O22 3D PRINTED POLYETHYLENE OXIDE ORAL DOSES WITH INNOVATIVE 'RADIATOR-LIKE' DESIGN: IMPACT OF MOLECULAR WEIGHT ON MECHANICAL AND RHEOLOGICAL PROPERTIES AND DRUG RELEASE

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Background Despite regulatory advances, lack of age-appropriate formulations (AAFs) remains a challenge in paediatric practice. 3D-printing of oral dosage forms (ODFs) offers potential for AAFs for children. Optimising drug release from 3D-printed ODFs is an important technological step. Despite the abundant use of polyethylene oxides (PEOs) and their extensive use as an excipient, there have been no previous reports of applying this thermoplastic polymer species alone to fused deposition modelling (FDM) 3D printing. We assessed the impact of polymer molecular weight (MW) on the mechanical properties of the resultant filaments and their rheological properties. In the FDM 3D printing process, we also tested the effect of an innovative radiator-like design of the ODF on the acceleration of drug release patterns.

Methods Blends of PEO (MW: 100K, 200K, 300K, 600K or 900K) with PEG 6K (plasticiser) and a model drug (theophylline) were prepared by hot-melt extrusion. The resultant filaments were used as a feed for a FDM 3D printer to fabricate innovative designs of ODFs in a radiator-like geometry with inter-connected paralleled plates and inter-plate spacing of either 0.5mm, 1mm, 1.5mm or 2mm.

Results Varying blends of PEO and PEG allowed formation of mechanically resistant filaments (maximum load at break of 357, 608, 649, 882, 781 N for filament produced with 100K, 200K, 300K, 600K or 900K, respectively). Filaments of PEO at a MW of 200K-600K were compatible with FDM 3D printing. Further increase in PEO MW resulted in elevated shear viscosity ($>10^4$ Pa.S) at the printing temperature and hindered material flow during FDM 3D printing. A minimum spacing (1 mm) between parallel plates of the radiator-like design was essential to boost drug release from the structure.

Conclusion These findings are essential in the development of next-generation personalised drug delivery doses using specialised polymer/polymer blends purposely optimised for FDM 3D printing.

Disclosure(s) Nothing to disclose

O23 CAN CHILDREN SWALLOW TABLETS? OUTCOME DATA FROM A FEASIBILITY STUDY TO ASSESS THE SWALLOWABILITY AND ACCEPTABILITY OF DIFFERENT SIZED PLACEBO TABLETS IN CHILDREN AND YOUNG PEOPLE (CREATING ACCEPTABLE TABLETS – CAT)

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Background It can be challenging to administer medicines to children and young people (CYP); due to the lack of available age-appropriate formulations. Developing medicines that are acceptable to CYP has the potential to improve treatment outcomes.[1] Acceptability has been defined as 'an overall ability of the patient and caregiver (defined as 'user') to use a medicinal product as intended'.[2] There is limited evidence for the acceptability of tablets in CYP. This feasibility study aimed to investigate the swallowability and acceptability of different sized placebo tablets in CYP aged 4–12.

Method Participants were asked to swallow three different sized placebo tablets; 6 mm, 8 mm and 10 mm, smallest to largest. Both healthy children and NHS patients were recruited. The researcher observed and recorded children's facial expressions as they swallowed each tablet.[3] Following administration, an internal inspection of the mouth was conducted to identify any residue or non-swallowed tablet.[4] Participants completed a questionnaire about the acceptability of each tablet. For analysis participants were stratified by age: 4–8 and 9–12 years.

Results 55 participants were recruited to the study. 30 children were in the younger group, of which 23% had taken a tablet before. 84% of the 25 older children had previously taken a tablet. 100% of participants attempted to swallow the 6mm tablet, with 67% of younger children and all older children successfully swallowing the tablet. All participants in the older group attempted to swallow the 8 mm and 10 mm tablet with 100% successfully swallowing the 8 mm and 96% successfully swallowing the 10 mm tablet. 77% of younger children attempted to swallow the 8 mm tablet, with 91% succeeding. 70% of younger children attempted the 10mm tablet, with 95% succeeding.

Conclusion This study demonstrates that tablets of 6mm, 8mm and 10mm are potentially an acceptable formulation for children aged 4–12 years.

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O24 IVERMECTIN IN CHILDREN: WHAT IS THE RIGHT DOSE TO ACHIEVE EQUIVALENT EXPOSURE COVERAGE IN CHILDREN AND ADULTS?

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