

# Blood compatibility of polymers derived from natural materials

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## Abstract

Several polymers derived from natural materials are effective for tissue engineering or drug delivery applications, due to specific properties, such as biocompatibility, biodegradability, and structural activity. Their blood compatibility needs to be carefully evaluated to avoid thrombosis and other material-related adverse events in the hematic environment. We compared the surface properties and blood compatibility of protein and polysaccharide polymers, including fibroin, gelatin, and chitosan. Both fibroin and chitosan showed good hemocompatibility, with low platelet adhesion and spreading. Chitosan induced strong interactions with plasma proteins, especially with albumin. It was hypothesized that surface passivation by albumin inhibited the adsorption of other procoagulant and proadhesive proteins on chitosan and fibroin films, which limited platelet spreading. However, the significant and rapid polymer swelling encouraged protein entrapment within the soft, gelatin films, inducing higher platelet adhesion and activation. Thrombin generation assay confirmed the higher blood compatibility of chitosan and fibroin with regard to clotting.

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