

# **A Comparative Study of the Antibacterial Efficacy of Colloidal Silvers (IA, IB) vs. Staphylococcus aureus**

(colloidal silver samples submitted by Mr. Anders Sultan)

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## **Purpose.**

The purpose of this study was to test the inhibition of Ionosil A (IA) and Ionosil B (IB) on both normal and antibiotic resistant strains of Staphylococcus aureus (“Staph”). This was accomplished by inoculating healthy Staph cultures with the colloidal silver on standard YT plates, then placing them in a 37° C incubator overnight.

## **Materials and Methods.**

Each 95mm sterile polystyrene plate was filled with 5mm of YT media consisting of 0.5% sodium chloride, 0.6% yeast extract, 0.8% tryptone and 2% agar. A small 3 mm scrape of Staph was resuspended in sterile 18 MΩ lab water and diluted. To each 100 µl dilution of staph cells, 10µl of silver was added and then let sit for both 4 minutes and 8 minutes. After the appointed time, five 10µl spots of each diluted staph strain containing silver were arranged on a YT plate.

**A.** The YT media was autoclaved and poured into sterile plates and allowed to dry.

**B.** Two strains of Staph received from the New York Hospital of Queens.

1. B14192 – wildtype/ normal strain -Renamed S-1
2. B14310 – antibiotic resistant (MRSA) -Renamed S-2

**C.** A small 3 mm scrape of both S-1 and S-2 were resuspended in 1250µl of lab pure water. Then a 10:1 dilution series was performed on each strain.

**D.** Silver was added to each dilution of S-1 and S-2; the cultures were then agitated and allowed to sit until spotted onto the YT plate. The exposure time of each dilution to the silver was both four and eight minutes.

**E. Silver products used:**

1. IA -clear
  - a. ppm = 10.94
  - b. pH = 6.66
  - c. Tyndall Effect = ++ (out of a possible +++)
  - d. Conductivity = 13 [ $\mu$ S]
  
2. IB -clear
  - a. ppm = 10.86
  - b. pH = 6.71
  - c. Tyndall Effect = +++ (out of a possible +++)
  - d. Conductivity = 13 [ $\mu$ S]

**F. Positive control plate** -No colloidal silver added to S-1 or S-2 cultures  
**Negative control plate** -No Staph or silver added to check for contamination (image not included, no contamination).

**G. Plates then placed in a 37°C incubator overnight.**

**Results.**

Qualitative results can easily be seen on each plate. The positive control for S-1 grew out 4.5 spots, represented by (++++ $\frac{1}{2}$ ) and the positive control for S-2 grew out 4.5 spots when colloidal silver was not present (++++ $\frac{1}{2}$ ). A (-) represents no Staph grew on the plate. The effectiveness of the colloidal silver can be compared by the number of spots or +'s as seen in the graph.

**Inhibition of Staph @ 4 Minutes**

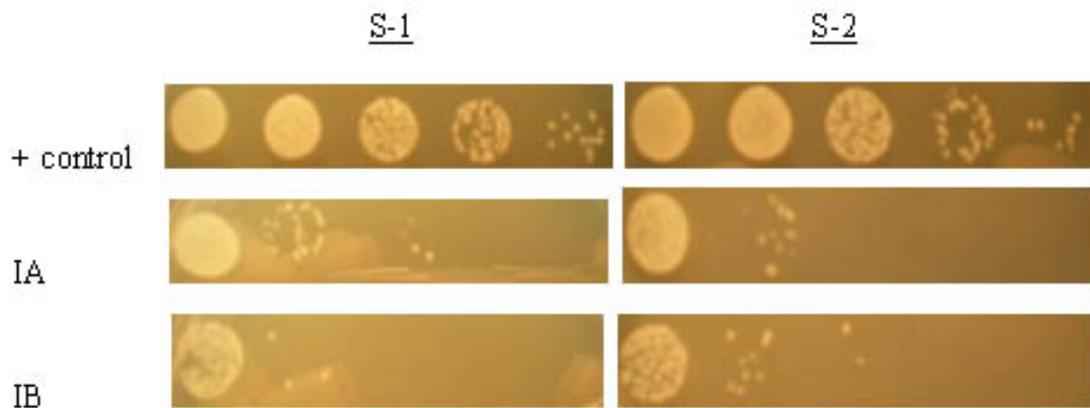
	<u>S-1</u>	<u>S-2</u>
+ control	++++ $\frac{1}{2}$	++++ $\frac{1}{2}$
IA	+ $\frac{1}{2}$	+ $\frac{1}{4}$
IB	+	+ $\frac{1}{4}$

**Inhibition of Staph @ 8 Minutes**

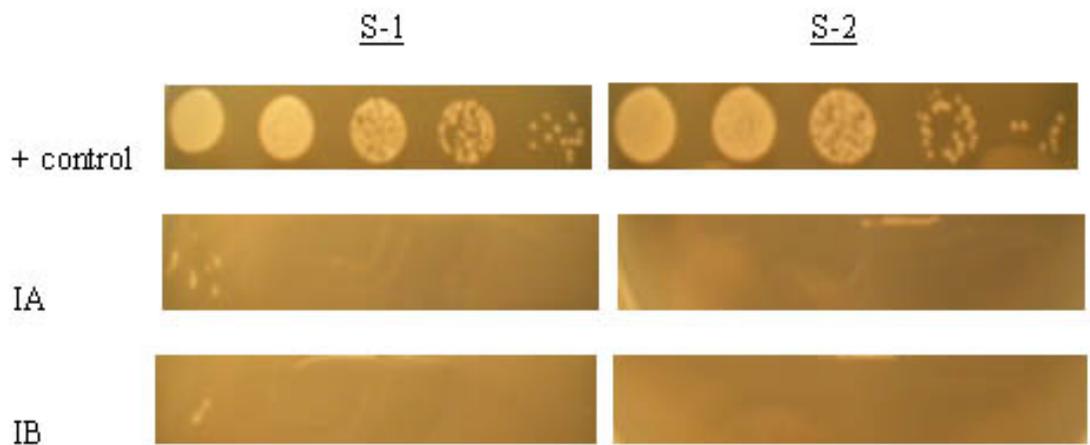
S-1                      S-2

+ control	++++ $\frac{1}{2}$	++++ $\frac{1}{2}$
IA	$\frac{1}{4}$	-
IB	$\frac{1}{4}$	-

**Inhibition of Staph @ 4 Minutes**



**Inhibition of Staph @ 8 Minutes**



## **Discussion.**

In this experiment, the efficacy of IA and IB were tested against the bacteria *Staphylococcus aureus* at four and eight minutes. Both the subject samples IA (10.94 ppm), and IB (10.86 ppm) performed quite well against the S1 and S2 strains. At four minutes, IA and IB significantly reduced the bacteria, while at eight minutes they almost completely eradicated the bacteria.