DreamWeaver

LIMITED

ELECTRONIC ALCHEMY
RESEARCH PROJECT

RESOURCE LIBRARY DOCUMENT

www.DreamWeaver.Ltd.uk

Colloidal Silver

Antiseptic, antimicrobial, antibacterial, antiviral:
Isolated Colloidal Silver exists as positively charged (dissolved) silver ions and clusters of minutely sized, negatively charged particles held in a distilled water suspension. The anion for the silver ions is (OH) and possibly some carbonate. With a quality colloidal isolated silver product, agglomeration is prevented by proper hydration of the silver during production, and not stabilizers.

Colloidal Silver - Historical & Germane Perspectives On Efficacy

Silver has been used in a variety of crude ways since ancient times to control infections and spoilage. In fact, for centuries silver was regarded as a premier antimicrobial tool. In 69 B.C. silver nitrate was elucidated in the contemporary pharmacopoeia[1].

Recently, new scientific evidence suggests that certain germs can overcome silver's lethal effects. While this may be true under special circumstances, such as bacteria having adapted to silver-rich soils, or a silver colloid or solution used or made improperly, it is not true when considering a product with ideal particle attributes where a correct dosage is applied; it is not true for a medicinal silver. Right up to the present time, microbial resistance to medicinal silver has not been scientifically established.

In fact, some antibiotics which fail to tame resistant germs actually regain their effectiveness when used together with select silver ions. Let's take a closer look.

Several studies indicated that some bacterial species have physiological mechanisms that circumnavigate silver's toxicity. [2,3,4,5] It is more probable than not that microbes lack sufficient defense mechanisms to circumvent the toxic effects of silver ions. In fact, the "apparent" resistance of microbes to silver appears to be an inadequate protocol or procedure. Reports that select microbes immune to the most powerful antibiotic strategies (i.e., MRSA, Acinetobacter spp., etc.) were resistant to silver proved erroneous. Grier stated that, "Some so-called Ag+ resistant microorganisms may result from an apparent neutralization of the metal's inhibitory action or other assay artifacts. These include the presence of chelators such as serial amino acids, constituents of hard water, different buffers, light, incubation temperature, and particularly, soluble components of trypticase soy agar (TSA) and tryptose glucose extract agar (TGE)."[7]

However, sufficient defense capacity to mitigate morbidity clearly exists in higher organisms including humans (with the exception of medically benign argyria)[8]. Zhao and Stevens state that, "With the rise of antibiotic-resistant bacteria, silver is re-emerging as a modern medicine because all pathogenic organisms have failed to develop an immunity to it { silver ion }."[9]

During the last century, various advances in pharmacological manufacturing methods sought to harness this time-valued strategy. As a result, over 96 different silver formulations were in use prior to 1939, as documented by The Council on Pharmacy and Chemistry of the American Medical Association[10], many of which were used intravenously.[11,12]

With the advent of antibiotic therapy, medicinal silver products fell largely into disuse, with the notable exceptions of topical silver salves and neonatal eye drop preparations. These salves advanced the science of silver ion delivery and effectiveness over the early 1900 era.[13] Then during the mid 1970's, several papers were published that utilized electrically activated silver probes as delivery systems for targeted silver ion strategies[14]. The interest in such strategies continues to grow to the present, with high efficacy being obtained for viral vectors such as HIV[15], and resistant bone and dental infection[16].

In Vitro Studies

The early medical literature of the last century, regarding silver, teaches a most important lesson from the past. It portrays the scientific mind's temptation to settle for equivocal knowledge and even misapplied context about medicinal silver, as opposed to definitive knowledge used in correct context with proper discernment concerning the applications of medicinal silver.

Clinical reports began to flood into the various medical journals worldwide on silver formulations at the very start of the last century. At first, the Journal of the American Medical Association took a negative position on silver

formulations. Merely eleven years later, a true revolution in medical practice occurred with silver formulations that didn't recede until the U.S. government's purchase of the patent rights to penicillin (circa 1942). Throughout this time period (1920 through 1942) JAMA articles were replete with oral and intravenous clinical reports of the efficacy and side effects of silver formulations.[18] On the other side of the Atlantic, the medical journals The Lancet as well as the British Medical Journal preceded and figured prominently in this trend.[19,20]

Perhaps the first definitive attempt to comprehensively evaluate the efficacy and variety of silver formulations was published by the Department of Pharmacology of the Medical School of Western Reserve University, Cleveland, circa 1923. This landmark study arguably established "silver nitrate" as the benchmark, in terms of efficacy, for all silver formulations.[21] This excitement as a superior antimicrobial tool simultaneously placed onto the horizon the likelihood that subgroups of patients would suffer from symptoms of argyria. Had the technology existed to render "pure silver and water only" colloidal silver products more potent than silver nitrate, this could have been avoided. "Pure silver and water only" colloidal silver products achieve their efficacy with several orders of magnitude less in silver quantity content. Put another way, technology today can render less silver more potent than ever historically possible. The result is a dramatic elongation of the Therapeutic Index, resulting in unprecedented safety, efficacy and dimension to protocol parameters.

For example, researchers at the University of Wisconsin were under contract from NASA to determine the biocidal effects of silver. They determined, beginning in 1970, that lethal effects of silver ions could be reliably reproduced at concentrations of only 250 ppb when exposed to infectious agents over 2 hours or less in vitro, or even of only 50 ppb over 4 hours or less.[22] Although these extinction times were long, the laboratory-produced silver ions worked marvelously. For the next several decades, follow-on studies of silver formulations by many investigators failed in many ways to exert lethal effects upon antibiotic resistant infectious organisms as previously noted. Then, as technology advanced, these highly resistant organisms were again found to succumb to the lethal effects of these cutting edge silver formulations.[23] Additionally, the extinction times dramatically lessened to mere minutes as compared previously to hours[24].

In Vivo Studies

Globally, a fair estimate of humans given oral and intravenous silver formulations probably exceeded 7 digits during the height of its popularity (i.e., from 1900 and beyond 1940). Thus, an unrecorded event of enormous scale took place defining and confirming the use of silver formulations as effective anti-microbials. For example, one pharmaceutical company was able to capture a $10,000,000.00 per annum marketplace for its solo silver medicinal. In today's equivalent, this would exceed ten times that market share just accounting for North America alone.

Presently, in vivo studies concerning the efficacy of oral and intravenous use of next-generation silver formulations is just beginning. With these high tech formulated silver formulations, this promises to be an exciting time. For the inferior grade silver formulations, history is apt to repeat itself for one needless iatrogenic event: such products in a few years will gestate a new saga of preventable argyric cases. The intent of this preliminary pilot study is twofold: (1) to help obviate this predilection of inferior silver formulations by helping to establish both safe standards and efficacy, as well as (2) to set in motion a future set of compelling and irrefutable investigational designs.

One fascinating in vivo study reported in the Journal of Clinical Ultrasound (2000) reported on a protocol involving puncture, aspiration, injection and reaspiration (PAIR) with silver nitrate directly into hepatic hydatid cysts with beneficial long-term results.[25] Other noteworthy early evidence in vivo suggests that HIV,[26,27] other viral vectors such as HCV, and the worst bacterial scourges including some of the most antibiotic resistant disease vectors may become events of the past via the judicious and strategic use of next-generation silver formulations and delivery systems.[28,29,30,31,32,33,34,35]

Product Description

- This discussion is concerned exclusively with a formulation of silver with the following attributes:
  - Professional grade formulation: Sterile and pyrogen-free
  - Highly stable shelf-life
  - Simple colloidal solution containing purest silver and ultra-pure water only
  - Extremely fine silver particle dispersion confirmed by transmission electron microscopy (TEM)
  - A concentration of 23 ppm, suitable for medical administration
  - An average particle size of 8 angstroms (0.0008 microns)
  - A Particle Diffusion Coefficient approaching 10^{-5} cm^2/second
  - A particle surface area (thermodynamically active sites) approaching 6 square kilometers per original cubic cm of raw silver material

- Suitable concentration and attributes to advantageously elongate the Therapeutic Index for silver in humans (i.e., the gap between the threshold of human toxicity vs. the threshold for pathogen extinction)
- Hypo-osmotic solution highly efficacious allowing low quantity usage

Optimizing Silver Particle Size

The diameter of a single atom of silver is approximately 0.0003 microns. The diameter of a silver ion approximates 0.00023 microns. An aggregate of pure silver measuring 0.001 microns would be comprised of 31 atoms of silver. In this discussion we are referring to technology that allows silver ion particles to remain an average of 0.0008 microns, or just below 31 atoms of silver. However, the attributes of the formulation in concern contains particles even smaller in diameter, which are stable for many years at room temperature, in the original sealed bottle. The result is a formulation which may deliver more with less (surface area equivalents of 6 square miles per original 1 cubic cm of silver starting material), and be much more powerful than products containing even 400 ppm concentrations due the latter's content of silver particles much larger in diameter.

According to the scientific literature spanning over many decades, it is the silver ion that is the active form of silver as a microcidal agent, as opposed to the silver salt, or the metallic (neutral valence) silver.[36,37,38] This is significant for formulations which are comprised of true colloidal silver aggregates for the following reasons:

- Pure silver formulated into colloidal silver aggregates express zeta potential. Colloidal silver aggregates can accumulate zeta potential, making the end product more highly charged than a single ion of silver.
- Zeta potential has the characteristic of an ion, but the charge can be more dynamic than a simple ion.
- The stable zeta rich colloidal silver particles retain extremely small sizes when manufactured properly.
- This product shelf-stability may then best enter into a biological environment. The cellular membranes of both human tissue as well as pathogens have pores that allow for simple diffusion of such small particle sizes. We shall see that silver ions do indeed readily combine with pathogen membranes as well as penetrate deep into the pathogen to accomplish a variety of strategic microcidal actions.
- Additionally, a pure silver and water product (i.e., a product which does not contain silver salts), is not only considered non-toxic, but also possesses the highest electrical and thermal conductivity of all metals, while possessing the least contact resistance.[39] In other words, pure silver ions, at colloidal particle size, exhibit potent thermodynamic energy signatures that in turn apply to silver's therapeusis.
- It is the various silver salts that express toxicity, and not colloidal silver. Taken together, these facts may be of utmost importance to the human body's strategic use of silver with the plethora of endogenous ROTS (Radical Oxygen Toxic Species) and antioxidant pathways. In other words, if silver intervenes with pathogens as an ion associated within WBC generated ROTS, the thermodynamic attributes of the ROTS may enhance immune efficacy that utilize ROTS to autolyse pathogens, such as: OCl^-, the peroxide cascade, NO, superoxide radical, etc. On the other side of the equation, mammalian tissue contains antioxidants that tame such ROTS, such as cysteine, selenium, glutathione, vitamin E, etc.
- And finally we must consider what happens after our inherent tissues' antioxidants reversibly quench silver. At the starting point, a pure silver ion or colloidal silver aggregate with zeta potential binds into pathogens or tissue by losing its charge. In cases where human WBC antioxidant levels are adequate, the deceased pathogen may be phagocytized by a megakaryocyte. Within the immune cell, this process may be reversible when certain antioxidants are present such as glutathione, selenium or N^{--}acetylcysteine.[40] This allows for a potential recycling of the metallic silver particle back into a silver ion, which in turn can thrust another available silver ion at a prospective pathogen, perhaps freed by the immune cell upon respiratory burst, or by integrating within its strategic intracellular ROTS cascade autolysing phagocytized pathogens. Previous work done with silver sulfadiazine showed it did not have a significant impact upon neutrophilic respiratory burst at clinical dosage levels.[41] However, the product selected in this study appears to possess at least several orders of magnitude greater potential, due to its smaller particle size and dispersion. Further work needs to verify this theory regarding this product.

For all of the above compelling reasons, all holistic antimicrobial strategies should consider utilizing a pure silver and water formula comprised of extremely fine colloidal silver particles. Such a product logically expresses better biological performance in a variety of ways. The only known cross-reaction to dual therapy thrusts would be where sulfa drugs were being employed. Most other forms of antibiotic therapy are not known to cross react with, or be diminished by the use of colloidal silver. In fact, many antibiotics have added silver within their formulation. Further, many antibiotic regimens may be enhanced by silver ions, rendering antibiotic-resistant microbes helpless against such a synergism.

Product Silver Ion Concentration:

A 23 ppm concentration of colloidal silver equals 23 mcg per cc. There are 23 mg of silver in a liter of 23 ppm

colloidal silver. I.V. utilization of up to 120 cc utilizing 1500 ppm has recently been reported. This preliminary study revealed dramatic viral reduction loads. Pronounced Herxheimer Effects (die-off symptoms, i.e., mild to moderate headaches, nausea, flu-like symptoms, etc &) resulted from this intravenous administration via a slow drip over 2 hours. This dose delivered 180 mg of elemental silver at one time. An effective dose also occurred with I.V. administration of 400 ppm over 2 hours. This delivered 48 mg of elemental silver at one time. The associated Herxheimer Effects (see below) that resulted may have contributed to difficulties with patient compliance. Herxheimer Effects may be made more tolerable by a smaller delivered dose of elemental silver, over a longer therapeutic window of several months, with particle size adjusted to increase efficacy. Efficacy in this case would be defined as both antiviral efficacy as well as elimination efficacy. In this way, die-off elimination may be better managed than "over-kill dosage levels" comprised of 10 times the silver exposure actually needed.

Conclusion:

The EPA has indicated that there is no known risk associated for an average adult to consume up to 7 teaspoons daily of 10 ppm for 70 years when manufactured according to the above attributes. For therapeutic purposes, doctors may use this as a general guideline to escalate dosages over a shorter time period. As a dietary supplement, the safety parameters of this product description serves a wide spectrum of patient populations. For example, this same EPA guideline would permit 14 teaspoons to be consumed daily for up to 35 years. Or, a doctor may even wish to utilize graduated dosages, and over time suggest that their patients take under supervision up to 7 Tablespoons daily. Due to the silver's purity, these recommendations should advise the patient to always take the product on an empty stomach, which may then be followed by food 25 minutes later.

In summary, this product formulation enables the doctor to create individualized supplement protocols to bring out the very best of the product to the patient's greatest benefit.

This information is for educational purposes only and is not meant to replace the advise of a doctor. If you have a medical condition, seek out the care of a health care practitioner. These statements have not been evaluated by the FDA. This information is not intended to diagnose, treat, cure, mitigate or prevent any disease.

References:

1. Cumston, CG, History of Medicine, NY, A.A. Knoff Co., 1926; p. 216.
2. Hall, RE, Bender, G, Marquis, RE, "Inhibitory and Cidal Antimicrobial Actions of Electrically Generated Silver Ions," J Oral Maxillofac Surg, 1987; 45:783.
3. McHugh, GL, et al., "Salmonella typhymurium Resistant to Silver Nitrate, Chloramphenicol and Ampicillin," Lancet, 1975; 1:235.
4. Summers, AO, et al., "Metal Cation and Osyanion Resistances in Plasmids of Gram Negative Bacteria," In: Schlessinger, edit., Microbiology, Am Soc Microbiol, Washington, DC, 1978.
5. Bridges, K, et al., "Gentamicin and Silver Resistant Pseudomonas in a Burn Unit," Br Med J, 1979; 1:446.
6. Hamilton-Miller, JM, Shah, S, Smith, C, "Silver Sulfadiazine: A Comprehensive in vitro Reassessment," Chemotherapy, 1993; 39:405-9.
7 . Grier, N, "Silver and Its Compounds," p. 385; In: Disinfection, Sterilization and Preservation, S. Block, edit., Lea & Febiger, Philadelphia, PA, 1983.
8 . Berger, TJ, et al., "Electrically Generated Silver Ions: Quantitative Effects on Bacterial and Mammalian Cells," Anti Microb Agents, 1996; p. 357-8.
9 . Zhao, G, Stevens, SE, "Multiple Parameters for the Comprehensive Evaluation of the Susceptibility of Escherichia coli to the Silver Ion," BioMetals, 1998; 11:28.
10 . Hill, WR, Pillsbury, DM, Argyria: The Pharmacology of Silver, The Williams & Wilkins Co., Baltimore, 1939; p. 169.
11. Tobler, T, Schweiz Med Wchnschr, 1922; 52:774.
12. Voigt, J, Ztschr f d ges exper Med, 1926; 52:33-40.
13. Fox, CL, "Silver Sulfadiazine - A New Topical Agent," Arch Surg, 1968; 96:184-8.
14. Becker, Robert O., MD, Spadaro, JA, "Treatment of Orthopaedic Infections with Electrically Generated Silver Ions," J Bone Jt Surg, 1978; 60:871-81.
15. Etris, S, "Clinical Experiments Show Silver Compound Can help AIDS Patients: Researchers Say Silver Oxide Offsets AIDS Loss of Immune Response," In: The Silver Institute's Silver News - February-March 1998; www.silverinstitute.org
16. Kim, TN, et al., "Antimicrobial Effects of Metal Ions (Ag+, Cu2+, Zn2+) in Hydroxyapatite," J Mater Sci Mater Med, 1998; 9:129-34.
17. Edsall, DL, et al., "Collargol (Crede's Colloidal Silver): Reports of the Committee Appointed to Consider the Claims Made Regarding its Effects," Special Articles - JAMA, March 13th, 1909; LII(11):862-874.
18. JAMA, December 23rd, 1922; 79:26.

JAMA, August 25th, 1923; 81:8.
JAMA, October 17th, 1925; 85:16.
JAMA, August 7th, 1926; 87:6.
JAMA, October 23rd, 1926; 87:17.
JAMA, March 17th, 1928; 90:11.
JAMA, August 4th, 1928; 91:5.
JAMA, November 2nd, 1929; 93:18.
JAMA, May 19th, 1934; 102:20.
JAMA, January 28th, 1939; 112:4.

19. Duhamel, BG, "Electro Metallic Colloids, Etc.," The Lancet, January 13th, 1912.

Simpson, WJ, Hewlett, RT, "Experiments on the Germicidal Action of Colloidal Silver," The Lancet, December 12th, 1914, p. 359.

Sanderson-Wells, TH, "A Case of Puerperal Septicemia Successfully Treated with Intravenous Injections of Collosol Argentum," The Lancet, February 16th, 1916; p. 258.
Fuller, AW, "Epidemic Encephalitis of Severe Type," The Lancet, July 24th, 1926; 2:172.

20. "Colloidal Solutions and Artificial Enzymes," Brit Med J, February 3rd, 1912; 6:252-4.

Marshall, CR, Killoh, GB, "The Bactericidal Action of Collosols of Silver and Mercury," Brit Med J, January 16th, 1915; 1:102-3.
Roe, AL, "Collosol Argentum and its Ophthalmic Uses," Brit Med J, January 16th, 1915; 3:104.
Morris, M, "The Therapeutic Effects of Colloidal Preparations," Brit Med J, May 12th, 1917; 1:617.

21. Pilcher, JD, Sollmann, T, "Organic, Protein and Colloidal Silver Compounds: Their Antiseptic Efficiency and Silver-Ion Content as a Basis for Their Classification," The Journal of Laboratory and Clinical Medicine, 1923; p. 301-10.
22. Cliver, DO, et al., "Biocidal Effects of Silver: Contract NAS 9-9300 Final Technical Report," University of Wisconsin, February 1970; p. 5.
23. In vitro investigations published on letterheads from Departments of Microbiology, Pathology, Infectious Diseases, Immunology, Biology. Etc &, from such universities as: Johns Hopkins, Northwestern Univ. Medical School, Queen's University, University of Arkansas for Medical Sciences, Georgetown University Medical Center, NYU Medical Center, University of Nebraska, University of Massachusetts, etc &circa 1996-1998.
24. Ibid.
25. Odev, K et al., "Sonographically Guided Percutaneous Treatment of Hepatic Hydatid Cysts: Long-Term Results," J Clin Ultrasound, Nov-Dec 2000; 28(9):469-78.
26. Etris, S, "Clinical Experiments Show Silver Compound Can help AIDS Patients: Researchers Say Silver Oxide Offsets AIDS Loss of Immune Response," In: The Silver Institute's Silver News - February-March 1998; www.silverinstitute.org
27. Dean, W, et al., "Reduction of Viral Load in AIDS Patients with Intravenous Mild Silver Protein - Three Case Reports," Clinical Practice of Alternative Medicine, Spring, 2001.
28. Becker, Robert O., Spadaro, JA, "Treatment of Orthopedic Infections with Electrically Generated Silver Ions," J Bone Jt Surg, 1978; 60-A:871.
29. Chu, CC, et al., "Newly Made Antibacterial Braided Nylon Sutures. 1. In vitro Qualitative and in vivo Preliminary Biocompatibility Study," J Biomed Mater Res, 1987; 21:1281.
30. Dietch, EA, et al., "Silver-Nylon Cloth: In vitro and in vivo Evaluation of Antimicrobial Activity," J Trauma, 1987; 27:301.
31. Haeger, K, "Preoperative Treatment of Leg Ulcers with Silver Spray and Aluminum Foil," Acta Chir Scand, 1963; 125:32.
32. Marchant, RE, Miller, KM, Anderson, JM, "In vivo Leukocyte Interactions with Biomer," J Biomed Mater Res, 1984; 18:1169.
33. Modak, SM, Sampath, L, Fox, CL, "Combined Use of Silver Sulfadiazine and Antibiotics as a Possible Solution to Bacterial Resistance in Burn Wounds," J Burn Care, July/August, 1988; 9(4):359.
34. Spadaro, JA, Becker, RO, "Some Specific Cellular Effects of Electrically Injected Silver and Gold Ions," Bioelectrechem Bioenergetics, 1976; 3:49.
35. Webster, DA, et al., "Silver Anode Treatment of Chronic Osteomyelitis," Clin Orthop, 1981; 1961:105.
36. Pilcher, JD, Sollmann, T, "Organic, Protein and Colloidal Silver Compounds; Their Antiseptic Efficiency and Silver-ion Content as a Basis for Their Classification," The Journal of Laboratory and Clinical Medicine, 1923, p. 301-10.
37. Bragg, PD, Rainnie, DJ, "The Effect of Silver Ions on the Respiratory Chain of Escherichia coli," Can J Microbiol, 1974; 20: p. 884.
38. CRC Handbook of Chemistry and Physics, 80th Edition, ed. By David R. Lide, CRC Press, Boca Rotan, Fl, 1999-2000; Section 4, p. 27.
39. CRC Handbook of Chemistry and Physics, 80th Edition, ed. By David R. Lide, CRC Press, Boca Rotan, Fl, 1999-2000; Section 4, p. 27.
40. Gruen, CL, "Interaction of Amino Acids with Silver(I) Ions," Biochimica et Biophysica Acta, 1975; 386:272.
41. Hansbrough, JF, Zapata-Sirvent, RL, Cooper, ML, "Effects of Topical Antimicrobial Agents on the Human Neutrophil Respiratory Burst," Arch Surg, May 1991; 126:603-8.
42. Dean, W, et al., "Reduction of Viral Load in AIDS Patients with Intravenous Mild Silver Protein - Three Case Reports," Clinical Practice of Alternative Medicine, Spring, 2001.