reactions:** Itching, sneezing, watery eyes, runny nose.
- **Smooth Muscle Contraction:** Bronchoconstriction (asthma) and ileum contraction.
- **Vasodilation:** Causes hypotension.
- **Gastric Secretion:** Increases HCl secretion, leading to acidity.
- **Inflammation:** Causes pain and allergic reactions.

Catabolism or Degradation of Histamine

- Histamine is inactivated by enzymes that alter its structure, preventing it from binding to its receptors:
 - Diamine Oxidase (DAO): Metabolizes extracellular histamine.
 - Histamine-N-Methyltransferase (HNMT): Metabolizes intracellular histamine.

Histamine Receptor

- Histamine exerts its effects by binding to four types of histamine receptors, all of which are G protein-coupled receptors (GPCRs):
 1. H₁ Receptor
 2. H₂ Receptor
 3. H₃ Receptor
 4. H₄ Receptor
- Each receptor subtype has distinct distributions and functions in the body.

H₁ Receptor

Mechanism:

- Coupled to Gq proteins; activates phospholipase C, leading to increased intracellular calcium.

Functions:

- **Vasodilation:** Causes dilation of blood vessels, increasing blood flow and redness.
- **Increased Vascular Permeability:** Leads to edema and swelling.
- **Bronchoconstriction:** Constriction of airway smooth muscles, affecting breathing.
- **Sensory Nerve Stimulation:** Causes itching and pain.

Distribution:

- **Smooth Muscles:** Respiratory tract, gastrointestinal tract.
- **Endothelial Cells:** Lining of blood vessels.
- **CNS Neurons:** Involved in sleep-wake regulation, appetite, and cognition.
- **Immune Cells:** T cells, B cells, eosinophils.

H₂ Receptor

Mechanism:

- Coupled to Gs proteins; stimulates adenylate cyclase, increasing cyclic AMP (cAMP).

Functions:

- **Gastric Acid Secretion:** Stimulates parietal cells to secrete hydrochloric acid.
- **Cardiac Effects:** Increases heart rate and contractility.
- **Smooth Muscle Relaxation:** Vasodilation in blood vessels.
- **Immunomodulation:** Inhibits antibody synthesis and T-cell proliferation.

Distribution:

- **Gastric Parietal Cells:** Stomach lining.
- **Cardiac Muscle:** Heart tissue.
- **Vascular Smooth Muscle:** Blood vessels.
- **CNS:** Neurons regulating various functions.

H₃ Receptor

Mechanism:

- Coupled to Gi/o proteins; inhibits adenylate cyclase, decreasing cAMP.

Functions:

- **Neurotransmitter Release Inhibition:** Modulates release of histamine, acetylcholine, norepinephrine, and serotonin.
- **Autoreceptor Function:** Regulates histamine synthesis and release in neurons.

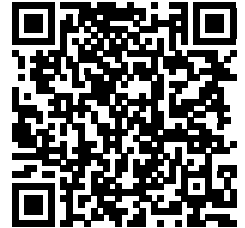


FREE PREVIEW

[Click here to visit our website](#)

PHARMACY PREMIUM NOTES

Complete subject
and semesters are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app



Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHopeNotes

Instagram

@firsthope.official

[Click here to follow >](#)

YouTube channel

FirstHope-Pharmacy / Live streams

[Click here to watch >](#)

WhatsApp channel

Follow FirstHope on WhatsApp

[Click here to join >](#)

FirstHope website

firsthopenotes.com

[Click here to visit >](#)

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.