

## 3D printing of medicines: Engineering novel oral fast dissolving film devices with unique design and drug release

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Fused deposition modeling is a 3D printing technique based on the deposition of continuous layers of thermoplastic materials following their softening/melting. This technique holds huge potential for the manufacturing of pharmaceutical products and is currently under extensive investigation. Recently attracted increasing research efforts towards the production of personalized solid oral dosage forms. The aim of this work was to explore the feasibility of using FDM 3D printing technology with hot melt extrusion (HME)

to produce oral fast dissolving film dosage form. Paracetamol was used as module drug in this experiment. Which successfully loaded into polyvinyl alcohol filaments via HME. The films were printed into two different 3D shapes (circular and square mesh shape). Then over covered with another printed layer of strawberry-PEO as taste masking. The final printed formulations were tested in a dynamic possibility of employing them for printing 200µm thick films. And during *in vitro* dissolution testing, it was clear that the disintegration behavior of the formulations significantly influenced the rates of drug release. Where mesh 3D shape films are all seen to disintegrate completely within 49seconds in warm water as disintegration media. Subsequent analysis of the filaments and films with differential scanning calorimetry, thermogravimetric analysis,

infra-red analysis, scanning electron microscopy and tensile strength test determined that the stability of paracetamol. Which encapsulated inside PVA with no chemical reaction and good elasticity as an oral film. Therefore, the data stated herein clearly establish that printed paracetamol/PVA films comprise excellent candidates for oral fast-dissolving films, which could be particularly useful for children and patients with swallowing difficulties. This work has demonstrated the potential of combining FDM 3DP with established pharmaceutical processes, including HME to fabricate oral fast dissolving film dosage forms.

### Biography

Deanna Marwan Algellay has completed his MSc in pharmaceutical manufacture and quality control from Liverpool John Moores University. He has published one papers in reputed journals.

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