

**A Feasibility Study  
of  
Silver Dihydrogen Citrate  
For Use as a Nutritional Supplement**

**January 29, 2007**

**Ingredient:**

Silver Dihydrogen Citrate (SDC)

**What it is:**

Ionic silver in a citric acid solution.

**What it does:**

Fights bacteria. Most personal care products are made with a lot of water and a variety of nutrients which make an incredibly hospitable breeding ground for microorganisms. What's worse – the product might smell and look just fine, but be swarming with bacteria or fungi that are dangerous to your health. Effective preservatives are vital for ensuring safety!

**Why we use it:**

Preservatives are especially difficult to formulate because they have to be strong enough to kill bacteria, but they also can't impact the effectiveness of other ingredients. Of course, for The Honest Company, safety is key.

Conventional preservatives like parabens are linked to hormone disruption (1-6). Another common category of conventional preservatives are formaldehyde-releasers, but formaldehyde is a known carcinogen (7,8). We were thrilled to discover SDC which is non-toxic to you and your family, non-irritating, colorless, and odorless.

- In a scientific review conducted by the EU's Scientific Committee on Consumer Products, they deemed SDC to be non-toxic by oral exposure, non-toxic by dermal exposure, non-irritating, and that it's not a skin sensitizer.
- The World Health Organization assessed the safety of using silver compounds for sanitizing drinking water and concluded that there have been no reports of toxic effects resulting from the exposure of healthy persons to these compounds.

***Safe and effective – that's what we like!***

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## INTRODUCTION

### GENERAL FACTS ABOUT SILVER

Silver has the highest electrical conductivity and the highest thermal conductivity of any metal.<sup>1</sup> This instantly distinguishes it as a special and important element in the universe, as it relates to its utilization by the human body. This also helps explain why the body utilizes silver as a catalyst in many diverse ways.

Natural silver contains two stable isotopes.<sup>2</sup> The amount of silver in the earth's crust averages 7.5 / 100<sup>th</sup>'s of a milligram per kilogram (0.00000075ppm). The amount of silver in the earth's oceans averages 4 / 100,000<sup>th</sup>'s of a milligram per liter (0.000000004ppm).<sup>3</sup> These figures appear to be insignificant, until one calculates how many atoms of silver there are per kilogram or per liter (which can be calculated utilizing Avogadro's Number).

There are many millions of atoms of silver in the earth's crust and oceans per kilogram and per liter, no matter what part of the earth to which one refers. It is scientifically accurate and proper to make this claim because silver is widely known by scientists to be part of our air, food, and water supply. The **form** of silver in our air, food, and water is not metallic. It is mono-atomic, meaning, "one atom."<sup>4</sup>

The EPA and FDA have published the fact that the average daily intake of silver in the American diet is between 27 and 88 micrograms of silver ***per day***.<sup>5</sup> Using Avogadro's Number, 75 micrograms of silver is calculated to amount to a daily consumption of about 420 ***trillion*** atoms of monoatomic silver per day.

These figures can also be contrasted to the amount of silver in the human body. The body naturally contains (or stores) about 1 milligram of silver per kilogram of body weight (1ppm).<sup>6</sup> This is many orders of magnitude above the average amount of what is found in the oceans and in the crust of the earth, as well to the amount of monoatomic silver consumed per day. Evidently, in order to function properly, the body itself requires, ***and then stores***, a more concentrated level of silver than what can be found in nature.

When combined with other atoms of silver, silver is a noble metal. It is resistant to corrosion and oxidation. Silver is considered "noble" because the d-band electron orbital (the third orbital from the nucleus) is filled with 10 electrons in silver's 3<sup>rd</sup> and 4<sup>th</sup> energy levels, out of a total of five energy levels.<sup>7</sup> This phenomenon presumably helps explain why silver is resistant to corrosion and oxidation. Silver has 47 protons in its nucleus and is stable at an atomic weight of 107 and 109 (naturally occurring isotopes).<sup>8</sup>

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<sup>1</sup> Wikimedia Foundation, [Wikipedia, the Free Encyclopedia](http://en.wikipedia.org/wiki/Silver), "Silver." <http://en.wikipedia.org/wiki/Silver>

<sup>2</sup> Ibid., [http://en.wikipedia.org/wiki/Silver#Occurrence\\_and\\_extraction](http://en.wikipedia.org/wiki/Silver#Occurrence_and_extraction)

<sup>3</sup> *Silver in Industry*, ed. By Lawrence Addicks, Reinhold Publishing Corporation. 1940, p. 401-429,

<sup>4</sup> Wikimedia Foundation, [Wikipedia, the Free Encyclopedia](http://en.wikipedia.org/wiki/Monatomic_ion), "Silver," [http://en.wikipedia.org/wiki/Monatomic\\_ion](http://en.wikipedia.org/wiki/Monatomic_ion).

<sup>5</sup> U.S. Environmental Protection Agency, Integrated Risk Information system (IRIS), "Silver (CASRN 7440-22-4," I.A.4. Additional Studies/Comments (Oral RfD); <http://www.epa.gov/iris/subst/0099.htm>

<sup>6</sup> Padlewska, KK, Schwartz, RA, "Argyria," *eMedicine Journal*, November 2, 2001; 2(11).

<sup>7</sup> Wikimedia Foundation, [Wikipedia, the Free Encyclopedia](http://en.wikipedia.org/wiki/Silver), "Silver." <http://en.wikipedia.org/wiki/Silver>

<sup>8</sup> Ibid., "Silver."

Interestingly, the element silver has an abundant number of isotopes. The atomic weight of silver can range from 93 to 130, the change in quantum state being caused by the abundant use of electricity.<sup>9</sup> Yet even at milliamperage levels, at the quantum level, silver is active in its immediate electromagnetic environment. It is therefore altogether proper to theorize that silver's efficacy in the body is directly related to its wide range of activity at the quantum level. This is at once both comforting and disconcerting, because scientifically accurate proof of efficacy in the body (*in vivo*) is difficult (if not impossible) to determine and establish at the quantum level.

Acceptance of efficacy data by the general public and health practitioners can be assumed to be attainable by providing reliable information of defined, observable physical events associated with the body's response to nanosilver particles, as well as by utilizing the concepts of organic chemistry and classical physics. On the other hand, acceptance of Silver Dihydrogen Citrate ("SDC's") efficacy and use as a dietary supplement by regulatory authorities may have to involve their willingness to favorably look at the nature of any information that may be provided to them from a quantum physics standpoint, which is *not explainable* (it requires the use of intuition) by using the concepts of traditional and mechanistic organic chemistry and physics.

### NANOSILVER RESEARCH

- 1) We<sup>10</sup> believe the chemical bond between the silver atom and the citric acid molecule in Silver Dihydrogen Citrate ("SDC") will withstand the electromagnetic field of any chloride compounds in the body,<sup>11</sup> especially in the stomach, where hydrochloric acid (and other chloride compounds) are manufactured.<sup>12</sup> This resistance will prevent SDC from becoming a silver salt when it enters the body. We believe this will maintain SDC's *in vitro* non-toxic characteristics<sup>13</sup> *in vivo*.

Research could be done into the possibility that the SDC molecule could be chemically bonded to a monosaccharide molecule as a viable delivery system for the silver ion in SDC.

- 2) From anecdotal information from people who have recovered from various diseases and ailments regarding off-label uses of Germ Control 24 and Axenhol, it is already apparent SDC is **bioavailable and active** in the body.

Apparently, the monoatomic silver ion in SDC is not negatively affected by the chloride compounds in the stomach, and is able to enter the bloodstream in a bioavailable form. Once in the bloodstream, it is adsorbed, or bonds, to the surface of a leukocyte (White Blood Cell).<sup>14</sup> (It is not known whether SDC is still attached to the citric acid molecule at this point) (It is; however, significant to note that the body contains a "Citric Acid System," or "Krebs Cycle.")<sup>15</sup>

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<sup>9</sup> Wikimedia Foundation, [Wikipedia, the Free Encyclopedia](http://en.wikipedia.org/wiki/Silver), "Silver." <http://en.wikipedia.org/wiki/Silver>

<sup>10</sup> James Mackey and Andy Arata

<sup>11</sup> Arata, Andrew, Pure Bioscience, Conversation with James Mackey, dated January 17, 2007

<sup>12</sup> Martin, A, BS, Roberts, JW, PhD, "Comparative Bacteriology Analysis: Particulate vs. Ionic Silver," Natural-Immunogenics Corporation, December 22, 2004; p. 1-4.

<sup>13</sup> U.S. Environmental Protection Agency, Germ Control 24, EPA Registration No. 72977-3-83062, EPA EST No. 66243-GA-001.

<sup>14</sup> Rentz, E, DO, COMM, CNMO, "Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention," *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>15</sup> Wikimedia

Once in the bloodstream, the silver ion then travels to all of the tissues of the body, including the bones (which are extremely difficult to treat with antibiotics because of reduced circulation in the dense bone tissues),<sup>16</sup> where it attacks and kills a broad spectrum of bacteria, viruses, and fungus while remaining medically benign to human cells.<sup>17</sup>

**No side effects of nanosilver have ever been reported to have been toxic to mammals.**<sup>18,19</sup> In 1974 and again in 1976 effective dosage levels of nanosilver were found to be safe for mammalian tissues.<sup>20</sup>

3) Ongoing medical research (2003) into Oligodynamic silver has conclusively demonstrated that

a) “The smaller the particle of silver, the more effective it is in the body.” *Surface coverage* (Surface Area – “SA”) is in direct proportion to the effectiveness of silver because of the increased biological activity caused by the dispersion of the nanoparticles.<sup>21</sup> The smaller the particle, the more surface coverage. It is very important to understand that it is not possible for silver to get any smaller than one atom.

SDC contains one, stabilized, positively charged, atom of silver per citric acid molecule.<sup>22</sup> This makes its dispersion **perfect**, unlike nanoscalar or even picoscalar colloidal, metallic forms, **which must rely on chemical processes in the body** to “free up” silver ions.<sup>23</sup> SDC is a mono-atomic form of silver. The silver in SDC is **not in a metallic form.**<sup>24</sup>

The term “speciation” is central to medical toxicology as it precisely describes and differentiates the fate, transport and toxicity of differing compounds of the same metal. For example, chromium is essential in one form (Chromium III), yet toxic in the same elemental amount when present in another form (Chromium VI). This is especially true with differing compounds of silver as well.<sup>25</sup>

The very real question then becomes: “What form does the silver ion in SDC have?” The truthful answer is, “The form of the silver ion in SDC is beyond the

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<sup>16</sup> Becker, RO, “Effects of Electrically Generated Silver Ions on Human Cells and Wound Healing,” *Electro- and Magnetobiology*, 19(1), 1-19, (2000), p. 14.

<sup>17</sup> Etris, S, “Clinical Experiments Show Silver Compound Can Help AIDS Patients: Researcher’s Say Silver Oxide Offsets AIDS Loss of Immune Response,” In: The Silver Institute’s *Silver News*, February-March 1998; [www.silverinstitute.org](http://www.silverinstitute.org)

<sup>18</sup> Gordon, E, MD, Holtorf, K, MD, “Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?” (Part I) 2006, p. 1.

<sup>19</sup> Rentz, E, DO, COMM, CNMO, “*Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention*,” *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>20</sup> Apsley, J, DC, Holtorf, K, MD, Gordon E, MD, Anderson, W, ND, Buttar, R, DO, “Nanotechnology’s Latest Oncolytic Agent: Silver, Cancer & Infection Associations (Part III), 2006, p. 4.

<sup>21</sup> Rentz, E, DO, COMM, CNMO, “*Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention*,” *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>22</sup> Arata, Andrew, Pure Bioscience, Conversation with James Mackey, dated January 17, 2007

<sup>23</sup> 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*, p. 301-310, 1922.

<sup>24</sup> Arata, A, Pure Bioscience, Conversation with James W. Mackey, January 17, 2007.

<sup>25</sup> Gordon, E, MD, Holtorf, K, MD, “Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?” (Part I) 2006, p.5.

mind's limited ability to imagine it." Sometimes, when desired, the form will be understood as a particle. Other times, it will be understood as a wave.<sup>26</sup> It depends entirely upon which form the mind wants to "see," or understand within the present moment.

- b) In addition to surface coverage, surface *energy* ("SE") is also a factor in determining efficacy. SDC is a positively charged ion – ready to work. The charge significantly facilitates electron displacement.<sup>27</sup> The electromagnetic charge effectively yanks electrons away from a molecule, in essence weakening the molecular bond and rendering it susceptible to cleavage.<sup>28</sup> It is important to understand that "*cells selectively bond only with silver ions,*"<sup>29</sup> and **not** with colloidal or metallic forms.
  - c) It is already certain at this time that the phenomenological effectiveness of nanosilver takes place at the quantum level. This is known ***from observing*** the great rapidity of an unprecedented Particle Diffusion Coefficient (PDC) of one-one hundred thousandths of a cubic centimeter per second,<sup>30</sup> and additionally in part because of
  - d) the absorption, penetration, and delivery of active silver into biological milieus (intracellular and intra-nuclear), where it best serves useful immune functions by way of the surface area, surface energy, and PDC. (SA, SE, PDC)<sup>31</sup>
- 4) Oligodynamic silver has been demonstrated to be a factor in adult stem cell dedifferentiation (Dr. Becker – Clinical trial in 2002).<sup>32,33</sup> It is theorized that one of the healing mechanisms of the body is its utilization of direct current millivolts through the neural system, which presumably travels *through* the silver ion. It is the active, available silver ions – not the particulate colloidal particles – in which the antimicrobial properties of silver reside.<sup>34</sup> The activity of biocatalysts like colloidal silver is directly proportional to the adsorption power upon a biological surface.<sup>35</sup> The silver ion is chemically bonded to a receptor site on the adult stem cell membrane.<sup>36</sup> Because of

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<sup>26</sup> Heisenberg, W., *Physics and Philosophy*, Harper and Row, NY, 1962; p. 155.

<sup>27</sup> Acel, D, *Biochem. Z.*, 1920; 112:23-32. In: Russell, AD, Path FR, Hugo, WB, "Antimicrobial Activity and Action of Silver," *Prog Med Chem*, 1994; 31:353.

<sup>28</sup> Eichorn, GL, et al., "Interaction of Metal Ions with Biological Systems, with Special Reference to Silver and Gold," Proceedings of the First International Conference on Gold and Silver in Medicine, Bethesda, MD, May 13-14, published by The Silver Institute, Washington, DC, 1987; p. 4.

<sup>29</sup> Rochart, C, Uzdins, K, "Katadyn (Silver Preparation): Clinical Application," *Schweiz Med Wochenschr*, 1947; 77:1100-4. In: Simonetti, N, et al., "Electrochemical Silver for Preservative Use," *Applied and Environmental Microbiology*, December 1992; 58(12):3834.

<sup>30</sup> CRC Handbook of Chemistry and Physics: 80<sup>th</sup> Edition, ed. By David R. Lide, CRC Press, Boca Raton, FL, 1999-2000; Section 15, p. 28 (15-28).

<sup>31</sup> Rentz, E, DO, COMM, CNMO, "*Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention,*" *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>32</sup> Becker, RO, "Induced dedifferentiation: A possible alternative to embryonic stem cell transplants," *NeuroRehabilitation* 17, IOS Press (2002) 23-31.

<sup>33</sup> Becker, RO, "Effects of Electrically Generated Silver Ions on Human Cells and Wound Healing," *Electro-andMagnetobiology*, 19(1), 1-19, (2000), p. 1

<sup>34</sup> Martin, A, BS, Roberts, JW, PhD, "*Comparative Bacteriology Analysis: Particulate vs. Ionic Silver,*" Natural-Immunogenics Corporation, December 22, 2004; p. 1-4.

<sup>35</sup> Quinto, S, "*Sovereign Silver News,*" Natural-Immunogenics Corporation, Newsletter Volume 1, No. 1, March/April 2006; p. 1-4.

<sup>36</sup> Becker, RO, "Induced dedifferentiation: A possible alternative to embryonic stem cell transplants," *NeuroRehabilitation* 17, IOS Press (2002) 23-31.

silver's natural ability to act as a catalyst for chemical reactions, dedifferentiation (a return to its original embryonic state) of the adult stem cell occurs.<sup>37</sup> Dedifferentiation enhances the body's process of repairing damaged tissues.

It is further theorized that the receptor site on the adult stem cell is a glycoprotein chain<sup>38</sup> Mono-saccharaides – simple sugars, which attach to, and thereby form, the glycoprotein chain on the surface of ***every cell membrane in the entire body*** (~100 trillion cells) (cell signaling). In Dr. Becker's trial, it was observed that in addition to the major local antibiotic action of the silver ion, organized tissue regeneration was produced.<sup>39</sup>

It was also observed that tissue growth was **at least five to six times faster** utilizing silver in the wound treatment when contrasted with non-silver-treatment (>1 square centimeter per day as opposed to <0.1 square centimeters per day) (wounds heal from the perimeter of the wound to the center of the wound)(as a result, the establishment of a "lawn" of granulation tissue over the entire wound occurs much earlier)<sup>40</sup> (the use of nanosilver for burn victims is thereby evident).

Furthermore, the tissue regeneration in Dr. Becker's trial occurred in bone, soft tissue, nerve, and skin, with replacement of missing tissues by histologically normal tissues, including hair follicles, ***even in the case where the surrounding tissues were diseased by lack of circulation caused by diabetes.***<sup>41</sup>

The addition of silver was shown to be safe and lacked side effects.<sup>42</sup> In the clinical trial, wound healing was observed to occur *after traditional treatments had failed* and amputation of the limb was the only remaining advisable possibility.<sup>43</sup>

The results obtained by Dr. Becker and his associates in their clinical trials with nanosilver particles would make possible a number of clinical applications that were not previously attainable.<sup>44</sup>

- 5) The last complete review (1990) of any possible adverse effect from a drug-silver interaction in the body concluded there was no reason for concern.<sup>45,46</sup> Also, the EPA's ATSDR CAS # 7440-22-4 has found no chemicals (food or drug based), which might escalate silver's toxicity as it relates to silver speciation.<sup>47</sup>

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<sup>37</sup> Becker, RO, "Effects of Electrically Generated Silver Ions on Human Cells and Wound Healing," Electro-andMagnetobiology, 19(1), 1-19, (2000), p. 14.

<sup>38</sup> Becker, RO, "Induced dedifferentiation: A possible alternative to embryonic stem cell transplants," NeuroRehabilitation 17, IOS Press (2002) 23-31.

<sup>39</sup> Becker, RO, "Effects of Electrically Generated Silver Ions on Human Cells and Wound Healing," Electro-andMagnetobiology, 19(1), 1-19, (2000), p. 1-15

<sup>40</sup> Ibid..

<sup>41</sup> Ibid.

<sup>42</sup> Becker, RO, "Induced dedifferentiation: A possible alternative to embryonic stem cell transplants," NeuroRehabilitation 17, IOS Press (2002) 23-31.

<sup>43</sup> Ibid,

<sup>44</sup> Ibid,

<sup>45</sup> Agency for Toxic Substance and Disease Registry (ATSDR), U.S. Public Health Service, Clement International Corporation, Under Contract No. 205-88-0608, "Toxicological Profile for Silver," CAS# 7440-22-4, Section 5.1, December 1990; p, 40-1.

<sup>46</sup> Apsley, JW, MD, "Microbial Multi-drug Resistance (MDR) and Oligodynamic Silver," Immunogenic Research Foundation, Inc., IMREF Newsletter , September 2006; p. 1-6.

<sup>47</sup> U.S. Environmental Protection Agency, Integrated Risk Information system (IRIS), "Silver (CASRN 7440-22-4," I.A.4. Additional Studies/Comments (Oral RfD); <http://www.epa.gov/iris/subst/0099.htm>

Some researchers have suggested that a deficiency of Vitamin E and selenium in the body may cause nanosilver to have an adverse effect on the body's ability to synthesize seleno-enzyme glutathione.<sup>48</sup> For safety reasons, it may then be advisable to *combine SDC with Selenium and Vitamin E* in a nutritional supplement form. Medical research has found that toleration of high amounts of silver is enhanced 10,000 times when the body is non-deficient in selenium and Vitamin E.<sup>49</sup> Also, it has been found that consuming green tea or green tea extract is beneficial to post-treatment with nanosilver.<sup>50</sup>

In addition to these safety concerns, it must be noted that the only other known side-effect of silver is argyria, which is known to be caused by *silver salts*,<sup>51</sup> and **not** nanosilver, or monoatomic silver.

Another safety factor to consider is that silver table utensils have been used for centuries without any untoward effects; furthermore, no evidence of undesirable consequences due to consumption of silver-treated food stuffs for extended periods of time, have been reported in Europe.<sup>52</sup>

- 6) The body is already normally composed of 1ppm of silver through daily ingestion of silver in the air, food, and water supply.<sup>53</sup> The widely documented mineral depletion of the soil (~0.3ppm silver to, now, ~0.1ppm)<sup>54</sup> may result in nanosilver eventually becoming classified by the US government as an essential nutrient (similar to Selenium, which was outlawed for human consumption in 1937, but is now considered essential to health),<sup>55</sup> as long as it is ingested in nanoparticle (microgram) or monoatomic (SDC) size.
- 7) A compelling argument can be made that SDC deserves to be grandfathered in to the 1994 DSHEA Act. The basic reasoning is:
  - a) The only ingredients of SDC are water, silver, and citric acid.
  - b) Water and citric acid were already in the food supply in 1994.
  - c) The form of silver in SDC is monoatomic, which is the **EXACT SAME FORM** of silver in our food and water supply.
  - d) When blended with other nutraceuticals, SDC can be easily formulated to have an ideal concentration factor of <100ppm (the upper limit of daily exposure to silver already approved by the FDA),<sup>56</sup> in an ideal liquid or powder medium.

There is a pressing need for clinical trials for nanosilver.

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<sup>48</sup> Fung, MC, Bowen, DL, "Silver Products for Medical Indications: Risk-Benefit Assessment," *Clinical Toxicology*, 34(1), 119-126, 1996.

<sup>49</sup> Gordon, E, MD, Holtorf, K, MD, "Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?" (Part II) 2006, p.4.

<sup>50</sup> Ibid.

<sup>51</sup> e-Medicine Journal, November 2, 2001; Number 11.

<sup>52</sup> *Silver in Industry*, ed. By Lawrence Addicks, Reinhold Publishing Corporation. 1940, p. 401-429,

<sup>53</sup> Padlewska, KK, Schwartz, RA, "Argyria," *eMedicine Journal*, November 2, 2001; 2(11).

<sup>54</sup> Agency for Toxic Substance and Disease Registry (ATSDR), U.S. Public Health Service, Clement International Corporation, Under Contract No. 205-88-0608, "Toxicological Profile for Silver," CAS# 7440-22-4, Section 5.1, December 1990; p, 69.

<sup>55</sup> Kutsky, RJ, Handbook of Vitamins, Minerals, and Hormones, Van Nostrand Reinhold Co., NY, 1981; p. 1.

<sup>56</sup> Agency for Toxic Substance and Disease Registry (ATSDR), U.S. Public Health Service, Clement International Corporation, Under Contract No. 205-88-0608, "Toxicological Profile for Silver," CAS# 7440-22-4, December 1990; p, 1-144.

**THE FISHER INSTITUTE** seeks to facilitate scientific research and education that will foster health and wellness, whether on a preventive basis or for those who may be in compromised states of health. A primary objective is to explore the extent, if any, to which nutraceuticals, glyconutritionals, phytonutritionals, functional foods, and/or other natural substances may provide integrative and complementary health and wellness support.

An additional objective is to support development of technology related to these areas. It is also hoped that the ongoing results of these endeavors will provide data that is sufficiently informative to stimulate further research and education for the benefit of the general public, as well as, for healthcare professionals and other interested researchers.<sup>57</sup>

Dr. McDaniel and his wife, Candace, are acknowledged and respected experts at determining the efficacy of micronutrient dietary supplementation as a means of supporting the body's innate anti-viral mechanisms and restoration of immune function.

- 8) **One intravenous dose** of nanosilver at a level of 10ppm silver blood plasma level was observed to cure 100% of the patients (30 women) diagnosed with breast cancer. Cure time was 19 days.<sup>58</sup> Other preliminary evidence *in vivo* suggests that HIV, herpes, rheumatoid arthritis, the worst bacterial scourges, and many other diseases **are cured** by utilizing nanosilver.<sup>59</sup>

Finding cures for complex diseases is perhaps the most daunting challenge. The challenge also involves the correction of the associated complex metabolic consequences associated with long-term infectious states, such as Fibromyalgia, Chronic Fatigue Syndrome, Depression, weight problems, severe fatigue, and chronic pain. **Nanosilver has been found to be effective in the treatment of these diseases, where a rapid and successful outcome was attained** through utilization of nanosilver and bio-equivalent hormonal therapy (May 2006 – Kent Holtorf, MD).<sup>60,61</sup>

Nanosilver has also been demonstrated to be effective against burns, severe chronic osteomyelitis, urinary tract infections, and central venous catheter infections.<sup>62,63</sup> Beyond even these astonishing outcomes, researchers have demonstrated in both animal and human studies that nanosilver can and will induce regenerative events that potentially exceed the promise of stem cell therapies.<sup>64</sup>

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<sup>57</sup> McDaniel R, MD, McDaniel C, DO. Ed.D, <http://www.fisherinstitute.org>

<sup>58</sup> Apsley, J, DC, Holtorf, K, MD, Gordon E, MD, Anderson, W, ND, Buttar, R, DO, "Nanotechnology's Latest Oncolytic Agent: Silver, Cancer & Infection Associations (Part III), 2006, p. 1.

<sup>59</sup> Rentz, E, DO, MSc, "Historic Perspectives on Clinical Use and Efficacy of Silver," In: AN Indepth History of Silver, 2003, p. 3.

<sup>60</sup> Immunogenic Research Foundation, Inc. Home Page, "Welcome to the Immunogenic Research Foundation's Home Page," <http://www.imref.org>

<sup>61</sup> Apsley, J, DC, Holtorf, K, MD, Gordon E, MD, Anderson, W, ND, Buttar, R, DO, "Nanotechnology's Latest Oncolytic Agent: Silver, Cancer & Infection Associations (Part III), 2006, p. 4-5.

<sup>62</sup> Feng, QL, et al., "A Mechanistic Study of the Antibacterial Effect of Silver Ions on Escherichia coli and Staphylococcus aureus," J Biomed Mater Res, March 2000; 52:662.

<sup>63</sup> Apsley, JW, MD, "Microbial Multi-drug Resistance (MDR) and Oligodynamic Silver," Immunogenic Research Foundation, Inc., IMREF Newsletter, September 2006; p. 1-6.

<sup>64</sup> Immunogenic Research Foundation, Inc. Home Page, "Welcome to the Immunogenic Research Foundation's Home Page," <http://www.imref.org>

The effects of nanosilver in anti-aging approaches is also very promising (Dr. Rashid Buttar). Dr. Buttar discovered Trans D-Tropin, a highly effective growth hormone stimulator that has produced astounding results. The combination of these technologies holds huge promise to treat anti-aging as well as runaway cancer growth.<sup>65</sup>

Restoring the strength and integrity to the human immune system, *that it has already been designed to possess*, is the key to longevity and good health.<sup>66</sup>

The finesse required to achieve the goal of producing a perfect SDC product for dietary supplementation is enhanced by the Transmission Electron Microscope. The microscope recommended for this purpose is the Phillips EM400T instrument, which is capable of resolution to less than 3 Angstroms. This instrument is a valuable quality control device.

- 9) The difficulties of elimination of silver particles from the body are in direct proportion to particle size.<sup>67</sup> Silver ions and atoms are first eliminated through the bile and then secondly through the kidney elimination route.<sup>68</sup> Apparently, large silver particles are deposited in the tissues rather than eliminated through the White Blood Cell-bile route mechanisms.<sup>69</sup> Emerging scientific investigations are revealing elimination routes for silver as silver ions or atoms suggest that elimination difficulties are proportional to the increase in silver particle size.<sup>70</sup> It follows, then, that the smaller the silver particle size, the less toxic silver is to the body. **Medicinal solutions of nanosilver have no known Lethal Dose (LD) or LD-50 value, nor is there any toxicity parameters established for nanosilver.**<sup>71,72</sup> Furthermore, the EPA and the FDA have no established RfC (Referenced Concentration level) for nanosilver.<sup>73</sup> The daily Reference Dose (RfD) for silver by the EPA is also questionable because it was based upon obsolete scientific data.
- 10) It is safe to declare that the safety of nanosilver falls well within the dosage amounts for Lowest Observed Adverse Event Level (LOAEL) set by the EPA.<sup>74</sup>
- 11) There is a compelling argument that nanosilver may be the solution to lessening the impact of viral plagues.<sup>75</sup> According to many health scientists and professionals, the

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<sup>65</sup> Ibid.

<sup>66</sup> Mannatech, Inc., <http://www.glycoscience.org>

<sup>67</sup> Luoma, SN, et al., "Biological Processes," Chapter 3. In: Silver in the Environment: Transport, Fate, and Effects, ed. AW Andren and TW Bober, Setac Press, Pensacola, FL, 2002; p. 66-73, 75-6, 82-6, 89-91.

<sup>68</sup> Agency for Toxic Substance and Disease Registry (ATSDR), U.S. Public Health Service, Clement International Corporation, Under Contract No. 205-88-0608, "Toxicological Profile for Silver," CAS# 7440-22-4, Section 5.1, December 1990; p, 40-1.

<sup>69</sup> Shinogi, M, Maeizumi, S, "Effect of Pre-Induction of Metallothionein on Tissue Distribution of Silver and Hepatic Lipid Peroxidation," *Biol Pharm Bulletin*, 1993; 16:372-4.

<sup>70</sup> Stillman, MJ, "Spectroscopic Studies of Copper and Silver Binding to Metallothioneins," In: Metal-Based Drugs, ed. Frank Shaw III, Freund Publishing House, Ltd, London, 1999; 6(4-5):277-90.

<sup>71</sup> Agency for Toxic Substance and Disease Registry (ATSDR), U.S. Public Health Service, Clement International Corporation, Under Contract No. 205-88-0608, "Toxicological Profile for Silver," CAS# 7440-22-4, December 1990; p, 1-144.

<sup>72</sup> Padlewska, KK, "Argyria," *eMedicine Journal*, November 2, 2001; 2(11).

<sup>73</sup> Research Triangle Institute, *Human Health and Ecological Risk Assessment Support to the Development of Technical Standards for Emissions from Combustion Units Burning Hazardous Wastes*, EPA Contract No. 68-W6-0053), 1999.

<sup>74</sup> U.S. Environmental Protection Agency, Integrated Risk Information system (IRIS), "Silver (CASRN 7440-22-4," I.A.4. Additional Studies/Comments (Oral RfD); <http://www.epa.gov/iris/subst/0099.htm>

next pandemic is overdue. Research with SDC should be done to determine if the two main “antigenic” surface glycoproteins of the flu virus A will receive SDC, and, thereby rapidly kill the virus cell.

Research may determine if SDC will easily defeat viral adsorption by the healthy host cell by **denaturing** surface/envelope proteins of the virus cell.<sup>76</sup> Altering **the shape** of a protein causes it to lose its biologic activity, which is named, “denaturation.”<sup>77</sup> Furthermore, SDC may be capable of entering the nucleus of a viral cell, thereby denaturing its capability to replicate through its RNA transcriptional end-products.<sup>78</sup> This strategy has the added benefit of treating newly created virus strains that specifically formulated drugs are unable to treat.

The same holds true for any new vaccine, because of the high rate of influenza mutation<sup>79</sup> (Tamiflu by Roche-Holding, for example)<sup>80</sup> (where the US government paid the company **billions** for a vaccine that may not work). There are currently over 200 known virus strains for upper respiratory tract infections (URTI). There are currently 24 major virus strains (not including each subgroup of each virus) that are known to succumb to nanosilver.

- 12) Nanosilver’s ability to kill virus, bacteria, and fungal organisms is noteworthy. There are currently many types of bacteria, virus, and fungus that are known to succumb to nanosilver, including the microbes that cause strep throat, pneumonia, diphtheria, gonorrhoeae, herpes, the flu, bronchitis, tuberculosis, and inflammatory conditions of the eyes, ears, nose, and throat.<sup>81</sup>

Furthermore, it has been demonstrated that nanosilver has a beneficial effect upon co-infections simultaneously.<sup>82</sup> In these cases, nanosilver demonstrated the capability of killing pathogens and purging the bloodstream of immune suppressing moieties, so as to restore the immune system **in a single treatment**.<sup>83</sup>

- 13) The pharmacology of nanosilver is astounding. The following pharmacokinetic information is provided:
  - a) The absorption of nanosilver into the body is nearly instantaneous.<sup>84</sup>
  - b) It has been observed that nanosilver will readily pass the blood-brain barrier, allowing for interface and intervention with neuropathologies such as ALS, MS, polio, spinal meningitis, viral encephalitis, and possibly Mad Cow Disease.<sup>85</sup>

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<sup>75</sup> Gordon, E, MD, Holtorf, K, MD, “Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?” (Part I) 2006, p.1.

<sup>76</sup> Ibid., p.3

<sup>77</sup> Murray, RK, MD, PhD, “*Glycoproteins: Crucial Molecules for Health*,” Published by the Research and Development Department of Mannatech, Inc., [www.usa.GlycoScience.com](http://www.usa.GlycoScience.com): The Nutrition Science Site, 2002-2003; p.2.

<sup>78</sup> Gordon, E, MD, Holtorf, K, MD, “Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?” (Part II) 2006, p.1.

<sup>79</sup> Ibid., p.5.

<sup>80</sup> Ibid., p.1.

<sup>81</sup> Ibid., p. 2.

<sup>82</sup> Ibid., p.2.

<sup>83</sup> Ibid., p.2

<sup>84</sup> Ibid., p.2

<sup>85</sup> Ibid., p.2.

- c) ***White Blood Cells (WBC's) are known to hoard nanosilver out of the bloodstream***, so it is likely that immunity is greatly enhanced with nanosilver.<sup>86</sup> It is now clear that nanosilver promotes the respiratory burst of WBC's.<sup>87</sup> Nanosilver's abilities extend to upregulation of the phagocytic index.<sup>88</sup> This index measures the average number of bacteria ingested per leukocyte (WBC) of the patient's blood.<sup>89</sup> This ability of nanosilver has been widely reported in authoritative medical literature for the past 100 years.<sup>90</sup>
- d) It is also confirmed that nanosilver increases the Red Blood Cell count, too.<sup>91</sup>
- e) No matter how silver enters the body, the predominant route of elimination is the feces. The body rids itself of silver in anywhere from 2 to 4 days to 5 years, depending upon particle size. This provides a therapeutic window to recharge spent silver. The therapeutic window is estimated to be 12-24 hours.<sup>92</sup>
- f) Nanosilver is known to negatively effect bacteria through lethal oxidation,
- g) an "intermolecular electron transfer," resulting in electrocution,
- h) a binding and chelating to essential pathogen receptor sites, which defeats the pathogen's mechanisms of invasion into host cells,
- i) an ion non-dependent heightened catalytic action, and
- j) cleavage, which fragments essential pathogen/proteinaceous structures.<sup>93</sup>
- k) Uniform nanosilver particles generate an adsorption power many magnitudes of order greater than any previous silver product.<sup>94</sup> Adsorption is defined as "the action of a substance in attracting and holding other materials or particles on its surface."<sup>95</sup> This means that **there should actually be more than one silver ion in the system for every atom in every bacterial cell.**<sup>96</sup> This characteristic of nanosilver is especially important in the immune system functions, where pre-treatment and post-treatment conditions must be considered.<sup>97</sup>

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<sup>86</sup>Ibid., p. 2.

<sup>87</sup> Ibid., p.2.

<sup>88</sup> Apsley, John W. II, DC, MD(E), "Has Nanotechnology Given Us the Latest Silver Bullet for Dealing with Our Most Serious Infections?" IMREF Newsletter, August 2006, by Immunogenic Research Foundation, Inc. p. 1-6.

<sup>89</sup> Wikimedia

<sup>90</sup> Rentz, E, DO, MSc, "Historic Perspectives on Clinical Use and Efficacy of Silver," In: AN Indepth History of Silver, 2003, p. 1-3.

<sup>91</sup> Bechhold, H, Bullowa, JGM, Colloids in Biology and Medicine, D. Van Nostrand Co., NY, 1919, p. 371-4.

<sup>92</sup> Gordon, E, MD, Holtorf, K, MD, "Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?" (Part II) 2006, p.2.

<sup>93</sup> Ibid., p.5.

<sup>94</sup> Ibid., p.5.

<sup>95</sup> Wikimedia

<sup>96</sup> Hartman, RJ. Colloid Chemistry, Houghton Mifflin Co., The Riverside Press, Cambridge, MA, 1939, p.13.

<sup>97</sup> Gordon, E, MD, Holtorf, K, MD, "Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?" (Part II) 2006, p.1.

- l) Only a non-pathological cosmetic discoloration (argyria) has been established as the sole “adverse event” for silver,<sup>98</sup> and this event has been established from the toxic effects of silver salts.<sup>99</sup> SDC is not a silver salt, nor does it get transformed into a silver salt upon entering the body.<sup>100</sup> The EPA has currently limited the oral intake of silver to 25 grams over a 70-year period for a 150 pound adult.<sup>101</sup>

To ingest SDC over a 70-year period to reach an intake of 25 grams would require a 150-pound person to begin consuming SDC at age 15 at a rate of about 1,000ppm per day until age 85. And then it must be assumed that, having consumed that amount, nanosilver causes argyria, which it is already known not to do.

- m) The key to *in vivo* dosing is saturating the focal point(s) (whether local or systemic) with approximately 1ppm to 10ppm of nanosilver for acute infectious processes, and up to 27ppm for chronic infections with heavy pathogen loads.<sup>102</sup> The 27ppm level was determined after a nanosilver solution (27ppm as the target saturation point for the blood plasma) was given in the mid-1990’s to AIDS patients, which was sufficient to **completely convert to sero-negative** all advanced AIDS patients presenting with frank Candidiasis (caused by a fungus) and Wasting Syndrome (caused by malnutrition), **when provided with a single dose.**<sup>103</sup>

- 14) The sero-negative report in 12)m) above requires more explanation. The observed phenomena of sero-negativity was determined to be caused by the action of the nanosilver particles.<sup>104</sup>

Evidently, the nanosilver acted upon the CD4 and CD8 T helper cells in such a way that the body’s deficiency of these cells was rapidly corrected in 24 to 72 hours, **resulting in total recovery.**<sup>105</sup> Evidently, the nanosilver initially and temporarily caused a drop in the number of T cells in the blood.<sup>106</sup> This is theorized to have occurred because the T cells were infected, and the nanosilver killed them in the mechanisms described in 20 below.<sup>107</sup> Following this episode, there was a rapid “rebound effect,” resulting in a dramatic increase in the number of healthy T cells in the bloodstream.<sup>108</sup> This “rebound effect” of silver has been widely noted in authoritative medical literature over the past 80 years.<sup>109</sup>

Interestingly, Cluster Differentiation cells (“CD” cells) (there are currently 32 identified types of CD cells) are a set of immunologically significant cell surface glycoprotein molecules (cell signaling molecules) found most primarily on WBC’s.<sup>110</sup> (WBC’s are

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<sup>98</sup> Rentz, E, DO, COMM, CNMO, “*Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention,*” *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>99</sup> *Handbook of Chemistry and Physics*, ed. David R. Lide, CRC Press, Boca Raton, FL., 2000; Section 4, p.27.

<sup>100</sup> Arata, Andrew, Conversation with James Mackey, January 17, 2007.

<sup>101</sup> U.S. Environmental Protection Agency, Integrated Risk Information system (IRIS), “*Silver (CASRN 7440-22-4,*” I.A.4. Additional Studies/Comments (Oral RfD); <http://www.epa.gov/iris/subst/0099.htm>

<sup>102</sup> Apsley, John W. II, DC, MD(E), “Has Nanotechnology Given Us the Latest Silver Bullet for Dealing with Our Most Serious Infections?” IMREF Newsletter, August 2006, by Immunogenic Research Foundation, Inc. p. 1-6.

<sup>103</sup> Ibid.

<sup>104</sup> Ibid.

<sup>105</sup> Ibid.

<sup>106</sup> Ibid.

<sup>107</sup> Ibid.

<sup>108</sup> Ibid.

<sup>109</sup> Ibid.

<sup>110</sup> Ibid.

produced in the bone marrow)<sup>111</sup> (stem cells are also produced in the bone marrow).<sup>112</sup> The WBC ligand-induced changes in the behavior of receptor proteins result in physiological changes that constitute the biological actions of the WBC ligands.<sup>113</sup>

This biological activity on the surface of the cells is extremely interesting research because that is a focal point of glycobiology (cell signaling mechanisms). Nanosilver causes a dramatic WBC and RBC burst, in addition to its other healing properties.<sup>114</sup>

- 15) The call for clinical investigators to discover the full potential of nanosilver involves the following research to identify dosage ranges and time periods of dosages of nanosilver on an empty stomach to alleviate symptoms.
  - a) *Early Acute Upper Respiratory Tract Infections (URTI)*
  - b) *Acute Respiratory Distress*
  - c) *Severe Acute Respiratory Distress*
  - d) *Chronic Infections with Heavy Loads and Co-infections*<sup>115</sup>
  
- 16) It has long been suspected that infectious agents are associated with solid tumor cancers, as well as non-tumor based cancers, such as leukemia. Also, cancer patients undergo therapy which suppresses the immune system, allowing for multiple pathogen foci to seed in the body.<sup>116</sup> Nanosilver may have the potential to play a dual role:
  - a) either destroy the infectious etiological agent of the cancer, or
  - b) destroy the pathogen loads arising with patients with compromised immune systems.<sup>117</sup>

It has already been documented that many of these cancer infections are susceptible to nanosilver.

- 17) Nanosilver has been documented to:
  - a) Absorb, interact with, and destroy bacteria;
  - b) Affect abnormal human tissue at the site of infection; and
  - c) Favorably upregulate immune tissues and healing mechanisms.<sup>118</sup>

**These abilities are augmented by the fact that nanosilver enjoys the greatest surface presentation and Particle Diffusion Coefficient ever created.** At this size

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<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

<sup>113</sup> Ibid.

<sup>114</sup> Apsley, JW, "Achieve a Healthier Immune System with Oligodynamic Sovereign Silver," Natural-Immunogenics Corporation, 2003; p. 1

<sup>115</sup> Gordon, E, MD, Holtorf, K, MD, "Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?" (Part II) 2006, p.4.

<sup>116</sup> Ibid.

<sup>117</sup> Ibid.

<sup>118</sup> Apsley, J, DC, Holtorf, K, MD, Gordon E, MD, Anderson, W, ND, Buttar, R, DO, "Nanotechnology's Latest Oncolytic Agent: Silver, Cancer & Infection Associations (part III), 2006, p. 2.

range and activity level, nanosilver will impregnate all collective atoms within each tumor cell or pathogen cell with up to one silver ion. This saturation potential supercharges nanosilver's ability to displace the Potassium-dependent glucose transport mechanism<sup>119</sup> (the exclusive means by which cancerous cells feed themselves as opposed to normal cells that enjoy two other additional means to feed themselves) (glucose and ATP),<sup>120</sup> thereby selectively starving cancer cells without harming healthy cells.<sup>121</sup>

The mechanism of starving as it relates to nanosilver can be explained: Once nanosilver penetrates the cell membrane, life-essential enzyme reactions governing cell metabolism go into partial or full arrest. Fortunately, cancer cells appear to lack the antioxidants necessary to defend against this potassium displacement by nanosilver.<sup>122</sup> The consumption of antioxidants as a dietary supplement is nevertheless encouraged to help down-regulate the liver antioxidant profile from treatment with nanosilver.<sup>123</sup>

- 18) Because nanosilver is readily absorbed into the stomach (and it could even be **instantly** absorbed through the mouth), it does not travel to the intestinal tract. The beneficial bacteria in the intestinal tract will not be exposed to nanosilver,<sup>124</sup> which presumably could destroy them. The rapid absorption into the bloodstream through the tissues in the stomach (or mouth) mirrors the absorption of nanosilver into germs.<sup>125</sup>
- 19) Nanosilver attacks mutated super germs without hurting human tissues, destroys germs from the inside out, does not harm good bacteria in the human intestine, is effective against viruses, and increases the rate and efficiency at which immune cells destroy germs. These characteristics far exceed the capabilities of patented antibiotics, which cannot keep up with bacterial organisms' ability to mutate, nor do antibiotics work against viruses.<sup>126</sup>

In addition, antibiotics have many side effects, such as yeast infections. This is because antibiotics travel deep into the intestinal tract, where they kill the good bacteria along with the bad. It is also known that taking antibiotics over a long time period weakens the body's immune system.<sup>127</sup>

**In summary, it can be confidently declared and scientifically proven that nanosilver is far safer than antibiotics or any other antimicrobial ever created.**<sup>128</sup>

- 20) Silver is in the same family of metals as copper and gold. Copper is an essential nutrient, and gold has been used widely to treat a form of arthritis. This family of

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<sup>119</sup> Ibid., p. 2.

<sup>120</sup> Apsley, JW, MD, "Microbial Multi-drug Resistance (MDR) and Oligodynamic Silver," Immunogenic Research Foundation, Inc., IMREF Newsletter, September 2006; p. 1-6.

<sup>121</sup> Apsley, J, DC, Holtorf, K, MD, Gordon E, MD, Anderson, W, ND, Buttar, R, DO, "Nanotechnology's Latest Oncolytic Agent: Silver, Cancer & Infection Associations (part III), 2006, p. 2.

<sup>122</sup> Ibid., p. 3.

<sup>123</sup> Ibid., p. 4.

<sup>124</sup> Apsley, John W. II, DC, MD(E), "Has Nanotechnology Given Us the Latest Silver Bullet for Dealing with Our Most Serious Infections?" IMREF Newsletter, August 2006, by Immunogenic Research Foundation, Inc. p. 1-6.

<sup>125</sup> Ibid.

<sup>126</sup> Ibid.

<sup>127</sup> Ibid.

<sup>128</sup> Apsley, J, DC, Holtorf, K, MD, Gordon E, MD, Anderson, W, ND, Buttar, R, DO, "Nanotechnology's Latest Oncolytic Agent: Silver, Cancer & Infection Associations (part III), 2006, p. 2.

metals are indispensable for bringing about a key reaction within the body's defense system. The body utilizes these metals to produce a chemical lethal to germs but harmless to human cells called a "superoxide radical."<sup>129</sup> If the body has an abundant supply of antioxidants in its system, such as selenium, Vitamin E, and amino acids like N-acetyl cysteine, the body is safe from any harmful effects from this family of metals.<sup>130</sup>

Germs, however, are not. Nanosilver also enables the body to produce another superoxide radical named, "hydrogen peroxide."<sup>131</sup> These "superoxide radicals" utilize the oxygen atom in an electron transfer mechanism, which *electrocutes* the germs.<sup>132</sup>

- 21) **Nanosilver's antigerm effectiveness goes even deeper.** Nanosilver destroys germs both outside the cell, as well as inside the cell.<sup>133</sup> This capability is important because there are a wide spectrum of germs that are located inside the cells (such as HIV) which invades the WBC's. It becomes more difficult for drugs to attack the invaders located inside the cell without becoming lethal to the cell.

Nanosilver works like 3 antibiotics combined. Nanosilver viciously attacks all three of the germ's vulnerable targets in a triple denaturing action:

- a) Nanosilver ruptures the germ's outer membrane, causing the germ's vital internal components to become exposed in the bloodstream to the WBC's. While the WBC's in the bloodstream attack the inner components,
  - b) the nanosilver continues its activities to destroy these internal components by cutting up its vital enzymes.
  - c) Furthermore, nanosilver then also penetrates into the nucleus of the germ, where its vital gene pool is stored. Once nanosilver attaches to these genes, the genes become paralyzed, and the germ cannot replicate itself.<sup>134</sup>
- 22) Nanosilver also helps certain types of immune cells called "lymphocytes," which are a type of WBC.<sup>135</sup> These cells, which include "natural killer cells" (NK cells), have been determined to more rapidly travel and identify an immune target when nanosilver is present.<sup>136</sup> This action is called the Opsonic Index.

The Opsonic Index is a measure of opsonic activity determined by the ratio of the number of microorganisms phagocytized (SEE: 12)c) above) by normal leukocytes (WBC's) in the presence of serum from an individual infected by the microorganism, to the number phagocytized in serum from a normal individual.<sup>137</sup> The Opsonic Index is

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<sup>129</sup> Samuni, A, et al., "On the Cytotoxicity of Vitamin C and Metal Ions," Eur J Biochem, 1983; 99:562.

<sup>130</sup> Apsley, John W. II, DC, MD(E), "Has Nanotechnology Given Us the Latest Silver Bullet for Dealing with Our Most Serious Infections?" IMREF Newsletter, August 2006, by Immunogenic Research Foundation, Inc.

<sup>131</sup> Jansson, G, Harms-Ringdahl, M, "Stimulating Effects of Mercury- and Silver Ions on the Superoxide Anion Production in Human Polymorphonuclear Leukocytes," Free Radic Res Commun, 1993; 18(2):87-98

<sup>132</sup> Antelman, MS, U.S. Patent Number 5,676,977. Method of curing AIDS with tetrasilver tetroxide molecular crystal devices. October 14<sup>th</sup>, 1997.

<sup>133</sup> Thurman, RB, Gerba, CP, "The Molecular Mechanisms of Copper and Silver Ion Disinfection of Bacteria and Viruses," CRC Critical Reviews in Environmental Control, 1989; 18(4):302.

<sup>134</sup> Feng, QL, et al., "A Mechanistic Study of the Antibacterial Effect of Silver Ions on Escherichia coli and Staphylococcus aureus," J Biomed Mater Res, March 2000; 52:662.

<sup>135</sup> Apsley, p.3

<sup>136</sup> Apsley, p.3

<sup>137</sup> Wikimedia

induced from the die-off of germs.<sup>138</sup> This die-off can produce discharge symptoms called Jarisch-Herxheimer Effects (JHE's). Specific kinds of immune cells become highly excited by the residue of germ die-off. These cells respond to the die-off by producing, or secreting, inflammatory chemicals. The chemicals help the body eliminate the debris from the body. Nanosilver; therefore, induces JHE's.<sup>139</sup>  
**Nanosilver's abilities do not stop here.**

Certain types of germs (like staphylococcus endotoxin and a fungal endotoxin) become toxic when they die. Once nanosilver ruptures a bacterial staph infection or certain fungal infections, the remaining nanosilver particles begin to act as an antidote to the resulting poisons. It appears that nanosilver can help the body during the very uncomfortable time period of JHE's (12 to 72 hours).<sup>140</sup>

All of this indicates the importance of having nanosilver recommended as a dietary supplement with an RDA value (because it will prevent diseases from reaching advanced stages).<sup>141</sup>

- 23) Limiting our comments in this section to only the value of nanosilver particles in relation to the immune system, one can reach certain conclusions:
- a) Nanosilver particles help stimulate immature blood cells to become fully-functioning adult cells.<sup>142</sup>

**Explanation of 22)a):**

In 1929, silver was found to optimally stimulate the reticulo – endothelial system (RES).<sup>143</sup> The RES is part of the immune system. The explanation of how silver stimulates the RES falls beyond the scope of this paper, and therefore, will be provided at a future time. It must be noted; however, that any explanation of the immune system will be incomplete, since there is still much to be discovered in the intricate mechanisms of the immune system as a whole. (SEE: Dr. John Axford)

- b) Nanosilver particles provide a precise immune support for WBC's<sup>144</sup>

The immune system must be mobilized in order to begin healing the body. WBC's utilize tools to help them eliminate disease from the body. One group of tools used by WBC's is the Reactive Oxygen Species (ROS). The ROS species is described in 19) above. The ROS can be described as "immune digestive aids."<sup>145</sup> Nanosilver; therefore promotes production of ROS. The targets of ROS are noxious proteins such as unfriendly enzymes, which are intrusive proteins within membranes of foreign nucleic acids.<sup>146</sup>

- c) Nanosilver particles enhance target-specific immunity<sup>147</sup>

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<sup>138</sup> Apsley, p.3

<sup>139</sup> Apsley p.3

<sup>140</sup> Apsley, p.4

<sup>141</sup> Gordon, E, MD, Holtorf, K, MD, "Promising Cure to URTI Pandemics Including the Avian Flu (H5N1): Has The Final Solution to The Coming Plagues Been Discovered?" (Part II) 2006, p.4.

<sup>142</sup> Apsley, JW, "Sovereign Silver Promotes Healthier Immunity," Natural-Immunogenics Corporation, 2003; p.1-4.

<sup>143</sup> Ibid.

<sup>144</sup> Ibid.

<sup>145</sup> Apsley, JW, "Sovereign Silver Promotes Healthier Immunity," Natural-Immunogenics Corporation, 2003; p.1-4.

<sup>146</sup> Ibid.

<sup>147</sup> Ibid.

When silver ions are added to ROS actions, they become site specific to the targets!<sup>148</sup> This provides rapid (Opsonic Index), repetitive immune efforts against such threats. Further support comes from secondary ROS, which look upon the same immune target area. In other words, ROS and silver ions **recycle** each other's efforts until the job is done! Scientific evidence suggests that nanosilver delivers active and recyclable silver ions that can redouble their efforts until local immunity is restored.<sup>149</sup>

d) Nanosilver boosts the ability of WBC's to intercept immune risks,<sup>150</sup> and

Nanosilver supports the *tracking, mobilization, recognition* and *surveillance* power of special WBC's. This is the Opsonic Index. Without the Opsonic Index, much of the immune system would be blind. In other words, silver ions appear to improve the WBC "senses," or cell signaling capabilities. **Nanosilver may enhance the WBC's to "prime" themselves to go on the offensive.**<sup>151</sup> The ability to enhance the immune system's response to JHE's also fall into this "interception" concept.<sup>152</sup>

e) Nanosilver particles help eradicate unhealthy immune challenges.<sup>153</sup>

From all of the above enhancements made available through nanosilver, there comes a point when there is a "cumulative effect" – the overall fitness of the immune system.<sup>154</sup> WBC's must *track, intercept*, and then *engulf* and *digest* foreign bodies well. This is the Phagocytic Index. In 1919, utilizing very large (and therefore less efficacious) colloidal silver particles, it was scientifically demonstrated that colloidal silver increased the Phagocytic Index by 24 percent ! This is compelling !<sup>155</sup>

- 24) Concerning the deleterious effects nanosilver may have on nutrients, there is an almost complete lack of information regarding such consequences of nanosilver sterilization, which would be of particular interest for fruit juices preserved in this manner. It has been stated repeatedly that the preservation of Vitamin C content of fruit juices treated with nanosilver was particularly successful. Evidently, the nanosilver concentrations required for preservation are insufficient to actually cause changes in the nutrient values. Nothing appears to be known about nanosilver with other vitamins. The necessity for better information concerning these questions is evident. It can be safely stated that nanosilver is practically insoluble in those compounds which can occur under practical conditions.<sup>156</sup>
- 25) The Therapeutic Index of silver activity depends upon the speciation of the silver.<sup>157,158</sup> Therapeutics will differ by orders of magnitude from the larger size particles to the smaller size particles, increasing as the silver particle size decreases.<sup>159</sup> Therapeutics will again be boosted by several orders of magnitude according to what percentage of

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<sup>148</sup> Ibid.

<sup>149</sup> Ibid.

<sup>150</sup> Ibid.

<sup>151</sup> Ibid.

<sup>152</sup> Ibid.

<sup>153</sup> Ibid.

<sup>154</sup> Ibid.

<sup>155</sup> Ibid.

<sup>156</sup> *Silver in Industry*, ed. By Lawrence Addicks, Reinhold Publishing Corporation. 1940, p. 401-429,

<sup>157</sup> Rentz, E, DO, MSc, "Historic Perspectives on Clinical Use and Efficacy of Silver," In: AN Indepth History of Silver, 2003, p. 2.

<sup>158</sup> Immunogenic Research Foundation, "Safety of Oligodynamic Silver Hydrosols," 2006; p. 1-14.

<sup>159</sup> Ibid.

the silver particles are in the charged state.<sup>160</sup> The higher percentage of charged particles per volume, the greater the microcidal activity.<sup>161</sup>

Reduced or neutral silver has no known medicinal value. The electric charge of the nanosilver particle is crucial to its medicinal value.<sup>162</sup>

The Therapeutic Index (also known as “therapeutic ratio” or “margin of safety”), is a comparison of the amount of a therapeutic agent that causes the therapeutic effect to the amount that causes toxic effects. Quantitatively, it is the ratio given by the dose required to produce the toxic effect divided by the therapeutic dose. A commonly used measure of therapeutic index is the lethal dose of a drug for 50% of the population ( $LD_{50}$ ) divided by the effective dose for 50% of the population ( $ED_{50}$ ).<sup>163</sup>

$$\text{Therapeutic ratio} = \frac{LD_{50}}{ED_{50}}$$

Nanosilver has a very high therapeutic value because there is no known  $LD_{50}$  for nanosilver,<sup>164</sup> and there is only one known deleterious side effect – argyria – and the only known side effect does not apply to nanosilver speciation, but only to colloidal silver compounds, especially silver salts.<sup>165</sup> The effective dose, on the other hand, is very low when compared to a ***strictly theoretical*** lethal dose.

- 26) It is helpful to understand the importance of the SDC technology by understanding it in relation to the history of the emergence of high-tech silver formulations.

Leading up to the 1940’s, colloidal silver compounds were used, which were typically very large particles of silver. Particle size ranged from 0.014 to 0.026 microns (14 to 26 nanometers).<sup>166,167</sup>

After the 1940’s, the only two silver compounds left in wide use were silver nitrate and silver sulfadiazine (which are still used today). Then the advancement of modern nanotechnology manufacturing processes enabled the production of nanoscalar and picoscalar colloidal silver particles. At least one company has produced a colloidal silver particle 0.008 microns (0.8 nanometers)<sup>168</sup>

Nano/picoscalar silver was tested against silver sulfadiazine and found to be *10-100 times more lethal* against both Gram-positive and Gram-negative pathogens.<sup>169</sup> Its efficacy was largely due to its surface area coverage,<sup>170</sup> which was estimated to

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<sup>160</sup> Ibid.

<sup>161</sup> Ibid.

<sup>162</sup> Ibid.

<sup>163</sup> Wikimedia

<sup>164</sup> Agency for Toxic Substance and Disease Registry (ATSDR), U.S. Public Health Service, Clement International Corporation, Under Contract No. 205-88-0608, “Toxicological Profile for Silver,” CAS# 7440-22-4, December 1990; p. 1-144.

<sup>165</sup> e-Medicine Journal, November 2, 2001; Number 11.

<sup>166</sup> Bechhold, H, Bullowa, JGM, *Colloids in Biology and Medicine*, D. Van Nostrand Co., NY, 1919, p. 13.

<sup>167</sup> Rentz, E, DO, COMM, CNMO, “Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention,” *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>168</sup> Immunogenic Research Foundation, “Safety of Oligodynamic Silver Hydrosols,” 2006; p. 2.

<sup>169</sup> Rentz, E, DO, COMM, CNMO, “Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention,” *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>170</sup> Feng, QL, et al., “A Mechanistic Study of the Antibacterial Effect of Silver Ions on Escherichia coli and Staphylococcus aureus,” *J Biomed Mater Res*, March 2000; 52:662.

approach six square kilometers per cubic centimeter of product.<sup>171</sup> *Exposure time to destroy pathogens was reduced from hours to minutes with the new colloidal technology.*<sup>172</sup>

SDC represents the final step in silver particle size, being only one atom of silver. *The exposure time to destroy pathogens with SDC is now down to mere seconds.*<sup>173</sup> The form of silver in SDC is non-metallic and extremely small, which makes it absolutely perfect for medicinal purposes. The particle charge of SDC is positive, identifying it as a cation (having more protons than electrons). SDC is produced electrolytically, making the single atom of silver available in a stable form.<sup>174</sup> The stability of SDC is particularly important because it will resist combination with the chloride compounds in the body.<sup>175</sup> This resistance is important because the activity of the silver atom in SDC will not become limited by the limitations of the salts themselves.<sup>176, 177</sup> When silver bonds into a “salt form,” with phosphates, chlorides, sulfides, etc., this bonding activity reduces its surface coverage and microcidal activity.<sup>178</sup> The silver atom’s activities in SDC are enhanced by its existence in the body as a catalyst for free radical processes (ROS, dedifferentiation, etc).<sup>179</sup>

- 27) The extremely small size of the silver and the positive charge of the silver atom in SDC is important in a number of ways (and it can be assumed that this importance will continue to escalate as additional research is performed). For the purposes of this report, current research in nanosilver’s ability to destroy the SARS virus is educational.

SARS is suspected of being a mutant human coronavirus, comprised of a “layered envelope-capsid complex” predominately composed of proteins and glycoproteins and a long flexible coiled helix.<sup>180</sup> SDC, or “nanosilver,” should readily denature:

- a) its envelope,
- b) capsid,
- c) protein constituents, and
- d) its entire genome.<sup>181</sup>

Nanosilver has been shown to be a first order inhibitor of both rennin and protease in HIV. The mechanism of action of nanosilver, in this case, is to denature the protein and

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<sup>171</sup> Quinto, S, “*Sovereign Silver News*,” Natural-Immunogenics Corporation, Newsletter Volume 1, No. 1, March/April 2006; p. 1-4.

<sup>172</sup> *In vitro* investigations published by Departments of Microbiology, Pathology, Infectious Diseases, Biology, etc. from many universities such as Johns Hopkins, University of Arkansas, Georgetown University Medical Center, NYU Medical Center; circa 1996-2006.

<sup>173</sup> Arata, A, Pure Bioscience, Conversation with James W. Mackey, January 17, 2007.

<sup>174</sup> Ibid.

<sup>175</sup> Ibid.

<sup>176</sup> Goetz, A, “The Oligodynamic Effect of Silver,” Chapter 16, ed. Lawrence Addicks, *Silver in Industry*, Reinhold Publishing Corporation, NY, 1940; p. 409.

<sup>177</sup> Apsley, JW, MD, “*Microbial Multi-drug Resistance (MDR) and Oligodynamic Silver*,” Immunogenic Research Foundation, Inc., IMREF Newsletter, September 2006; p. 1-6.

<sup>178</sup> Russell, AD, Path, FR, Hugo, WB, “Antimicrobial Activity and Action of Silver,” *Prog Med Chem*, 1994; 31:354.

<sup>179</sup> Apsley, JW, “Sovereign Silver Promotes Healthier Immunity,” Natural-Immunogenics Corporation, 2003; p.1-4.

<sup>180</sup> Rentz, E, DO, COMM, CNMO, “*Viral Pathogens and Severe Acute Respiratory Syndrome: Oligodynamic Silver for Direct Immune Intervention*,” *Journal of Nutritional & Environmental Medicine* (June 2003) 13(2), 109-118.

<sup>181</sup> Ibid.

glycoproteins in the envelope-capsid complex by swapping protons with the rennin molecules and the protease molecules, thus rendering them inert.<sup>182</sup>

In the case of SARS, a nanosilver formula is capable of impregnating (cleavage) up to 30,000 particles into the outer envelope of a single coronavirus 100 nanometers in diameter.<sup>183</sup>

Metal chelators (such as nanosilver) have been shown to form metal-linked 20ebuliz<sup>184</sup> (two molecules linked together).<sup>185</sup> By chelation (which is a process similar to the way in which silver is absorbed out of the soil by plants)<sup>186</sup> to the proteins and glycoproteins, nanosilver intervenes in the virus' life cycle, interrupting the ability of the virus to replicate.<sup>187</sup>

The most effective administration of the nanosilver into the body in the specific case of SARS (an URTI disease) would be to 20ebulizer, or atomize, or vaporize, the SDC through a mechanical device, whereby the patient could breathe the nanosilver directly into the lungs. The sub-micron particles would then penetrate the viral envelope.<sup>188</sup>

SARS probably has the following multiple protein-related targets vulnerable to the denaturing action of nanosilver:

- a) protein gene,
- b) nucleocapsid protein,
- c) integral membrane matrix protein,
- d) club-shaped peplomer,
- e) hemagglutinin/esterase,
- f) RNA-dependent RNA polymerase, and
- g) protein kinase.<sup>189</sup>

- 28) The disconcerting thing about silver's medicinal value is that it is now against the law to speak about it. The Dietary Supplement Health and Education Act (DSHEA) of 1994 "protected" vitamins, minerals, and botanicals as being treated as drugs.<sup>190</sup> Dietary supplements now have the "freedom" to make what are known as structure/function claims. Permissible claims may characterize the means by which a nutrient or dietary ingredient acts to maintain the structure or function of the body. For nanosilver, this means a claim may be made such as,

"SDC may be an effective tool for supporting your immune system in the presence of emerging strains of bacterial, viral and fungal infections, and may also support tissue regeneration."

But this claim must be followed by the statement,

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<sup>182</sup> Ibid.

<sup>183</sup> Ibid.

<sup>184</sup> Ibid.

<sup>185</sup> Ibid.

<sup>186</sup> Ibid.

<sup>187</sup> Ibid.

<sup>188</sup> Ibid.

<sup>189</sup> Ibid.

<sup>190</sup> Quinto, S, "Sovereign Silver News," Natural-Immunogenics Corporation, Newsletter Volume 1, No. 1, March/April 2006; p. 1-4

“This statement has not been evaluated by the FDA. This product is not intended to diagnose, treat, cure, or prevent any disease.”

In short, one cannot cross the line from a structure/function statement to what the FDA considers a “disease claim” without falling under the auspices of drug regulation.<sup>191</sup>

Fortunately, there is a new law being considered in Congress which would change this infringement upon our right to free speech. It is HR 4282. The most important part of the law (which is sweeping in its scope) would be to allow truthful and scientifically-based therapeutic claims for foods and dietary supplements. In the case of nanosilver, it is absolutely necessary to have this law enacted. It is strongly recommended that we utilize all of our resources to help pass this law.

#### SUMMARY OF HR 4282 – **WHICH DID NOT PASS IN CONGRESS**

##### **11/9/2005–Introduced.**

Health Freedom Protection Act – Amends the Federal Food, Drug, and Cosmetic Act (FFDCA) to provide that a food or dietary supplement is not a drug solely because the label or labeling contains a claim to cure, mitigate, treat, or prevent disease.

Prohibits the Secretary of Health and Human Services from:

2. restricting the reprinting and distribution or sale of any U.S. government publication or any accurate quotations of such a publication, including content concerning nutrients and disease treatment or prevention; or

(2) construing the distribution or sale of, or accurate quotation from, such a publication in connection with the sale of a food or dietary supplement as evidence of an intent to sell that food or dietary supplement as a drug requires the Secretary to allow claims on food or nutrient labeling that characterize the relationship of a nutrient to the cure, mitigation, treatment, or prevention of a disease (with no more than a three-sentence disclaimer) unless the Secretary proves by clear and convincing evidence that:

2. there is no scientific evidence that supports the claim; and

(2) the claim is inherently misleading and incapable of being rendered non-misleading through the addition of a disclaimer.

Authorizes the use of specified health claims on the label of all foods and dietary supplements, including claims related to saw palmetto, omega-3 fatty acids, glucosamine, and calcium.

Allows a statement for a dietary supplement to include words that are recognized as signs or symptoms of disease so long as the statement does not include the name of a specific disease.

Amends the Federal Trade Commission Act to exempt from being regulated as advertising:

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<sup>191</sup> Ibid.

2. government publications exempted from reprinting or distribution restrictions under FFDCFA; or

(2) accurate summaries of scientific publications.

Places the burden of proof that an advertisement for a dietary supplement or ingredient is false and misleading on the Federal Trade Commission.

- 29) In consideration of this paper's purpose of promoting the concept of utilizing SDC as a nutritional supplement *because of its therapeutic value*, the question arises as to how much SDC actually reaches the target site and how fast does it get there? Finding the answers to these questions involve the utilization of proper testing protocols, as well as a number of other factors.

The skills of the researcher are challenged by six factors:

- a) Where is the foci?
- b) What form of administration will best deliver SDC?
- c) What is the total pathogen load?
- d) What specific pathogen is involved?
- e) What frequency of dosage is required to defeat the pathogen?
- f) What concentration is required to defeat the pathogen?

These factors determine the difference between therapeutic success or failure.<sup>192</sup>

- 30) The need for answers to the above questions remain unanswered.

This is unfortunate, because the mortality rate for drug resistant infections continues to climb. In 1992, Newsweek reported that 13,000 hospital patients **died** from drug resistant infections. The next year, there were 70,000. The next year, the CDC declared this health crisis as the # 1 health issue in America.<sup>193</sup> Now, twelve years later, in 2007, the number of **deaths** is projected to far surpass 100,000.<sup>194</sup>

Right up to the present moment, microbial resistance to medicinal silver (nanosilver) has not been scientifically established.<sup>195, 196</sup>

- 31) Following the work of Dr. Becker, another big breakthrough for ***the re-utilization*** of silver for medicinal purposes occurred in China in the year 2000.<sup>197</sup> A team of great researchers in China (Feng, *et al*) demonstrated that a silver nitrate compound<sup>198</sup> (not

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<sup>192</sup> Apsley, JW, MD, "Microbial Multi-drug Resistance (MDR) and Oligodynamic Silver," Immunogenic Research Foundation, Inc., IMREF Newsletter, September 2006; p. 1-6.

<sup>193</sup> Apsley, JW, MD, "Microbial Multi-drug Resistance (MDR) and Oligodynamic Silver," Immunogenic Research Foundation, Inc., IMREF Newsletter, September 2006; p. 1-6.

<sup>194</sup> Ibid.

<sup>195</sup> Feng, QL, et al., "A Mechanistic Study of the Antibacterial Effect of Silver Ions on Escherichia coli and Staphylococcus aureus," J Biomed Mater Res, March 2000; 52:662.

<sup>196</sup> Rentz, E, DO, MSc, "Historic Perspectives on Clinical Use and Efficacy of Silver," In: An Indepth History of Silver, 2003, p. 2.

<sup>197</sup> Feng, QL, et al., "A Mechanistic Study of the Antibacterial Effect of Silver Ions on Escherichia coli and Staphylococcus aureus," J Biomed Mater Res, March 2000; 52:662.

<sup>198</sup> Ibid.

nanosilver, which is about 40 times more effective)<sup>199</sup> (SDC is presumably even more effective than nanosilver) studied silver nitrate's mechanism of inhibition against Staph and E. coli.<sup>200</sup> They found, through utilization of an electron microscope and X-ray microanalysis (they have photographs of the mechanisms of silver), that morphological changes occurred in *both* forms of Gram positive and Gram-negative bacteria after treatment with silver. Quoting from the 2000 report,

“The cytoplasm membrane detached from the cell wall. A remarkable electron-light region appeared in the center of the cells, which contained condensed DNA molecules. There are many small electron-dense granules either surrounding the cell wall or depositing inside the cells. The existence of elements of silver and sulfur in the electron-dense granules and cytoplasm detected by X-ray microanalysis suggested the antibacterial mechanism of silver:

**DNA lost its replication ability and the protein became inactivated after silver treatment.”**

Feng, *et al* concluded their study by stating,

“1. As a reaction against the denaturing effects of silver ions, DNA molecules become condensed (the DNA molecule shrinks, or becomes shorter) and lose their replication abilities;

2. Silver ions interact with thiol groups in protein, which induce the inactivation of the bacterial protein.”

The importance of the thiol group in biological processes, at it relates to nanosilver, is theorized to be linked to the thiol group's role in electron-transfer and catalysis of proteins.<sup>201</sup>

## SUMMARY

The research paper of January 29, 2007 has made evident a number of things about the pharmacokinetic properties and the therapeutic value of the silver ion *in vitro* and *in vivo*:

- 1) The elemental matter of the universe, named the element “silver,” has the highest electrical conductivity and the highest thermal conductivity of any metal. This instantly distinguishes it as a special and important element in the universe, as it relates to its utilization by the human body. This also helps explain why the body utilizes silver as a catalyst in many diverse ways.
- 2) The plant kingdom has utilized silver for millions of years, and absorbs silver out of the soil through the chelation process.

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<sup>199</sup> Natural-Immunogenics Corporation, “Be Careful of Those Who Uniquely Sell ‘the Truth’ About Colloidal Silver,” December 16, 2004; p. 9.

<sup>200</sup> Feng, QL, et al., “A Mechanistic Study of the Antibacterial Effect of Silver Ions on Escherichia coli and Staphylococcus aureus,” J Biomed Mater Res, March 2000; 52:662.

<sup>201</sup> Ibid.

- 3) Through a daily consumption of monoatomic silver in our air, food, and water supply, the human body has received a regular supply of monoatomic silver into it for at least the last 40,000 years.
- 4) The absorption of the silver ion into the body is nearly instantaneous. This means the beneficial bacteria in the intestinal tract of the body will not be exposed to the silver ion, which presumably could destroy them.
- 5) The silver ion is non-toxic to the body because it is readily eliminated through the White Blood Cell-bile route mechanisms.
- 6) The last complete review (1990) of any possible adverse effect from a drug-silver interaction in the body concluded there was no reason for concern.
- 7) The EPA's ATSDR CAS # 7440-22-4 has found no chemicals (food or drug based), which might escalate the silver ion's toxicity as it relates to silver speciation.
- 8) The silver ion is utilized by the body in such a way as to actually be an integral and important part of the body's immune system response to infections and disease.
- 9) The DNA of the body is already pre-programmed to utilize silver to fight infections and disease.
- 10) In addition to being absorbed into the bloodstream so as to be transported to all of the tissues of the body, the silver ion is also stored on the surface of White Blood Cells.
- 11) The silver ion is bonded to the surface of adult stem cells and causes dedifferentiation of the adult stem cells into the embryonic state.
- 12) Through the silver ion's absorption, penetration, and delivery of active silver into biological milieus (intracellular and intra-nuclear), it serves useful immune functions by way of the Surface Area, Surface Energy, and Particle Diffusion Coefficient. (SA, SE, PDC)
- 13) New, healthy tissue growth is **at least five to six times faster** utilizing silver in wound treatment when contrasted with non-silver-treatment.
- 14) The new tissue growth caused by the silver ion is not negatively influenced by the status of any tissues surrounding the treatment focal point.
- 15) The silver ion aids the body's ability to "find" the focal point of treatment, through the body's cell signaling mechanisms.
- 16) The silver ion speeds up the body's ability to "find" the focal point of treatment. This activity is known to increase the Opsonic Index.
- 17) The silver ion aids the body's ability to "digest" the pathogen.
- 18) The silver ion aids the body's ability to "digest" more pathogens per White Blood Cell. (The silver ion evidently increases the Phagocytic Index.)

- 19) The silver ion aids the body in the correction of the associated complex metabolic consequences associated with long-term infectious states.
- 20) The effects of the silver ion in anti-aging approaches is very promising.
- 21) The silver ion has a beneficial effect upon co-infections simultaneously.
- 22) The silver ion will readily pass the blood-brain barrier, allowing for interface and intervention with neuropathologies such as ALS, MS, polio, spinal meningitis, viral encephalitis, and possibly Mad Cow Disease.
- 23) The silver ion promotes the respiratory burst of White Blood Cells.
- 24) The silver ion increases the Red Blood Cell count.
- 25) The silver ion is known to negatively effect bacteria through: lethal oxidation, an “intermolecular electron transfer,” resulting in electrocution; a binding and chelating to essential pathogen receptor sites, which defeats the pathogen’s mechanisms of invasion into host cells; an ion non-dependent heightened catalytic action; and cleavage, which fragments (and thereby destroys) essential pathogen/proteinaceous structures.
- 26)** Because the size of the silver ion in SDC is limited to one atom, this means that, upon consumption of SDC, there should actually be more than one silver ion in the system for every atom in every bacterial cell.
- 27)** The silver ion may have the potential to play a dual role in the treatment of cancer: either destroy the infectious etiological agent of the cancer, or destroy the pathogen loads arising with patients with compromised immune systems.
- 28)** It has already been documented that many cancer infections are susceptible to the silver ion.
- 29)** These abilities of the silver ion are augmented by the fact that SDC enjoys the greatest surface presentation and Particle Diffusion Coefficient ever created.
- 30)** At this size range and activity level, the silver ion will impregnate all collective atoms within each tumor cell or pathogen cell with up to one silver ion.
- 31)** This saturation potential supercharges the silver ion’s ability to displace the Potassium-dependent glucose transport mechanism (the exclusive means by which cancerous cells feed themselves as opposed to normal cells that enjoy two other additional means to feed themselves) (glucose and ATP), thereby selectively starving cancer cells without harming healthy cells.
- 32)** Once the silver ion penetrates the cell membrane of pathogens, life-essential enzyme reactions governing cell metabolism go into partial or full arrest.
- 33) It can be confidently declared and scientifically proven that the silver ion is far safer than antibiotics or any other antimicrobial ever created. The characteristics of the silver ion far exceed the capabilities of patented antibiotics, which cannot keep up with bacterial organisms’ ability to mutate, nor do antibiotics work against viruses. In addition, antibiotics have many side effects, such as yeast infections. This is because antibiotics travel deep into the intestinal tract, where they kill the

good bacteria along with the bad. It is also known and documented that taking antibiotics over a long time period weakens the body's immune system.

- 34) The silver ion destroys germs both outside the cell, as well as inside the cell. This capability is important because there is a wide spectrum of germs that are located inside the cells (such as HIV) which invades the WBC's. It becomes more difficult for drugs to attack the invaders located inside the cell without becoming lethal to the cell. The silver ion works like 3 antibiotics combined. The silver ion viciously attacks all three of the germ's vulnerable targets in a triple denaturing action.
- 35) The body utilizes the silver ion to produce a chemical lethal to germs but harmless to human cells called a "superoxide radical" (ROS). The silver ion enables the body to produce a superoxide radical named, "hydrogen peroxide." These "superoxide radicals" utilize the oxygen atom in an electron transfer mechanism, which effectively *electrocutes* the germs.
- 36) When silver ions are added to ROS actions, they become site specific to the targets! This provides rapid (Opsonic Index), repetitive immune efforts against such threats.
- 37) Further support comes from secondary ROS, which look upon the same immune target area. In other words, ROS and silver ions **recycle** each other's efforts until the job is done! Scientific evidence suggests that the silver ion delivers active and recyclable silver ions that can redouble their efforts until local immunity is restored.
- 38) The silver ion induces Jarisch-Herzheimer Effects ("JHE's").
- 39) Once the silver ion ruptures a bacterial staph infection or certain fungal infections, the remaining silver ion particles begin to act as an antidote to the resulting poisons.
- 40) The silver ion particles help stimulate immature blood cells to become fully-functioning adult cells.
- 41) In 1929, silver was found to optimally stimulate the reticulo – endothelial system (RES). The RES is part of the immune system.
- 42) In 1919, utilizing very large (and therefore less efficacious) colloidal silver particles, it was scientifically demonstrated that colloidal silver increased the Phagocytic Index by 24 percent ! This is compelling !
- 43) It has been repeatedly reported that the preservation of Vitamin C content of fruit juices treated with silver ions was particularly successful. Evidently, the silver ion concentrations required for preservation are insufficient to actually cause changes in the nutrient values of vitamins.
- 44) The silver ion has a very high therapeutic value because there is no known LD50 for nanosilver, and there is only one known deleterious side effect – argyria – and the only known side effect does not apply to silver ion speciation, but only to colloidal silver compounds, especially silver salts. The effective dose, on the other hand, is very low when compared to a strictly theoretical lethal dose.
- 45) The exposure time to destroy pathogens with SDC is now down to mere seconds, as scientifically proven and recorded by numerous Association of Analytical Chemists (AOAC) laboratories.

- 46) The silver atom's activities in SDC are enhanced by its existence in the body as a catalyst for free radical processes (ROS, RES, dedifferentiation, etc).
- 47) The importance of the silver ion to the body will continue to escalate as additional research is performed.
- 48) There are a number of ways to administer the silver ion into the body: One way would be to nebulizer, or atomize, or vaporize, the SDC through a mechanical device, whereby the patient could breathe the silver ions directly into the lungs. The sub-micron particles would then penetrate the viral envelope. Other ways of administration of the silver ion are: intravenous dosing; oral dosing with a liquid or powder form of SDC; spraying the silver ions in solution onto/into the target area; and direct injection into the focal point.
- 49) As a reaction against the denaturing effects of silver ions, DNA molecules become condensed and lose their replication abilities; silver ions also interact with thiol groups in protein, which induce the inactivation of the bacterial protein. The importance of the thiol group in biological processes, as it relates to nanosilver, is theorized to be linked to the thiol group's role in electron-transfer and catalysis of proteins.

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**End of "Silver Study"**