Adhesive and sealant interfaces for general surgery applications. [Review]

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Abstract:

The main functions of biological adhesives and sealants are to repair injured tissues, reinforce surgical wounds, or even replace common suturing techniques. In general surgery, adhesives must match several requirements taking into account clinical needs, biological effects, and material features; these requirements can be fulfilled by specific polymers. Natural or synthetic polymeric materials can be employed to generate three-dimensional networks that physically or chemically bind to the target tissues and act as hemostats, sealants, or adhesives. Among them, fibrin, gelatin, dextran, chitosan, cyanoacrylates, polyethylene glycol, and polyurethanes are the most important components of these interfaces; various aspects regarding their adhesion mechanisms, mechanical performance, and resistance to body fluids should be taken into account to choose the most suitable formulation for the target application. This review aims to describe the main adhesives and sealant materials for general surgery applications developed in the past decades and to highlight the most important aspects for the development of future formulations.