**SILVER ION RELEASE FROM A SILVER FIBER HYDROGEL WOUND DRESSING**


**ABSTRACT**

**Introduction**

The effectiveness of silver fiber hydrogel wound dressings is based on the antimicrobial effect of the silver ions (Ag+) on bacterial or fungal pathogens absorbed onto the dressing from the wound.

**Methods**

The silver release profile was investigated in triplicate for a 24-hour incubation period (Day 1) and after eight 24-hour incubation periods (Day 9).

**Results and Conclusion**

After 24 hours, the concentration of Ag+ was >8 to >18 ppm. After 8 days, the liquid removed after the initial 24-hour period and after the eighth 24-hour incubation period was returned to the oven for another 24 hours, after which, the samples were removed and returned to the oven for another 24 hours. This process was repeated with fresh purified water every 24 hours through Day 8. On Day 9, extracts were again obtained and tested.

**Discussion**

The authors conclude that the silver fiber hydrogel wound dressing provides an environment that promotes more rapid healing.

**References**


2. Lindsay S. Silver White Paper. Everything you ever wanted to know about the use of silver in wound therapy.


**Objective**

To assess the silver ion release profile of a silver-containing hydrogel wound dressing over an 8-day period and thereby establish guidelines for its efficacious application.

**Results Concentration of Ag+ Versus Time in Water**

![Concentration of Ag+ Versus Time in Water](image)

**Discussion**

- Levels of silver cations (Ag+) retrieved were lower in NS than at both Day 1 and Day 9. This finding was also described in another study using similar methodology.

- Although de-ionized water and NS are not true substitutes for wound fluid, they provide models of what might be expected in vivo.

- Silver ion release has been shown to be higher in models where albumin has been added to water or saline as a better approximation of wound exudate. Therefore, it may be anticipated that these levels are lower than what may be anticipated in vivo.

- Over time, the silver fibers throughout the dressing (rather than just superficial areas) may become more saturated, allowing for more silver cation release at the later time period tested (Day 9).

- Silver-release evaluations cannot be meaningfully compared across studies using different solution solutions, so direct comparisons with other studies are difficult to make.

**Conclusions**

- The silver fiber hydrogel wound dressing tested delivers a sufficient, sustained concentration of silver ion to provide antimicrobial activity for up to 8 days in both water and NS solution in vitro.

- Higher concentrations of silver ion were detected when dressings were incubated in de-ionized water compared to NS solution.

- Findings from both of these studies support a 7-day dressing change period.

**Introduction:** Silver Chemistry

Elemental silver is relatively ineffective; the antibacterial action of silver is dependent on the release of silver cations (Ag+) and is proportional to its concentration and availability to interact with bacterial and fungal cell membranes.

Although studies have shown in vitro cytotoxic effects of silver ions on fibroblasts, the use of silver containing dressings provides an environment that promotes more rapid healing.

**Methods**

- Two studies were conducted; one using de-ionized water, and a verification study was conducted using 0.9% sodium chloride solution (normal saline [NS]) in place of water.
- Silver hydrogel samples (each 4.8–4.9 g in de-ionized water or about 12.3–13.0 g in NS) were incubated in a water bath at 37°C for 24 hours.
- Water volume was based on the hydrogel starting weight at a ratio of 1:1.00.
- NS volume was based on the hydrogel starting weight at a ratio of 1:1.00.
- Water or NS was replaced every 24 hours. The volume of each change was based on the hydrogel starting weight.
- The liquid removed after the initial 24-hour period and after the eighth 24-hour period was retained.
- The silver ion concentration of the retained samples was measured by atomic absorption spectrometry (PerkinElmer, Waltham, MA).

**Conclusion**

- The liquid removed after the initial 24-hour period and after the eighth 24-hour period was retained.
- The silver ion concentration of the retained samples was measured by atomic absorption spectrometry (PerkinElmer, Waltham, MA).

**Silver Ion Hydrogel Dressing (12x magnification)**

![Silver Ion Hydrogel Dressing (12x magnification)](image)

**References**


2. Lindsay S. Silver White Paper. Everything you ever wanted to know about the use of silver in wound therapy.


