Technical Collateral

Xcoating™ Surface Coating

Biopassive Polymer Coating to Reduce Protein Denaturation and Platelet Adhesion

Xcoating™ surface coating is Terumo's exclusive biopassive surface coating comprised of an amphiphilic polymer that has both hydrophobic and hydrophilic properties. It is these dual properties that allow it to form a new surface in the extracorporeal circuit that reduces protein denaturation and platelet adhesion.

Description

This non-heparin based biopassive polymer [poly(2-methoxyethylacrylate) or PMEA] does not react with blood components and can be used with heparin-intolerant patients.

Xcoating surface coating can be applied to virtually all device material surfaces (polypropylene, polycarbonate, polyurethane, stainless steel, filter mesh and PVC) without affecting the gas transfer performance of CAPIOX® oxygenators.

During application, the Xcoating surface coating molecules bind to each other as well as to the surface material, forming a very thin, very supple layer. This highly elastic layer conforms to even the most flexible surfaces, like tubing, without any clinically significant leaching. Therefore, the surface coating has no contraindications for patient size.

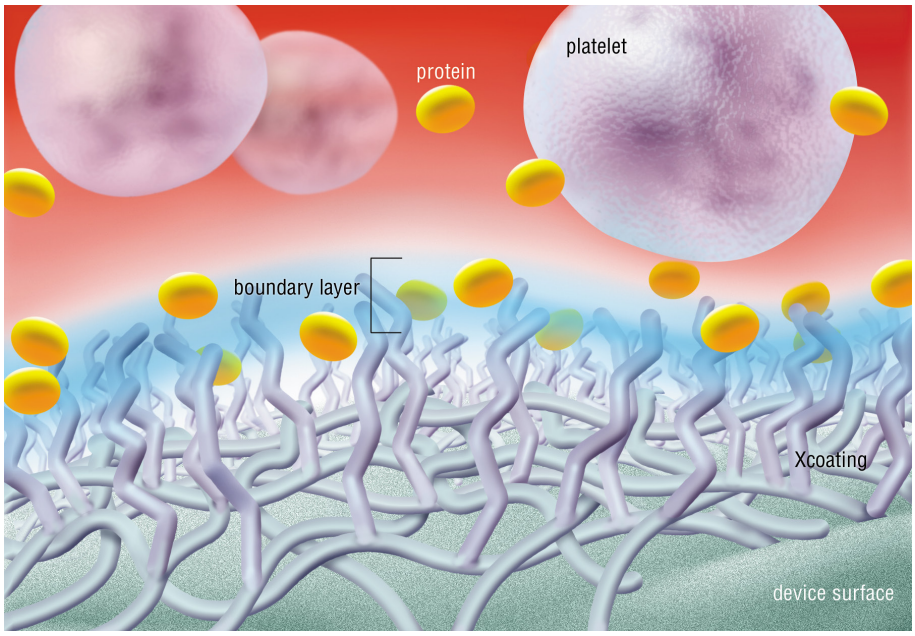
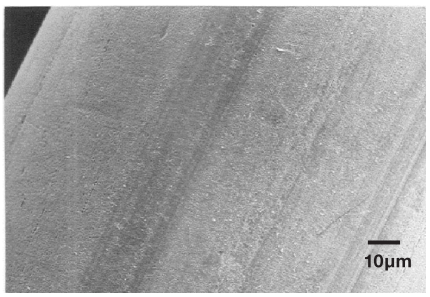
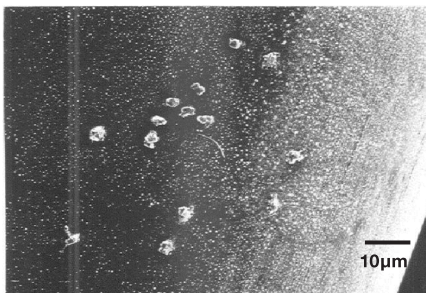


FIGURE 1: Fiber surfaces, one with Xcoating™ surface coating (left) and one uncoated (right), shown after four hours of ex vivo recirculation with porcine blood. The uncoated surface shows emboli aggregation.



Coated with Xcoating™ surface coating



Uncoated

Process

During extracorporeal circulation, Xcoating surface coating creates a boundary layer over the surface of the device, composed of water and the patient's native protein. While the surface coating is hydrophobic where it contacts the device, its blood contact surface is hydrophilic. Water in the blood collects at the coating's hydrophilic interface, causing the coating to swell and create a molecular "mesh" or "net." Protein molecules associate freely within this watery layer; they maintain their native conformation as they move between the boundary layer and the bloodstream, just as they would in normal circulation.

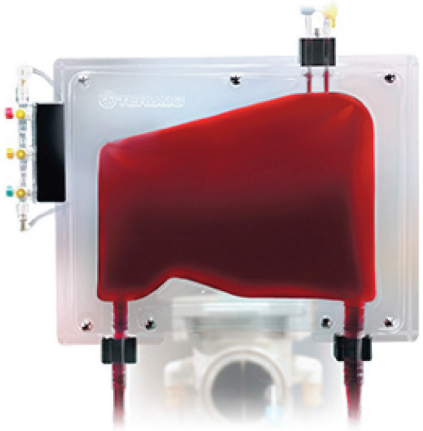
Clinical Benefits

In an uncoated circuit, protein molecules that contact the device surface lose their conformation, or become denatured, creating conditions that promote platelet aggregation.

In a circuit with Xcoating surface coating, the proteins do not deform or become denatured in the boundary layer, so platelets will not aggregate or adhere to the surface (see Figures 1).

Studies demonstrate that Xcoating surface coating reduces platelet adhesion and fibrinogen/albumin adsorption.[1,2]

Studies suggest fewer platelets were administered both intraoperativly and postoperatively with circuits with Xcoating surface coating.[1,3]



Xcoating™

REFERENCES

1. Gunaydin, S., et al. Clinical Performance and Biocompatibility of Poly(2-Methosxyethylacrylate)-Coated Extracorporeal Circuits. Ann Thorac Surg. Sept 2002; 74:819-24.
2. Kocakulak, C., Gunaydin, S., Bingol, N. Investigation of Blood Compatibility of PMEA Coated Extracorporeal Circuits. Journal of Bioactive and Compatible Polymers. Sept 2002; 17:343-56.
3. Vang, N., et al. Clinical Evaluation of Poly(2-Methosxyethylacrylate) in Primary Coronary Artery Bypass Grafting. JECT. 2005;37:23-31.

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