

Certificate of Analysis

Product: Mesosilver vs. Sovereign Silver

Project: Comparative Efficacy Testing

EMSL Reference Number: 090501375

Experimental Design Summary:

Test survival of *Escherichia coli* American Type Culture Collection Strain No. 25922 in two silver colloid products (Mesosilver and Sovereign Silver) both diluted to 1% concentrations of product as supplied. The microorganism was tested for survival at four (0, 2, 5, and 24 hour) time points. A negative control (no product) was included for comparison. The first group of treatments was performed in triplicate in sterile phosphate buffer with MgCl₂ (Hardy Diagnostics). The second group of treatments was identical to the first but with the addition of 3600 ppm HCl. In addition, treatments of HCl alone were included as controls. Both groups were incubated without continuous mixing at 35°C then plated in duplicate on nutrient agar for 72 hours. Results were reported as mean ± standard deviation. Media sterility controls showed no growth.

Experimental Results Summary:

Escherichia coli inoculated at 2.9×10^7 cells ml⁻¹ was used to determine the effect of Mesosilver colloidal silver and Sovereign Silver colloidal silver on bacterial survival. The results show that both products have a negative impact on the survival of *E. coli* with and without 3600 ppm HCl. Mesosilver 20ppm was successful in reducing the numbers of cells to below the level of detection within 24 hours (Table 1).

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Antimicrobial effectiveness of Mesosilver

20 ppm Mesosilver	CFU ml ⁻¹		
	2h	5h	24h
0	>300 X10 ⁵	>300 X10 ⁵	>300 X10 ⁵
1% Mesosilver	1.9 x 10 ⁶ ± 1.6 x 10 ⁵	5.3 x 10 ⁵ ± 2.2 x 10 ⁵	<1
1% Mesosilver + HCl	2.2 x 10 ⁷ ± 6.3 x 10 ⁵	1.1 x 10 ⁶ ± 1.9 x 10 ⁵	<1

Table 1. Survival of *Escherichia coli* American Type Culture Collection Strain No. 25922 inoculated at 2.9 x 10⁷ cells ml⁻¹ in the presence of 1% 20 ppm Mesosilver® colloidal silver and 1% 20 ppm Mesosilver® + 3600ppm HCl.

Antimicrobial effectiveness of Sovereign Silver

10 ppm Sovereign Silver	CFU ml ⁻¹		
	2h	5h	24h
0	>300 X10 ⁵	>300 X10 ⁵	>300 X10 ⁵
1% Sovereign Silver	3.1 x 10 ⁶ ± 3.1 x 10 ⁵	1.3 x 10 ⁶ ± 2.5 x 10 ⁵	1.3 x 10 ⁵ ± 5.1 x 10 ⁴
1% Sovereign Silver + HCl	2.9 x 10 ⁷ ± 4.4x 10 ⁵	1.2 x 10 ⁷ ± 6.2 x 10 ⁵	3.8 x 10 ⁵ ± 1.5x 10 ⁵

Table 2. Survival of *Escherichia coli* American Type Culture Collection Strain No. 25922 inoculated at 2.9 x 10⁷ cells ml⁻¹ in the presence of 1% 10 ppm Sovereign Silver® (colloidal) silver hydrosol and 1% 10 ppm Sovereign Silver ® + 3600ppm HCl.

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Antimicrobial effectiveness of colloidal silver

Treatment	Time Point (hours)					
	2		5		24	
	Colony Count	Dilution Factor	Colony Count	Dilution Factor	Colony Count	Dilution Factor
1% Mesosilver -1	17 / 19	100000	7 / 8	100000	0 / 0	100000
1% Mesosilver -2	20 / 21	100000	5/6	100000	0 / 0	100000
1% Mesosilver -3	18 / 17	100000	2 / 4	100000	0 / 0	100000
1% Mesosilver+HCl -1	213 / 212	100000	9 / 11	100000	0 / 0	100000
1% Mesosilver+HCl -2	226 / 227	100000	13 / 14	100000	0 / 0	100000
1% Mesosilver+HCl -3	220 / 219	100000	10 / 11	100000	0 / 0	100000
1% Sovereign Silver -1	28 / 26	100000	15 / 16	100000	1 / 2	100000
1% Sovereign Silver -2	31 / 32	100000	14 / 14	100000	2 / 1	100000
1% Sovereign Silver -3	34 / 33	100000	12 / 9	100000	1 / 1	100000
1% Sovereign Silver+HCl -1	286 / 289	100000	112 / 115	100000	6 / 5	100000
1% Sovereign Silver+HCl -2	290 / 291	100000	128 / 125	100000	3 / 3	100000
1% Sovereign Silver+HCl -3	297 / 291	100000	121 / 116	100000	4 / 2	100000
3600 ppm HCl -1	>300/>300	100000	>300/>300	100000	82/81	100000
3600 ppm HCl -2	>300/>300	100000	>300/>300	100000	93/84	100000
3600 ppm HCl -3	>300/>300	100000	>300/>300	100000	82/83	100000
Phosphate Buffer -1	>300/>300	100000	>300/>300	100000	>300/>300	100000
Phosphate Buffer -2	>300/>300	100000	>300/>300	100000	>300/>300	100000
Phosphate Buffer -3	>300/>300	100000	>300/>300	100000	>300/>300	100000

Table 3. Raw data of antimicrobial effectiveness of colloidal silver against *Escherichia coli*. Average colony count x dilution factor = colony forming units per ml (CFU ml⁻¹).