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Novel electrospun bioadhesive oral patchs for mucosal drug delivery

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A major problem in the treatment of oral mucosal diseases is the delivery of appropriate amounts of drug to affected regions. Frequently, drugs applied in the form of mouthwashes or ointments result in irregular dosage and side-effects. Furthermore, mouth movement and saliva production may remove the drug, reducing treatment efficiency. Thus, there is a clinical need to develop systems capable of delivering controlled amounts of drug locally, whilst remaining adherent to the delivery site for prolonged periods of time. This project aimed to develop bioadhesive polymeric membranes for mucosal or transmucosal drug delivery using electrospinning.

Solutions of polyvinylpyrrolidone and ammonio-methacrylate copolymer (AMC) were prepared in ethanol. Dextran and poly(ethylene oxide) particles were added to the solutions to enhance the bioadhesive properties of the electrospun membranes. A hydrophobic backing layer was fabricated using poly(caprolactone). Solution properties were studied through rheometry. Membrane morphology was examined using scanning electron microscopy. Wetting properties were investigated *in vitro* using optical tensiometry and solubility studies.

Solution viscosity varied depending on composition and concentration, directly affecting fibre formation. The addition of AMC resulted in reduced membrane porosity and solubility, as well as increased surface hydrophobicity. The bioadhesive particles were located on the surface of the electrospun fibres. A poly(caprolactone) hydrophobic backing layer was successfully produced, with enhanced attachment between layers achieved through the application of thermal treatment.

In conclusion, combinations of poyvinylpyrrolidone and AMC may be used to tailor patch properties and, potentially, control drug release. Furthermore, electrospinning allows for the easy addition of various substances to the membranes (drugs, bioadhesive particles), and the increased surface area of electrospun materials may facilitate adhesion and drug release. Therefore, this approach exhibited great potential for the fabrication of bioadhesive systems for the efficient treatment of oral mucosal diseases.