

CONTROLLING *PSEUDOMONAS AERUGINOSA* BIOFILM FORMATION: SURFACE MODIFICATION OF PVC ENDOTRACHEAL TUBES WITH DEXTRAN.

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INTRODUCTION: Data from 4500 infected intensive care patients all over Europe demonstrate that *Pseudomonas aeruginosa* remains the most important Gram-negative pathogen responsible for 30% of nosocomial infections, of which 47% are pneumonia¹. Intubation with an endotracheal device is the greatest risk factor for pneumonia. Colonisation of the intubation device and the trachea by *P. aeruginosa* occurs in over 90% of ventilator-associated pneumonia (VAP); mortality due to *P. aeruginosa* VAP exceeds 60% despite aggressive antibiotic therapy. Therefore, new approaches must be sought to reduce the incidence of *P. aeruginosa* VAP. The surface was modified with a layer having passivation properties. Dextran^{2, 3} is known to have such properties. Optodex® (CSEM) is a diazirine-containing derivative of dextran. Upon light activation, a reactive carbene is generated and can react with the surface and form a covalent bond.

METHODS Optodex® was deposited (aqueous solution), dried under vacuum and immobilised by light activation at 350 nm. The samples were washed 3 times in KSCN 3 M, 3 times in PBS/Tween, 3 times in PBS, and finally 3 times in bi-distilled water (5 min sonication for each step). Bacterial adhesion tests were performed in PBS.

RESULTS: Dextran binding to PVC was confirmed by XPS analysis (Figure 1).

The washing procedure removed adsorbed molecules. Minimum amounts of Fluorine were detected only on sample C and can also be related to the presence of Optodex®.

Bacterial adhesion was reduced by a factor of 1.4 between sample A and sample C when incubated in PBS.

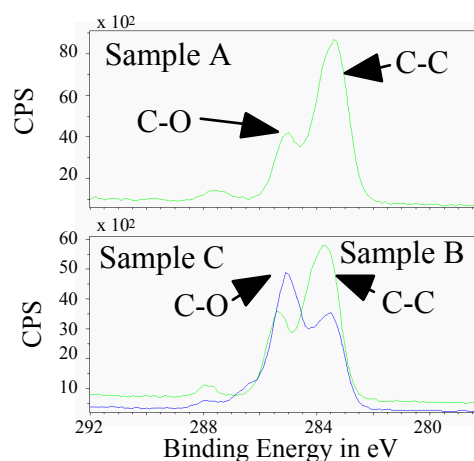


Fig. 1: XPS C1s of samples A, B and C. Sample A is the pristine surface, B is the surface on which Optodex® was deposited and washed without light activation and C is the surface on which Optodex® was deposited, light activated and washed.

CONCLUSIONS: The chemical treatment was efficient in reducing *P.aeruginosa* adhesion to medical grade PVC.

REFERENCES: ¹ JAMA 274, 639-644, 1995, ² Z. Zdanowski, B. Koul, E. Hallberg (1997), J. Biomater. Sci. Polymer Edn, **8**, 825-32. ³ E. Östergerg, K. Bergström, K. Holmberg, et al (1995) *JMBR* **29**:741-77.

ACKNOWLEDGEMENTS: The Common Program on Biomedical Engineering and Research (1999-2002), EPFL Lausanne, is greatly acknowledged for financial support.