Autocoid Pharmacology

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- Autocoids are **locally acting biological substances** that are produced in the body and act near their site of synthesis.
- They are not stored in large amounts; instead, they are synthesized when needed and act quickly.

Basic Characteristics of Autocoids

- Act locally (paracrine or autocrine action)
- Have short duration of action
- Rapidly metabolized or inactivated
- Play roles in both normal physiology and disease (pathology)

Major Types of Autocoids

1. Histamine
2. Serotonin (5-HT)
3. Kinins (e.g., Bradykinin)
4. Prostaglandins and related compounds
5. Opioid peptides

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General Functions

- **Autocoids regulate many body processes:**
  - Inflammation
  - Allergic reactions
  - Pain perception
  - Gastric secretion
  - Blood Vessel Tone
  - Platelet function

Mechanism of Action

- **Autocoids act by binding to specific receptors on target cells:**
  - G-protein coupled receptors (most common)
  - Lead to second messenger activation (cAMP, IP3, DAG, Ca^{2+})

Clinical Importance

- **Involved in diseases like:**

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- Allergy
- Asthma
- Migraine
- Gastric ulcers

- **Many drugs act by:**
  - Blocking their receptors
  - Inhibiting their synthesis
  - Enhancing or mimicking their action

Histamine (Autocoid Pharmacology)

- Histamine is an endogenous (naturally produced) chemical mediator stored mainly in mast cells and basophils.
- It plays a major role in allergic reactions, gastric acid secretion, neurotransmission, and inflammation.

Synthesis and Storage

- Formed from the amino acid histidine by the enzyme histidine decarboxylase
- **Stored in granules of:**
  - Mast cells (in tissues)
  - Basophils (in blood)
- **Released during:**
  - Allergic reactions (IgE-mediated)
  - Tissue injury
  - Inflammation

Histamine Receptors and Their Actions



1. H1 Receptors

- Located in smooth muscle, endothelium, CNS

Effects

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- Vasodilation → redness
- Increased vascular permeability → edema
- Bronchoconstriction
- Itching and pain (sensory nerve stimulation)

2. H2 Receptors

- Located in gastric parietal cells, heart

Effects

- Increased gastric acid secretion
- Mild vasodilation
- Increased heart rate

3. H3 Receptors

- Located in CNS (presynaptic neurons)

Effects

- Decrease release of neurotransmitters

4. H4 Receptors

- Found in immune cells

Effects

- Role in inflammation and chemotaxis

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Physiological Roles

- Regulation of gastric secretion
- Neurotransmission in brain
- Local immune response

Pathological Roles

1. Allergy and Hypersensitivity

- Histamine is the main mediator of allergic reactions
- **Causes:**
  - Redness
  - Swelling
  - Itching
  - Bronchospasm

2. Anaphylaxis

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- Severe systemic allergic reaction
- **Leads to:**
  - Hypotension
  - Airway obstruction

3. Gastric Disorders

- Excess histamine → increased acid → ulcers

Termination of Action

- **Metabolized by:**
  - Histamine-N-methyltransferase
  - Diamine oxidase

Serotonin (5-HT): Physiological and Pathological Role

- Serotonin **(5-hydroxytryptamine, 5-HT)** is a neurotransmitter and autocoid involved in mood, gastrointestinal function, vascular tone, and platelet aggregation.

Synthesis and Location

- Synthesized from tryptophan
- **Found in:**
  - CNS (brain)
  - Enterochromaffin cells (GIT)
  - Platelets

Serotonin Receptors (Important Types)

1. 5-HT1

- Located in brain and blood vessels

Effects

  - Vasoconstriction
  - Inhibit neurotransmitter release

2. 5-HT2

- Found in smooth muscle and platelets

Effects

  - Vasoconstriction
  - Platelet aggregation

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- Smooth muscle contraction

3. 5-HT3

- Found in GIT and CNS

Effects

- Vomiting reflex
- Pain transmission

4. 5-HT4

- Located in GIT

Effects

- Increase gut motility

Physiological Roles

1. CNS Functions

- Mood regulation
- Sleep
- Appetite
- Behavior

2. Gastrointestinal System

- Increases intestinal motility
- Promotes secretion

3. Cardiovascular System

- Causes vasoconstriction or vasodilation depending on site
- Involved in platelet aggregation

Pathological Roles

1. Migraine

- **Fluctuation in serotonin levels causes:**
  - Vasodilation of cranial vessels
  - Headache

2. Depression

- Low serotonin levels associated with mood disorders

3. Carcinoid Syndrome

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