Western Kansas Seminar
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# The role of nasal moisturizers

## NO, THEY ARE NOT ALL THE SAME

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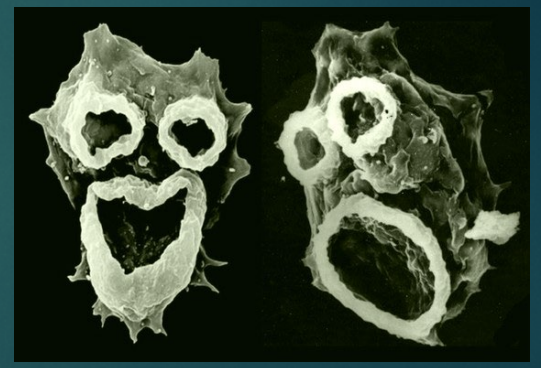
CEO Profounda

# About Me

- BSc (hons) in Chemistry (UPEI), MBA (Northwestern)
- In the Pharmaceutical industry since 1984
- Roles include sales, marketing, product planning, licensing, general management
- VP Bayer North America, VP Watson Pharma, VP Cardinal Health, GM Cephalon
- Currently the Founder Ceo of Profounda, inc
  - Drug for rare disease including the brain eating amoeba
  - Developed and manufacture line of nasal care products, natural and skin care.



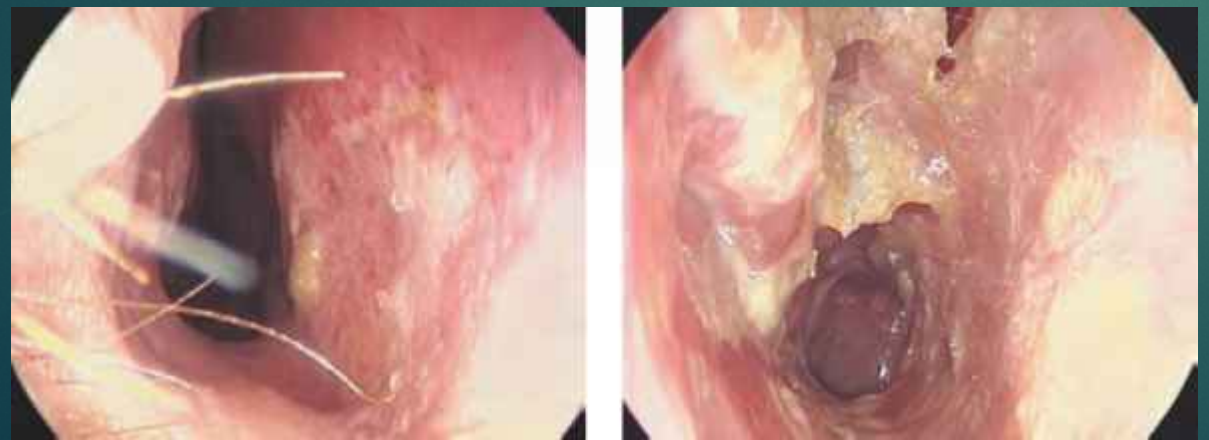
# Did you know?

- Wichita ranked first in the country on all three pollen levels: tree, grass and weed. Kansas City ranked 20th most severe out of 100 cities on tree pollen, 36th on grass pollen and 34th on weed pollen.

The Kansas City Star Apr 20, 2023

# What is Dry Nose?

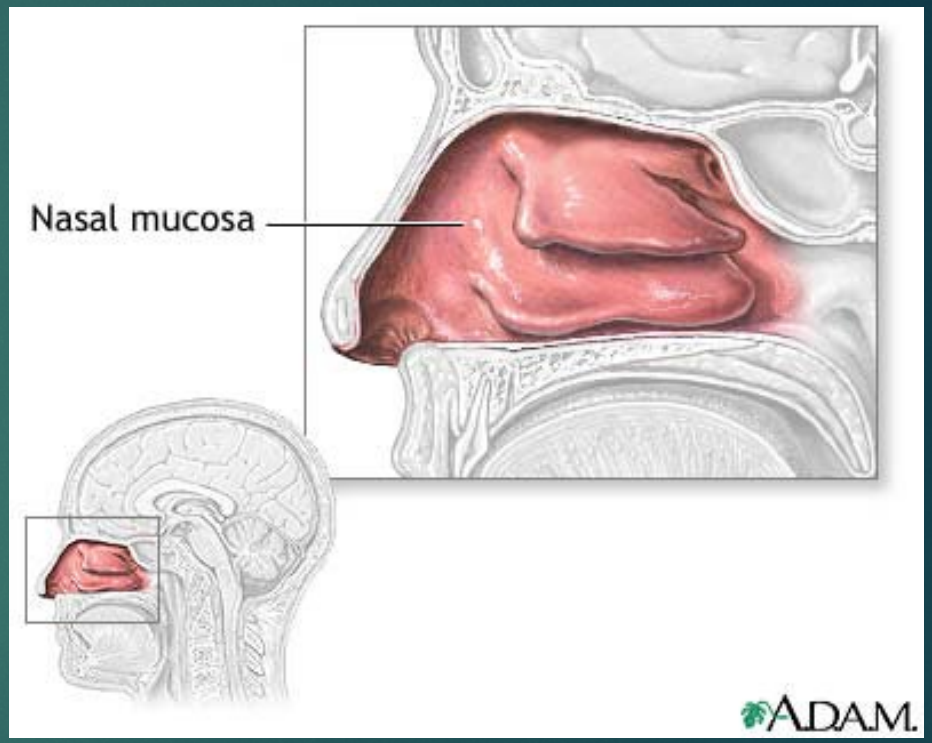
- Dry sinuses develop when the mucous membranes (Nasal mucosa) in your nose and sinus cavities don't contain enough moisture.
- If the walls of the nasal and sinus passages lack moisture, uncomfortable symptoms can manifest such as pain and swelling, nosebleeds, and even sinus infections.



# What is the Nasal Mucosa?

## Anatomy of the nasal mucosa

The nasal mucosa, also called respiratory mucosa, lines the entire nasal cavity, from the nostrils (the external openings of the respiratory system) to the pharynx (the uppermost section of the throat). The external skin of the nose connects to the nasal mucosa in the nasal vestibule. A dynamic layer of mucus overlies the nasal epithelium (the outermost layer of cells of the nasal mucosa).

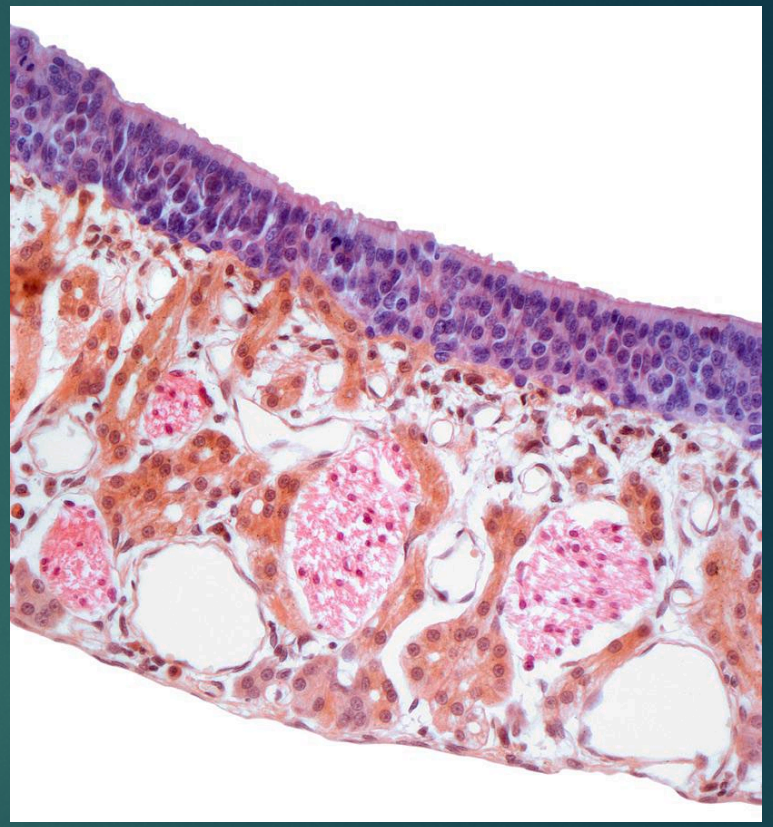


# What is the Nasal Mucosa?

Anatomy of the nasal mucosa

The initial one-third of the nasal cavity is lined by stratified squamous epithelium (smooth epithelium consisting of flat surfaced cells), several cell layers thick. The outmost layer of squamous cells overlies a layer of proliferative cells (cell which divide and replicate to form new cells) which is attached to a basement membrane, a network of tough fibres which supports the epithelium.

The posterior two-thirds of the cavity is lined with pseudostratified columnar ciliated epithelium (a type of epithelium in which cells arrange themselves in columns and project tiny hairs called cilia) containing goblet cells (mucus producing cells), and which overlies a basement membrane.



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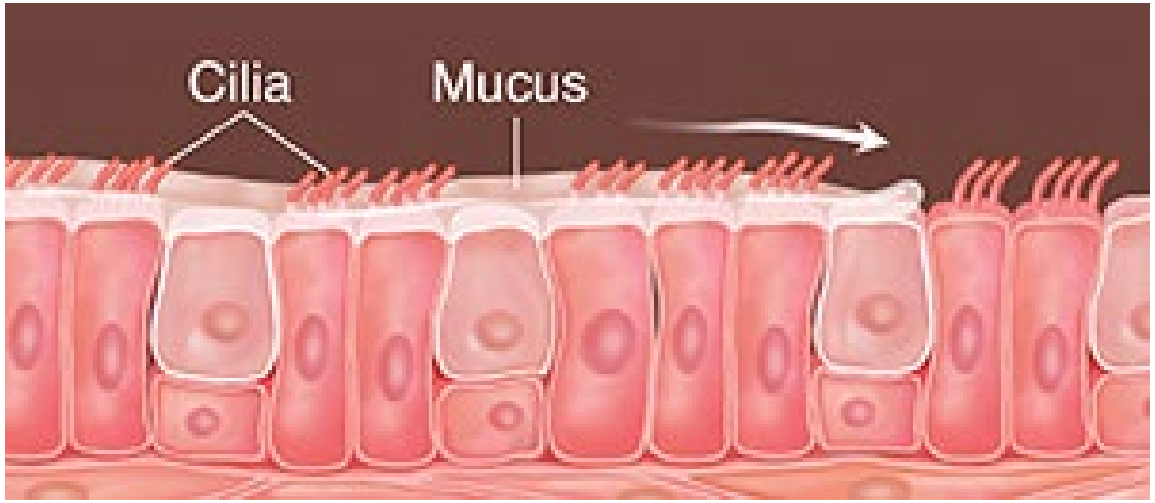


# Physiology of the nasal mucosa

- The nasal mucosa plays an important role in mediating immune responses to allergens and infectious particles which enter the nose. It helps prevent allergens and infections from invading the nasal cavity and spreading to other body structures, for example the lungs.
- The mucus secreted by and which lines the mucosa and in a healthy nose provides a physical barrier against invasion by pathogens (harmful microorganisms). It is sticky and traps pathogens when they enter the nasal cavity.
- The nasal mucosa acts as a protective barrier to prevent immune reponses.

# Atrophic Rhinitis

- Atrophic rhinitis is nasal dryness that occurs when tissue inside of your nose thins or atrophies. Eventually, the tissue hardens. As a result, the nasal cavities where air flows through your nostrils widen. Your nasal passages become too dry, causing a foul-smelling nasal crust to form.
- **Atrophic or atrophy** is the medical term for the shrinking, thinning or loss of tissue. With atrophic rhinitis, a thin layer of expandable tissue called mucosa inside of your nose becomes thinner and then hardens. This tissue covers bones called the turbinates that warm, humidify and filter the air you breathe. The turbinate bones may also shrink or become thinner.
- **Rhinitis** is swelling (edema) and inflammation of your nasal passages. This inflammation affects your respiratory system, causing breathing problems.
- Atrophic rhinitis is a type of nonallergic rhinitis. The common cold is another type. At any given time, as many as 30 million Americans have some type of nonallergic rhinitis.

# What Causes Dry Sinuses?

- Here's a list of some of the most common conditions:
- A Cold
- **Allergic Rhinitis (Hay Fever)***
- Blowing your nose too frequently
- Overuse of Antihistamines and Decongestants
- Weather Changes
- Environmental Conditions and Air Quality
- Air Condition/Heating
- Smoke
- Non-allergic Rhinitis
- Certain Medications
- Surgery
- Old Age
- CPAP Therapy
- Oxygen use

Negative effects on nasal mucosa

*estimated to affect between 10 and 40% of the population worldwide (Bjorksten et al., 2008; Bernstein et al., 2016)

# Symptoms Associated with a Dry Nose

Dried out sinuses can cause suffering through a number of uncomfortable symptoms. Your breathing, head, nose, mouth, and throat can all be affected by the inflammation and irritation caused by dry sinuses. Some of the most common symptoms of dry nose and sinuses include:

- sore throat
- sinus infection
- headache
- sinus pain or pressure
- pain or pressure around the eyes
- nosebleeds
- dry nose
- Loss of taste or smell
- dry mouth
- inflammation
- irritation
- scratchy throat
- trouble sleeping

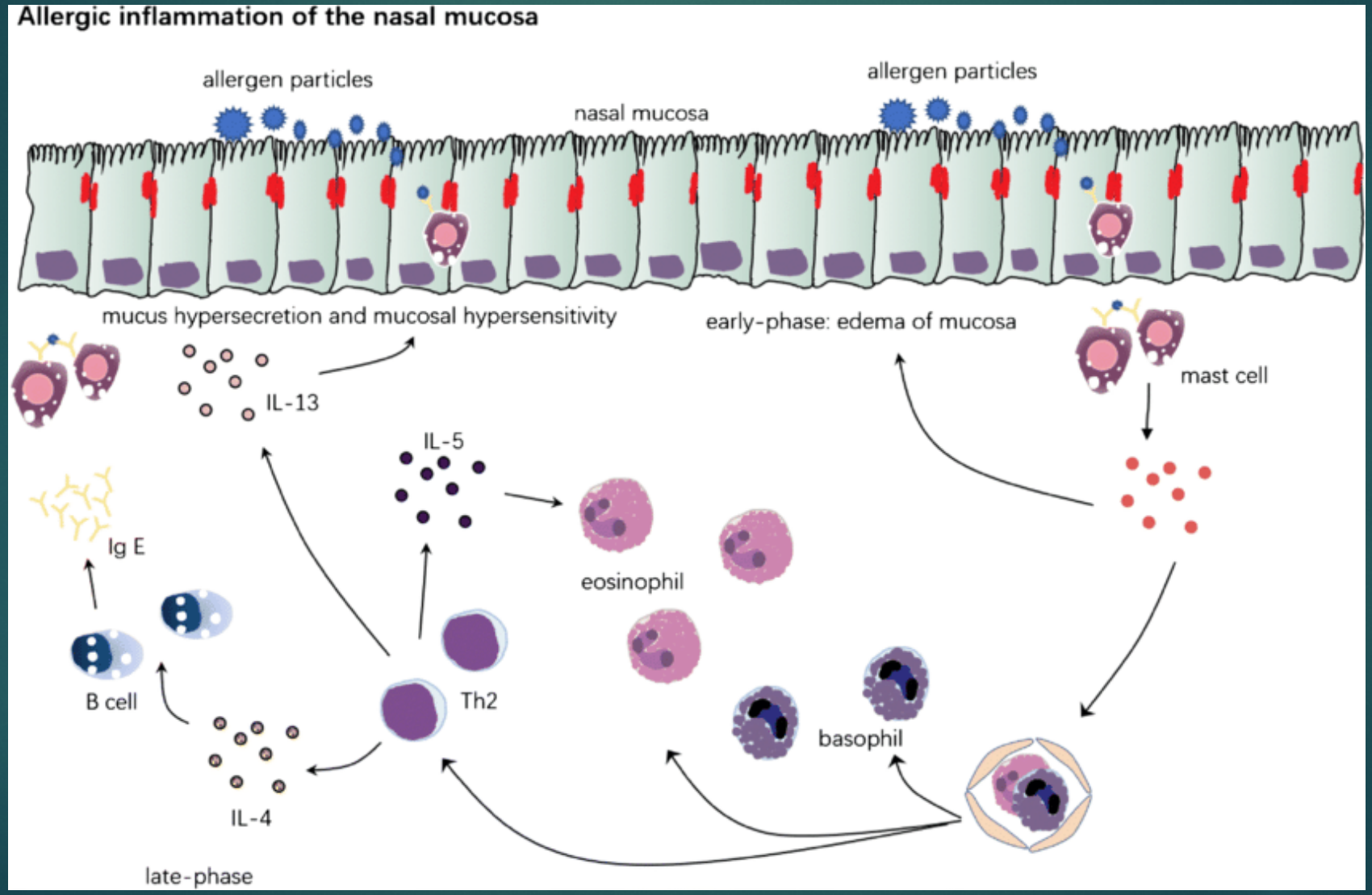
# Is it dry nose or allergy?

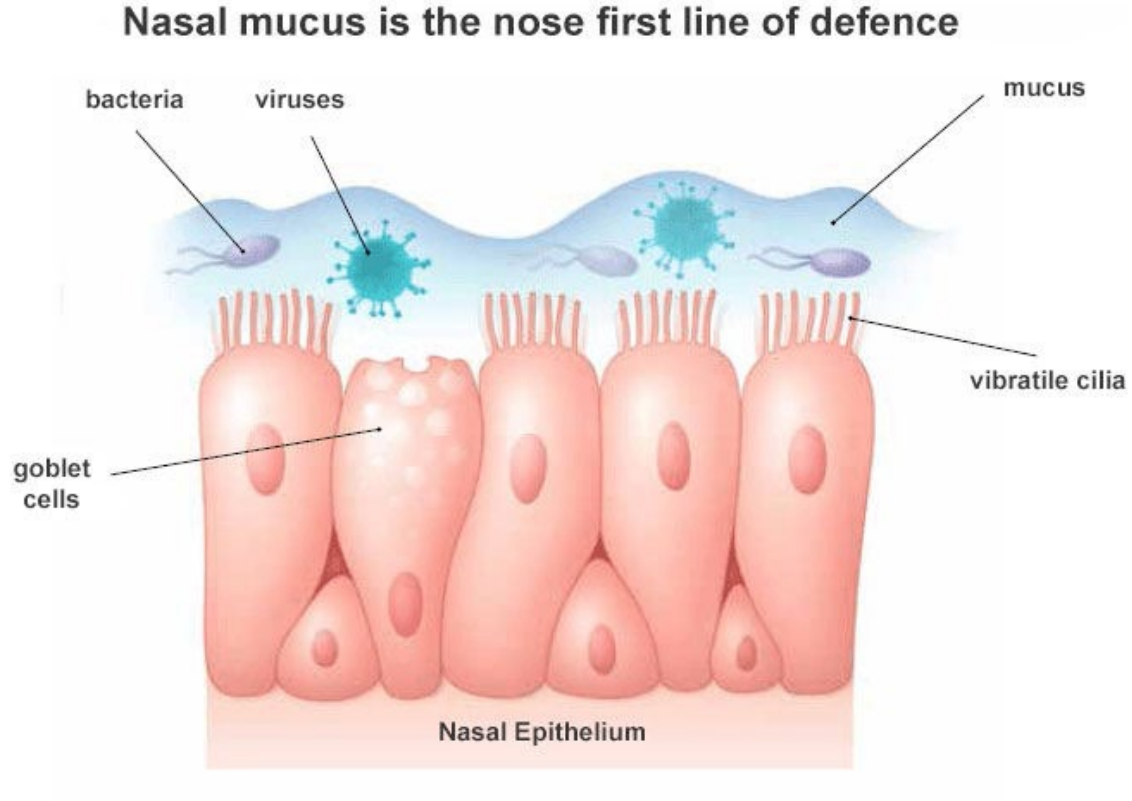
| Dry Nose | Allergy |
| --- | --- |
| Congestion | Congestion |
| Itchiness | Itchiness (But may include eyes) |
| Runny Nose | Runny Nose |
| Sneezing | Sneezing |
| Nosebleed | Nosebleed |

# The Immune Response

- Allergies are the result of your immune system's response to a substance.
- Immune responses can be mild, from coughing and a runny nose, to a life-threatening reaction know as anaphylaxis
- A person becomes allergic when their body develops antigens against a substance. Upon repeated exposure the severity of the reaction may increase.
- Allergies affect people of all ages, races, genders and socioeconomic statuses.
- Mucus traps antigens and prevents them from coming in contact with nasal mucosa, thereby avoiding an immune response

# The Immune response illustrated

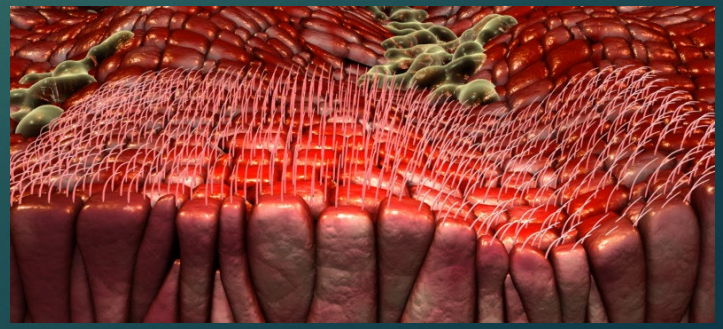




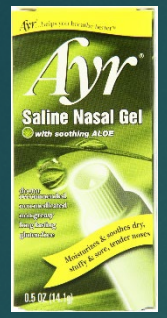

Mucus traps noxious substances (viruses, bacteria, dust particles, pollen etc.) on the surface of mucus and vibratile cilia transport the mucus towards the pharynx to get rid of it

A healthy nose has a Ciliary Layer

No contact of allergen with Nasal Epithelium means no Immune response



# Treatment Options for Dry Nose & Allergy





All Natural Option Nasal moisturizers

**Most common symptoms of nasal dryness and allergy**

Itchiness
Runny Nose
Sneezing
Cough
Nosebleeds
Crusty nose

Antihistamines



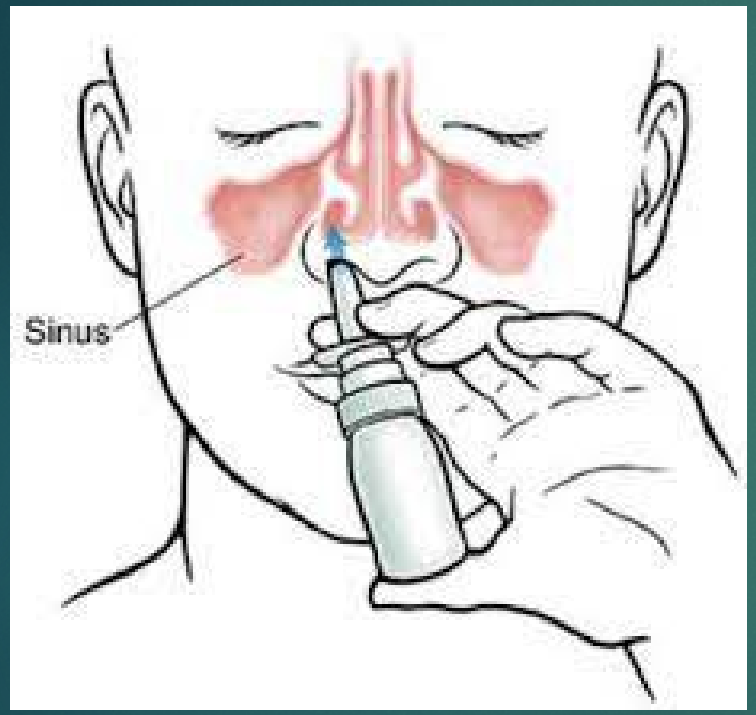
- **Saline Sprays, Netti Pots, etc**
- **Safe but not as effective in moisturizing**
- **Good at flushing out nasal debris**


- **Systemic side effects and local nasal drying**


- **Systemic side effects and local nasal drying**
- **Adrenal Supression**

# Did you know?

- Why do they suggest spraying steroids away from the nasal septum?




Continued intranasal drug use causes permanent septum perforations. Over or misuse of steroid or OTC nasal sprays can create cartilage damage in the septum.

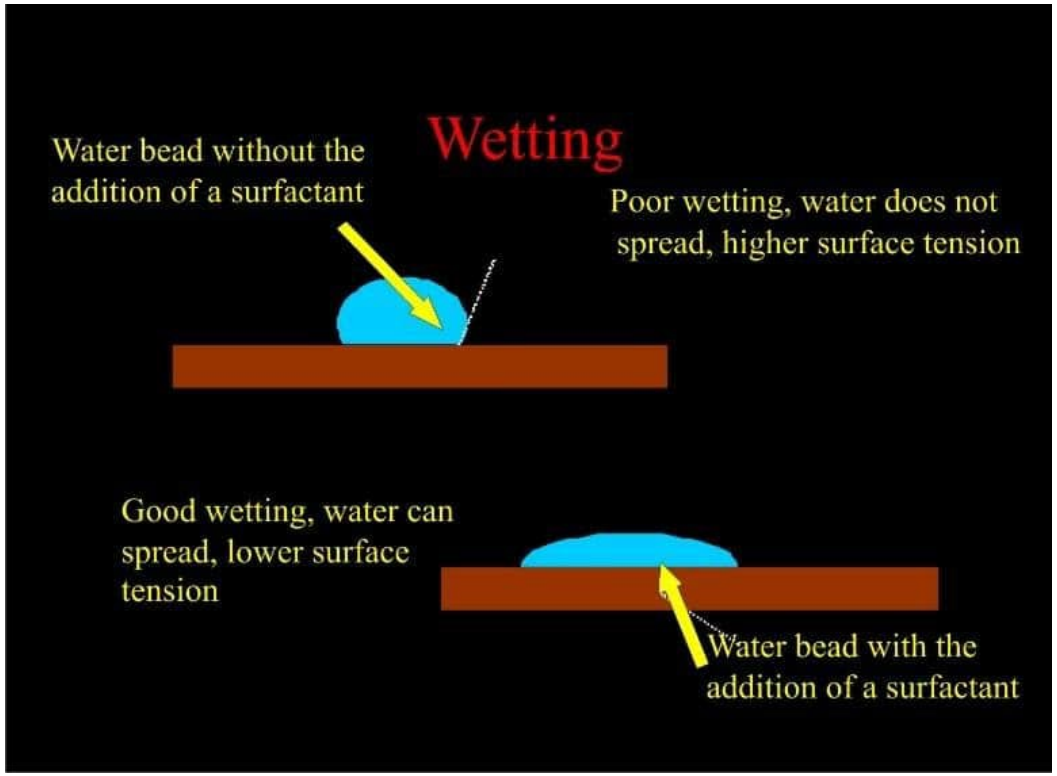
Beconase Aq, Vancenase Aq used to be just available as powder nasal steroid sprays

Side effect of nasal perforation was suggested as cause of repeated contact with the powder nasal sprays

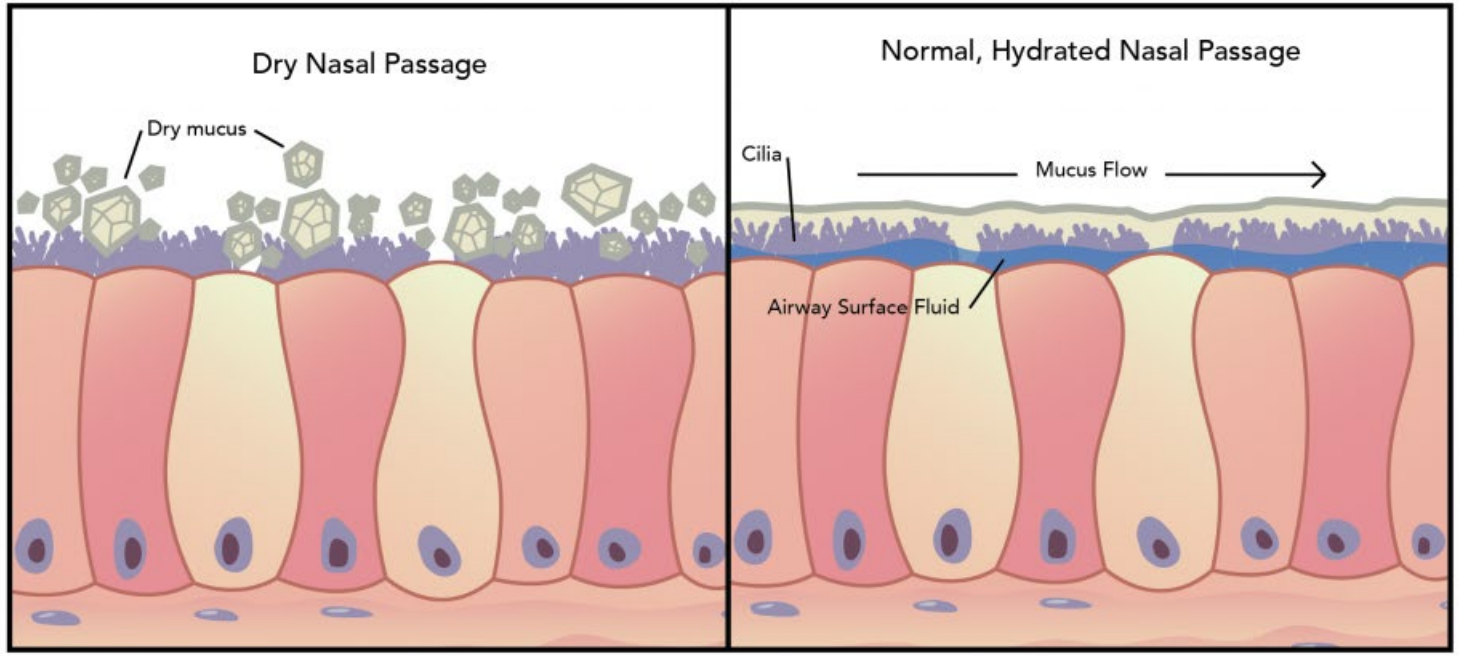
Aq forms all have "wetting agents" to help disperse the steroid to avoid over concentration and better distribution.

# Wetting agents

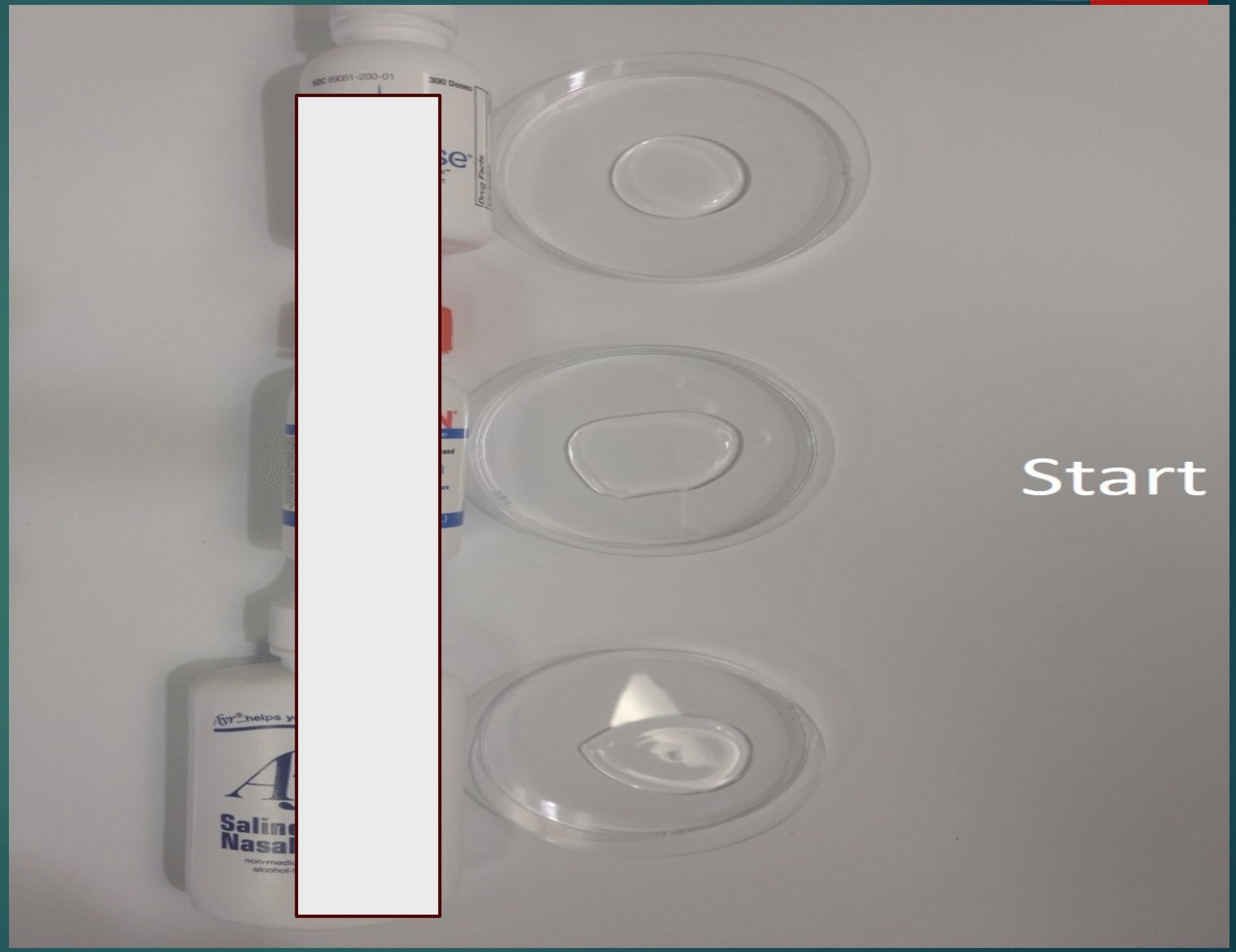
- A wetting agent is a surface-active molecule used to reduce the surface tension of water. The high surface tension of water is problematic in many applications where spreading and penetration of water is required. These include for example paints and other coating formulations, detergents, pesticides, and others.
- They use wetting agents on golf courses to avoid watering as often to prevent grass from drying up.



But what if you could replace the ciliary fluid using wetting agents in a nasal moisturizer?



Wetting agents last longer than saline solution alone products providing a longer lasting effect



# Comparing Products - pH


6.0 – 6.2

pH

7.2

pH is important because a change from the healthy nose pH of 6-6.2 can cause stinging. Also steroids are formulated to optimally work at that pH to cross the nasal mucosa. A chance that a different pH could affect the effectiveness if used together

# Comparing Products - Tonicity


hypotonic

isotonic

hypertonic

Most Nasal moisturizers only use one salt and they use either isotonic or hypertonic formulations hoping to "dry out" the nose. Formulated steroids and wetting agent products use two salts in the hypotonic level to allow it to work with the natural cells way of moisturizing – more on that later.

# Comparing Products – Dual Wetting Agents


Yes

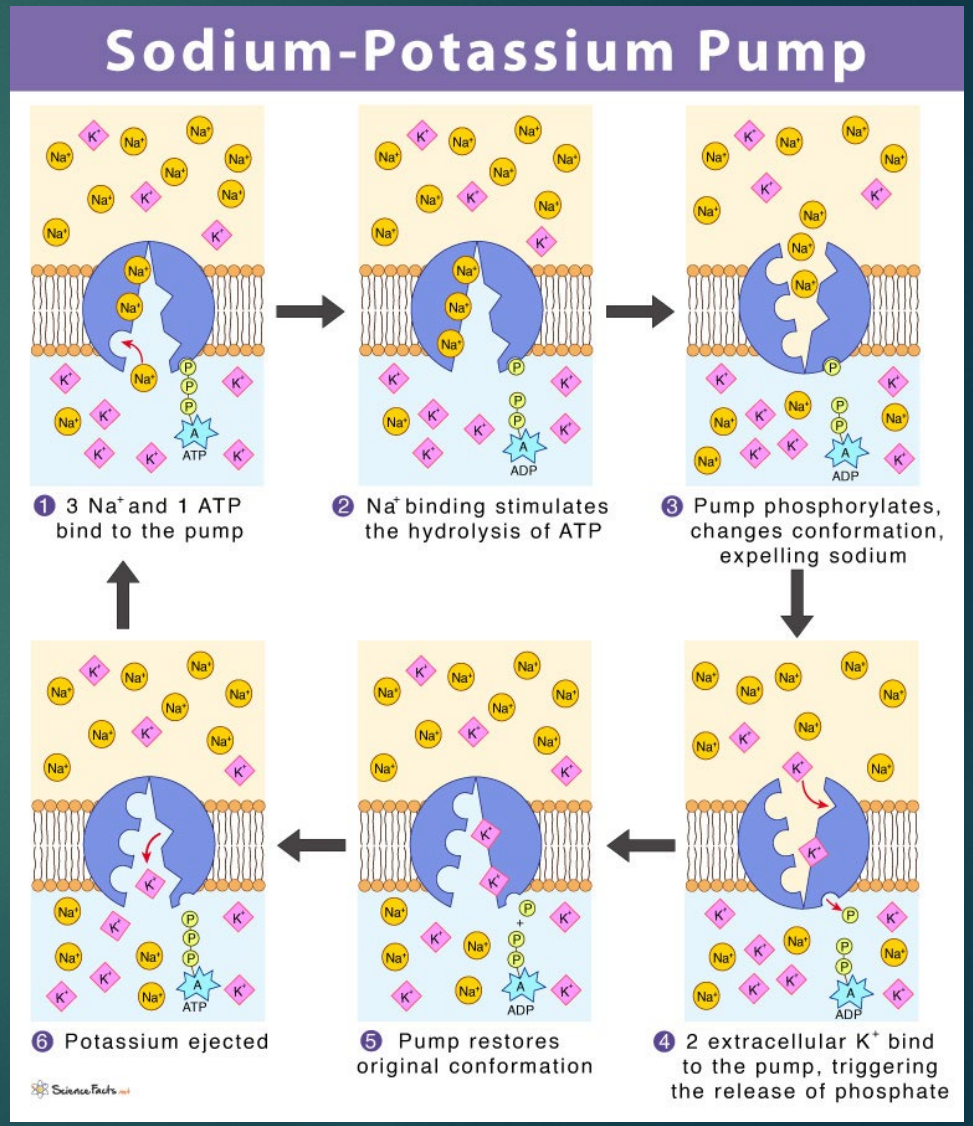
No

Wetting agents create that protective layer as well as helping steroids (as well as the dual salts) to distribute across a larger area of the nasal mucosa.

# The Sodium Potassium Pump

Water passively follows the sodium. To restore balance, the sodium-potassium pump transfers sodium back to the extracellular fluid and water follows. Every cycle of the sodium-potassium pump involves the movement of three sodium ions out of a cell, in exchange for two potassium ions into a cell.

If potassium is not concentrated enough inside the cell, the sodium/potassium pump is hard pressed to keep out enough sodium, called dehydration. With high sodium adsorption comes too much water and the cell becomes waterlogged possibly to the point of bursting, causing a drop in blood pressure.



# Comparing Products – Sodium and Potassium Salts


Both Sodium and Potassium

Sodium Chloride only

In order for the nasal moisturizer to function best with the sodium potassium pump (the bodies natural way of water movement in and out of cells, both sodium and potassium are required.

# Comparing Products – Aloe Vera & Dyes


No

Yes

*Aloe vera* whole leaf extract has been classified by the International Agency for Research on Cancer as a possible human carcinogen (Group 2B), along with other natural products such as *Ginkgo biloba* extract and kava extract.[15,16]


[15] Grosse Y, Loomis D, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, Guha N, Baan R, Mattock H, Straif K, and International Agency for Research on Cancer Monograph Working Group. Carcinogenicity of some drugs and herbal products. *Lancet Oncology*. 2013;14:807–808. [PubMed] [Google Scholar]

[16] International Agency for Research on Cancer. Aloe vera In: *Some Drugs and Herbal Products* (Volume 108), International Agency for research on Cancer, Lyon, France; 2015. http://monographs.iarc.fr/ENG/Monographs/vol108/mono108.pdf (accessed October, 2015). [Google Scholar]

# Other stuff you already know

- Nasal moisturizers: DO NOT USE VASELINE OR OIL BASED PRODUCTS! They can cause problems in your lungs, and break down the seal in your mask.

# Summary

- Not all moisturizers are the same
  - Different pH
  - Different Tonicity
  - Wetting agents
  - Petroleum based
  - Number of salts
  - Presence of dyes or aloe
- Wetting agents can prevent the allergic immune response in the first place by providing protective barrier that also helps to moisturize.