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Safety and Efficacy of Intravenous Oligodynamic Silver

Silver compounds have been used as medicine since the late 1800's and have been used as a treatment against infections by hundreds of thousands of individuals in the United States. Silver is a natural mineral in the same class as zinc, chromium, cobalt, copper, iron, magnesium, molybdenum, vanadium and zinc which are important for health maintenance. Humans naturally ingest from 22 to 300 mcg of silver per day from natural sources in food and water (1,2). Levels of silver vary in foods with the highest reported levels being in immune boosting mushrooms with up to 5mg/kg of silver. There is evidence that silver is a natural critical component of our immune system and that low tissue levels associated with a dietary deficiency may result in a relatively weakened immune system, making one more prone to infection. (3,4,5) The modern versions of colloidal silver (oligodynamic silver) are shown to have little or no toxicity (3,4,5,6,7,10,11,12,14,26).

There are several distinct forms of silver compounds, which include silver-salts, silver-proteins and colloidal silver. Colloidal silver is a very small particle (0.001-0.1 micron) that remains suspended in water without forming an ionic solution. In contrast, a solution of silver-salt is one in which the silver remains dissolved in ionic form in water, which is significantly more reactive than colloidal silver and can be toxic at high doses when compared to the extremely small risk of toxicity from the use of colloidal silver. In addition to being more reactive than colloidal silver, silver salts and silver proteins are excreted much more slowly than the smaller colloidal silver particles and can accumulate in the tissues. Such accumulation does not occur with colloidal silver.

The US Food and Drug Administration has approved silver compounds for clinical use and various versions have been formulated by compounding pharmacies. Silver nitrate is used in the eyes of newborns to prevent blindness. Concentrated silver nitrate is used topically on mucus membranes to stop bleeding. Silver sulfadiazine is used for the treatment of burns and to prevent sepsis or bacterial infection in severe burns. Silver formulations have also been used in hundreds of various infections and other conditions including pneumonia, tuberculosis, STD's, eczema, meningitis, erysipelas, Mediterranean fever, corneal ulcers, conjunctivitis and septicemia (3,7,10).

Silver serves as a potent antibacterial agent acting against an exceptionally broad spectrum of bacteria while exhibiting low toxicity to mammalian cells.

Hundreds of thousands of doses of oral colloidal silver and thousands of doses of intravenous colloidal silver are given every month in the United States. This is usually done to treat acute and chronic infections including those associated with chronic fatigue syndrome (CFS) and fibromyalgia (FM). The effectiveness of the use of oral and intravenous colloidal silver in the treatment of chronic fatigue syndrome and fibromyalgia was presented at the 38th Annual Meeting of the American Academy of Environmental Medicine (Identifying the Causes and Exploring the Newest Treatment Options for Chronic Fatigue Syndrome, Fibromyalgia and Environmental Sensitivities) in October 2003 (395). The extremely low level of colloidal silver used at 23 parts per million (ppm) has been shown to have little or no potential for toxicity while having the significant potential for clinical benefit. (1-26)

The effectiveness of oligodynamic silver's antimicrobial action at extremely low doses in combination with its potential immune stimulating actions, makes oligodynamic silver an ideal naturally occurring substance in the treatment of CFS and FM. (4,6,8,910)

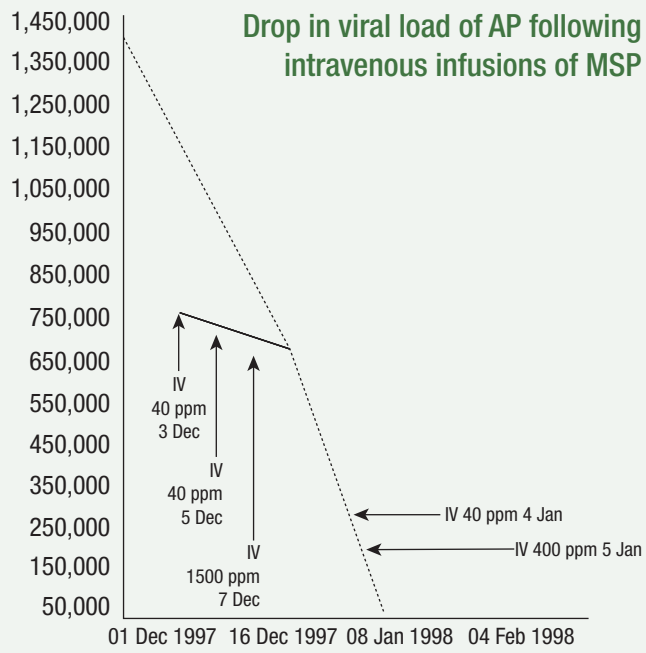
A 1976 study published in the journal Antimicrobial Agents and Chemotherapy compared the minimum inhibitory concentrations of oligodynamic silver to that of silver sulfadiazine against 16 bacterial species. The oligodynamic silver was found to be 10-100 times as effective (10-100 fold decreased MIC) as silver sulfadiazine against the bacterial species. Silver's effect on the mammalian cell system was studied by culturing bone marrow cells in the silver treated nutrient broth. No toxic effects on bone marrow cells was found but rather a slight improvement in functioning of the bone marrow as demonstrated by a slight but significant improvement in neutrophils and a slight beneficial reduction in promylocytes and normoblasts. The authors state, "The inhibitory and bactericidal concentrations of electrically generated silver ions were 10-100 times lower than for silver sulfadiazine...In conclusion, Ag+ generated at the anode seems to be a very effective bacteriacidal agent at low concentrations with out any detrimental effects upon normal mammalian cells (6).

Case studies published in The Lancet have demonstrated the effectiveness of intravenous 500 mcg/cc colloidal silver in the treatment of septicemia with no untoward effects (11).

A study published in the journal Chemotherapy administered 1050 mg/kg of oral and subcutaneous silver sulfadiazine to mice infected with Plasmodium berghei (malaria) for 30 days. The mice were cured of malaria and these huge doses, that were equivalent to over 30,000 IV's per day, did not result in any toxicity (12).

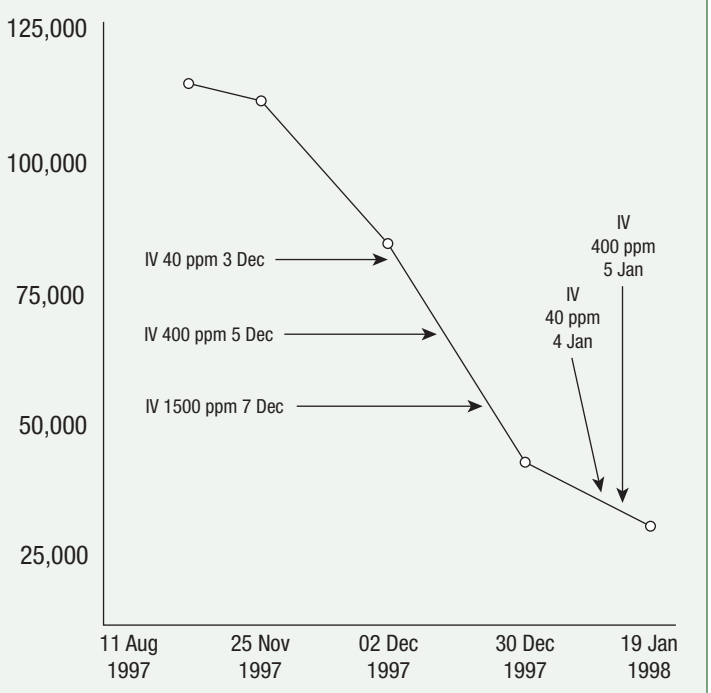
A 2001 study published in Clinical Practice of Alternative Medicine demonstrated the efficacy of intravenous mild silver protein (MSP) in the reduction of HIV Viral Load and significant clinical improvement in AIDS patients. In addition there was significant improvement in CD 4 and WBC counts. There was no significant toxic effect when MSP is utilized below the 400 ppm concentration. The authors conclude, "First,

Figure 1



AP's results may be even more dramatic than shown (solid line), as the maximum limit of detection of the instrument is 750,000 RNA copies/ml. Assuming a linear drop in viral load from 1 December 1997 to 8 January 1998, projecting backwards yeilds a possible maximum of 1,400,000 RNA copies/ml (dotted line). The actual load was certainly somewhere between 750,000 and 1,400,000 copies ml, probably closer to the higher number.

Figure 2



Drop in Viral load of RC following MSP treatment. Results are much less dramatic than AP. It would have been interseting to have tracked him further. Unfortunately, RC (like other subjects in this series) discontinued treatment after he no longer felt ill

IV MSP 400 ppm appears to be a safe, effective virucidal agent in HIV-positive patients…most important, is the apparent ability of MSP to dramatically reduce the viral load and cause clinical reversals of rapidly deteriorating patients with HIV. Although the optimum dosage and frequency of infusions has not been determined, 1-2 infusions weekly appears to be a safe and effective regimen (3)."

Numerous studies have demonstrated that there is a total lack of toxicity related to the use of modern silver colloids even in doses that are over tens of thousands times normal standard doses (6,11,12,13,14). As stated in the review of oligodynamic silver by Rentz published in the 2003 Journal of Nutritional & Environmental Medicine, "There is no known toxicity for Oligodynamic Ag+ in humans (10)."

In the CRC Handbook of Chemistry and Physics (80th edition) 2000, it states, "Silver has germicidal effects and kills many lower organisms effectively without harm to higher animals (24). Another study published in 1992 in Biochemical and Biophysical Research Communications also demonstrated silver's effectiveness against HIV with an absence of toxicity and that silver is only toxic to bacteria and viruses and not to human cells (13). A 1993 study tested bacterial resistance in 409 strains of bacteria. No resistant strains were found including methicillin-resistant Staphlococcus aureus and Acinetobacter spp. (16)

A study published in 1998 looked at the effect of silver ions on potentially pathogenic bacteria E. coli.B. The authors state, "At relatively low concentrations, the silver ion was inhibitory to the growth of E. coli, showing a rapid killing activity and a prolonged post-agent effect…Silver serves as a potent antibacterial agent acting against an exceptionally broad spectrum of bacteria while exhibiting low toxicity to mammalian cells.

Since silver therapy is of significant clinical benefit in the control of bacterial infections, various forms of new agents containing the silver ion…have been developed over the past decades in medical, biological and pharmaceutical preparations…with the rise of antibiotic-resistant bacteria, silver is re-emerging a modern medicine because all pathogenic organisms have failed to develop an immunity to it (17)."

A review article regarding colloidal silver was published in the The Lancet. Although this is certainly an old article, it is very interesting. It discussed the truly remarkable results of colloidal silver in the treatment of infections. With the advent of antibiotics, colloidal silver fell out of favor despite no reported significant toxicities of colloidal silver. As there now has been increasing problems with antibiotic resistant bacteria, the interest in colloidal silver is again increasing. There has been no reported development of resistance to colloidal silver by bacteria (4,6,10,12,16).

An excerpt of this Lancet article:

Speaking generally, the colloidal metals are especially remarkable for their inhibitive action in infective states— septicaemia and pyaemia. This action has been shown to be due to their stimulating influence on phagocytosis and to their destructive effects on micro-organisms and their toxins as shown by the immediate fall of temperature and the subsi¬dence of the constitutional symptoms of intoxication.

Similarly, the colloid products can be injected, in accordance with the indications, into the spinal canal (cerebro-spioal meningitis) and the serous cavities (pleurisy, timpyt-ma, in.) or applied locally to the surface of diseased mucous membranes. Their introduction into the circulation is followed in a few boors by a sharp febrile reaction for which we must be prepared, but which soon gives place to a marked and durable fall of temperature associated with remission of the general and local symptoms.

The colloidal metals have been extensively employed in acute inflammatory infections of the lungs (pneumonia and broncho-pneumonia) and pleura (pleurisy and empyema). The injection is followed by a marked change in the opsonic index (positive) and the crisis in pneumonia is notably precipitated. It is indeed in the treatment of inflammatory affections of the lung and pleura (and in puerperal fever, vide infra) that the electric colloids have yielded the most brilliant results. In addition to the intravenous or intramuscular injections, eleotrargol has been introduced into the pleural cavity in presence of pleurisy and empyema, apparently with much benefit.

In puerperal septicaemia (puerperal fever) and peritonitis whether consecutive to labour or as the result of appendicitis the most remarkable effects follow the intravenous injection of these colloids; Indeed, in some instances the patients have been rescued from apparently inevitable death.

Even more interesting are the results obtained in acute meningitis and in epidemic cerebrospinal meningitis. In the latter electrargol can be employed either alone or in con¬junction with the serum treatment. The injection is usually intravenous, but in severe cases it should be made directly into the spinal canal so as to obtain immediate effects.

It will be seen that the action of the metallic colloids it not limited to any particular variety of microbial infection, but extends to most.

A glance at the bibliographical notes will show that these remarkable results have not been obtained by any one observer or group of observers, nor in any one country. They are daily being placed on record in medical literature all over the world. In view of their daily increasing field of usefulness it can hardly be doubted that a new and interest¬ing chapter has been opened up in contemporary therapeutics by the introduction of the colloid metal.

One point stands out prominently, and that is the absolute innocuousness of these bodies, whether injected into the veins or muscles or into the spinal canal. Injected into muscle they cause very little local reaction or pain, and the dose i) determined solely by the requirements of the case since they are devoid of toxicity (6).

A study in the 1978 Journal of Bone and Joint Surgery demonstrated the effectiveness of silver ions in the treatment of osteomyelitis in patients who had long-standing osteomyelitis and had failed standard treatment with antibiotics and wound care. The authors state, "In twelve of the fourteen patients treatment was considered successful and in all fourteen patients (including the failure) treatment resulted in markedly reduced bacterial flora in the wound as shown by sequential colony counts. In no case were any undesirable side effects of the silver treatment apparent (4)."

The most studied potential toxic effect of silver is argyria, which is a semi-permanent blue-gray discoloration of the skin from silver deposition. This rare side effect with silver salts and silver proteins is not seen with colloidal silver. This has been shown to occur at much lower exposure levels than any other potential toxic effect of silver salts and proteins. Thus, the Lowest Observed Adverse Effect Level (LOAEL) as determined by the Environmental Protection Agency (EPA) reflects the lowest observed adverse levels to potentially be at risk for developing argyria. Thus, a person would have a visibly apparent blue-gray skin discoloration long before there are potential risks of any more serious toxic effects.

Argyria results from the deposition of silver in the dermis and the increased pigmentation becomes more pronounced in areas exposed to sunlight due to photoactivated reduction of the metal. Although the deposition of silver is semi-permanent, it is not associated with any adverse health effects. No pathologic changes or inflammatory reactions have been shown to result from silver deposition in the skin and it has been shown to not produce any significant physiological disturbance in involved organs or tissues other than cosmetic (18,19). Again, this effect occurs at silver concentrations hundreds to thousands fold less than any other toxic effects. Even then, this is an extremely rare side effect that can occur with extreme doses of the less soluble silver salts and proteins that were used in the nineteenth and early twentieth centuries, and is essentially impossible to occur with modern oligodynamic silver hydrosols and there has not been any reported cases despite its widespread use.

A 1935 study by Gaul and Staud involved the intravenously administration of the relatively insoluble silver arsphenamine. This form of silver is significantly more toxic and less soluble than colloidal silver, making it much more likely to cause argeria. This study demonstrated that there is a risk of argyria if the total dose exceeded 8 grams (15). This would be equal to 4000 IV's if the IV's contained the significantly less soluble and more toxic silver arsphenamine instead of colloidal silver. It may not be possible to get argyria with colloidal silver because of its significantly increased ability to be excreted.

In 1992 the EPA determined the Lowest Observed Adverse Effect Level (LOAEL) of silver salt compounds to be 0.014 mg/kg/day or approximately 350 mg/year. This is the minimal exposure that would poten-

tially case any adverse effect (argyria is the potential side effect that occurs at the lowest dose) in sensitive individuals. Even if a patient were to undergo the most aggressive treatment with intravenous oligodynamic silver hydrosol for a year, the amount received would not approach the LOAEL even if the IV's did contain the more toxic silver salts.(24)

The EPA recommends that an individual's intake of silver salts from natural sources be less than 1800 mcg/kg/year (25). Even this recommended limit of ingestion from natural sources is never approached by individuals receiving treatment in the center.

As discussed, the medical literature and hundreds of physicians' clinical experiences demonstrate that the natural substance silver given as an oligodynamic hydrosol can be hilgly effective treatment for acute and chronic infections with an exceedingly small risk of any significant toxicity for patients.

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