

The image is a composite. On the left side, there is a vertical strip showing a white, ribbed vase with a flared top, set against a dark, textured background. The right side of the image is dominated by a large, crumpled white fabric, possibly a sheet or a piece of paper, which is illuminated from the top, creating strong shadows and highlights that emphasize its texture. The overall color palette is white and light purple/lavender.

**SILVER FOR
HUMAN
HEALTH**

SILVER FOR HUMAN HEALTH

"Silver fell out of favor. The reason was Argyria—a skin discoloration that results when hundreds of times the proper amount of silver compounds are injected or taken orally."
Science Digest, March 1978.

"Thanks to eye opening research, silver is emerging as a wonder of modern medicine. An antibiotic kills perhaps half-dozen different disease organisms, but silver kills some 650. Resistant strains fail to develop... silver is the best all around germ-fighter we have."
Dr. Harry Margraf, St. Louis, Missouri, in Science Digest, March 1978.

"In twelve of the four-teen 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 count. In no case were any undesirable side effects of the silver treatment apparent." *Dr. Robert O. Becker, M.D. and Dr. Joseph A. Spadaro, Ph.D., "Treatment of Orthopedic Infections with Electrically Generated Silver Ions," The Journal of Bone and Joint Surgery, Vol. 60-A, No. 7, Oct. 1978. Research team from the Veterans' Administration Hospital and the Department of Orthopedic Surgery, State University of New York, Upstate Medical Center, Syracuse.*

... even tiny amounts of silver wipe out huge quantities of disease organ-isms in water."
Dr. Charles Fox, Columbia University (inventor of FDA approved sulfadiazine).

Quotations like these prompted the investigation of current interest in research and the documentation of available information concerning the various uses of silver and silver compounds.

This is a report of the Environmental Health Foundation's review of the recorded data.

HISTORICAL USE

Silver vessels and receptacles for storing and trans-orting water have been found in royal tombs dating back to 4000 B.C. Persian history records the practice of keeping drinking water in copper and silver vessels. In the record of Herodotus' (Rawlinson's translation) we find the following example:

"The Great King, when he goes to the wars, is always supplied with provisions carefully prepared at home, and with cattle of his own. Water too, from the river Choaspes, which flows by Susa is taken with him for his drink, as that is the only water which Kings of Persia taste. Wherever he travels, he is attended by a number of four-wheeled carts drawn by mules, in which Choaspes water, ready boiled for use, and stored in flagons of silver is moved with him from place to place."

History also records that the ancient Babylonian and Greek civilizations were aware of silver's ability to disinfect. They used silver containers to hold and transport water for their royalty as well.

In the book *Antiseptics, Disinfectants, Fungicides and Chemical and Physical Sterilization*, I.B.

Romans reports that the use of silver compounds for medical treatment has been recorded since the eighth century A.D. Thus, silver compounds have been used medicinally in the treatment of various maladies and diseases for more than one thousand years.

LITERATURE REVIEW

More than 200 pages of information on human uses of silver were found by the research team. The collected body of information can generally be reported as follows:

Use of Silver In Recent History

- As reported in *Science Digest*, March 1978, more than half of the world's airlines use silver treated water as the method of choice for protecting airline passengers from water-carried diseases such as dysentery.
- *Science Digest* went on to state that the government of Switzerland approved silver water filters for home and office use throughout the country.
- One report from *Science Digest* included data on the use of silver treated water versus conventional chlorine
- treatment. Fifty gallons of "raw" sewage were dumped into a swimming pool and tested for E. coli, a dangerous pathogen found in the
- human digestive track. Initially, the colony count was 7,000 E. coli per milliliter of water.
- After three hours of pumping raw sewage through silver electrodes, the water was retested and found to be free of E. coli.
- In addition to water treatment, Dr. G.A. Krause produced a colloidal silver powder used for dressing wounds, a spray for tonsillitis, and a wet pack for treating burns and abrasions. His goal in producing multiple colloidal products was to limit or totally eliminate pathogenic bacteria from wounds, inflamed mucous membranes and drinking water.

Scientific Research

From an historical perspective, the most progress in the field of silver compounds and human use has occurred during the past 100 years.

For example, it was not until the latter part of the nineteenth century that Karl Sigmund Franz Crede (1884) introduced the use of silver nitrate for the prevention of ophthalmia neonatorum.

At approximately the same time, Raulin (1869), von Behring (1890) and von Nageli (1893) were studying the effects of small quantities of silver and silver nitrate on microbial life such as bacteria and molds.

In 1897, Dr. Benno C. Crede's antiseptic (powdered silver citrate), and his ointment (colloidal silver in an ointment base) were both used in the treatment of wounds and skin

diseases. It is reported that Crede received his inspiration for the creation and use of these silver compounds from the use of silver foil as an anti-infection wound dressing at Johns Hopkins University.

In 1928, G.A. Krause reintroduced the principle of using silver as a coating in filtration systems in order to sterilize water for domestic use.

Schweizer (1929) confirmed the research data of Krause, reporting that all pathogens, including *E. coli*, were killed when water was treated with Katadyn Silver. Schweizer also determined that this silver treatment did not damage or eliminate beneficial air or water microorganisms.

Mallmann's (1937) research verified that Electro-Katadyn Silver killed *E. coli* in treated swimming pools while having no negative effect on useful microbial life.

Sallman (1943) conducted testing on the use of silver in the treatment of nervous diseases and lunacy.

Goodman and Gill (1943) treated vaginitis with silver compound suppositories.

Greenberg (1953) continued silver compound studies, researching the use of silver nitrates applied to the eyes of newborn babies.

Dr. A.C. Barnes (1957) developed a form of mild silver protein known as "Argyrol," which served as an effective local anti-infective.

Silver compounds used today fall within two general groups:

- 1) The soluble silver salts, such as nitrates and citrates, and the less soluble compounds referred to as the oxides, halogen salts (chlorides and iodides).
- 2) The proteينات which are not water soluble but exist as colloidal suspensions.

SILVER NITRATE COLLOIDAL

Silver Nitrate

Of the soluble silver salts, nitrate is the most common. When combined, nitrate and silver function as an astringent, irritant, or as a caustic, depending on the strength of the solution applied and the duration of use. Silver nitrate is commonly applied as a solution of varying concentrations or by a silver nitrate stick or pencil. Both forms may be used to remove warts or to treat ulcers and granulations. A one-percent solution of silver nitrate is instilled routinely into the conjunctival sac of newborn children to prevent ophthalmia neonatorum (a conjunctivitis affecting infants born to mothers infected with gonorrhea). This treatment is not without risk since cauterization of the cornea of the eye and blindness may occur.

Colloidal Silver

Colloidal silver suspensions are various insoluble compounds of silver and other elements in a solution. They include the iodides, chlorides and oxides. This insoluble compound is precipitated in the presence of protective colloids. For example, gelatins can suspend small particles that do not settle out but remain in suspension. The miniature particles of silver compound serve as reservoirs, releasing silver ions (the active substances of the compounds) in a controlled manner and in minimal quantities.

These suspended particles often include the attributes of true solutions. Colloidal silver compounds are divided into three classes: strong silver proteins, mild silver proteins and silver halides.

OLIGODYNAMIC EFFECT

Some metals (i.e., silver, copper, brass and tin) are lethal in large doses, but in miniscule quantities, they have the ability to kill bacteria and fungi. This is described as the oligodynamic effect.

Many researchers have attempted to determine and explain how the oligodynamic effect actually works. However, a definitive answer has not been found.

The word "oligodynamic" is a combination of two Greek words: "oligas" meaning little, and "dynamis" meaning power. The definition of this word is "effective in small quantities."

Because silver has this oligodynamic effect, it has been used for centuries to purify water, and through the ages creative people have tried to harness this property for the benefit of mankind. More recently, scientists have discovered that by adding small amounts of a second metal, one lower in the electro-potential series than silver, the oligodynamic effect could be intensified.

In 1928, Krause developed "Katadyn Silver" which has a much stronger oligodynamic effect than pure silver due to the addition of an activating second metal. He further increased the oligodynamic effect by coating other materials, such as sand, or lining water containers with "Katadyn Silver." Because a greater surface area of silver contacted the material to be sterilized, the process could then be completed in a shorter period of time with less silver. Numerous tests verify that even at very low concentrations silver kills the E. coli bacteria within 2 to 24 hours, depending on the quantity of bacteria present.

SILVER PROTEINS

Strong Silver Proteins

The strong silver proteins contain only small amounts of silver. This minimal amount of silver gains its antiseptic benefit because the silver and protein combination compound is largely ionized. Because of the increased ionization, strong silver proteins are more irritant. On the other hand, strong silver proteins tend to alter with storage. This silver compound becomes more strongly bonded to the protein property, and therefore, yields a less powerful silver ion solution. Because of this reduction in ion strength, there is a decrease in the anti-septic function after time.

Mild Silver Proteins

The mild silver proteins consist of 19 to 23% silver. This demonstrates how silver oxide particles are protected by a suitable protein colloid. There is only a small fraction of the silver in the mild silver protein solution that is ionized. Even though the amount of silver that is ionized is minimal, it is remarkably consistent. Various reports indicate that dilutions as weak as 0.01% of a standard 23% solution will still experience an ion concentration very close to that of a more concentrated solution. This is an important factor because much of the solution will be diluted by body fluids. Nevertheless, a weak dilution still remains effective.

Electrolytic Colloidal Silver

The literature review further identified various concepts suggesting colloidal silver can be produced by arching an electrical current across two silver electrodes sub-merged in distilled

water, or water with a mild electrolyte. The electric arc creates a nitrogen-free ozone that, as a dissolved gas, may help destroy harmful anaerobic bacteria. However, regardless of the potential ozone benefits, the process and silver benefit may be of little value given the extremely small amount of silver that remains suspended in solution.

CANCER AND SILVER

It is widely believed that except for bone marrow cells, humans are unable to produce primitive cells. However, while researching the effects of silver compounds on bone healing, Dr. Robert Becker discovered that fibroblast cells in the body, upon exposure to silver ions, dedifferentiated (became generic, not one specific type). The cells multiplied rapidly and produced many primitive cells which differentiated into whatever variety of tissue-producing cells were needed at that place. The body regenerated itself!

Dr. Becker details this amazing phenomenon in his book *Cross Currents*. And he asks, **"If the electrically generated silver ion dedifferentiated normal human fibroblast cells, would it also dedifferentiate human cancer cells?"**

His answer is excerpted from his book:

"I also had a patient with a severe, chronic bone infection who had an associated cancer in the wound. He refused amputation, which would have been the treatment of choice, and insisted that I treat his infection with the silver technique. After three months, the infection was under control, and the cancer cells in the wound appeared to have changed back to normal. When I last heard from him, eight years after the treatment, he was still fine."

WHAT HAPPENED TO THE SILVER SHEEN?

Although various fields of science have lagged behind in the conventional warfare involving mutant strains of "superbugs," they are beginning to reexamine the merits of silver. For example, Dr. Charles Fox of Columbia University developed a product, approved by the FDA, known as sulfadiazine (also as silvadene). This product is now being used in many burn centers around the world to control *Pseudomonas Aeruginosa* burn infections.

A few years ago, with the introduction of many so-called "miracle drugs," silver compounds apparently fell out of favor. Despite the initial benefits of the "miracle drugs," some of the literature indicated these drugs can produce patient sensitization and may become ineffective with prolonged use. On the other hand, sensitization with silver compounds is low if it occurs at all.

Data in available literature substantiates that silver compounds offer broad, consistent antimicrobial protection against common pathogens, specifically against mycotic and viral infections.

Although the word "oligodynamic" was first used more than one-hundred years ago, potential uses of silver's oligodynamic effect are still being discovered. As reported in *Science Digest*, March 1978, Dr. Richard L. Davies, Executive Director of the Silver Institute which monitors silver technology in 37 countries, states:

"In the last four years, we've described 87 important new medical uses for silver. We're just beginning to see to what extent silver can relieve suffering and save lives."

SAMPLE CASE STUDIES

Included in the article, "Silver—New Magic in Medicine," *Science Digest* March 1978, were several case histories describing the benefits of silver treatments. In burn injuries, those suffering from burns covering more than 80% of their bodies usually die from infections rather than from the actual burns.

The first case study reported an 18-year-old victim of an auto accident with burns on 80% of his body. Remarkably, the victim was able to leave the hospital four months after the accident. Doctors credited the use of a silver compound (sulfadiazine) to his recovery. At the time, the silver compound was being used in 70% of the burn centers in the United States.

The second case study reported on an individual who was a diabetic. People who are afflicted with this health problem often are susceptible to infections that do not heal.

The subject was a 65-year-old who acquired an infection from a cut on his leg. It was reported that after a year the infection had digressed to a "stasis ulcer." Amputation was considered. A number of antibiotics were tried without success, and the patient was referred to a clinic which pre-scribed a silver compound. The ulcer was healed within two months.

Eleven patients suffering from chronic osteomyelitis and non-union bone fractures were treated. Each was given treatments of direct, electrically generated silver ions into the areas of the fracture and infection. Three other patients suffering from chronic osteomyelitis without the fractures were also given the same treatment.

The treatments resulted in control of the infection in eleven of the 14 cases and partial control in two of the cases. Only one of the 14 cases resulted in failure to control the infection and to heal the fracture. Two of the cases resulted in partial healing of the fractures. All other cases resulted in total healing. There were no undesirable side effects resulting from the silver treatment in any of these cases.

In five of the cases, the silver treatment produced an additional benefit. It was reported that substantial amounts of new bone tissue were deposited during the treatments. Common to all successful treatments was major growth stimulation to the bone, soft tissue and skin areas of the wounds.

CHELATED SILVER & ELECTROLYTES

Because of the potential toxic side effects from colloids derived from silver nitrate and other harsh chemicals, some researchers are hesitant to use current silver technology with-out some modifications. For example, the most pure forms of silver colloids are electrically generated and will stay in sus-pension only in trace amounts. Even if kept in suspension, however, their particle size may be a deterrent. When taken orally, very little silver gets to the vascular system to fight viral and microbial diseases, and any silver finding its way into the bloodstream most likely would never contact viral infection lodged inside the cell.

When injected intravenously much greater amounts of silver colloids can be introduced into the blood stream. However, the dilution caused by body fluids reduces electrolytically generated silver colloids to ineffective levels. Chemically derived colloids also could be used intravenously,

but their attendant adverse effects restrict use to small amounts for limited duration.

In all, it seems the most desirable form of silver for internal use is a non-toxic solution taken orally and in effective amounts. If the silver is attached to an electrolyte and cell nutrient, it will be absorbed into the blood and can interact with contagions found there. In this form it can also gain entrance to cells to interact and destroy intercellular, invasive viral infection. This can be accomplished by using fulvic acids with silver.

Fulvic acids are water-based electrolytes. Their chelating ability bonds essential minerals and enhances them for use by living organisms. Fulvic acids have proven to be a powerful organic electrolyte, available to balance cell life. They are an ideal chelator of silver compounds.

Electrolytes and Human Health

Medical researchers have long known the vital role electrolytes play in human health. Researchers now report a breakthrough in the ability to dissolve and attach electrically generated silver (in substantial quantities) to a naturally occurring "chelate."

Not only has chelation been achieved, but the substance used for chelation is of immense value as a natural electrolyte and cell nutrient. Of this naturally occurring electrolyte, Dr. William R. Jackson, in his book, *Organic Soil Conditioning* says:

"The physical well being of the organism, whether plant or animal, can be expressed in terms of electrical potential. Fulvic acid has proven to be a powerful organic electrolyte, serving to balance cell life. It is available at times as a donor and at other times as an acceptor, based on the cell's requirements for balance. If the individual cell is restored to its normal chemical balance and thereby, in turn, its electrical potential, we have given life where death and disintegration would normally occur within plant and animal cells."

SUMMARY: QUESTIONS AND FINDINGS

What is the ideal concentration for silver supplements taken internally? It has been suggested that the number of pathogens killed relates directly to the number of silver ions present, but there is no ideal concentration for all cases. It appears from the review of literature, that severe cases would require increased dosages.

Can small amounts of silver be beneficial? Small amounts of Vitamin C are beneficial, but they do not prevent scurvy. Likewise, those involved in the various case studies used silver compounds in amounts relative to need.

Are all colloidal silver supplements the same? The research data indicated multiple vendors are marketing silver compounds under a variety of trade names, all containing greater or lesser amounts of silver or combinations of silver compounds.

What is the relationship between total silver content and effective results? The research data confirmed that it is not the total amount of silver in suspension, but the total amount of ionized silver in solution, that determines effectiveness.

Will ionized silver destroy friendly microorganisms? Schweizer (1929), using a silver sponge combined with electropotential, verified that silver kills pathogens, including E. coli, without harming helpful airborne and waterborne microorganisms.

How do commercial silver products differ? It appears that most commercially available products are a preparation of silver protein powders derived from the precipitation of silver nitrate solutions. While the silver is beneficial, the nitrate radical may do harm to cells and tissues.

What is argyria? Argyria is a darkening of the skin or tissues resulting from injections of excessive amounts of silver (or its compounds) or from topical applications of these same compounds to broken skin for a prolonged period of time. Studies published in 1957 (*Antiseptics, Disinfectants, Fungicides and Chemical and Physical Sterilization*) indicated that no cases of argyria had been reported where silver was taken in amounts consistent with its oligodynamic benefits. Moreover, the amounts of silver required to cause argyria are much greater than amounts necessary for oligodynamic action. Fortunately, apart from discoloration, there are no negative physiological symptoms associated with the condition of argyria.

Can silver colloids in small amounts purify water? Research tests performed by Supfle and Werner (1951) and Schioppa (1936) provide some answers. Their data confirms that silver ion solutions work best and appear superior to any other form of silver. They also demonstrated that factors such as temperature and the hardness of the water affected results. They were successful in identifying the specific amount of silver ions in the solutions necessary to kill all pathogens. These amounts were measured in micrograms (gamas) per liter of water treated.

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