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PROSPECTS FOR THE USE OF MECHANISMS OF INFLUENCE OF SILVER ON MICROORGANISMS IN INDUSTRIAL SECTORS

M. M. Murodov
Tashkent Innovative Chemical-Technological Scientific-Research Institute

N. R. Yakubova
Tashkent Chemical-Technological Institute

Abstract: Among the theories explaining the mechanism of action of silver on microorganisms, the most popular is adsorption, according to which positively charged silver ions and as a result of the interaction between negatively charged bacterial cells and during the adsorption process, the cell loses its viability.

Keywords: Banana cellulose, extraction process, basic substance content, cotton lint, polymerization rate, pentosan, alkali sediment, suffocation, ash content, moisture, cellulose, concentration, parameter, optimal conditions, destruction.

For thousands of years, humans have used silver for medicinal purposes because it has good bactericidal properties. In ancient times, rulers experienced marches, thus neutralizing drinking water, in silver bowls and vessels. Silver plates were tied to the warriors' wounds to prevent inflammation and rapid healing.

Silver in medicine

This wonderful metal improves the condition of the human microflora [82]. Silver particles eliminate harmful elements and "improve" the work of the useful ones. Another important feature of silver for humans is its ability to neutralize pathogenic bacteria, viruses of many very dangerous diseases.

In the early XX century, colloidal silver was actively used in medicine. It is a liquid solution (suspension) containing microscopic fragments of silver. This antimicrobial agent has been used for inflammation of the eye, various infections, colds, epilepsy, gonorrhea, and suspected trophic aphthae. At present, medicine uses protargol (silver proteinate) and collargol as antiseptics.

Silver ions found in drinking water actually inhibit the growth of bacteria, but large amounts of silver are harmful to human health. The State Sanitary and Epidemiological Surveillance has set a limit on the amount of silver nitrate in the water - it should not exceed 0.05 mg / L, which is the maximum concentration for the human body.

If silver enters the body in excessive amounts over many years, a specific disease - argyrosis (silver poisoning) is formed. It is not curable in practice, but does not pose a serious threat to life. A characteristic feature of the appearance of argyrosis is that the skin color is blue-gray (sometimes silver).

Stephen Barrett, Doctor of Medical Sciences, author of "Colloidal Silver: An Unnecessary Danger", has stated the following against the use of silver for medicinal purposes;

1. High risk of toxic effects on the body (especially when overdosed);

2. Lack of reliable data on the truth of all therapeutic effects associated with colloidal silver;

3. The need to limit the proliferation of suspicious silver drugs that can cause serious health problems.

In modern medicine, I often use colloidal silver, which is a microscopic particle of silver scattered in a liquid medium. As a result, a special silver solution is formed.

This silver has a beneficial effect on the human body, i.e. against germs and against inflammation. Therefore, this substance is used in medical practice in the treatment of various infectious diseases, as well as to disinfect water.

Note that proponents of treatment with colloidal silver say that it fights many viruses and microbes well and, unlike drugs that fall into the category of antibiotics, does not destroy the microflora.

Siberian scientists have invented a drug based on silver molecules that can treat AIDS, the press service of the Russian Academy of Sciences reported.

"Irkutsk chemists have proposed the treatment of dangerous diseases and AIDS using silver molecules. A few years ago, they developed a substance that kills all types of pathogenic bacteria. The Favorsky Institute of Chemistry has already tested the drug in a test tube", said RAS.

According to the press release, work is underway to test the toxicity of the drug, and in about two months will begin testing this invention in animals. Most likely in rats or rabbits, because the composition of their blood is the most humane.

"We are conducting one of the first experiments with the AIDS virus. Theoretically, our invention can overcome this incurable disease", said one of the developers of the new drug, A.J. Favorsky is the head of the laboratory at the Boris Sukhov Institute of Chemistry, and his remarks were quoted in the press service of the Russian Academy of Sciences.

Because silver was poorly absorbed by the human body, chemists in Irkutsk created a microscopic vessel to transport this metal to the center of the disease. The "box" is made up of polysaccharides of the Siberian larva at the molecular level. This substance enters the human cell very easily. We were able to put a silver molecule inside the container. "When it reaches the cell, the silver disinfects it. In addition, both of these components are able to restore the body's immune system", said Sukhov. This was reported by Interfax.

1913 - Dr. Solovyov is the first person in Siberia to save a patient from gangrene and death with the help of electrorargol injections. The practice of treatment with silver nanoparticles lasted until 1940.

In 1978-1990, Novosibirsk chemists suggested the use of nanosilver to suppress dangerous viral infections such as HIV infection (V.V. Tretyakov) and Marburg virus (V.A. Burmistrov).

1970-1995 - Altai physician-balneologist N.P.Maryukha, using collargol therapy, resuscitated several hundred miners seriously ill with rheumatoid arthritis in Kuzbass from their beds and in wheelchairs. He injected collargol intravenously in a gentle mode.

1992-1998 - The period of collapse and depression of the Russian economy, including the health care system, strangely enough, a wide range of clinical trials of cheap silver nanopreparations due to the wide antibacterial spectrum of clinics in Novosibirsk region, allergic reactions, local and general immunoactivating effects on the patient's body helped him get ready to spend. 1994-2008 Silver

nanopreparations were used in Novosibirsk and regional clinics in a number of external nosologies, in the treatment of infected wounds, inflamed eye membranes, in the treatment of inflammatory wounds in women during childbirth and in the treatment of ENT (Otolaryngologist) diseases. As a result of this work, five patents of the Russian Federation were obtained.

In 1997, N.N. Volsky and his colleagues at "IKI SB RAMS" discovered that nanocrystals are immunomodulators in the body, which increase their ability to fight infectious diseases.

By the early 2000s, Siberian science had developed special dosage forms based on silver nanopreparations for widespread introduction into the health care system of the Russian Federation. However, for some reason they are not of interest, although such drugs are increasingly used in world practice.

Even ancient civilizations used silver nanoparticles for therapeutic and prophylactic purposes. The information that has come down to us from ancient times is astonishing in its depth, perfection, and reliability. It turns out that the ancient civilizations had technologies for the preparation of drinking water from natural sources, purification, which was of great importance for the preservation of mankind. According to the ancient historian Herodotus, the Persian king Cyrus the Great kept for himself only water from a pure mountain river. Then they boiled the water, poured it into silver cisterns, and loaded the donkeys onto carts. The ruler drank only this water and never became ill. Since the rest of the army drank water only from natural sources, many suffered from intestinal diseases.

We also note other aspects of the medical-biological use of silver, such as the contact method for suppressing pathogenic microflora in infected wounds. Such examples are derived from the experience of ancient Roman, Indian, and Egyptian civilizations.

In essence, they differ in the method of technical implementation of the applicator. It should be noted that the main medicinal substance, Ag ° / Ag + particles, was of course associated with the second Cu ° / Cu + / Cu ++, as the ancient metallurgists had not yet learned how to make silver with a purity above 90% of silver. When applicators were used, the drug substance was actually silver nanoparticles.

Recent research by scientists at the Manchester Metropolitan University has shown that Silver ions destroy 650 species of pathogenic microorganisms.

Even before the antibiotic era, silver-plated bandages and sutures were used in surgery to close wounds. The antimicrobial effect of silver is based on the fact that its ions block the reproductive mechanisms of microorganisms. Salmonella, Escherichia coli, and even Staphylococcus aureus, which is not affected by antibiotics, are also transmitted to it.

Scientists estimate that silver-plated medical equipment and furniture reduce the chances of bacterial infections by 99%. Silver begins to heal burns and wounds, and during experiments it was used as an internal antibiotic. The results were impressive: it eliminated influenza and immunodeficiency viruses in 3 hours. However, more research is needed to assess the possible side effects of silver when taken orally.

Silver as a potential antiviral "agent"

In 2011, a group of Italian scientists published a large volume of material that showed that silver was resistant to several types of viruses: hepatitis B virus, herpes simplex virus, respiratory syncytial virus, and smallpox virus.

The use of silver particles opens up exciting possibilities for new antiviral therapy. Because silver has the ability to attack the virus in a variety of ways, it is less likely to develop resistance compared to traditional antiviral drugs.

Chinese scientists have found that silver nanoparticles of size 10 nm (Ag10Ns) and 50 nm (Ag50Ns) are able to reduce the formation of extracellular DNA of hepatitis B virus (HBV) by 50% relative to the control value (without the use of silver). Silver nanoparticles can inhibit the formation of the

virus's intracellular RNA. Silver nanoparticles bind to hepatitis B virus double-stranded DNA in DNA: silver molar ratio 1:50.

Similarly, in 2019, a group of Egyptian scientists confirmed the antiviral activity of silver nanoparticles synthesized by the green method. Such silver particles may have activity against herpes simplex virus (HBV -1), hepatitis A (HBV -10), and Coxsackie virus (CoxB4). Research nanoexerts herpes simplex (thymidine kinase), hepatitis A (proteinase) and showed interactions with Coxsackie virus (protease) enzymes.

Silver prevents the development of HIV

In January 2010, the Journal of Nanobiotechnology published a study in which Mexican immunologists from the University of Nuevo Leon studied the effectiveness of silver particles against HIV. They found that silver blocks the entry of HIV into cells and stops the virus from developing in its early stages, reducing the chances of infection between cells.

Areas of application of silver

Surgery:

- ✓ postoperative complications and infectious wounds, purulent-septic surgery;
- ✓ phlegmon and abscess;
- ✓ diabetic and trophic ulcers;
- ✓ ulcers, bed sores, osteomyelitis, leakage;
- ✓ carbuncles and boils;
- ✓ Prevention and treatment of purulent-inflammatory complications after burns. **Dermatology:**
- ✓ esophagus;
- ✓ herpetic rash; microbial and true eczema;
- ✓ medicinal taxidermic**;**
- ✓ dermatosis and psoriasis complicated by secondary infection;
- ✓ shingles;
- ✓ dermatomycosis;
- ✓ cracked skin;
- ✓ nail fungus, acne, sores;
- ✓ skin irritation of various etiologies.

Pathobiology:

- ➢ Drug-resistant tuberculosis.
- ➢ Nephrology and urology.

Dentistry:

- ✓ stomatitis, gingivitis, periodontal disease;
- ✓ ophthalmology;
- ✓ purulent conjunctivitis, an infectious lesion of the cornea**.**

Gastroenterology:

- ➢ bacterial, viral and intestinal infections of mixed etiology (enterovirus diarrhea, salmonellosis, colibacillosis, etc.),

- Ulcers, paraproctitis and hemorrhoids.

Otolaryngology:

- infectious diseases of the upper respiratory tract, ear, throat, nose: angina, tonsillitis, pharyngitis;
- catarrhal rhinitis and sinusitis;
- purulent otitis media;
- ORI, ORVI, influenza.

The exchange of silver in the body

Silver belongs to the group of evenly distributed bio elements; it does not accumulate in significant amounts in the internal organs and environment of the body with a single or multiple appointments and has no cumulative effect. Silver drugs are poorly absorbed from the gastrointestinal tract (on average, about 7%). Silver is mainly excreted through the gastrointestinal tract, partly in the urine.

Nowadays, silver is considered not only a metal capable of killing microbes, but also as a trace element that is a necessary and permanent component of the tissues of any animal and plant organism. According to A.I. Voinara, on average, a person's daily diet should contain about 90 mcg of silver ions. The amount of silver in the body of animals and humans is 20 mcg per 100 g of dry matter.

The richest in silver are the brain, endocrine glands, liver, kidneys and skeletal bones.

According to the WHO, the average consumption of silver by a modern person is about 5-8 mcg per day, and the recommended daily intake of silver (vital dose) is 50-100 mcg. Thus, silver can be considered not only as a means of prevention and treatment of infection, but also as a bio element necessary for the normal functioning of internal organs and systems, as well as a powerful tool that enhances immunity.

Mechanism of bactericidal action of silver

The most popular of the theories explaining the mechanism of action of silver on microorganisms is adsorption, according to which the cell loses its viability as a result of the interaction between positively charged silver ions and negatively charged bacterial cells and during adsorption.

Voraz and Tophern (1957) showed the antimicrobial effect of silver on the inactivation of enzymes containing Sh- and COON-groups, Tonley K. and Wilson N. - with a violation of the osmotic balance. There is evidence that nucleic acids form complexes with heavy metals as a result, the stability of DNA and the viability of bacteria are disrupted. Silver also increases the number of free radicals in the cell, which disrupts the metabolism in the bacterial cell.

Taking into account the above, reed cellulose obtained on the basis of local raw materials is used as a reinforcing agent (apmipuyushie) from 0.2 gp to 0.5 gpam per 1 kg of mass in order to increase the strength of medical gypsum in the amount of 0.2 gp to 0.4 gp of N-KMTs obtained on the basis of a composite of cane and cotton lint cellulose alapi in order to prevent the formation of tufts in the body, as well as bacteremia due to the duration of gypsum processes and the amount of 0.03 gp of silver ion per 1 kg of mass in the medical plaster cast in the case of acute baptism. and a pleasant fragrant plant efip oil extract was presented as an optimal composite petsept. This pet-cover was made by us in the development department of IMPERIA FORTIS FARM LLC and it was determined that it complies with the guidelines of TU 5744-013-78667917-13. The obtained composite was first recommended for production in Uzbekistan under the name "METN-Best" on the basis of local raw materials. The following is a list of innovative medical plaster METN-Best, approved on the basis of the dissertation research, approved by the industry representative:

It is considered a matepial for the development of temporary artificial limbs and immobilizing ligaments:

- ✓ Loss of fracture;

- ✓ installation of adhesive stretch;
- ✓ manual repositioning of bone fragments;
- ✓ relocation at the end of the search section.

Soft gypsum is also used in the manufacture of toothpicks (full and partial) and toothpicks from toothless jaws.

Application method: METN-Best gypsum is slowly sprinkled with water, based on 0.6-0.7 litp per 1 kg, and creamed to obtain a mass of foaming strength. After 2-3 minutes, the mass becomes ready for use. It should be used within 5-7 minutes after preparing the mass.

The prepared orphan has a specific odor on the basis of a specific plant extract. The peak of the eptima and the environment are neutropaldip. After 24 hours of preparation of the plaster, the bandage softens - the mark does not appear when pressed with the mark and tap. When the package is opened, the shelf life of the package in the closed state is 12 months.

Some technical characteristics of the fault:

- ➢ sieve residue 0.2 mm - 1-1.6%;
- ➢ pH-7;
- ➢ Water consumption for 1 kg of "METN-Best" gypsum powder is 0.6-0.7;
- ➢ The start of cooking - no earlier than 3–5 minutes;
- ➢ use time not later than 15 minutes.

Based on the results of the above scientific research, the first innovative find is based on local raw materials and a solid composite mass – "METN-Best" medical artificial limbs were made and recommended for production.

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