

## The Important Blankets of Your Life

You all know Charlie Brown and his friend Linus. You remember that Linus had a blanket. In fact, Linus and his blanket were inseparable. Did any of your children have a blanket? I still remember one of my kids, with his blanket, in the pediatric intensive care unit of Riley Hospital in Indianapolis. He had severe croup but fortunately recovered completely. The doctors thought it was medical science that pulled him through, but my wife and I knew it was his blanket. He is now forty with a wife, two kids, a dog, and a streak of gray hair.

Do you remember your blanket? Probably not, as most of us can't remember what we had for breakfast and your baby blanket has long since gone to baby blanket heaven. But fear not, you have another blanket that has been with you since birth and will stay with you until you shuffle off into the great beyond. It doesn't exactly keep you warm and toasty or give you any particular feeling of security. It does, however, keep you in good health and, when it is functioning correctly, you aren't even aware of its presence. I am speaking of your mucociliary blanket. "What in all God's green earth is the mucociliary blanket?" you ask. You did ask didn't you? Of course you did. If you hadn't, I wouldn't have an excuse to go on.

The mucociliary blanket, also called the mucus escalator, covers the surface of your respiratory tract, the nose, sinuses, larynx, and bronchial tree. Its job is to clear the gunk out of the air that we breathe and it does the job very efficiently. More than 99% of particulate matter (think gambling night, cleaning out the garage, running the lawn mower) in the air that we take in, some 8,000-10,000 liters per 24 hours, is cleared out before the air gets down to the air sacs where oxygen and carbon dioxide exchange occurs (Respiratory System 1085, Bennett et al. 372). Any particles that get to this level are so small (How small? They are about the size of one red blood cell, 7 microns or seven-millionths of a meter.) that they are gobbled up by the white cells that either live in the area or are traveling through (Wintrobe 112).

The blanket is composed of two parts, cilia and mucus. The cilia are very tiny hair like structures that project out from ciliated cells that make up most of the lining of the respiratory tree. They beat between 1,000 and 1,500 times a minute, which is pretty fast, and they do it in a coordinated fashion and they do it all the time (Respiratory System 1086). They do it from the time your born to the time you die. I don't know how many times that is but I know it is a whole lot of 0's.

What are they doing with all this waving about? Are they flagellating themselves like medieval monks or beating up on their neighbors?

No, this is not a frantic useless waving about but is a reasonably coordinated beating that pushes mucus, over a quart per day, up out of the lungs and through the glottis where we swallow it and don't even know it. The cilia move it along at about 1 mm/min in the small airways and 5-20 mm/minute in the trachea and main bronchi, clearing the lungs out about every 24 hours. The mucus comes from mucus secreting acinar glands (90%) and goblet cells (10%). The goblet cells make up the rest of the lining of the respiratory tree (the majority of the cells being the ciliated cells) while the acinar glands are more deeply situated (Maxomov 263). What is mucus? It is clear, sticky, proteinaceous material. What does the mucus do? In addition to carrying white cells and antibodies, it traps the above mentioned gunk and, pushed along by the cilia, carries it up to your pharynx where you swallow it. The gunk then goes to your stomach where it is destroyed by the stomach acids.

So the mucus producing cells produce over a quart of mucus which is pushed out of the lungs by the rapidly beating cilia to your throat where you swallow it. Sounds disgusting doesn't it? It conjures up visions of snail slime in the early morning. Yuch! But the system works and by and large we are totally unaware of it. It's when it doesn't work that we become very conscious of it especially as barbershoppers. If it doesn't work, we don't sing, or at least we don't sing well. What are some of the problems?

1. Smoking. Primary or Secondary. Smoking paralyzes the cilia and causes increased mucus production. Increased slime with no place to go just stacks up here and there. This results in hoarseness when it accumulates on the vocal cords and a productive cough when it stacks up anywhere in the respiratory tree. Remedy: Don't smoke and avoid second hand smoke if

possible. (Did you ever wonder why our government, in all its wisdom, gives financial assistance to the tobacco industry while prosecuting it for marketing a harmful substance? I would guess that more people die of smoking than will ever die of terrorist bombs. Our exportation of tobacco is truly a weapon of mass destruction.)

2. Infection. Acute bacterial or viral infections cause a shedding of ciliated cells and secrete substances that impair the motility of the cilia that remain. Remedy: Avoid them, live in a bubble. Obviously we can't do that and go to singouts. Did you know that most respiratory infections are spread not by inhalation of infected aerosols but via contact with your own hands? Washing your hands is a simple but effective way to help reduce the spread of upper respiratory infections.

3. Adequate hydration. Singing or any activity that necessitates heavy breathing (use your imagination here) tends to dry out the mucus. Dried mucus doesn't clear easily. Try blowing your nose if your humidifier isn't working correctly. It would seem that the best time to drink fluid and hydrate your mucus membranes is before singing. However, do not drink so much that you have to run off the stage or otherwise embarrass your self during a performance. The water that you sip during a rehearsal has to pass through your stomach before it gets to its primary site of absorption in the small bowel. If you have eaten before you came, the additional water may sit in the stomach for awhile as it mixes with the food that you are beginning to digest. After it gets to the small bowel it has to be circulated and secreted into the mucociliary blanket. The mucus that is already there and interfering with your singing will still have to be cleared out before the better hydrated stuff can replace it. So wetting your whistle is probably just that, wetting your whistle (your lips), and not your larynx. It will help keep your tongue from sticking to the roof of your mouth but it won't do much for the mucus rattling in your windpipe. It certainly doesn't hurt anything. My personal experience with drinking while I am singing is that it just makes me belch. Sipping and not gulping would probably avoid this as less air is swallowed.

4. Drying medications. Some medications are necessary on a continual basis and can not be stopped. Others can be taken at times when they are less likely to change the character of the mucus while you are singing. Still other medications have the opposite effect on mucus and thin it out. These are called expectorants. A common one is guaifenesin as found in Robitussin Rx and others. These are over the counter medications and can be used temporarily with adequate hydration to decrease the viscosity of mucus and make it easier to bring up. Guaifenesin is often mixed, however, with anti-histamines which are drying and should not be used unless you are overproducing thin watery mucus typical of allergic states. In this last instance, drying medications might be helpful. The amount of mucus necessary follows the Goldilockian Theory, not too much, not too little, but just right.

5. Effect of certain foods. My mother always told me that milk produced phlegm (another name for mucus if you are a Hoosier, or for mucous if you're a Brit) in the windpipe.

Mother was wrong? Can it be? Studies have indicated that the viscosity of the milk gives a coated feeling to the throat and possibly thickens the saliva but that it does not alter the amount of mucus produced (National Asthma Campaign).

Mother was right! I knew it all along. While the production of mucus is not increased, the character of the mucus is. All dairy products, milk, cheese, ice cream and especially yogurt have been shown to alter the character of the mucus and make it thicker. This makes it more difficult to clear. One physician I know who treats some big time singers from the Lyric, recommends that they not eat or drink dairy products or, for that matter, that they not eat anything for at least four hours before singing (Personal communication).

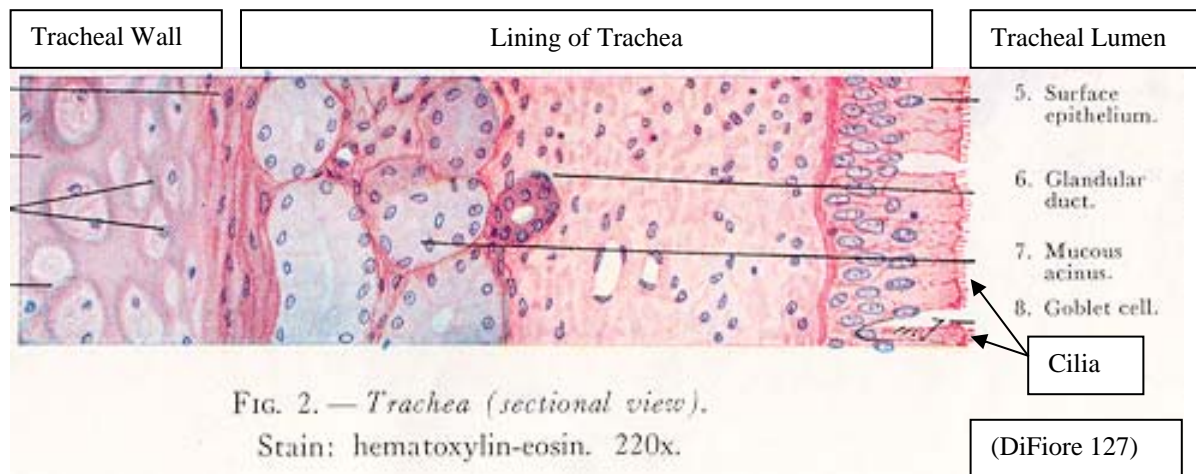
On the other side of the coin, salty and spicy foods seem to thin out mucus. (Personal communication).

Personally, I avoid the whole issue of how food effects your mucociliary blanket because I don't think it is a good idea to eat before singing. A full stomach is going to impede your diaphragmatic movement. Also, singing is like working out, jogging, etc. It is not a good idea

to do these activities on a full stomach. When you are digesting your meal, your gut needs all the blood flow it can get. When you are singing, your lungs, diaphragm and abdominal muscles need it. It is difficult for your cardiovascular system to supply everything at the same time. A light snack might not be a bad idea but again this depends on the individual's own experience. By not eating I avoid scientific controversy and besides, who among you would go against your own mother's advice?

(Also, if you have any tendency to have gastroesophageal reflux (GERD), this will tend to be worse after meals. That's is the last thing you need to have is heartburn or in some cases even mild aspiration of gastric acid into your windpipe. Talk about coughing!)

These are some of the more important factors influencing the health of your mucociliary blanket. Your baby blanket may be long gone, but your mucociliary blanket is still with you. Take care of it.



#### Works Cited

- Bennett, J Claude and Plum, Fred. Cecil Textbook of Medicine Philadelphia: W.B. Saunders and Co. 1996.
- Di Fiore, Mariano. An Atlas of Human Histology. Philadelphia: Lea & Febiger, 1957.
- Maxomov, Alexander and Bloom, William. A Textbook of Histology. Philadelphia: W.B. Saunders and Co., 1956.
- National Asthma Campaign. [http://www.NationalAsthma.org.au/media/pr\\_dec992.html](http://www.NationalAsthma.org.au/media/pr_dec992.html)
- Respiratory System. [http://edcenter.med.cornell.edu/CUMC\\_PathNotes/Respiratory/RESPLIST.html](http://edcenter.med.cornell.edu/CUMC_PathNotes/Respiratory/RESPLIST.html)
- Wintrobe, Maxwell. Clinical Hematology. Philadelphia: Lea & Febiger. 1961.

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