Controlling legionella using copper-silver ionization: is this scientifically proven?

The use of copper-silver ionization for the control of Legionella in hospitals has been around for many years but is it scientifically validated? A four step evaluation process of biocide systems has been proposed and includes

- Demonstrated efficacy of Legionella eradication *in vitro* (controlled environment) using laboratory assays
- Anecdotal experiences in preventing legionnaires' disease in individual hospitals
- Controlled studies in individual hospitals
- Validation in confirmatory reports from multiple hospitals

Lets take each step separately:

- Demonstrated efficacy of Legionella eradication *in vitro* (controlled environment) using laboratory assays

There are several scientifically reviewed publications that have shown the efficacy of copper and silver to control Legionella in the laboratory (1-5). Copper and silver ions are released into the water system after electricity is applied to copper and silver electrodes. The ions work synergistically (together) to attack the bacteria (5). Copper binds to the negatively charged cellular membrane and makes it porous allowing access of the silver ions. The silver acts upon cellular mechanisms, leading to denaturing of proteins and cell death.

- Anecdotal experiences in preventing legionnaires' disease in individual hospitals

Stout *et al*., (6) reported only one case of legionnaires disease from 16 hospitals soon after the installation of copper-silver ionization systems, with no cases since reported 1995 to the end of the study in 2002. Model *et al*., (7) reported the use of copper-silver ionization in significantly reducing the incidence of Legionella detection in a hospital where the pathogen was hyper-endemic and persistent. There are numerous papers that report on the decrease, and eradication, of samples positive for Legionella in hospitals (6-17) after installation of copper-silver ionisation to treat both hot and cold water systems.

- Controlled studies in individual hospitals

The long term use of copper-silver ionization in hospitals has been well documented. Liu *et al.,* (14) report the use of copper-silver ionization in hospitals as far back as 1994, and there have been many controlled studies on the use of the system in hospitals (14-18) and compared to other treatment methods. In a review of the literature Cachafero *et al.,* (18) highlights several hospital studies in which controlled scientifically investigation have been performed and results published, and concluded that copper-silver ionisation is a safe, effective means of controlling legionella.

- Validation in confirmatory reports from multiple hospitals

Stout *et al.,* (6) reported the first review of multiple hospital sites using copper-silver ionisation over a long time period (5 to 11 years). Only one hospital from 16 reported a case of Legionnaires disease and this was just after installation of the equipment and no case was reported in the next seven years of the study. Within this paper it was stated that copper-silver ionisation was the only treatment regime for legionella to have completed the four step evaluation process.

In a review by Sabria and Yu (19) on hospital-acquired legionnaires disease it was stated that copper-silver ionization has emerged as the most successful long term disinfection method for hospital water disinfection systems. The method has been scientifically validated in the laboratory and its efficacy in hospitals well documented and shown to have undergone rigorous scientific scrutiny and peer review. Of all the treatment methods, including that of hot water treatment as outlined in the HTM04 document, copper silver ionization is the **only** method to be shown to have long term scientific validation and is the **only** method to complete the four step evaluation method.

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