Periodic Graphics

A collaboration between C&EN and Andy Brunning, author of the popular graphics blog *Compound Interest*

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To see more of Brunning's work, go to compoundchem.com. To see all of C&EN's Periodic Graphics, visit cenm.ag/periodicgraphics.

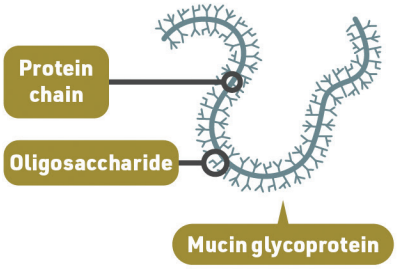
Liquid assets: Mucus, tears, and saliva

PERIODIC GRAPHICS

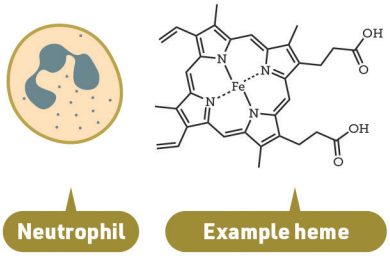
Snot, tears, and spit might sound unpleasant, but all three are an important part of our immune systems. Here we compare them and look at their components' role in protecting us from infections.

Mucus

Mucus is mostly water and contains substances like mucin glycoproteins: protein chains with oligosaccharides attached. These proteins form gels, giving mucus its thick consistency. Mucus traps and removes pathogens from the body.

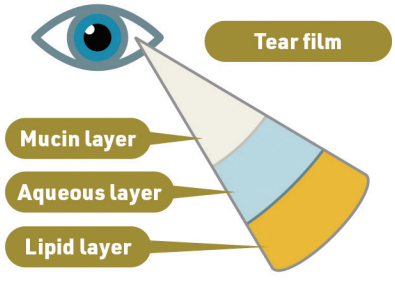


During infection, mucus in the nose turns yellow or green. The color comes partly from the heme unit in myeloperoxidase, which is an enzyme in neutrophils—white blood cells that fight infection.

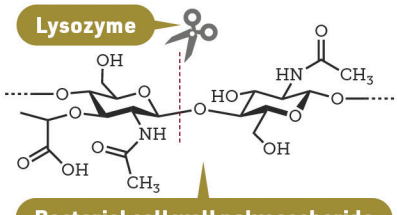


Tears

Tears are mostly water and contain proteins, lipids, electrolytes, and mucins. The different layers of a tear film have different purposes. The mucin layer sticks tears to the cornea, the aqueous layer keeps the eye's surface hydrated, and the lipid layer prevents evaporation.

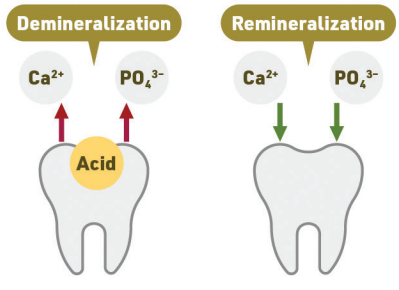


Tears contain several antibacterial proteins, including lysozyme and lactoferrin, to prevent infections. Lysozyme ruptures bacterial cell walls. Lactoferrin binds iron, preventing bacteria from using it to grow.



Saliva

Like tears, saliva contains antibacterial proteins. Saliva also contains ions of calcium, phosphate, and fluoride. These ions repair our teeth's enamel and dentin in remineralization, a process that reverses the acid-driven mineral loss that occurs in demineralization.



Saliva plays an important role in dental health by maintaining the mouth's pH. Bicarbonate ions in saliva react with acids produced by bacteria. The resulting carbonic acid is broken down by carbonic anhydrase, an enzyme found in saliva.