Interaction inhibition of *Staphylococcus aureus* with biofunctionalized cellulose acetate scaffolds

S. Pentas[1,6], A. Katranidis[1, 2], G. Papadopoulos[3], K. Panagiotou[4], E. Pavlidou[5] and **T. Choli -Papadopoulou[1]*,**

1. *School of Chemistry, Laboratory of Biochemistry, Aristotle University of Thessaloniki, GR-54124 Thessaloniki, Greece*
2. *Forschungszentrum Julich,ISB-2: Molecular Biophysics, 52425, Julich, Germany*
3. *Department of Biochemistry and Biotechnology , University of Thessalia*
4. *Department of Chemical Engineering, Physical Chemistry Laboratory*
5. *Department of Physics, Electron Scanning Laboratory*
6. *Hospital Agios Dimitrios, Thessaloniki*

*To whom correspondence should be addressed: Theodora Choli-Papadopoulou, Laboratory of Biochemistry, School of Chemistry, Aristotle University of Thessaloniki, TK 54124, Thessaloniki, Greece Email, tcholi@chem.auth.gr, Tel., +302310 997806, Fax, +302310-99768

Abstract

St. aureus is a major virulence factor and is associated with a plethora of human diseases (endocarditis, soft tissue infections, osteomyelitis, abscess formation and pneymonia. This microorganism owns its high virulence partly to the great number of its membrane adherence proteins. Within this work we investigated the interaction of *St. aureus* with cellulose acetate (CA) biofunctionalized with the domain D of *S.aureus* Protein A (SpaD) by taking into consideration one of *S.aureus* adherence mechanisms.

SpaD was cloned in pAN5 plasmid, expressed and in vivo biotinylated by AVB101 *E.coli* strain and immobilized onto cellulose acetate scaffolds by using biotin-streptavidin strategies. The effectiveness of the functionalization of the scaffolds was tested with the immobilization of biotinylated green fluorescent protein (GFP) and its direct visualization with fluorescence microscopy. The scaffolds were subsequently incubated with *S.aureus* culture with or without the presence of A1 domain of vWF. The non-adherent properties of the resulting scaffolds were examined with scanning electron microscopy. Namely,the interaction of *St. aureus* with cellulose acetate was examined with scanning electron microscope (SEM) techniques after the incubation of *St. aureus* cultures with the scaffolds over a broad range of time (3 hours - 3 days). In particular *St. aureus* was cultured for 3, 6, 24 and 72 hours with cellulose acetate scaffolds in LB culturing medium. The adhered cells were fixed on the above mentioned scaffolds and examined with SEM microscope using a broad range of magnifications (1000-7000x).

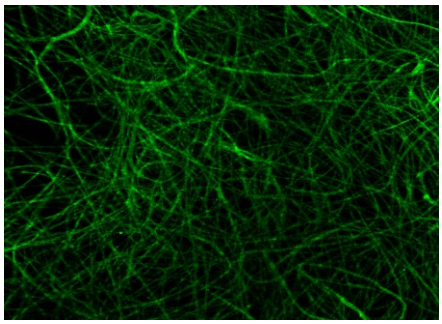

Figure 1. Bio functionalized cellulose acetate scaffolds with GFP.

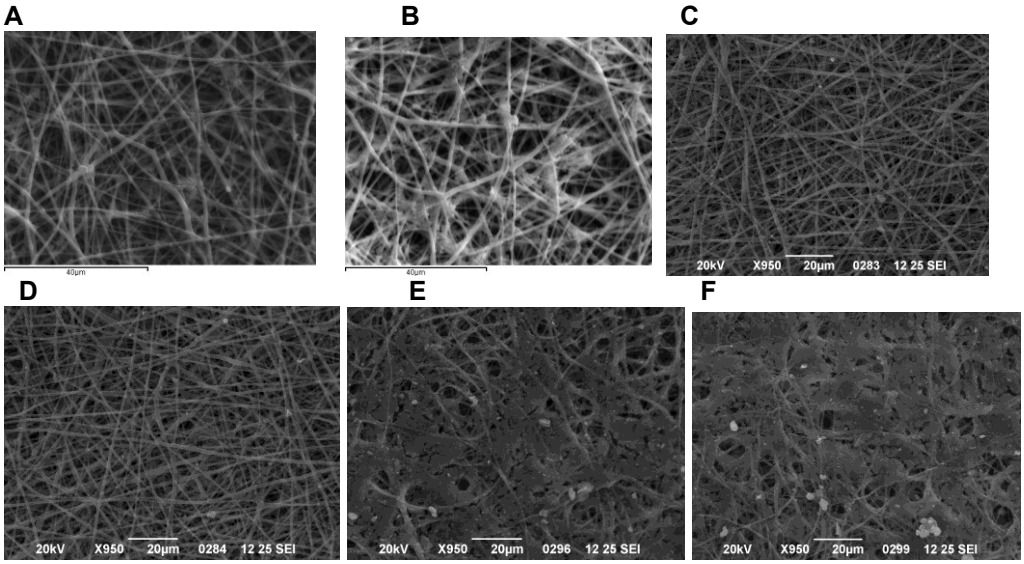

Figure 2. Cellulose acetate scaffold biofunctionalized with SpaD *S.aureus* (A-B), additionally incubated with A1 vWf (C-D) and non functionalized (E-F).

Conclusion

Cellulose acetate bio functionalized scaffolds with SpaD and further incubated with A1 vWf domain show a promising resistance to *S.aureus* and addresses the impact of the proposed scaffolds for bio medical uses.