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3D Printing of prolonged-release tablets containing felodipine

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3D printing technology is a modern manufacturing process, called additive manufacturing. The most common method used to manufacture 3D printed drugs is through fused deposition modeling (FDM). This uses drug loaded filaments previously obtained by hot melt extrusion (HME).

The objectives of this work were: to formulate polyvinyl alcohol-based filaments containing felodipine through HME technique, were the API remains stable at the extrusion temperature; to determine the maximum concentration of felodipine from which usable filaments can be obtained; to prepare 3D printed felodipine tablets through FDM using different filament types and infill percentages and to assess the *in vitro* release profile of felodipine from the prepared imprints.

Two types of filaments containing 5% and 15% felodipine were prepared. These showed appropriate properties to be used in 3D printing of tablets and the API remained stable during the HME and FDM process. Six types of tablets were 3D printed using the two filaments and three infill percentages for each filament type (10%, 50%, 80%). All the tablets were tested for the *in vitro* release of felodipine.

It was determined that increase of felodipine concentration from 5% to 15% in the filament used in 3D printing, decreases the release rate of the API during the *in vitro* dissolution test, most probably due to the low water solubility of felodipine. Also a higher infill determined a release prolongation, most likely due to the difficulty with which the dissolution medium penetrates through the free spaces of the imprint.

In conclusion felodipine was released in a prolonged manner over a period of 5 hours, from the 3D printed tablets.