

Abstract:

INTRODUCTION: Catheter-related blood stream infection (CRBSI), the most common complication of central vein catheter (CVC), was closely associated with high morbidity and mortality in hemodialysis (HD) patients. Conjunction with systemic antibiotic, antibiotic lock (ABL) is an important therapeutic option to salvage the catheter. With extra antimicrobial and biofilm removing properties, urokinase plasminogen activator (uPA)-based ABL could have a potential role in the treatment of CRBSI.

OBJECTIVE: In this study, we aimed to explore effectiveness of uPA-based (ABL) on microorganisms embedded in biofilms in vitro and CVC salvage rate in HD patients with CRBSI.

METHODS: In vitro, we induced biofilms formation on the surface of HD catheter by mimicking the development of CRBSI. Applying uPA with or without antibiotics on the kinds of microorganism biofilms to explore its antimicrobial and biofilm removing properties. In vivo, 86 HD patients diagnosed as CRBSI were retrospectively enrolled to see effectiveness of uPA-based ABL on catheter salvage rate as compare to heparin-based ABL.

RESULTS: uPA was effect to *Staphylococcus epidermidis* biofilms compared to *Staphylococcus aureus*, *Escherichia coli*, and *Candida albicans*. Less biofilm residues made the regrowth of *S. epidermidis* also limited. The combination of uPA with antibiotic showed better antimicrobial and antibiofilm activity than uPA alone or heparin-based ABL in vitro and in vivo. Among HD patients, uPA-based ABL did not cause any obvious adverse affects, and it was more effective in treating coagulase-negative *Staphylococci* related CRBSI than other microorganisms.

CONCLUSIONS: The combination of uPA and a therapeutic plasma concentration of sensitive antibiotic can work together to effectively remove coagulase-negative *S. epidermidis* embedded in biofilms in vitro. uPA-based ABL is safe and effective therapeutic intervention for HD patients with CRBSI, especially compared to heparin-based ABL.

Reference:

Wang, J., Peng, X., Yin, W., Peng, Y., Liu, H. and He, L. (2020) Eradication of Microorganisms Embedding in Biofilm by a Dose-Dependent Urokinase-Based Catheter Lock Solution in Chronic Hemodialysis Patients. *Blood Purification*. January 14th. doi: 10.1159/000505566. (Epub ahead of print).