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Copper and Silver Water Treatment

# Scientific statements on copper-silver ionisation

### It controls Legionella

"The detection in April 1997 of a case of nosocomial legionellosis in our hospital led to the discovery that both our hot- and cold-water circuits were heavily colonized with Legionella pneumophila. Conventional methods for eradication of the organisms were unsuccessful, so a copper-silver (Cu-Ag) ionization system and a continuous chlorination system were installed. Five months later, the number of colonized sites decreased from an initial 58.3% to 16.7%." (Biurrun et al. 1999).

"We evaluated the impact of copper-silver ionisation system in a hospital where hyperendemic nosocomial legionellosis was present and all previous disinfection measures had failed. After implementation of the copper-silver ionisation system, environmental colonisation with Legionella species decreased significantly, and the incidence of nosocomial legionellosis decreased dramatically, from 2.45 to 0.18 cases per 1000 patient discharges."

(Modol et al. 2006)

"Our study shows that environmental colonisation of water by Legionella species, in association with a decrease of legionellosis disease, can be successfully reduced using a properly monitored copper-silver ionisation system." (Muzzi et al. 2008).

"By 2000, the ionization systems had been operational from 5 to 11 years. Prior to installation, 47% of the hospitals reported that more than 30% of distal water sites yielded Legionella. In 1995, after installation, 50% of the hospitals reported 0% positivity, and 43% still reported 0% in 2000. Moreover, no cases of hospital-acquired legionnaires' disease have occurred in any hospital since 1995." (Stout & Yu, 2003)

"Copper-silver ionisation appears to be the best available technology today for controlling Legionella colonisation in hot water systems."

#### (Lin, Stout & Yu, 2011)

"In this study the efficacy of copper-silver ionisation in "4 complex drinking water distribution systems (1 juvenile institution, 2 hotels and 1 penitentiary) and 1 cooling tower was studied over a period of at least 5 years. Dosing of 400 +/- 200µg/l copper and 40+/- 20 µg/l silver proved to be effective to control, abate and eradicate Legionella bacteria at all 5 treated locations. Legionella reoccurred only incidentally and temporarily (in 3.8% of measurements; 27 out of 718), most likely due to insufficient flushing of the water distribution systems." (Walraven, Pool & Chapman, 2016)

"We conclude that a properly maintained and monitored copper-silver ionisation system was more effective than the superheat-and-flush method for reducing the recovery of Legionella from the hospital water distribution system." (Stout et al. 1998)

"One copper-silver ionisation system was sequentially installed onto the hot-water recirculation with the same water supply and also colonised with Legionella served as a control. Four weeks after activation of the system, distal site positivity for Legionella in the first building dropped to zero. Twelve weeks of disinfection reduced the distal site positivity for Legionella in the second test building to zero." (Liu et al. 1998)

"The results of ionisation water treatment have shown that it can be an effective strategy in hot and cold water installations provided that the application is properly assessed and designed as part of an overall water treatment regime by reputable and experienced companies." (Pavey, 1996)

#### It acts against other pathogens

"All combinations of copper and silver ion concentrations tested in this study were able to reduce M. avium viability by 99.9%."

#### (Lin et al. 1998)

"Our finding showed that both copper and silver ions alone were effective in killing P. aeruginosa, S. maltophilia and A. baumannii at ion concentrations currently used in hospital water distribution systems for Legionella." (Hwang et al. 2008)

"Our study demonstrates that copper- and silver-ionised water distribution systems have lower prevalences of fungal colonization, and that the greatest reductions are seen with fungi, such as septate moulds and yeasts, that have been related to hospital-acquired infections in severely immunocompromised patients."

(Pedro-Botet et al. 2007)

#### It controls biofilm

"Our results show that copper-silver ionisation is effective in controlling biofilms and plankton-associated waterborne pathogens."

(Shih & Lin, 2010)

"Due to copper-silver ionisation, biofilm and/or scale is released from the internal surface of the water distribution system (visual observations)." (Walraven, Pool & Chapman, 2016)

#### It has a long residual effect

"Legionella recolonization did not occur in the first test building for 6 - 12 weeks and in the second test building for 8 - 12 weeks after inactivation of the system." (Liu et al. 1998)

"A CSI unit was installed as a short-term treatment in location A of the acute care facility (ACF). It effectively reduced the Legionella populations to undetectable levels and, as planned, the unit was removed after 3 months. Three months after removal of the unit, culture results increased and did not decline again until the ionization unit was permanently reinstalled. Consequently, CSI was installed in multiple areas of the ACF." (Dziewulski et al. 2015)

#### It's not affected by temperature

"Unlike chlorine and chlorine dioxide, the biocidal activity of copper-silver ionisation is not affected by temperature." (Lin, Stout & Yu, 2011)

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