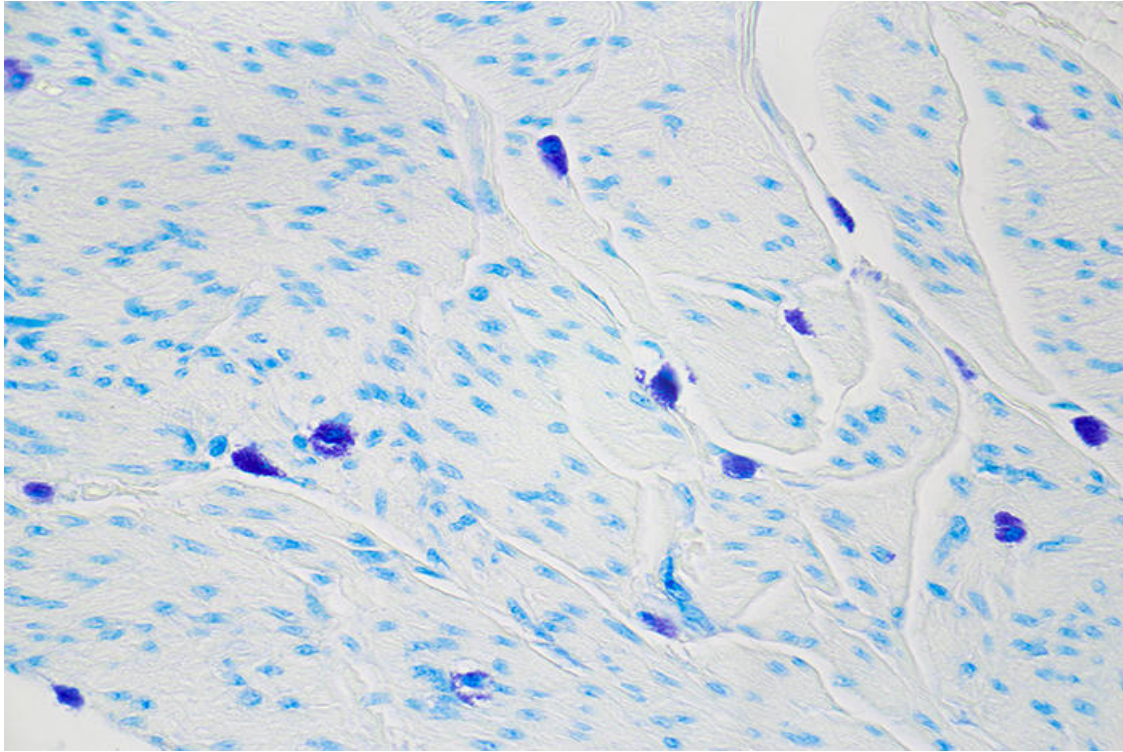


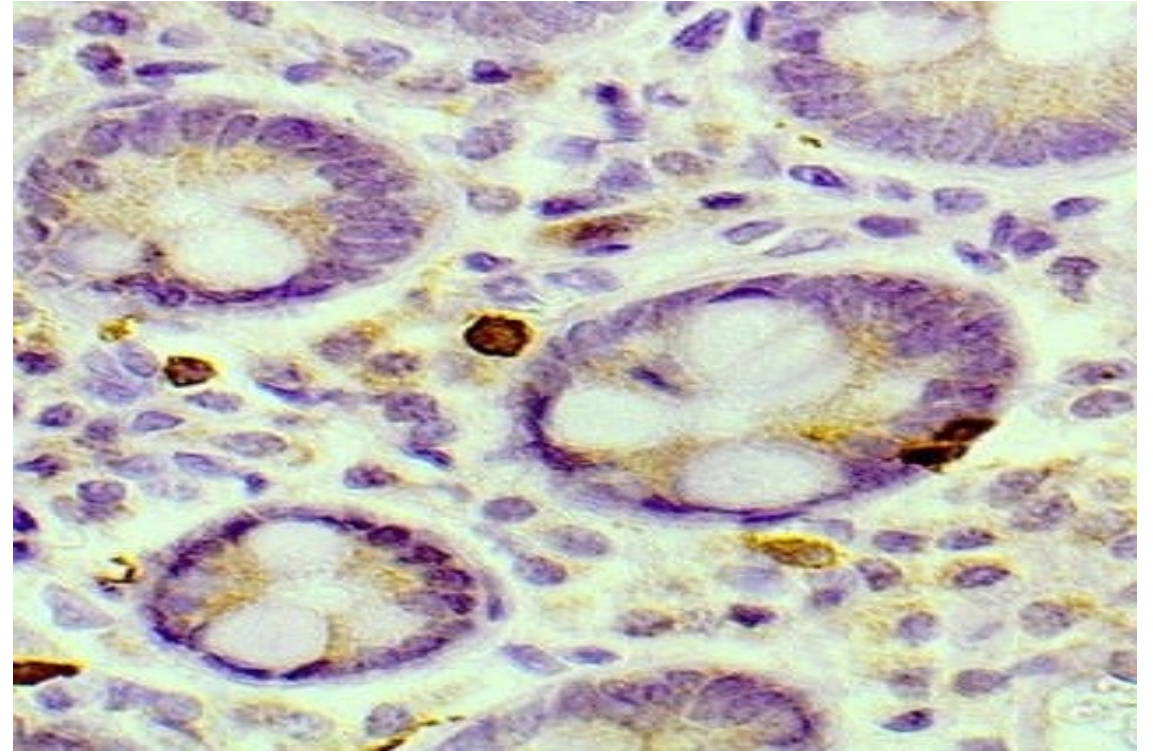
Mast cells under the microscope

Tissue sentinels packed with granules — same cell type, different neighborhoods.



SKIN / connective tissue

Purple cells = mast cells (metachromatic stain).



GUT • mucosa between glands

Brown cells = mast cells (tryptase stain).

Real photomicrographs. Left: metachromatic stain in connective tissue. Right: tryptase stain in gut mucosa.

They also live in lungs, bladder, and next to nerves and blood vessels throughout the body.

Where they come from — not the same as basophils

Close cousins. Different home addresses and life spans.

MAST CELL

- Starts in bone marrow as an immature seed
- Travels in blood, then settles in tissue
- Finishes growing up in skin, gut, lung
- Lives for a long time as a local guard
- Rarely seen in circulating blood once mature

BASOPHIL

- Also starts in bone marrow
- Finishes maturing in the marrow
- Circulates in blood as a finished cell
- Short-lived; enters tissue during flares
- Looks similar (histamine + IgE receptor)

Take-home

Mast cells are long-lived tissue residents. Basophils are circulating blood cells. Both can dump histamine in allergy, but they are not the same cell that simply “moved into tissue.”

What turns them on — and who talks to them

Allergy is only one switch. Neighbors can raise or lower the volume.

TRIGGERS

- Allergen + IgE (classic allergy)
- IL-33 — tissue “danger” signal
- Stem cell factor (SCF)
- Complement C3a / C5a
- Nerve peptides (substance P)
- Stress hormone CRH
- Some drugs (MRGPRX2)
- Heat, cold, pressure, exercise

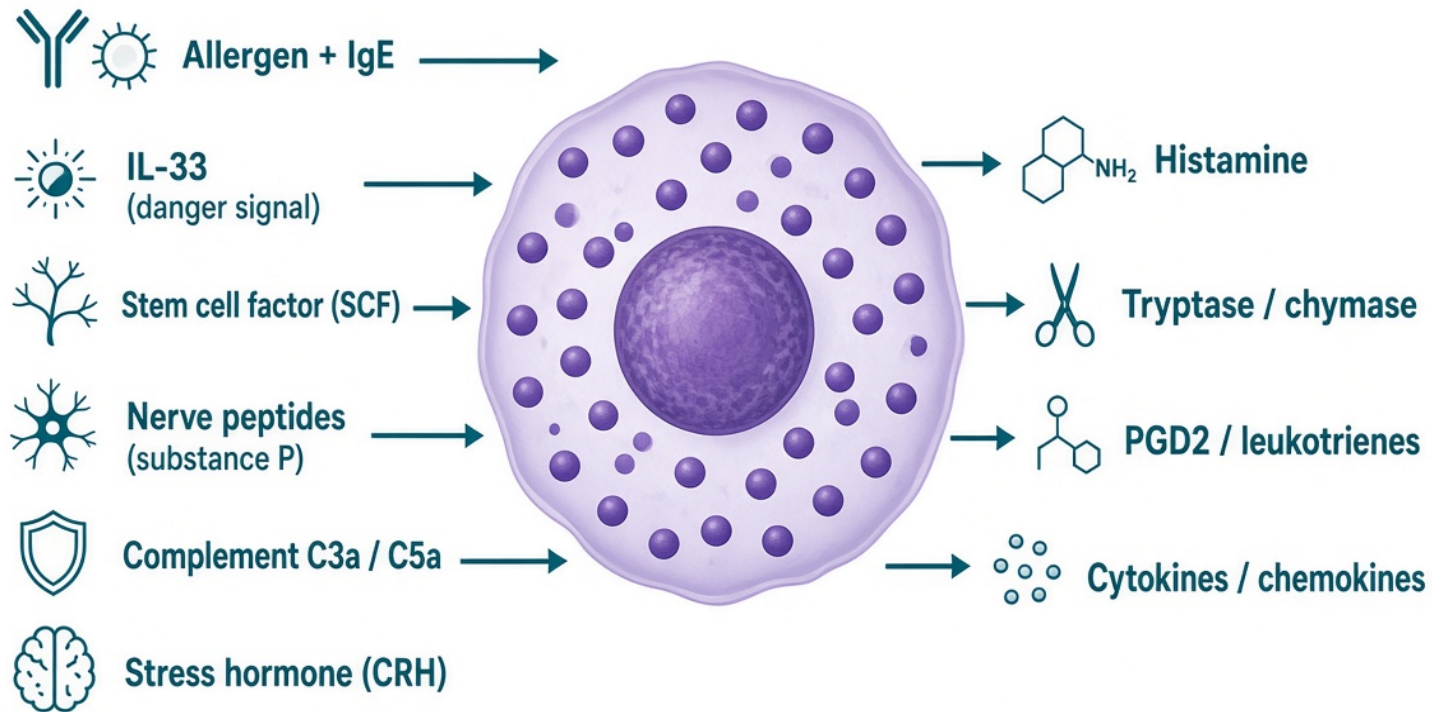
TURN THE VOLUME UP

- Fibroblasts — make SCF
- Skin / gut lining — IL-33, TSLP
- Th2 T cells — IL-4, IL-9, IL-13
- Nerves — substance P, CGRP
- ILC2 innate helpers

TURN THE VOLUME DOWN

- TGF- β (tissue calm-down)
- IL-10 (often from T-regs)
- Some resolving lipid signals
- Context: corticosteroids

What they release when they fire



SECONDS

Already in granules
Histamine · tryptase
chymase · heparin · some TNF

Itch, flush, swelling, cramps

MINUTES

New fats from the membrane
PGD2 · leukotrienes · PAF

Tight airways, mucus,
vessel leak

HOURS

New proteins
TNF, IL-4, IL-5, IL-6, IL-13
chemokines, VEGF, NGF

Call in other immune cells

Not every trigger dumps the whole warehouse. Some signals (like IL-33) leak selected messengers without a full explosion.

Left labels = what can turn the cell on. Right labels = what it dumps out.