

Purines	Purines (cont)	Cannabinoids (Endocannabinoids)	Serotonin (5-HT) (cont)
Adenosine Formed from the breakdown of ATP. Acts via adenosine receptors (A1, A2A, A2B, A3). Functions: <i>Vasodilation</i> (especially coronary arteries) <i>Sedative and sleep-promoting effects in the brain. Inhibits neurotransmitter release. Anti-inflammatory and immunosuppressive effects</i>	ATP Beyond being the "energy currency," extracellular ATP: Acts via P2 receptors (P2X and P2Y) . Mediates pain, inflammation, and immune responses. Can trigger cell death pathways or survival signalling.	Anandamide and 2-AG are naturally occurring ligands. Bind to CB1 (central nervous system) and CB2 (immune cells) receptors.	Roles Mood regulation (CNS). GI motility. Platelet aggregation and vasoconstriction. Sleep, appetite, thermoregulation.
ADP (Adenosine Diphosphate) Plays a critical role in platelet aggregation. Released during tissue injury → binds P2Y12 receptors on platelets → promotes clot formation.	Cannabinoids (Endocannabinoids) Anandamide and 2-AG are naturally occurring ligands. Bind to CB1 (central nervous system) and CB2 (immune cells) receptors.	Cannabinoids (Endocannabinoids) Anandamide and 2-AG are naturally occurring ligands. Bind to CB1 (central nervous system) and CB2 (immune cells) receptors.	Receptors Multiple (5-HT1 to 5-HT7), all involved in diverse functions like anxiety, pain, nausea, and cardiovascular tone.
	Roles: Modulate pain, appetite, mood, memory. Regulate immune responses. Provide neuroprotection	Histamine Histamine Stored in mast cells, basophils, and enterochromaffin-like cells in the stomach. Released in response to allergens, injury, or inflammation. Receptors: H1, H2, H3, H4	Eicosanoids These are derived from arachidonic acid and include:
	Cannabinoids (Endocannabinoids) Anandamide and 2-AG are naturally occurring ligands. Bind to CB1 (central nervous system) and CB2 (immune cells) receptors.	H1 Inflammation, allergy (vasodilation, bronchoconstriction, itching) H2 Gastric acid secretion in the stomach H3 Neurotransmission in the brain (auto-inhibition) H4 Chemotaxis in immune cells	Key Enzymes COX (Cyclooxygenase) → Prostaglandins & Thromboxanes. LOX (Lipoxygenase) → Leukotrienes.
	Roles: Modulate pain, appetite, mood, memory. Regulate immune responses. Provide neuroprotection	Serotonin (5-HT) Location: Derived from tryptophan, found in the CNS, GI tract, and platelets.	Roles Inflammation and immunity. Fever, pain. Bronchoconstriction (asthma). Platelet function (e.g., TXA2 promotes clotting, PGI2 inhibits). Gastric protection and renal blood flow regulation.

Bradykinin

A nonapeptide released during tissue injury or inflammation. Very potent vasodilator and pain mediator. Increases vascular permeability and causes edema. Also causes bronchoconstriction and stimulates prostaglandin and nitric oxide release.

Neuropeptides

These are small protein-like molecules used by neurons to communicate.

Substance P Pain transmission, vasodilation

Neuropeptide Y (NPY) Appetite stimulation, vasoconstriction

Calcitonin gene-related peptide (CGRP) Potent vasodilator, involved in migraines

Endorphins/Enkephalins Pain inhibition (natural opioids)

Interferons

A type of cytokine (usually classified separately but functionally similar to autacoids).

Produced in response to viral infections and other immune triggers

Type I (IFN- α , IFN- β) Antiviral

Type II (IFN- γ) Activates macrophages and promotes antigen presentation

Nitric Oxide (NO)

A gaseous signaling molecule, synthesized by nitric oxide synthases (NOS).

NO diffuses across cell membranes and activates guanylyl cyclase, increasing cGMP.

Functions: Vasodilation (endothelium-derived relaxing factor). Neurotransmission (e.g., in memory and learning). Antimicrobial and antitumor effects (in macrophages).

Cytokines

Small proteins involved in cell signaling, especially in the immune system. Produced by various cells (T-cells, macrophages, endothelial cells).

Interleukins (IL-1, IL-6) Inflammation, fever

TNF- α (Tumor Necrosis Factor) Inflammation, apoptosis

IL-10 Anti-inflammatory

Cytokines can act locally (autocrine/paracrine) or systemically.