

## Remesothelialization of a polylactide-based membrane for the prevention of peritoneal adhesions

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**INTRODUCTION:** Intraperitoneal adhesions represent a major problem after abdominal surgery and intraabdominal inflammation with relevant clinical complications such as bowel or vessel obstruction respectively. Therefore, great efforts are being made to understand the pathogenesis of adhesion formation and strategies for its prevention. In the peritoneal cavity mesothelial cells play a crucial role in prevention of adhesion formation, due to the maintenance of a smooth and gliding surface. Any damage to the mesothelial cell layer leads to fibrin exudation, micro-bleeding and adhesion formation. To prevent these processes several barriers have been developed. SupraSeal® is a synthetic Lactide-caprolactone-trimethylene-carbonate copolymer (Fig 1a, fig. 2a).

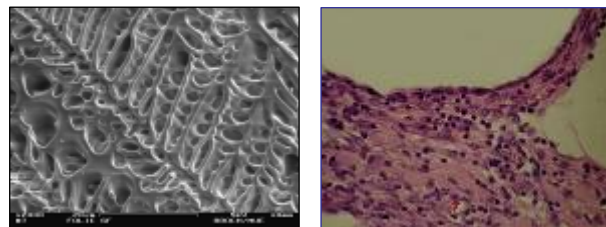
**METHODS:** Female, virgin Wistar rats with a weight range of 220–280 g were treated with a polylactide-based membrane (SupraSeal®) after bipolar electrocoagulation and induced ischemia (1). After 14 days the experiments were terminated and the peritoneal wall with the barrier-membrane including surrounding peritoneum was explanted. The barrier material and the interface with intact peritoneum were analysed histomorphologically by standard histological methods and SEM.

**RESULTS:** Immediately after implantation the experimental defect was completely covered by the membrane (fig.1a). 14 days after implantation at the second look SupraSeal® was still attached on the side of the peritoneal defect with marked shrinking and folding (fig 1b). Focally at the suture site minor smooth adhesive strands could be observed.

Histologically, a minor inflammatory reaction with multinucleated giant cells could occasionally be observed. The surface of the barrier material was completely covered by a single layer of almost flat mesothelial cells, which only rarely showed minimal activation (Fig 2b). The mesothelial cells in the surrounding tissue were typically flat without any signs of activation.



a) b)  
Figure 1: SupraSeal® in native form (a) immediately after implantation and (b) after 14 days implantation in the rat model.



a) b)  
Figure 2: SupraSeal® in native form (SEM x1000) (a). Defect covered by SupraSeal® with a complete monolayer of flat mesothelial cells at the surface of the barrier material (HE x100).

**DISCUSSION & CONCLUSIONS:** In conclusion, SupraSeal® revealed good antiadhesive effects. The fact of a rapid remesothelialization within 14 days and the minor inflammatory reaction implies a good biocompatibility of this material in this application. The minor adhesions found in these first results had close contact to the suture material, which indicates the relevance of the suture or the suture material for the adhesion formation.

### REFERENCES:

1. Wallwiener et al. (2006) Fertil Steril 86:1266-1276