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Editorial

A New Antibacterial Agent: Antibacterial Zeolite

A new antibacterial agent, zeolite, is currently available. It looks like a plain white powder, but this agent offers excellent antiseptic and nontoxic effects to the buying public. Furthermore, zeolite is a tasteless and odorless material.

Also, these inorganic compounds are very different from other conventional antibacterial agents. The differences include chemical stability such as the melting and volatility points. Furthermore, zeolite is more cost effective, and there is no toxicity to the human. (1) In Japan, there are many manufactured goods that have this antibacterial coating. Some common examples of antibacterial coatings include those on toothbrushes and toothpaste, bath and toilette tiles, kitchen utensils, stationery, baby toys and so on. Recently, many medical instruments have begun to be coated.

What is the composition of this antibacterial agent? Recently, Dr. Hagiwara, a professor in the Department of Technology at the University of Tohoku, has developed the possible applications of zeolite (a low cost, heat stable, and nontoxic inorganic compound) (2). The structure of zeolite is three-dimensional and made of aluminosilicates. More specifically, it is fabricated of a tetrahedron of SiO_4 and AlO_4 and appears as one large cavity in a molecule (3). In this cavity, zeolite has many Na ions. (Fig. 1) Dr. Hagiwara reported that substituting a metal ion for the Na ion resulted in a release of the metal ion little by little and semipermanently (Fig. 2). Because of the antibacterial effects of the metal ion, such zeolite has a semipermanent antibacterial effect and is thus antibacterial zeolite (2). What was the original purpose of this agent? Originally it was made for broiler chickens and other dairy animals because the agent is odorless (4).

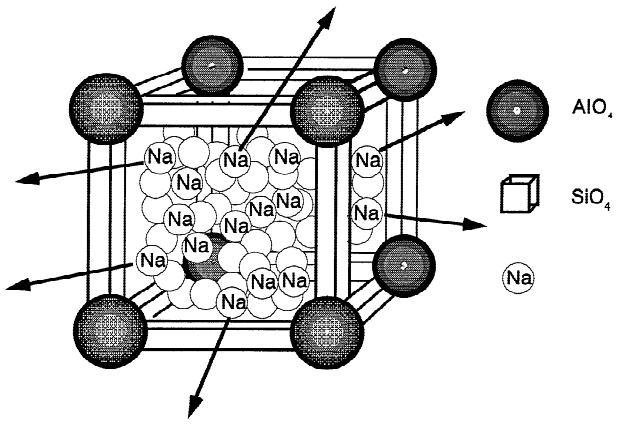

FIG. 1. Shown is the structure of zeolite.

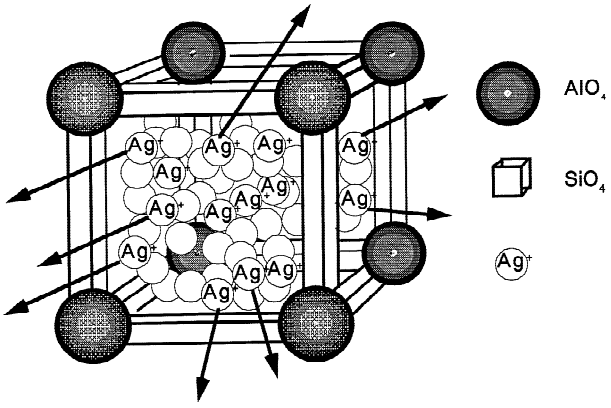

FIG. 2. The structure of antibacterial zeolite is shown; it reveals substitution of the Na ions with Ag ions.

One of the most ideal methods of sterilization is to use ozone, but ozone is too toxic, very unstable, and too expensive. On the other hand, the sterilization process for antibacterial zeolite is similar to that of ozone, but the difference is that this active oxygen is produced gradually. Thus, we can use zeolite safely and semipermanently. These authors believe that this agent can be useful in solving infectious problems that are created by implanted artificial devices.

Actually, several clinical cases have been reported (5,6). First, antibacterial zeolite easily coats silicone, and the first clinical examination was evaluated with an indwelling catheter for the urinary bladder. Dr. Uchida and his associates investigated this product for its potential in controlling urinary tract infection (6). The antibacterial balloon catheter showed a bactericidal effect against *Pseudomonas aeruginosa, Staphylococcus aureus,* and *Escherichia coli* during in vitro studies. Also, Dr. Uchida and associates tried this catheter in 11 various urological patients who needed long-term indwelling balloon catheters for lower urinary tract obstructions and neurogenic bladders. The group concluded that the antibacterial balloon catheter had an effective coating for an indwelling catheter for 3–7 months without side effects. Other basic studies were conducted and reported by D.L. Dorset and T. Matsuura. They

reported that antibacterial zeolite had an excellent antibacterial effect during in vitro studies (2,7,8).

The potentials for this antibacterial agent are countless in the medical arena and for everyday household products. In the near future, many medical instruments and artificial devices will be coated with antibacterial zeolite. However, antibacterial zeolite is related to a heavy metallic ion; thus, it is necessary to investigate the toxicity effects when this agent is implanted inside the body. Successful urinary tract application of this agent does not warrant the safety of zeolite when implanted intracorporeally.

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