Silver—The Science Behind the Scene

Silver, as an unbound positively charged ion (Ag^{1+}), or charged nanoparticle ($Ag_{(n)}^{1+}$) as it is in bio-active silver hydrosol, is the only biologically active state in which it can work in full symbiosis with the body. Neutral silver (Ag) or silver in salts and proteins are not biologically active. Here are the some important facts to understand when considering silver supplementation:

- Positive silver ions are the only active state of silver for ingestion. Acél[1] first observed that the bio-active silver was due to liberated Ag^{1+} as opposed to neutral Ag.
- Chambers *et al* have shown that the activity of silver is related to the concentration of Ag^{1+} instead of the chemical or physical nature of its source.
- Rochart and Uzdins observed that cells selectively bond only with positively charged silver.
- Eichorn *et al* emphasized that the charge facilitates electron displacement. This removes electrons from a molecule, weakening the molecular bond and potentially causing membrane rupture.
- Bio-active silver has the greatest antimicrobial activity at or near the picoscalar level because it enjoys the greatest surface presentation.

A Natural Trace Element

Silver, as a trace element, is found in whole grains, edible and medicinal mushrooms, milk (animal and human), spring water, sea water and even tap water. The researcher, F. Gallyas, demonstrated that silver is an essential trace element for the nervous system as there are receptor sites for silver in myelin neural tissue. Normal metabolism and elimination of some silver species, such as $Ag_{(n)}^{1+}$, occur in phase II liver glutathione conjugation and is excreted normally. It's a natural part of our world for which our body is adapted.

UNIQUE PROPERTIES OF SILVER

Silver has so many unique qualities that make it a versatile nutritional supplement for immune support, antimicrobial action and tissue regeneration. It really is in a class by itself. A review of the scientific literature shows the following benefits:

Immune Support Activity

- Silver helps your immune system work more efficiently. It can carry up to ten times its atomic weight in oxygen for the benefit of the immune system.
- Silver enhances reactive oxygen species (ROS) production, facilitating B-lymphocyte* activity.
- Silver improves the body's internal colloidal environment by facilitating immuno-centric oxidative reactions, including ROS** production.
- Silver enhances White Blood Cell (WBC) activity.

Anti-Microbial Activity

Positively charged silver nano and picoscale particles can block viral replication, penetrate the cell membrane of bacteria or fungi and enter the mitochondria, stopping reproduction.

Anti-Viral Action

- Silver is virostatic, which means that it stops a virus from replicating on contact.
- Silver nanoparticles neutralize negatively charged Zeta-potentials of glycoproteins within viral envelopes.
- Permanent binding to DNA and RNA macromolecules prevents host cell injection and replication.
- "Silver nanoparticles possess high binding affinity for Hepatitis B Virus dsDNA and extracellular virions."

Anti-Bacterial Action

- Silver nanoparticles attach to the surface of the cell membrane and disturb permeability and respiration.
- Silver kills antibiotic resistant bacteria.
- In prokaryotes, there is a destructive translocation of silver nanoparticles through their biological membrane or cell wall. In eukaryotes, this translocation is observed in fungal species. The Zeta potential of $Ag_{(n)}^{1+}$ in organized water molecules further destabilizes the bacterial cell wall. Ag^{1+} ions have been tested for their antibacterial efficacy on gram negative and gram positive bacteria.

Anti-Fungal Action

Silver acts against fungal species in much the same way it acts against bacteria.

- Ag^{1+} and $Ag_{(n)}^{1+}$ exhibit powerful actions against yeast organisms, including Candida albicans.
- Some scientists have already established the anti-proliferative and antitumor activity of silver nanoparticles.

The New Paradigm in Silver Supplements is Bio-Active Silver Hydrosol

Over the past two decades, the term "colloidal silver" has been dramatically polluted by manufacturers that produce (knowingly or unknowingly) silver products contaminated by the presence of salts, proteins, compounds and stabilizers—all of which serve to degrade and diminish the bio-activity of the silver.

Leading the way into the future of nano- and picosilver is bio-active silver hydrosol, which makes many other silver preparations so twentieth century. Bio-active silver hydrosol represents the ultimate refinement and purity in the colloidal silver category. It is the suspension of a high content of positively charged silver ions (96 percent $Ag_{(n)}^{1+}$) in pharmaceutical-grade purified water only. This is not to be confused with ionic silver, a neutral silver/silver salt that is in solution (dissolved) rather than in suspension. The positively charged silver ions (cations) in bio-active silver hydrosol remain in suspension, maintaining their fully active state for use within the body.

Tissue Regeneration Activity

Silver reduces tissue inflammation, accelerates tissue healing and prevents scar tissue formation, thereby promoting healing while improving cosmetic appearance.

- Silver nanoparticles exert anti-inflammatory activities by decreasing Interferon-g*** production.
- Silver nanoparticles decrease TNF-a production**** on LPS-stimulated macrophages.
- Ag^{1+} and $Ag_{(n)}{}^{1+}$ stimulate de-differentiation and re-differentiation of stem cells, accelerating regenerative events wherever inflammation, infection or injury occurs.
- Positive effects include antimicrobial properties, less wound inflammation and modulation of fibrogenic cytokines. ■

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** White blood cells crucial for adaptive immune response.*

*** ROS disrupt the metabolic and respiratory pathways of pathogenic microbes.*

****Part of the cytokine inflammatory response.*

*****Cytokine involved in systemic and acute phase inflammation.*