

## 論 文 要 旨

**Antimicrobial Effect of an Ultrasonic Levitation Washer Disinfectant with Silver Electrolysis and Ozone Oxidation on Methicillin-Resistant *Staphylococcus aureus***

銀イオンとオゾンを用いた超音波レビテーション洗浄消毒装置の  
メチシリン耐性黄色ブドウ球菌 (MRSA) に対する効果

玉井 真理子

Methicillin-resistant *Staphylococcus aureus* (MRSA) has rapidly emerged as a cause of severe and intractable skin infection. At present, there are no effective topical treatments, and infection or colonization by MRSA of the skin raises serious medical problems. We developed an ultrasonic levitation washer that generates silver ions ( $\text{Ag}^+$ ) and ozone ( $\text{O}_3$ ) to clean and sterilize medical devices. We report the effect of ultrasonic levitation (levitation) with  $\text{Ag}^+$  and  $\text{O}_3$  on MRSA *in vitro* and *in vivo*. Antimicrobial effect against six MRSA strains of all *agr* types was examined under three *in vitro* conditions; cells floating in a water tank, cells infiltrating-, and cells forming a biofilm on an atelocollagen membrane. In the *in vivo* studies, we assayed the number of MRSA organisms that survived treatment on murine skin ulcers and evaluated the ulcer size. Levitation with  $\text{Ag}^+$  dramatically decreased the survival of MRSA floating in a water tank. Levitation with  $\text{Ag}^+$  and  $\text{O}_3$  significantly decreased the viability of MRSA that had infiltrated or formed a biofilm on atelocollagen membranes regardless of the level of biofilm production. *In vivo* studies showed that the number of MRSA on murine skin ulcers was significantly decreased when 15-min treatment was performed for 7 consecutive days and that the ulcer size was significantly decreased after the seventh treatment course. Levitation with  $\text{Ag}^+$  and  $\text{O}_3$  may be a valuable tool for treating MRSA infestation of the skin and for accelerating wound healing.