The Nose: Much More than Smell

Part 1- Anatomy, Structure, & Function

The Nose: Gateway, Guardian, and Guide

We think of it mainly as “for smelling”…

But it is:

- The **frontline of the immune system**
- A **primary air conditioning system**
- A **chemical sensing organ**
- A **direct highway to the brain**

Every breath you take is being filtered, warmed, analyzed… and communicated to your brain.

Big Picture Overview

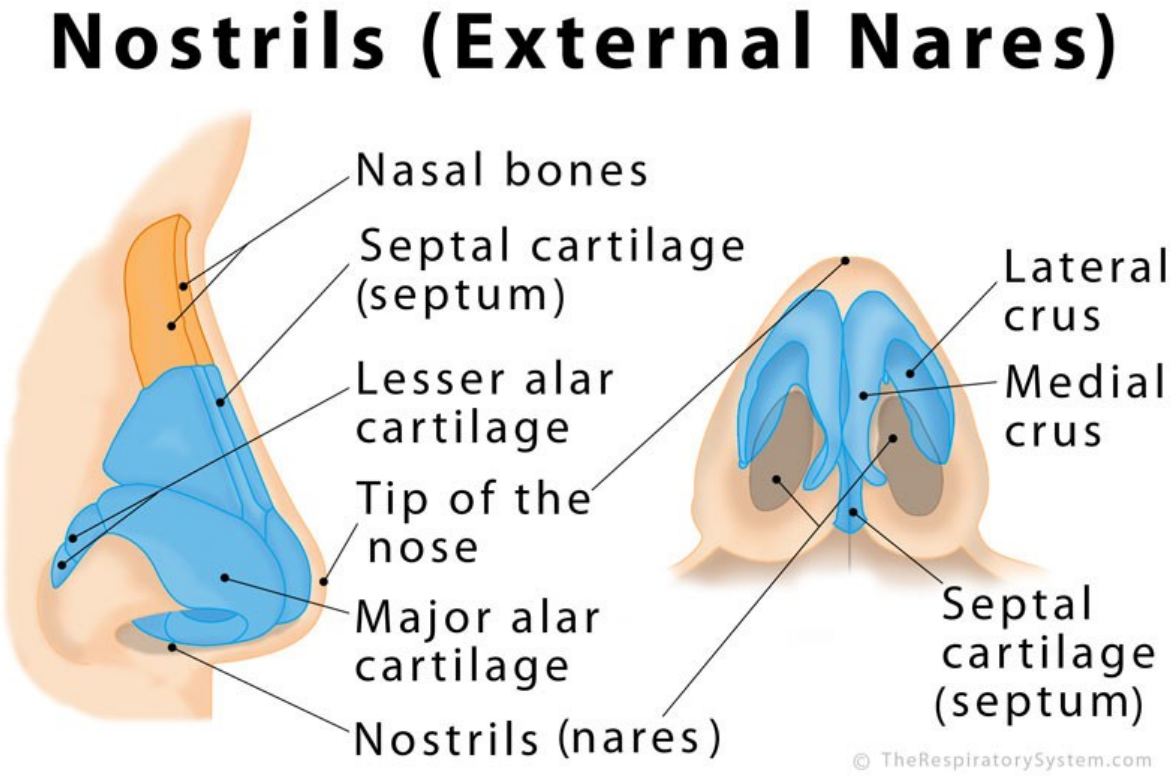
The nose is part of:

- The respiratory system
- The sensory nervous system
- The immune system

It performs 4 primary functions:

- Air filtration
- Air conditioning (warming + humidifying)
- Olfaction (smell)
- Defense

External Anatomy (Simple but Important)



- **Nares (nostrils)** – entry point for air
- **Septum** – divides left and right sides
- **Cartilage + bone** – structure and shape

👉 Clinical note:

Deviated septum → airflow disruption → downstream issues

Internal Nasal Cavity (Where the Magic Happens)

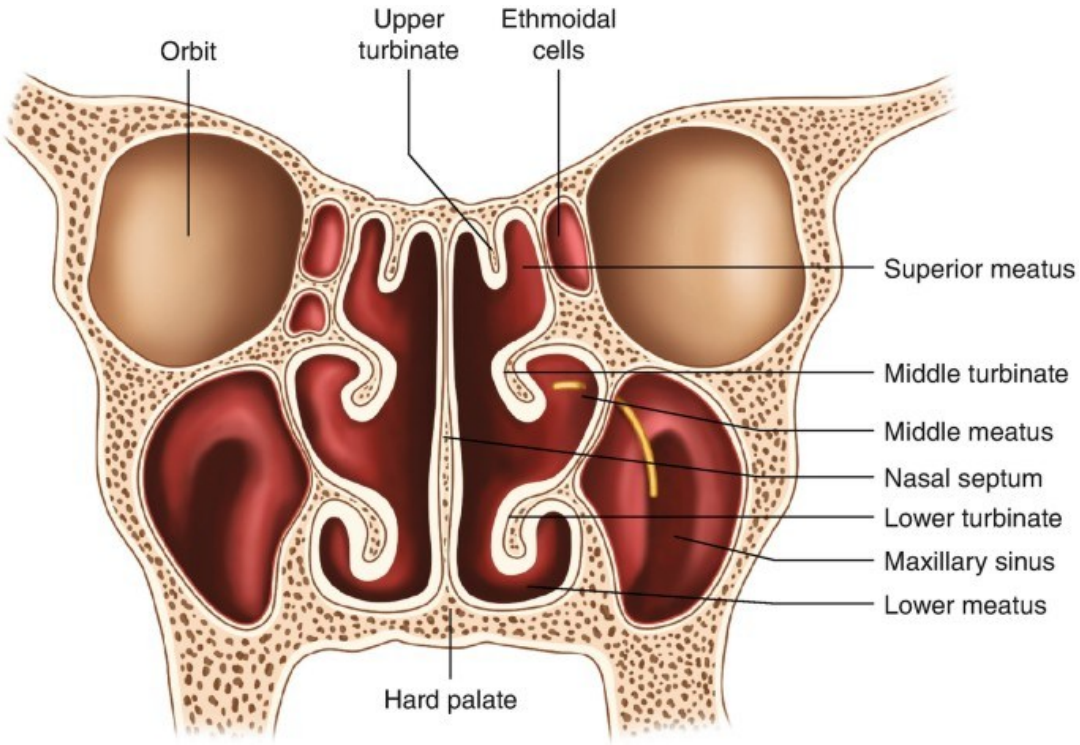
Key Structures:

- **Nasal Septum**
- **Turbinates (Conchae)**:
  - Superior
  - Middle
  - Inferior

👉 These are NOT random folds… They:

- Increase **surface area**
- Create **turbulence**
- Slow airflow for processing

The nose doesn't just let air in — it works on it.

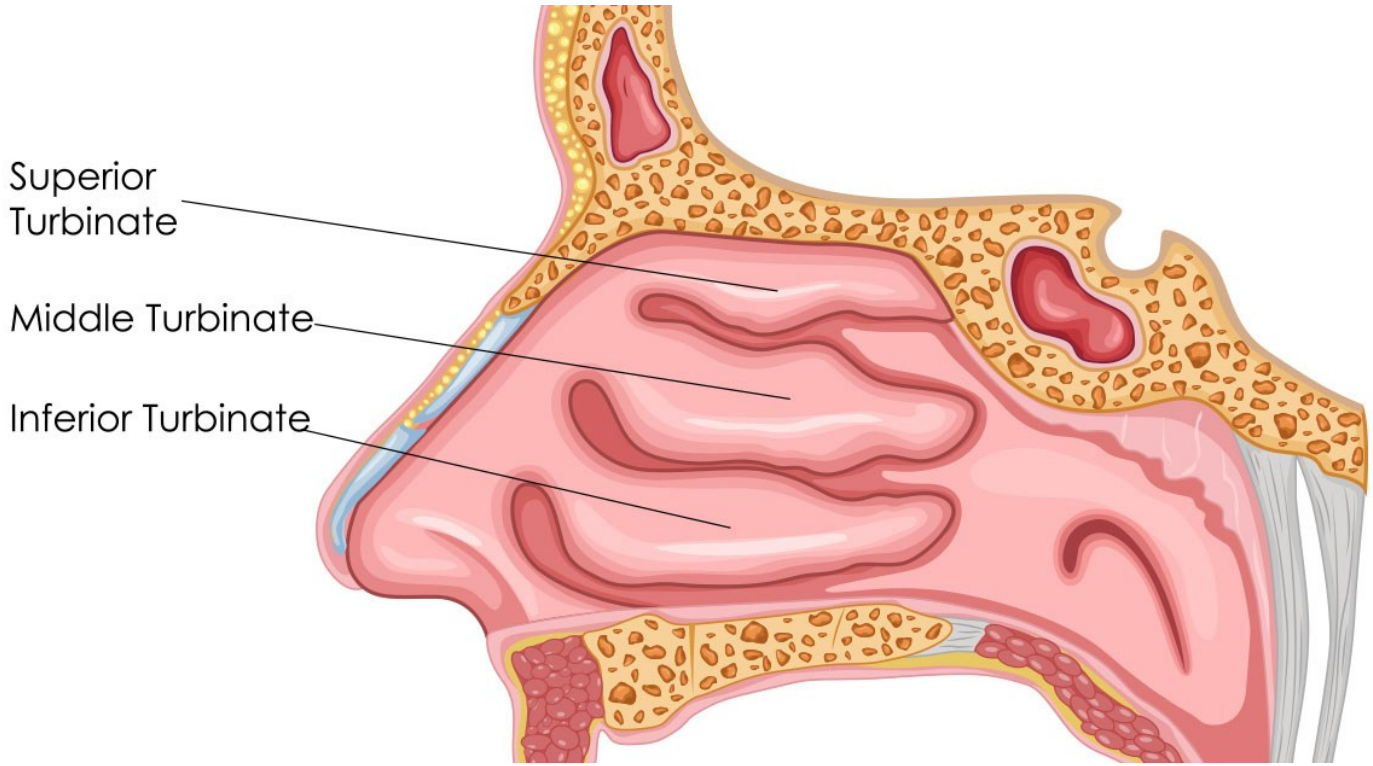


Turbinates = Air Processing System

Air is:

- **Swirled**
- **Warmed**
- **Moistened**
- **Filtered**

Rich blood supply → rapid warming



👉 This is why:

- Cold air can irritate lungs
- Nose breathing protects the lower respiratory tract

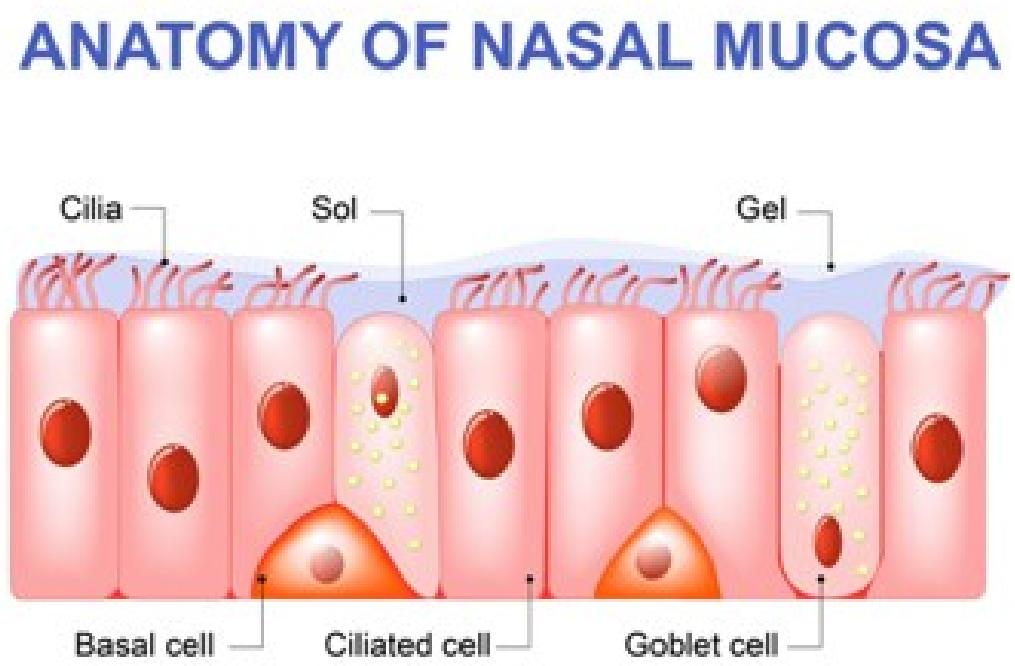
Mucosal Lining & Immune Defense

The Nasal Lining Contains:

- **Goblet cells** → produce mucus
- **Cilia** → microscopic “sweeping hairs”
- **Function:**
- Trap:
  - Dust
  - Pathogens
  - Allergens
- Move debris → throat → swallowed/destroyed

👉 This is **mucociliary clearance**

Your nose is constantly cleaning the air before your lungs ever see it.



Immune Layer (Underrated Powerhouse)

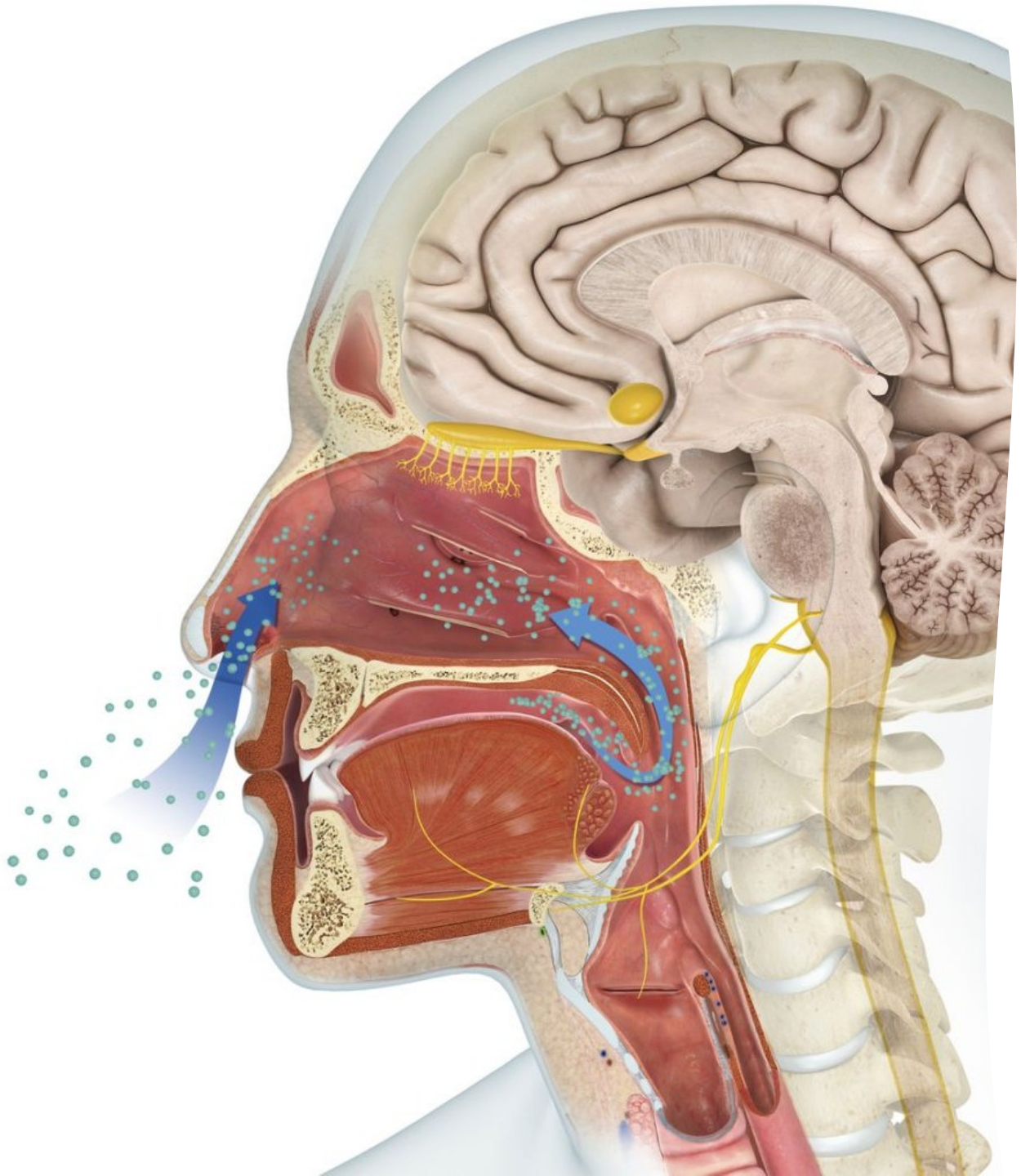
Contains:

- IgA antibodies
- Immune cells (macrophages, dendritic cells)

First line of defense against:

- Viruses
- Bacteria
- Environmental toxins

👉 *This is why nasal health = immune health*



Olfactory System (Sense of Smell)

Located in the upper nasal cavity

- **Olfactory receptors** detect chemicals
- Signals travel via:
  - **Cranial Nerve I (Olfactory nerve)**

Direct connection to:

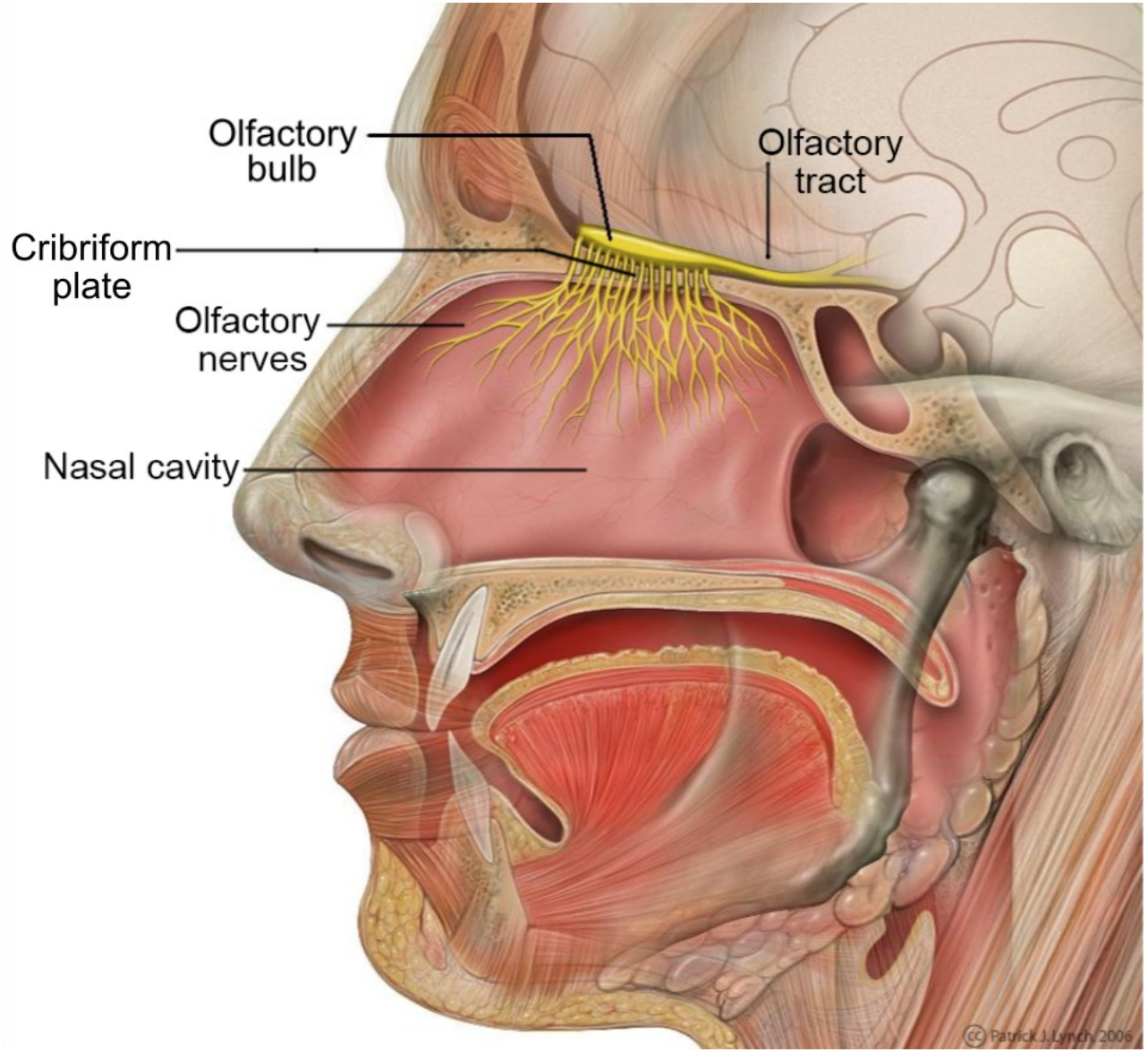
- Limbic system (emotion)
- Memory centers

👉 This is why:

- Smell is tied to **memory and emotion**

The nose is the only sense with a direct line to the emotional brain.

Rebecca Roentsch Montrone, BS - Wondrous Roots, Inc.


Olfactory bulb
Olfactory tract
Cribriform plate
Olfactory nerves
Nasal cavity
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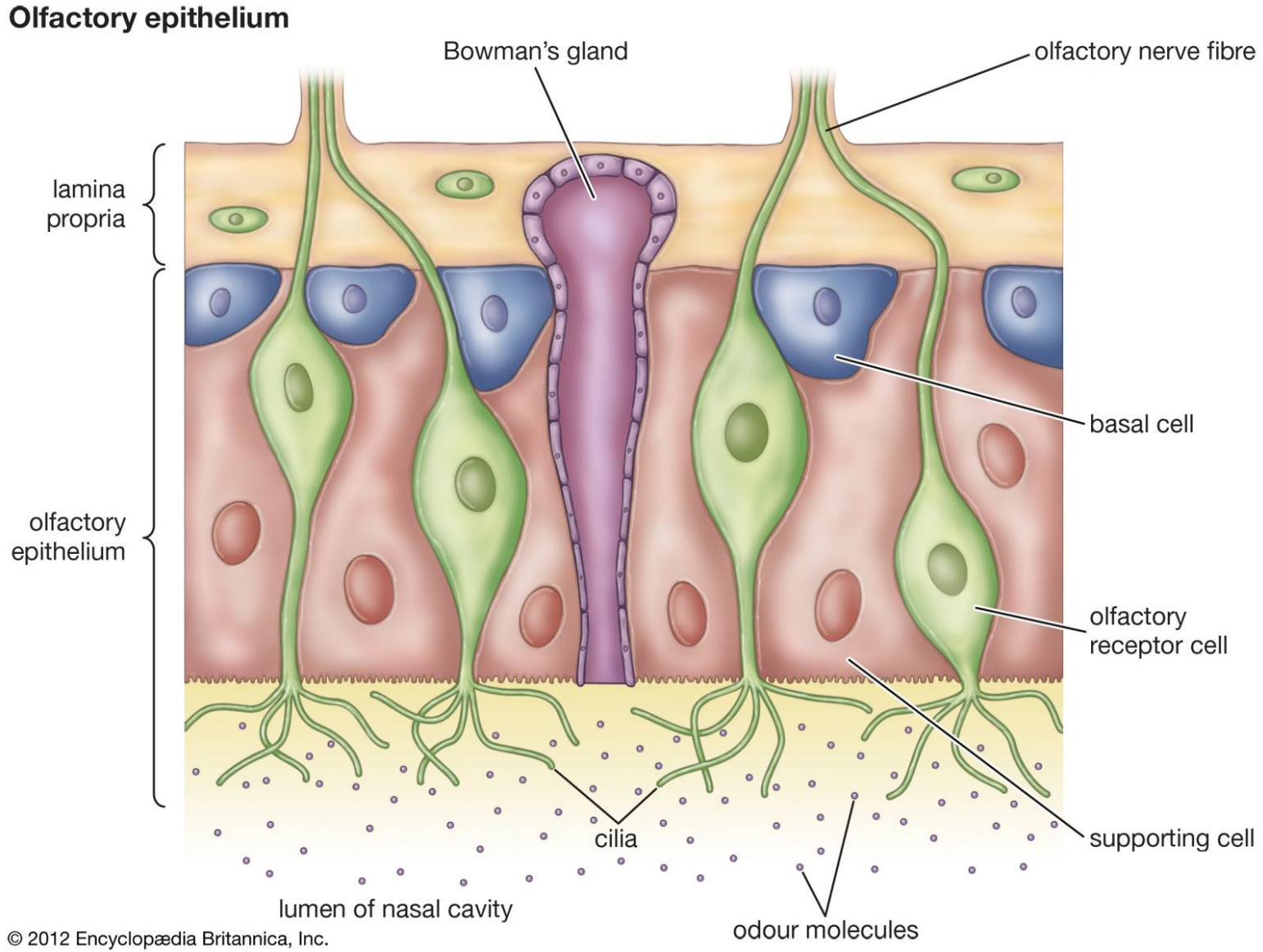
Olfactory epithelium
Bowman's gland
olfactory nerve fibre
lamina propria
olfactory epithelium
basal cell
olfactory receptor cell
supporting cell
cilia
lumen of nasal cavity
odour molecules
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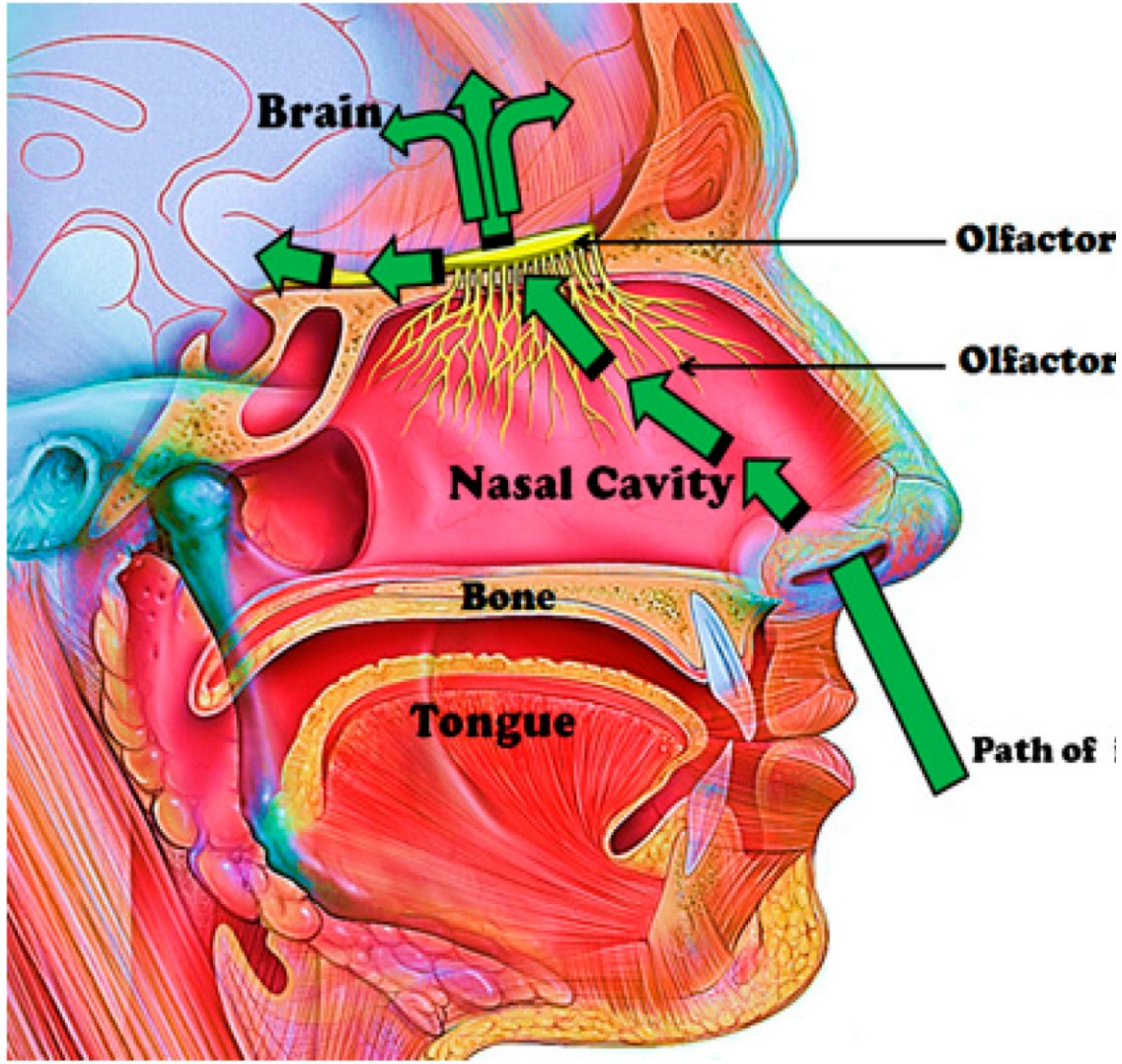
Nose → Brain Connection

- Bypasses typical blood-brain barrier routes
- Provides a **direct pathway into the CNS**

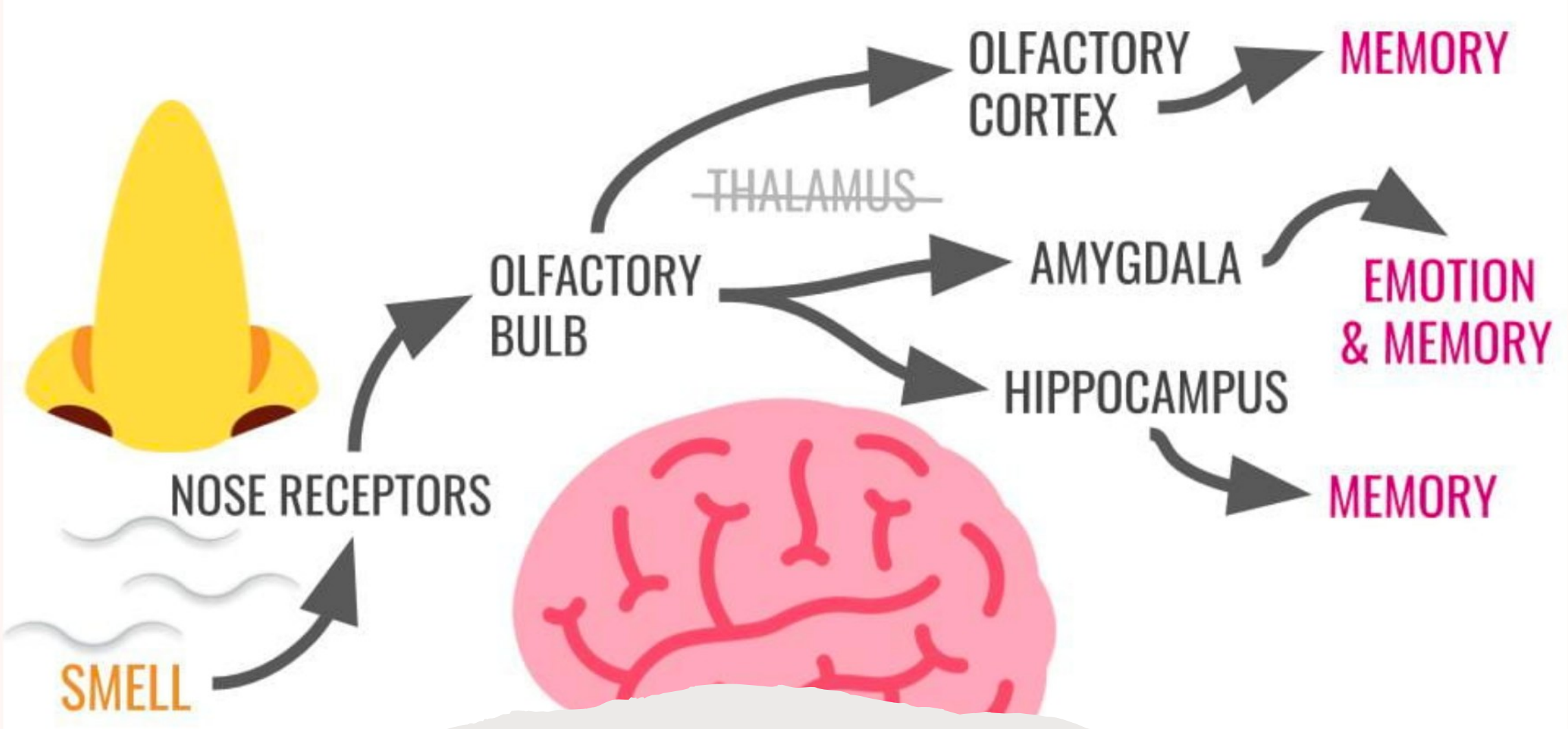
👉 Clinical relevance:

- Toxins can enter this way
- But also:
  - Therapeutics (nasal delivery)
  - Essential oils



Why Some Scents Feel Comforting

The Science of “Scent Memories”



THE SENSE OF SMELL

Scents, the Brain & Memory

The Thalamus = The Brain's Relay & Gatekeeper

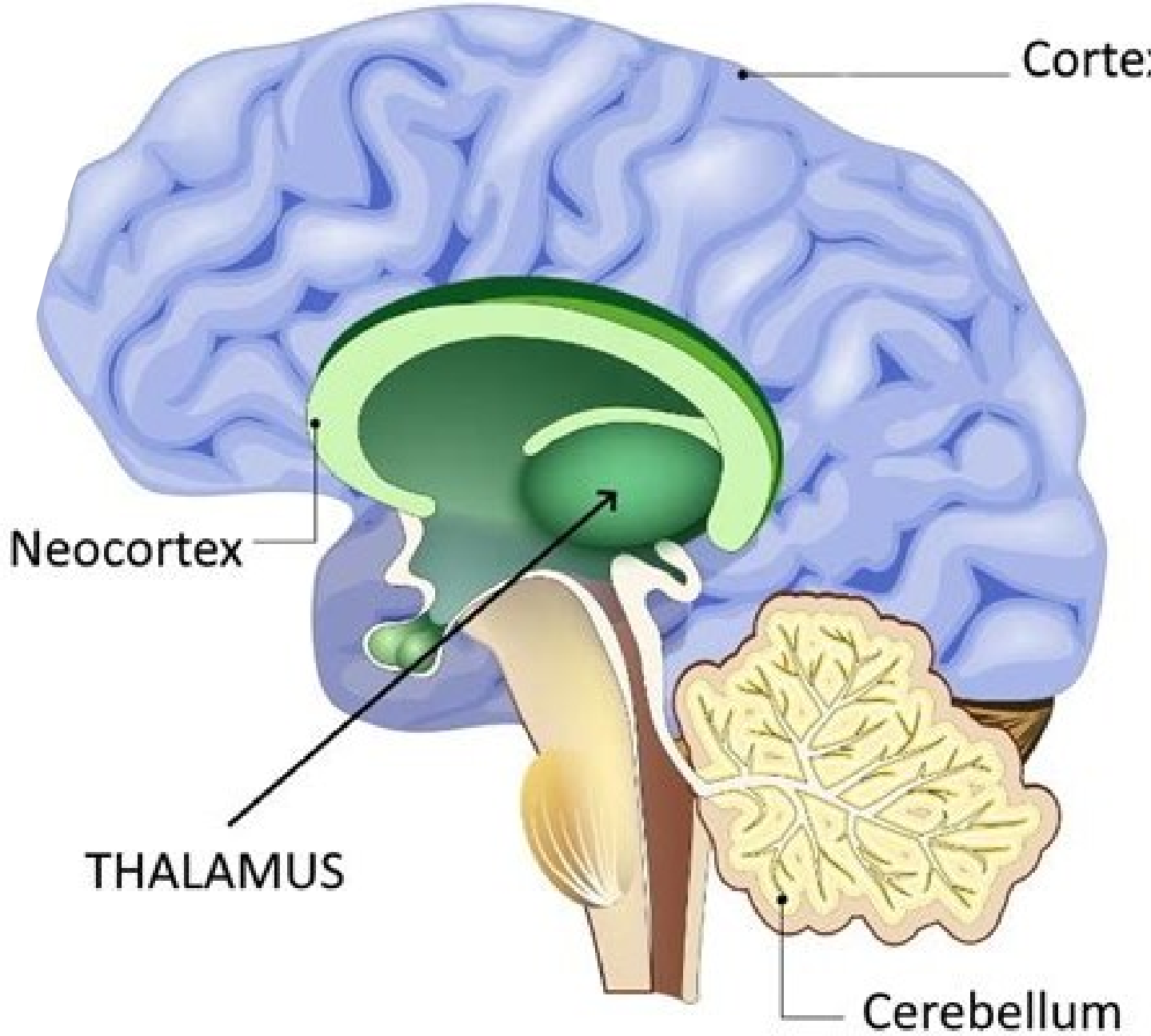
The thalamus is often described as a **relay station**, but functionally it also acts as a **filter and gatekeeper**.

It receives incoming sensory information, then...

Sorts and prioritizes it, then...

Sends it to the appropriate areas of the brain

👉 So not everything gets through equally.



The Key Idea

Most sensory pathways go like this:

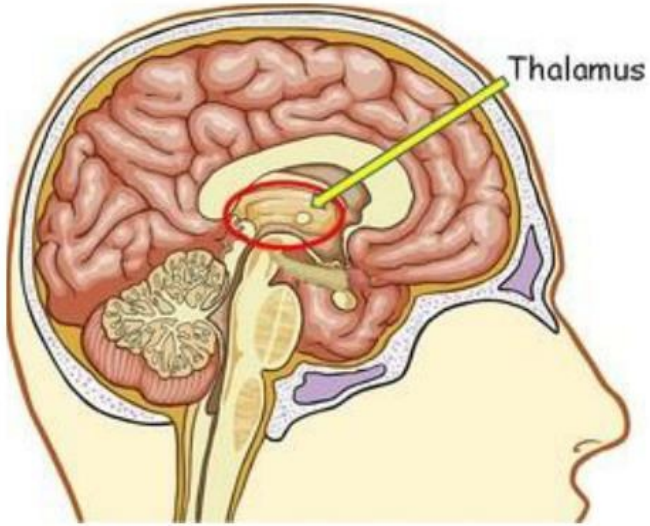
Receptors → Thalamus → Cortex

- The **thalamus** acts as a *relay station* — kind of a processing/filtering hub before information reaches higher brain areas.

👉 Vision, hearing, touch — all go through the thalamus first.

Thalamus

- relay station for sensory impulses passing thru to sensory cortex



👃 Smell Is the Exception

Olfactory signals go:

Nose receptors → Olfactory bulb → Limbic system (amygdala, hippocampus) → Cortex

🚫 They bypass the thalamus initially

✨ Why That Matters

- That “skipped step” is exactly why:
- Smell is **immediate**
- Smell is **emotional**
- Smell is **memory-triggering**

There’s no “filtering” or “processing delay” first.

👉 It goes straight to:

- **Amygdala** → emotion
- **Hippocampus** → memory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Smells Like Freshly Sharpened Crayons
9 oz / 255 g
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Soy Wax
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50 Hour Burn Time
Since 2025

The Core Truth

The same reason smell feels so immediate…
is the reason it becomes so **powerfully embedded in memory**.

👉 **Because it reaches:**

- Emotion (amygdala)
- Memory formation (hippocampus)
  before conscious processing

🔗 Why That Matters for Memory Formation

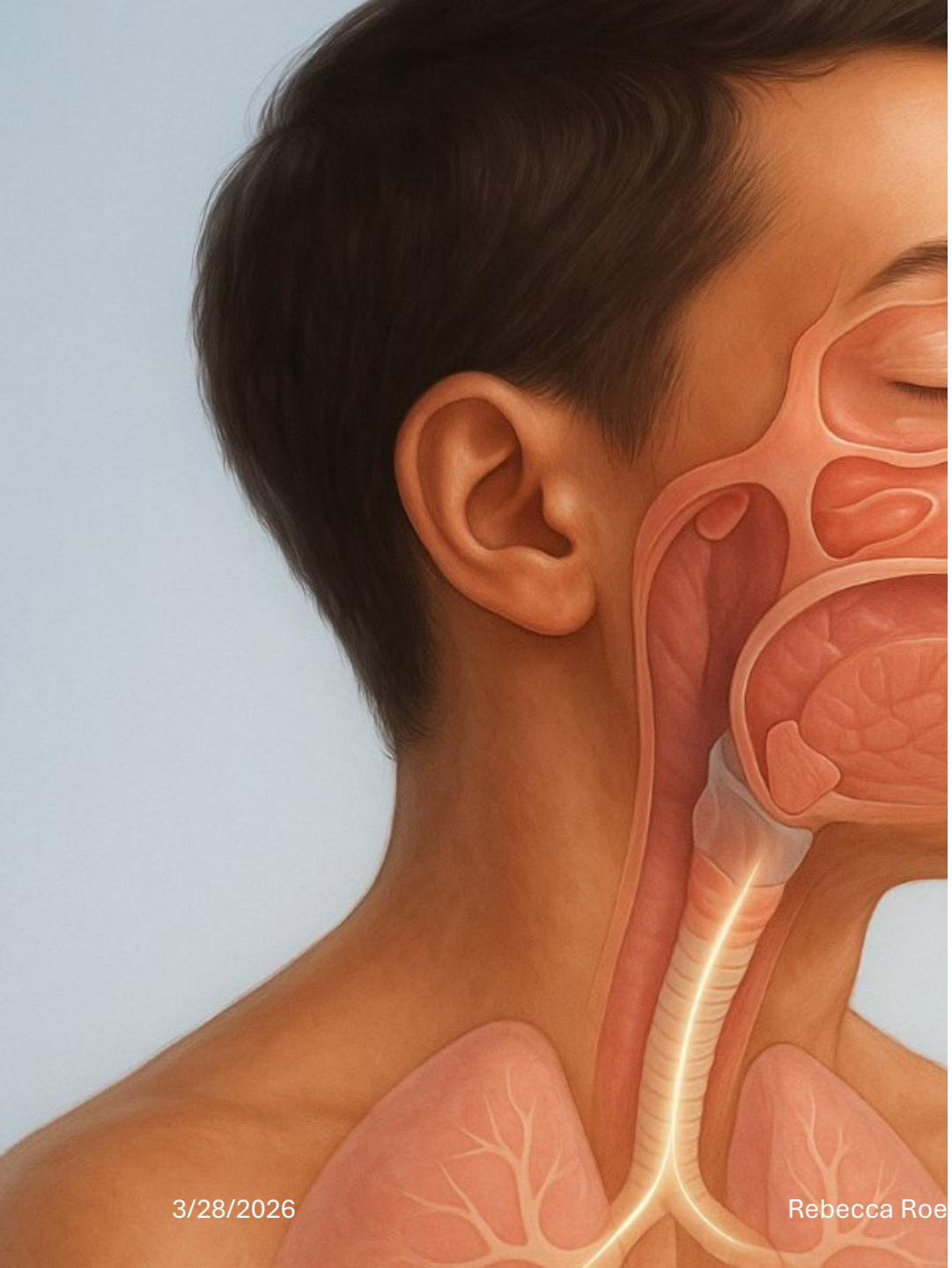
Memory formation is **strongest when emotion is involved**.

So, with smell:

- No thalamic “filtering” first
- Immediate activation of emotional centers
- Simultaneous engagement of memory centers

👉 Result:

Smell + emotion + moment = deeply encoded memory



Nitric Oxide Production (This is BIG)

Produced in **paranasal sinuses**

Functions:

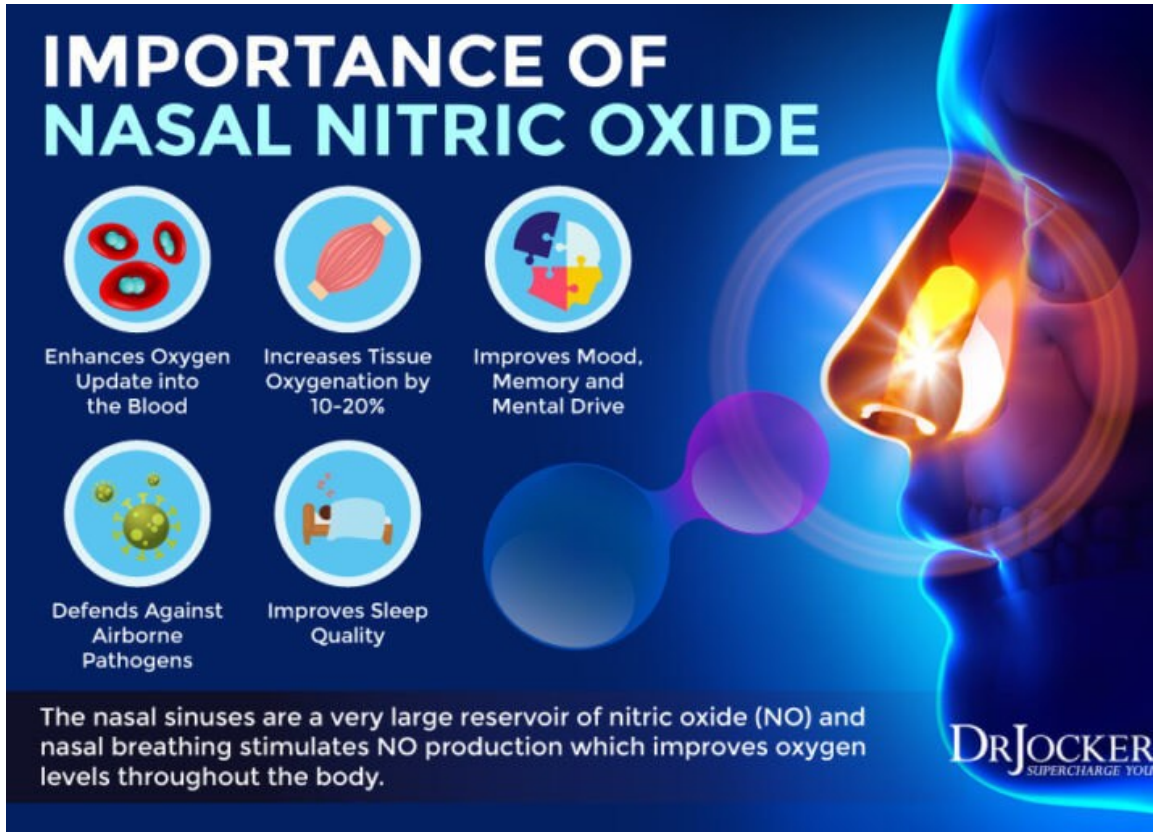
- **Antimicrobial**
- **Vasodilator**
- Improves **oxygen delivery**

👉 Nasal breathing increases nitric oxide intake

Your nose helps oxygen work better in your body.

Nitric Oxide – a little more info

Nitric oxide is a naturally produced signaling molecule that relaxes blood vessels, supports circulation, and helps cells communicate throughout the body. Nitric oxide is incredibly beneficial, but more is not always better. The body is designed to produce and regulate nitric oxide **very precisely**, depending on need. At healthy levels, it supports circulation, oxygen delivery, and cellular communication. However, when nitric oxide is produced in excess — especially during inflammation or immune overactivation — it can contribute to **oxidative and nitrosative stress**, potentially damaging tissues and disrupting normal cellular function. This is why balance is key. The goal is not to push nitric oxide as high as possible, but to support the body's ability to **generate and regulate it appropriately**. When that regulation is intact, nitric oxide becomes a powerful ally; when it is dysregulated, it can become part of the problem.



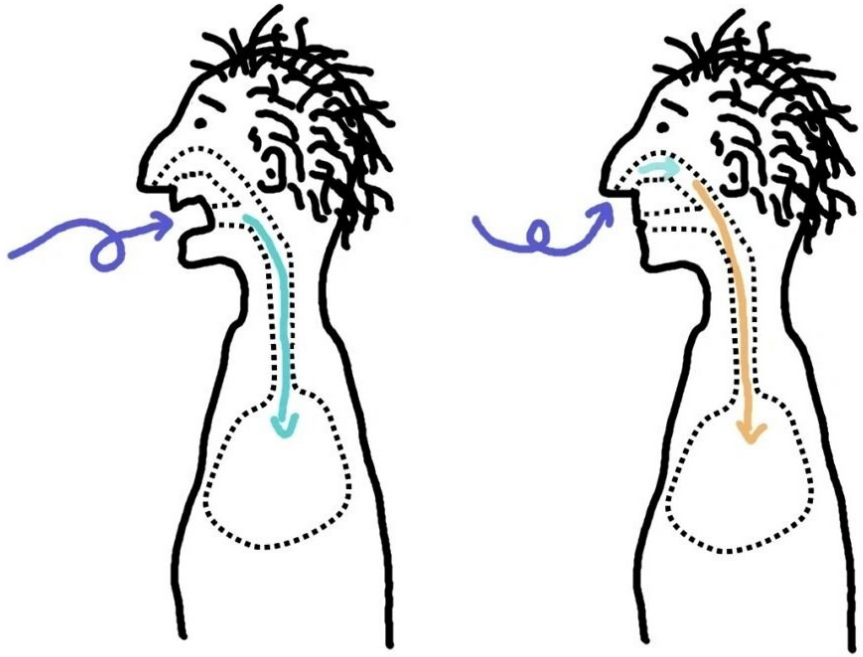
What about nitric-oxide boosting supplements?

Many supplements aim to boost nitric oxide indirectly by providing precursors like L-arginine or L-citrulline, or through nitrate-rich compounds (like beetroot).

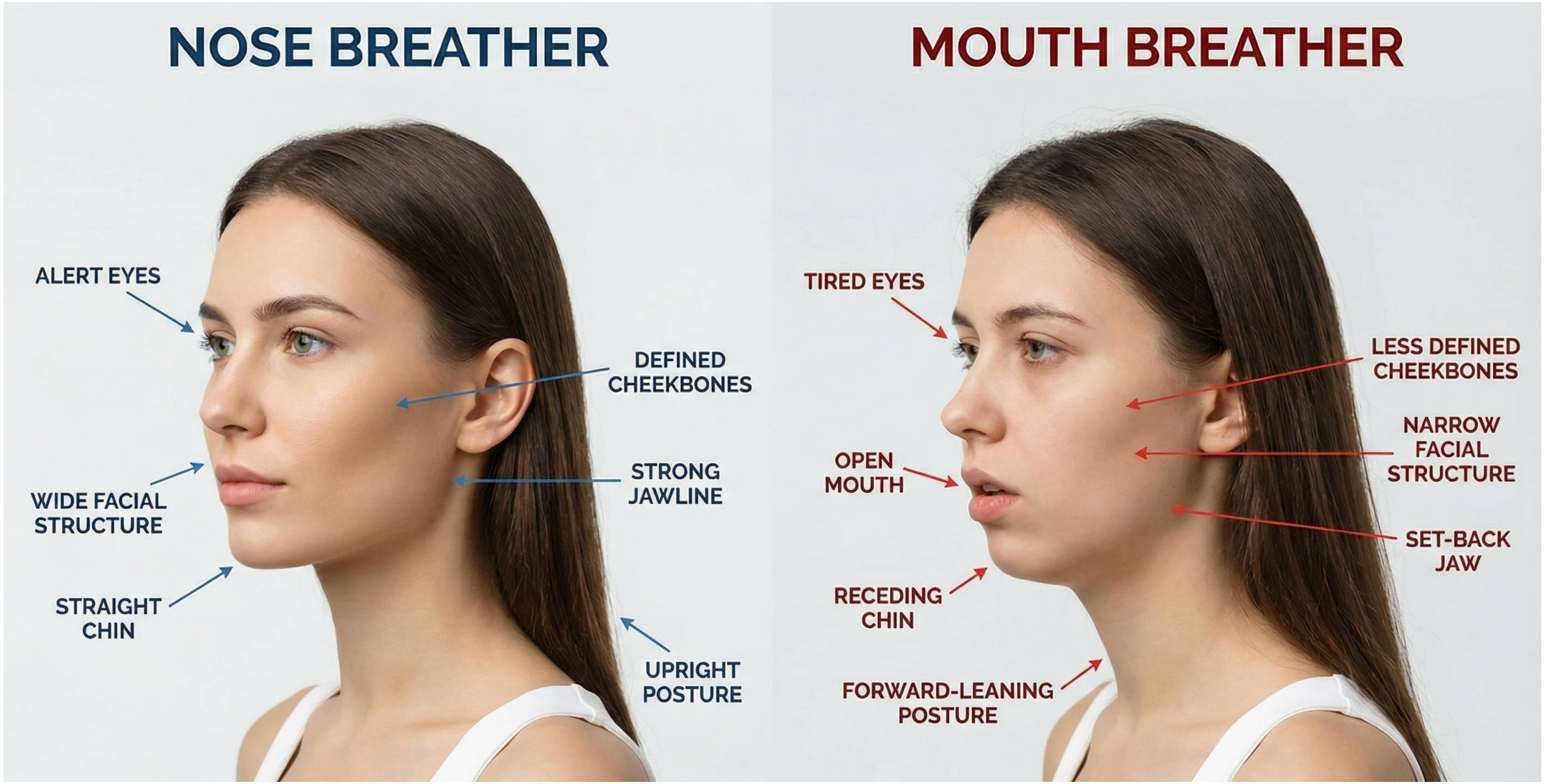
These can support nitric oxide production **when the body needs it**, but they do not override the body's regulatory systems — nor should they.


NOSE VS. MOUTH BREATHING
WHY IT MATTERS

Nose Breathing	Mouth Breathing
Filters air	No filtration
Warms air	Cold air hits lungs
Produces nitric oxide	No NO production
Supports oxygen delivery	Less efficient oxygen use



- **Nose breathing and mouth breathing** are not equivalent, even though both move air in and out of the body. When we breathe through the nose, the air is **filtered, warmed, humidified, and enriched with nitric oxide**, which helps improve oxygen delivery and supports immune defense.
- The nasal passages are designed to slow and condition the air, protecting the lungs and enhancing overall efficiency of respiration. In contrast, mouth breathing bypasses these critical steps — allowing unfiltered, cooler, and drier air to reach the lungs, which can contribute to irritation, reduced oxygen utilization, and increased susceptibility to infection.
- Over time, habitual mouth breathing has been associated with issues such as poor sleep quality, dry mouth, and even changes in oral and facial structure. Simply put, the nose is built for breathing; the mouth is not.


NOSE BREATHER
ALERT EYES
DEFINED CHEEKBONES
STRONG JAWLINE
WIDE FACIAL STRUCTURE
STRAIGHT CHIN
UPRIGHT POSTURE
MOUTH BREATHER
TIRED EYES
LESS DEFINED CHEEKBONES
NARROW FACIAL STRUCTURE
OPEN MOUTH
SET-BACK JAW
RECEDING CHIN
FORWARD-LEANING POSTURE

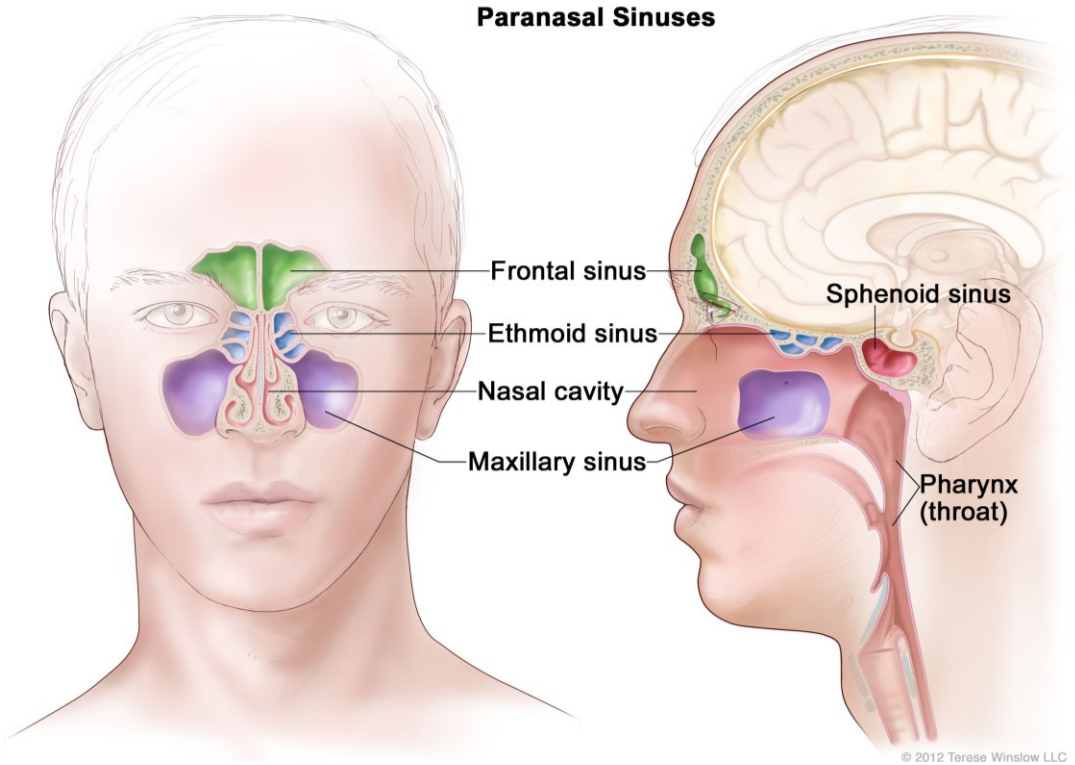
Sinuses are, indeed, part of *"the nose!"*

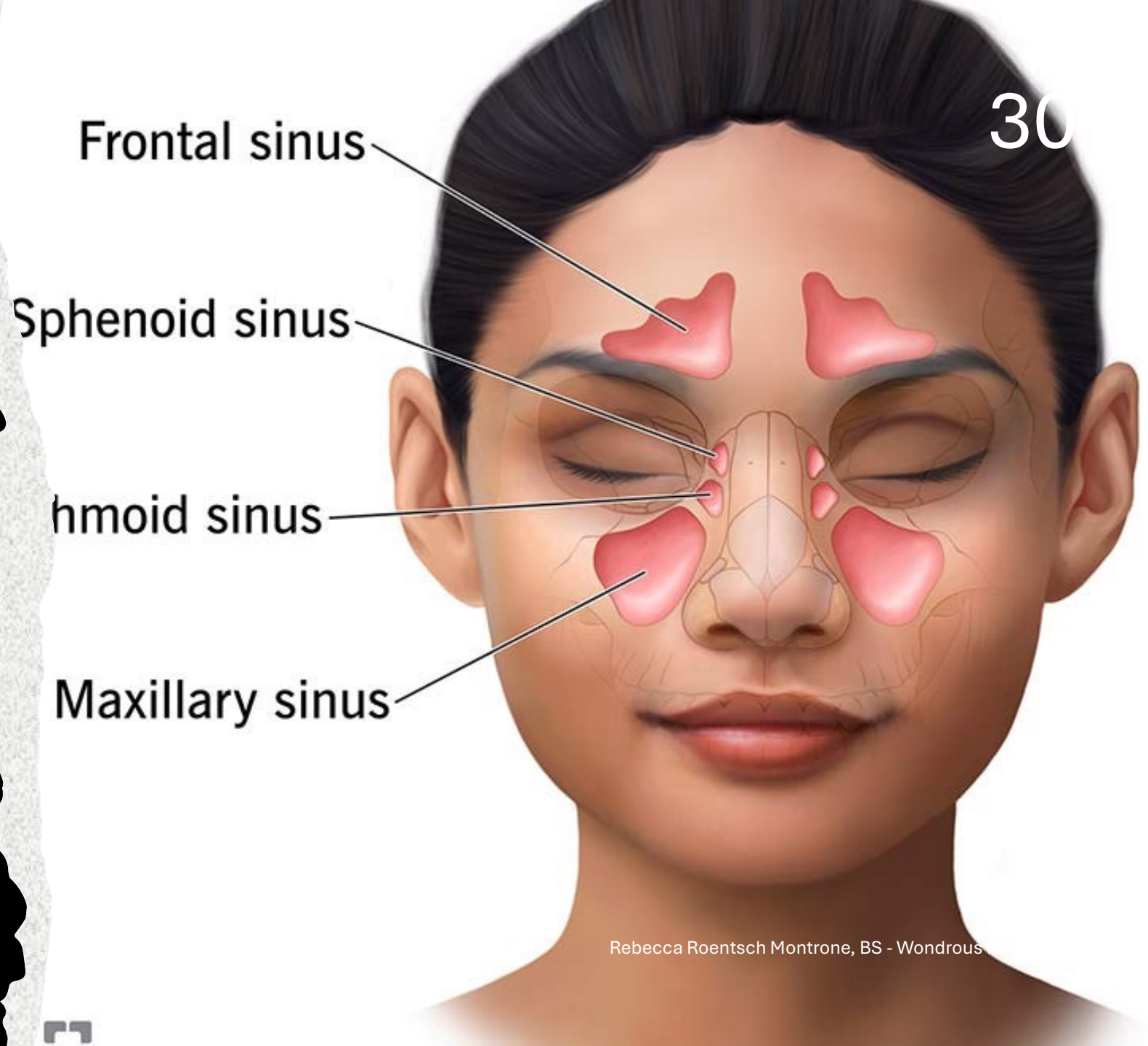
Sinuses

- Frontal
- Maxillary
- Ethmoid
- Sphenoid

Roles:

- Lighten skull
- Produce mucus
- Enhance voice resonance
- Support nitric oxide production





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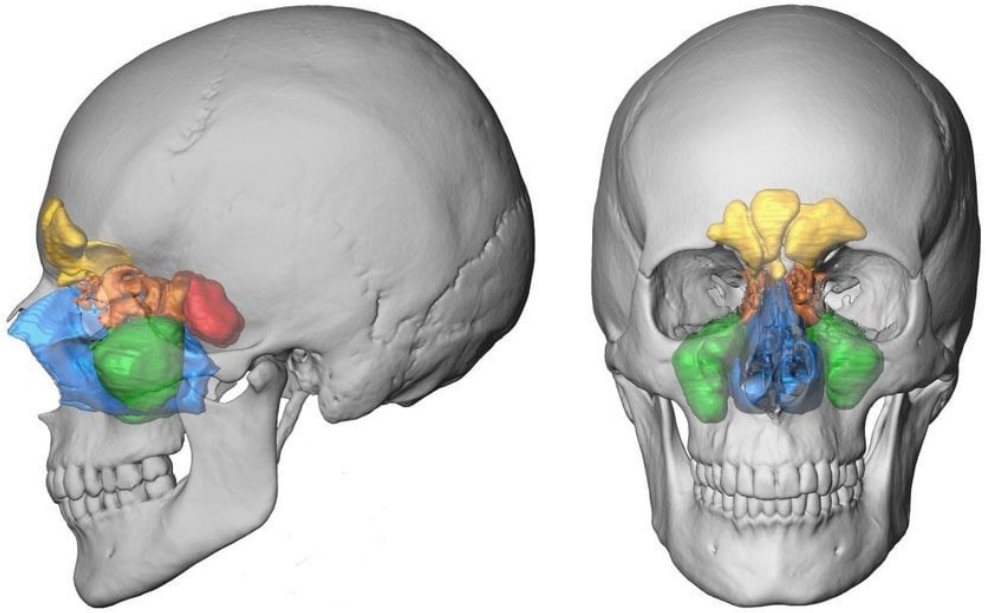


🦴 How the Sinuses “Lighten” the Skull

The paranasal sinuses are **air-filled cavities** within the bones of the skull:

- Frontal
- Maxillary
- Ethmoid
- Sphenoid

Instead of being solid bone, these areas are **hollowed out and filled with air**.

👉 This reduces the overall weight of the skull **without compromising structural strength**.

⚖️ Why That Matters

1. Head Weight & Neck Strain

- Your head already weighs about **10–11 pounds**.
- If the skull were completely solid:
- It would be significantly heavier
- The neck and upper spine would have to work much harder

👉 Sinuses help keep the head **manageable and balanced**

2. Energy Efficiency

- Holding up the head is a **constant muscular task**
- Even small increases in weight → more energy expenditure

👉 Lighter skull = less strain over a lifetime

3. Biomechanics & Posture

The head sits on a relatively small support base (cervical spine)

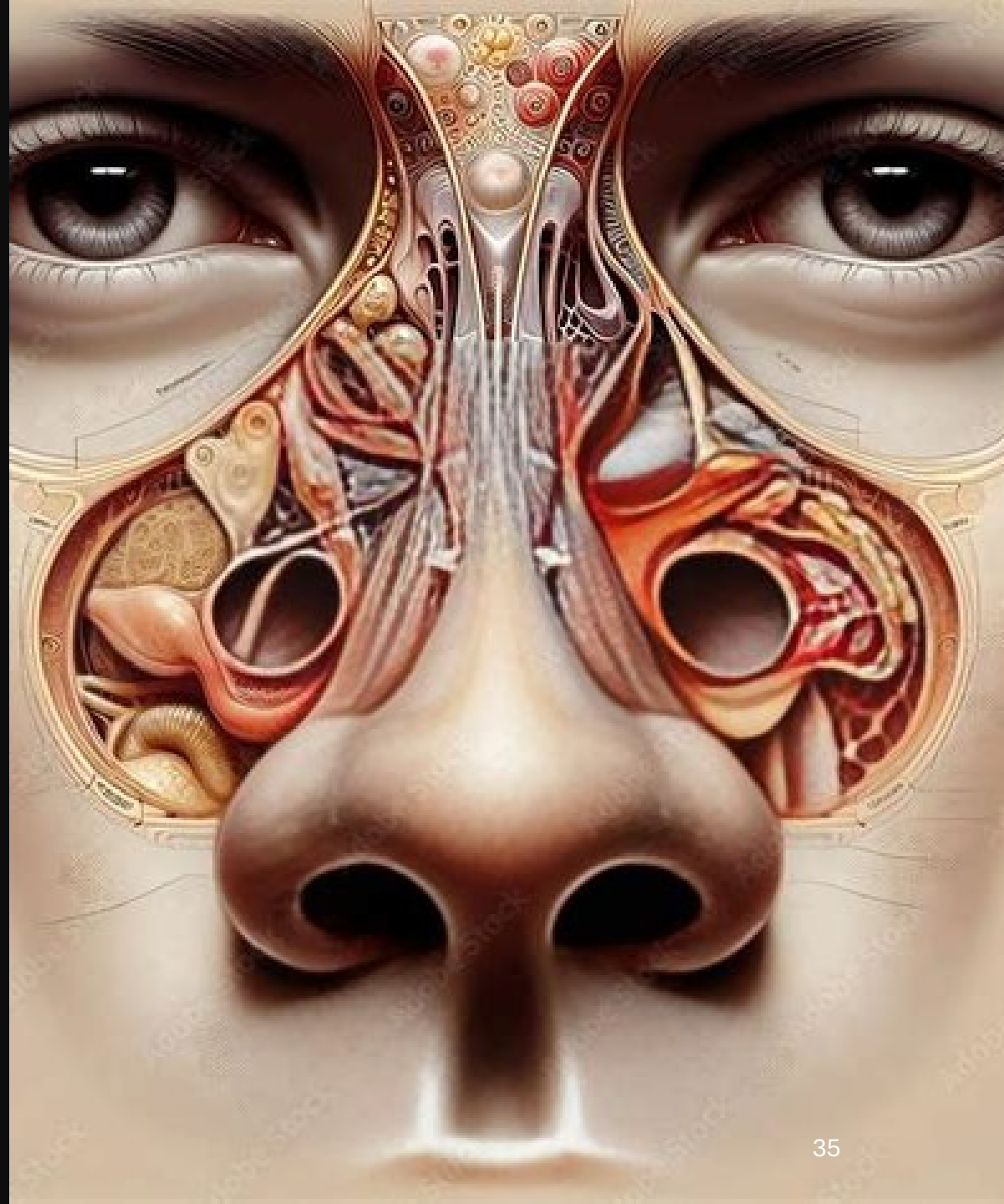
- Weight distribution matters for:
  - Posture
  - Balance
  - Movement

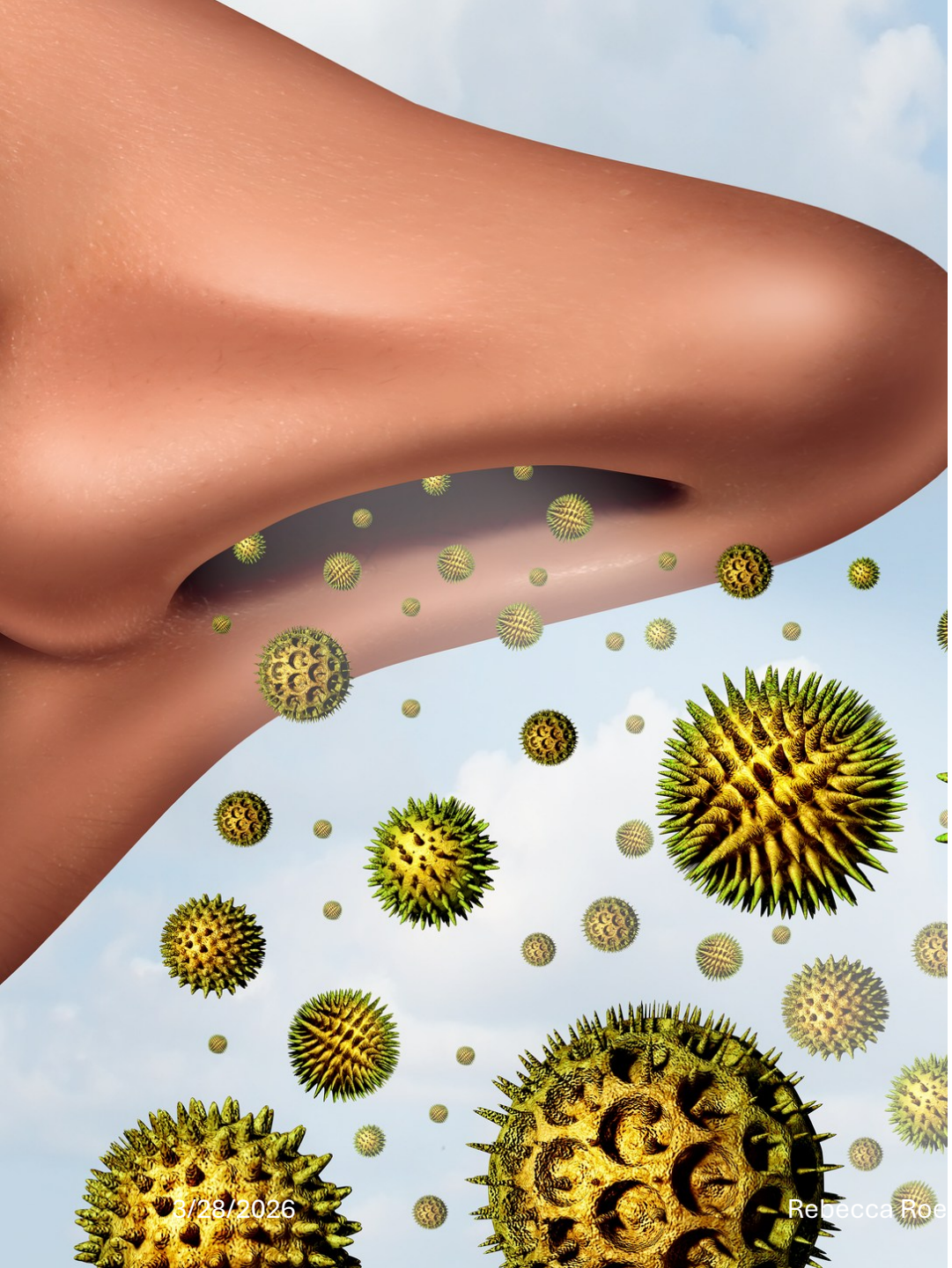
👉 A lighter skull helps maintain **efficient alignment**

⚡ Functional Summary

The Nose:

- Filters air
- Conditions air
- Defends against pathogens
- Produces nitric oxide
- Enables smell
- Communicates directly with the brain





Coming Next: When Things Go Wrong

- Sinus congestion
- Allergies
- Loss of smell
- Chronic inflammation
- Structural issues