



## QSI-Nano™ Science Chat

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### **Nano Silver Kills Germs and Promotes Healing**

Microorganisms have been around since long before human beings inhabited the planet. Many are necessary and beneficial to us and others can cause a great deal of harm. The harmful organisms known as “germs” are responsible for a myriad of bacterial and viral infections.

Although the use of silver to kill germs in the water supply has been known for well over 5,000 years, it wasn't until 1893 that researchers in Switzerland determined that silver ions can kill living cells, algae, moulds, spores, fungi, virus, and other microorganisms, even when used in low concentration. Silver is a powerful, natural antibiotic and was used to prevent and treat infections in the late 19<sup>th</sup> and early 20<sup>th</sup> century for a variety of ailments. However, in the late 1930's, the medical profession turned its attention to pharmaceutical drugs and until the mid-70's use of silver in antimicrobial applications was largely ignored. More recently, researchers began to understand the mechanism of bacterial destruction; the healing properties of silver are now cast in the limelight again. Colloidal silver is now widely offered in nutrition shops, drug stores, and homeopathic treatment centers.

How does silver work to fight germs? Simply put, silver is capable of destroying single-celled bacteria, viruses, and fungus by disrupting the cell's breathing mechanism (it inhibits the metabolism of oxygen). This action annihilates the organism's cell membranes and halts DNA replication. Fortunately, the complex cells in our bodies have very thick cell walls compared to most pathogens; the good cells in our bodies are largely unaffected by treatment. Within minutes, the invading cell is suffocated, to be cleared out of the body by the immune, lymphatic and elimination systems. Killing pathogens is only one of silver's remarkable qualities. Silver is also known to heal wounds and can now be found in a variety of bandages and dressings, and is commonly used in a clinical setting for treatments of a variety of wounds. Recent studies also suggest it aids in repairing some nerve damage.

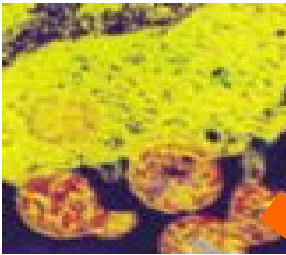
Although silver is known to be effective in very low concentrations, a smaller particle size is potentially more effective based on surface area. Silver can only be as effective as the amount of its surface area that comes in to contact with the pathogen cell wall. In the case of nanoscale silver particles (in the 5-100 nanometer size range), a huge increase in surface area (due to small particle) is far more effective when it comes into contact with the surrounding bacteria compared to larger-sized particles.

In addition, these particles are also more easily dispersed into various solutions, which enables them to travel more freely in our fluid-based bodies. QSI Nano™ Silver should be highly active in applications such as:

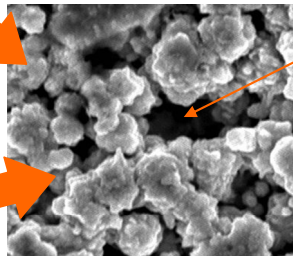
- **Antibacterial Clothing**
- **Acne Treatment**
- **Air and Water Filters**
- **Deodorants**
- **Bandages**
- **Shoe Liners**
- **Burn/Wound Treatment**
- **Cosmetics**

Below is an illustration of how QSI-Nano™ Silver can be used in an air filtration device to remove harmful bacteria.

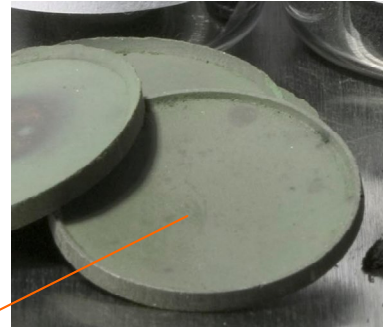
*Pneumonia Bacteria*



*E. Coli Bacteria*



**Magnification of surface  
in filter.**



**QSI-Nano™ silver filter.  
Silver nanoparticles can be  
pressed into a porous disk  
and inserted into a filtration  
device.**

**The bacteria found in air, such  
as E. Coli and Pneumonia,  
react on the high surface area  
filter and are destroyed within minutes.**