Study of the supercritical impregnation of polymers with drug-active solutes for additive manufacturing

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Polymeric drug-eluting implants are devices that allow gradual and localized drug delivery and can achieve a therapeutic effect with lower drug concentrations [1]. On the other hand, additive manufacturing has been emerged as a profitable and on-demand method of fabrication for complex structures used in biomedicine [2]. The aim of the study was to develop a method for the loading of active pharmacological ingredients into polymer filaments in order to create a material that may play a role in additive manufacturing for biomedical applications.

Generally, the addition of active substances is achieved by immersing the implant already generated in a solution containing the drug, or by adding this active compound in the production of the polymer. In this work, supercritical solvent impregnation technique was used to load the drug-active substances in the polymeric matrix [3,4]. The material used was polymer filaments suitable for additive manufacturing. The variables pressure, temperature, time of impregnation, depressurization rate and use of cosolvent were evaluated to optimize the process. The objective was to maximize the solute loading and the pharmacoactive properties, while minimizing the swelling and foaming effects which can negatively affect the printing process.

After printing with the impregnated filament, the pharmacoactive capacity of the generated product was analysed to verify the feasibility of the method. *In vitro* release studies were also conducted by contrasting the impregnated filament and the printed samples.

References:

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