

ISEMPH Poster

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HOW DOES OPTIMIZING OUR DEFENSES CHANGE THE SYSTEM?

Knowles and Boucher described our airway defenses, pointing out the major role of the mucin glycans: “It appears that mucin macromolecules are well adapted to binding and trapping inhaled particles for clearance from the lung, at least in part because of the extraordinary diversity of their carbohydrate side chains [the glycans]. Because they provide, in effect, a combinatorial library of carbohydrate sequences, mucins can bind to virtually all particles that land on airway epithelia and can thus clear them from the lung.” These defenses extend throughout the airway.

Much earlier, in 1978, Bill Costerton, the father of biofilm, had an insight that he published in the January, 1979 *Scientific American*, entitled *How Bacteria Stick*. He describes the glycocalyx of virtually all microbes that is a polymer coating for the microbes made up of the same family of sugars and their complexes described by Knowles and Boucher as the carbohydrate side chains. The glycans on our cells, and our mucins, bind with those on the microbe. The preferred binding of virulent microbes are specific glycans on our cells, for which those on our mucins offer decoys.

In 1998 Finnish researchers showed that: “The exposure of either epithelial cells or pneumococci or both to 5% xylitol reduced the adherence of pneumococci.” They did this study because they had earlier found xylitol in their chewing gum reduced ear infections. They, along with the dentists who promoted the gums’ use in their public schools, thought it worked because the *Streptococcus* species lacks the enzyme to digest five carbon sugars. Because it worked as well on just the cells other doors were opened for how.

So, when a microbe enters an optimally working airway the first docking sites are most likely tied to mucins. Docking there inactivates the microbe. It no longer needs to attach; it’s attenuated, just like our immunization antigens. And the processes of building immunity begin in the nasopharynx and continued in the GI tract. Both of these are technically outside of the body, so the body itself is protected from the antigen or parts thereof that may contribute to autoimmunity.

So why are our defenses not optimal and what can we do about it?

Those defenses are made up of the mucus, which binds all pollutants, the cilia, which sweep it all out, and the airway surface fluid, which provides the microscopic ocean in which the cilia sweep, and the water needed by the dry secreted mucus to become the sticky runny mucus that works. The problem is that that amount of fluid is rare in our environment.

In 1986 A.V. Arundel published a study, Indirect health effects of relative humidity in indoor environments. His chart is available toward the end of his article. He was interested in what the humidity did to all of the elements effecting our health. But there is more to it than that. The top two lines show the common microbes to thrive in wet environments. The only way, then, to explain the “insufficient data” or the absence of respiratory infections in the empty line to the right of ‘Respiratory Infections,’ is what that level of humidity does for our defenses. As you can see from his chart there is an optimum zone where humidity is between 40 and 60% R.H. That is a level usually found outdoors, and everyone seems to know that outdoors is healthier—it’s what our

evolutionary ancestors adapted to. But we want comfort more than health, so our homes are well insulated and equipped with automatic heating and cooling equipment, both of which reduce the relative humidity to less than optimal. This becomes critical in the early winter. Cold air holds less water and when we heat that air it drives the relative humidity even lower—we call it cold season.

Fixing this in the natural way means humidifying our homes, but that is an expensive process, both for the equipment and the power to vaporize in the range of 30 gallons of water daily. The alternative use of osmotic agents, like hypertonic saline, administered by nasal spray has been considered, but many of our airway defensins are handicapped by saline. Sugar alcohols are a reliable alternative.

Based on the Finnish research discussed above, and prompted by my special ed teacher wife, who knew firsthand of the connection between chronic otitis media and her students with language learning difficulties, putting xylitol in the nasopharynx seemed a reasonable choice. When our granddaughter went to day care so mother could return to teaching, she developed chronic otitis and my wife challenged me: “If you really cared about children you’d find a way to prevent ear infections.” So I did.

The Finns used chewing gum with xylitol, but our granddaughter was too young to chew gum. They said it worked on the bacteria. Those microbes live in the back of the nose. So I put 5 grams of xylitol in a 45 ml. bottle of half-normal saline nasal spray and told mom and care givers to spray her nostrils before every diaper change. It worked. I used it on other kids. I followed ten of them for a year and found their incidence of infections reduced by more than 95%. I used it on other kids with different problems and found myself reproducing the results of Arundel’s Optimum zone—all respiratory complaints were normalized. I was fortunate in my choice of 5 grams. Isotonic xylitol is five grams per one hundred ml., so my spray was a bit more than twice that, but that edge is what pulled water into the nose to reproduce the optimal environment. I wrote this up for the journal, *The Clinical Practice of Alternative Medicine*, which unfortunately was not indexed, so no one knows about it. You can find it on my web site commonsensemedicine.org or here. I talked with the FDA and filed an Investigational New Drug Application, quickly finding out that their standard protocols mitigate against Hippocratic drugs, i.e. foods with drug effects. Hippocrates told us our foods should be our drugs, but foods are not controlled or patentable; they cannot raise their prices to pay for the expensive and required randomized, double-blind, placebo-controlled, trials that were initiated to show safety after the thalidomide disaster. The spray is sold around the world as a nose wash, with none of the above explanation or claims. The FDA was satisfied with its safety when I explained that a person could use this spray every hour, 24 hours a day, both nostrils, and get less than half a plum’s worth of xylitol, which is not absorbed, but delivered to the stomach, just like the plum.

Conclusion

Osmotically optimizing our airway defenses in this way is what Joseph Schumpeter termed the creative destruction that provides the novelty that keeps our economic system running and healthy. Clayton Christensen used kinder words, ‘innovative disruption’, but it’s the same thing.

THAT’S HOW OPTIMIZING OUR DEFENSES CAN CHANGE THE SYSTEM.

New Paradigms open new doors that were not there before.

To read about these new doors read the two books entitled Common Sense Medicine.

One is about our personal health and our physiological defenses. The other is about our social defenses.

Both are available at Amazon.