Mussel adhesion-employed water-immiscible fluid bioadhesive for urinary fistula sealing

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Urinary fistulas, abnormal openings of a urinary tract organ, are serious complications and conventional management strategies are not satisfactory. For more effective and non-invasive fistula repair, fluid tissue adhesives or sealants have been suggested. However, conventional products do not provide a suitable solution due to safety problems and poor underwater adhesion under physiological conditions. Herein, we proposed a unique water-immiscible mussel protein-based bioadhesive (WIMBA) exhibiting strong underwater adhesion which was employed by two adhesion strategies of mussels; 3,4-dihydroxy-L-phenylalanine (DOPA)-mediated strong adhesion and water-immiscible coacervation. The developed biocompatible WIMBA successfully sealed ex vivo urinary fistulas and provided good durability and high compliance. Thus, WIMBA could be used as a promising sealant for urinary fistula management with further expansion to diverse internal body applications.