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# Testing of the Antimicrobial Effect of Silverline Catheter on Streptococcus Intermedius

Regina Zschaler  
Diplom-Biologin  
Öffentlich bestellte und vereidigte Sachverständige

## Problem

Infections are a serious complication of catheters, for External Ventricular Drainage (EVD). Even with best surgical technique and utmost aseptic handling measures catheter associated infections cannot be avoided completely (1, 5, 7).

Spiegelberg KG developed a catheter material for ventricular catheters (Silverline) that is impregnated with a combination of antimicrobial substances. The substances used are 1% of nano-particles of silver and 1% of nano-particles of an insoluble silver salt. Silver ions are a strong antiseptic with a broad spectrum (6, 8). Silverline EVD catheters have been on the market since 2004. They were proven to reduce the infection rate markedly (11). Their antiseptic effect on a number of species of organisms were shown by us in a previous report (10).

Streptococcus Intermedius reportedly is responsible for rare nosocomial infections.

The aim of this study is to use a standardized method to assess the antimicrobial properties of Silverline catheters on Streptococcus Intermedius.

## Method

For this study we used the method described by Guggenbichler et al. (2, 3) and standardized by us (10).

Streptococcus intermedius DSM 20573 was used to assess the antimicrobial effect. The suspension of organisms was generated by three times streaking of the micro-organism on blood agar incubated under microaerophilic conditions using Anaerocult C (Merck). The harvesting of the cells was done in physiologic saline solution. the concentration of streptococcus Intermedius was  $5.3 \times 10^6/\text{ml}$ .

Three samples of Silverline catheters (REF: EVD 30.010.02, Lot 611-493 ), 5 cm long, 2,7 mm diameter and one control catheter of the same dimensions, but not antiseptic (Spiegelberg EVD catheter material, REF: EVD 30.010.01, Lot B 1347010/1) were subjected to the test.

The materials under observation were placed in tubes with 5 ml physiological saline solution. The incubation was done for three hours at 37 C. Then the samples were taken out of the suspension, all droplets were shaken off and the samples were rolled back and forth over the surface of a Petridish with blood-agar (Oxoid). Then they were transferred into 5 ml of fresh sterile saline. Taking out and rolling was repeated 3 h, 10 h, 20 h, and 30 h thereafter. The samples were transferred back into the medium after each roll process. The plates were incubated at 37 C. The final analysis was done 24-48 hours after the roll process.

## Results

A strong antimicrobial effect on Streptococcus Intermedius was observed.

Table 1 shows the results. After 10 hours no growth could be observed. Also growth turned out to be completely suppressed and it did not return after 20 h and 30 h.

## Summary

Using the standardized method of Guggenbichler a strong antimicrobial effect of Streptococcus intermedius by the material under test could be observed.

Incubation time	0h	3h	10h	20h	30h
Silverline Sample 1	5	5	0	0	0
Silverline Sample 2	5	5	0	0	0
Silverline Sample 3	5	5	0	0	0
Control	5	5	5	5	5

**Table 1:** Observations of roll cultures of Silverline tubing and control tubing after inoculation and intervals of incubation

**5 = dense growth**

**4 = strong growth**

**3 = growth**

**0 = no growth**

### Discussion

The antimicrobial effect of Silverline Catheters could be shown in the in-vitro trial for *Streptococcus Intermedius* in a spectacular manner. The broad spectrum of efficacy against common hospital bacteria and yeasts and also against rare species like *Streptococcus Intermedius* provide the microbiologic background for the clinical effect.

### Bibliography

- Anneke, A.: Infektiöse Komplikationen von Liquoraußendrainagen. Dissertation Universität Heidelberg, 1999
- Guggenbichler, J.P.; Juhl, G.; Braun, G.G.; Fraß, M.; Künstle, O.A.; Plötz, J.; Saffartzik, W.; Steinhäuser, M.; Wenisch, C.: Klinische Untersuchungen mit einem neuen Nano-Silber imprägnierten zentralvenösen Katheter. *Hyg Med* 28, 2003, 228-34
- Guggenbichler, J.P.: Central Venous Catheter Associated Infections Pathophysiology, Incidence, Clinical Diagnosis, and Prevention - A Review. *Mat.-wiss. u. Werkstofftech.*, 34, 2003, No. 12, 1145-54
- Kojic, E.M.; Darouiche, R.O.: *Candida* infections of medical devices. *Clin. Microbiol. Rev.*, 17, 2004, 255-267
- Lozier AP, Sciacca RR, Romagnoli MF, Connolly ES Ventriculostomy-related infections: A critical review of literature. *Neurosurgery* 51, 2002, 170-182
- Naegeli, C. v.: Über die oligodynamischen Erscheinungen an lebenden Zellen. *Neue Denkschr. Allg. Schweiz. Ges. Naturwiss.* 33, 1893, 174 - 182
- Pfisterer, W.; Mühlbauer, M.; Czech, T.; Reinprecht, A.: Early diagnosis of external ventricular drainage infection: results of a prospective study. *J Neurol Neurosurg Psychiatry* 74, 2003, 929-932
- Thurmann, R.B.; Gerba, C.H.P.: The molecular mechanisms of copper and silver ion disinfection of bacteria and viruses. *Crit. Rev. Environmental Control*, 18, 1989, 295-315
- Zabramski J.M.; Darouiche, R.O. et al.: Efficacy of antimicrobial-impregnated external ventricular catheters: a prospective, randomized, controlled trial. *J Neurosurg*, 98, 2003, 725-730
- Zschaler, R.: Testing of the Antimicrobial Effect of Catheter Tubing with a Roll Culture Method. [www.spiegelberg.de/home/documents/Zschaler.pdf](http://www.spiegelberg.de/home/documents/Zschaler.pdf)
- Keong, N.; Kirkpatrick, P.J.: SILVER trial - interim results. *Europ. Ass. Neurol. Surg.* 2007 abstracts

### Address for Correspondence

Regina Zschaler  
Diplom-Biologin  
Öffentlich bestellte und vereidigte  
Sachverständige  
Golfstr. 12  
22605 Hamburg  
[regina\\_zschaler@web.de](mailto:regina_zschaler@web.de)