

Background and Importance

Administration of medications in pediatric → challenging and cumbersome → impacting acceptability and clinical outcomes

Three-dimensional (3D) printing is an additive manufacturing technology that enables the **customization** of medications

Production of « **gummies** » with semi-solid extrusion technology
Anticancer molecule **ONC201** used in the treatment of diffuse intrinsic pontine glioma, **only available in fixed-dose capsules**



Aim and Objectives

- ❖ Develop a 3D-printable ONC201 hydrogel
- ❖ Evaluate the physicochemical characteristics of the resulting dosage forms

Materials and Methods



- A M3DIMAKER pharmaceutical 3D printing machine with a pressure-instrumented SSE motorized print head was used.



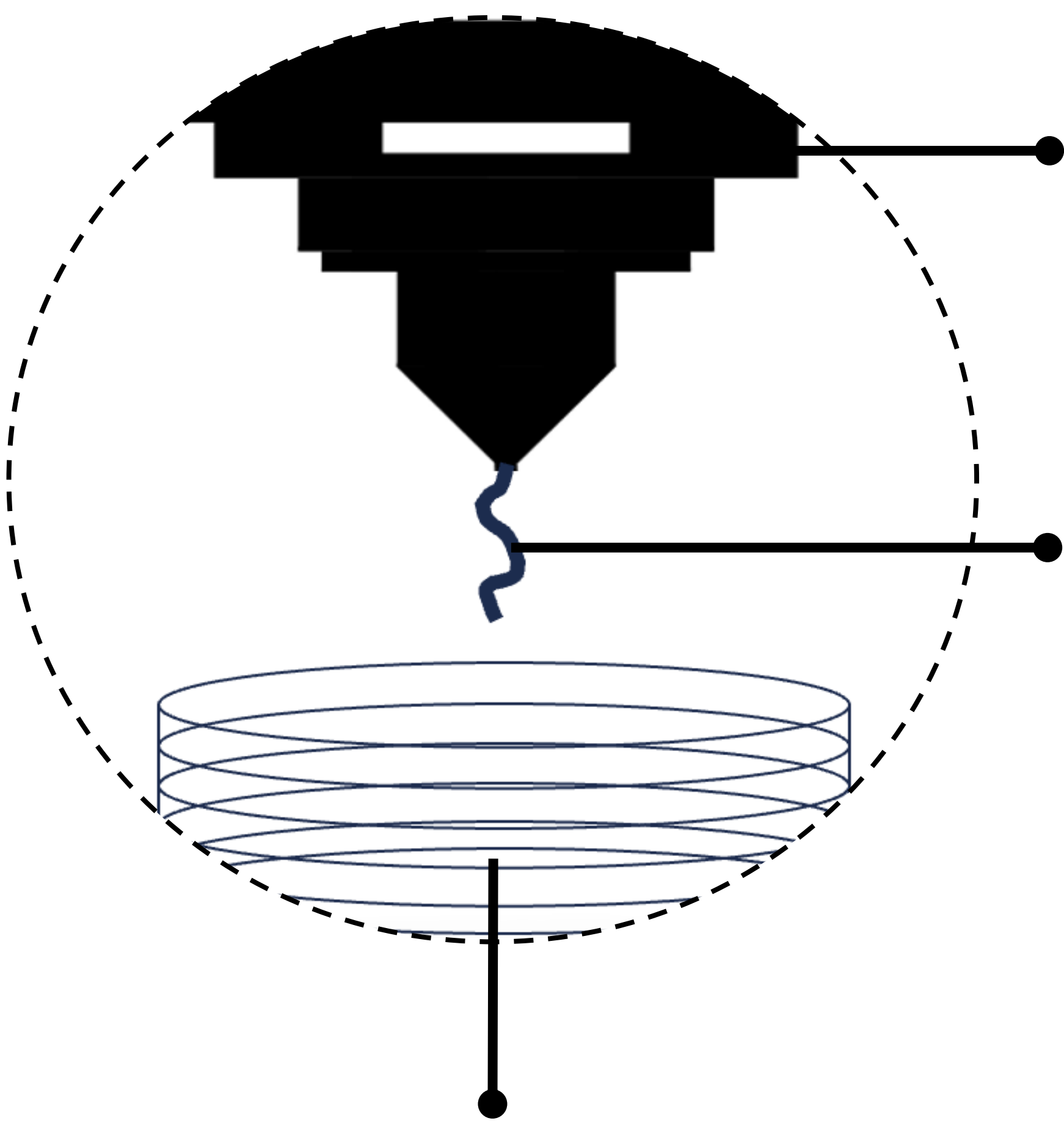
- X-ray diffraction (XRPD), Fourier transform infrared spectroscopy (FTIR), **differential scanning calorimetry** and **thermogravimetric analysis** assessed active ingredient-excipient interactions.

- An MCR302 rheometer studied the rheological characteristics.



- The dissolution profile of chewable forms was established using a **USP type II dissolution apparatus**, preceded by a treatment with artificial saliva.
- Content uniformity measurements by **high-performance liquid chromatography** and mass measurements were carried out in accordance with European Pharmacopoeia (Ph.Eur.) standards.

Results



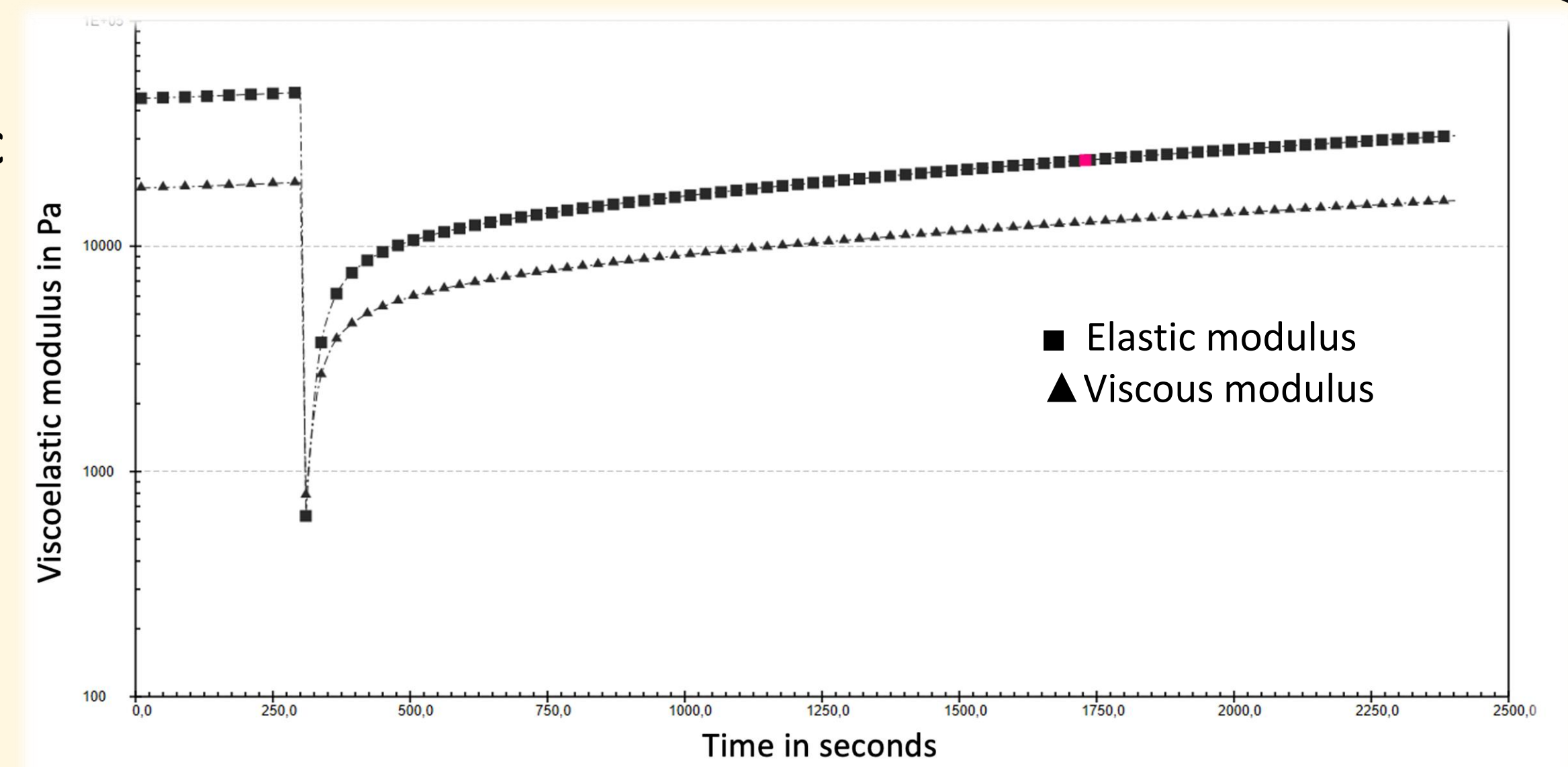
Extrusion through a fine 20G nozzle at room temperature and constant pressure with a 30% infill

Parameters for printing ONC201 hydrogel

Hydrogel composed of 60% of water with solubilized ONC201 in a eutectic system with :

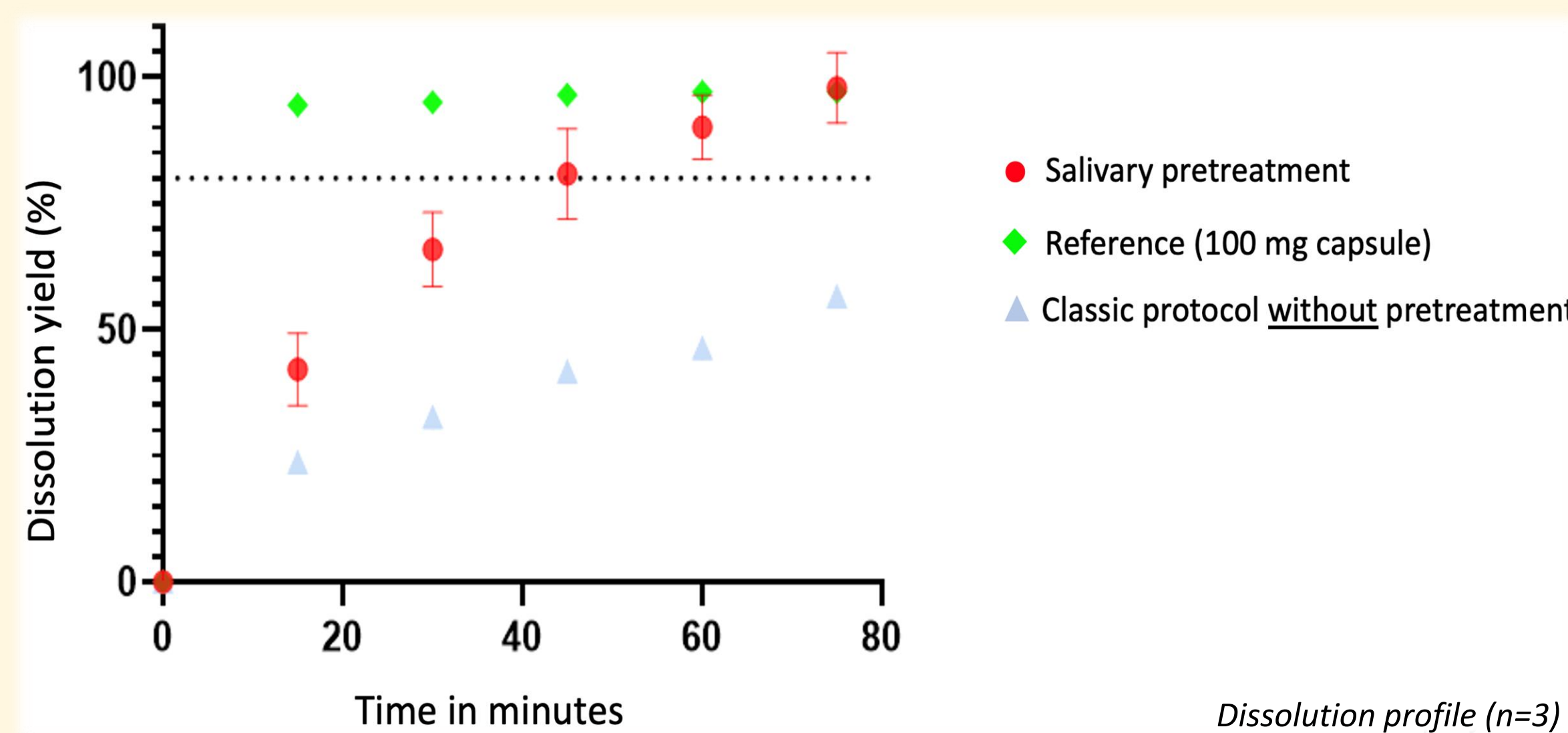
- **Thixotropic behavior**
- **Rheofluidifiant behavior**
- Predominantly **elastic behaviour** ($G' \gg G''$)

Hydrogel suited for 3D printing

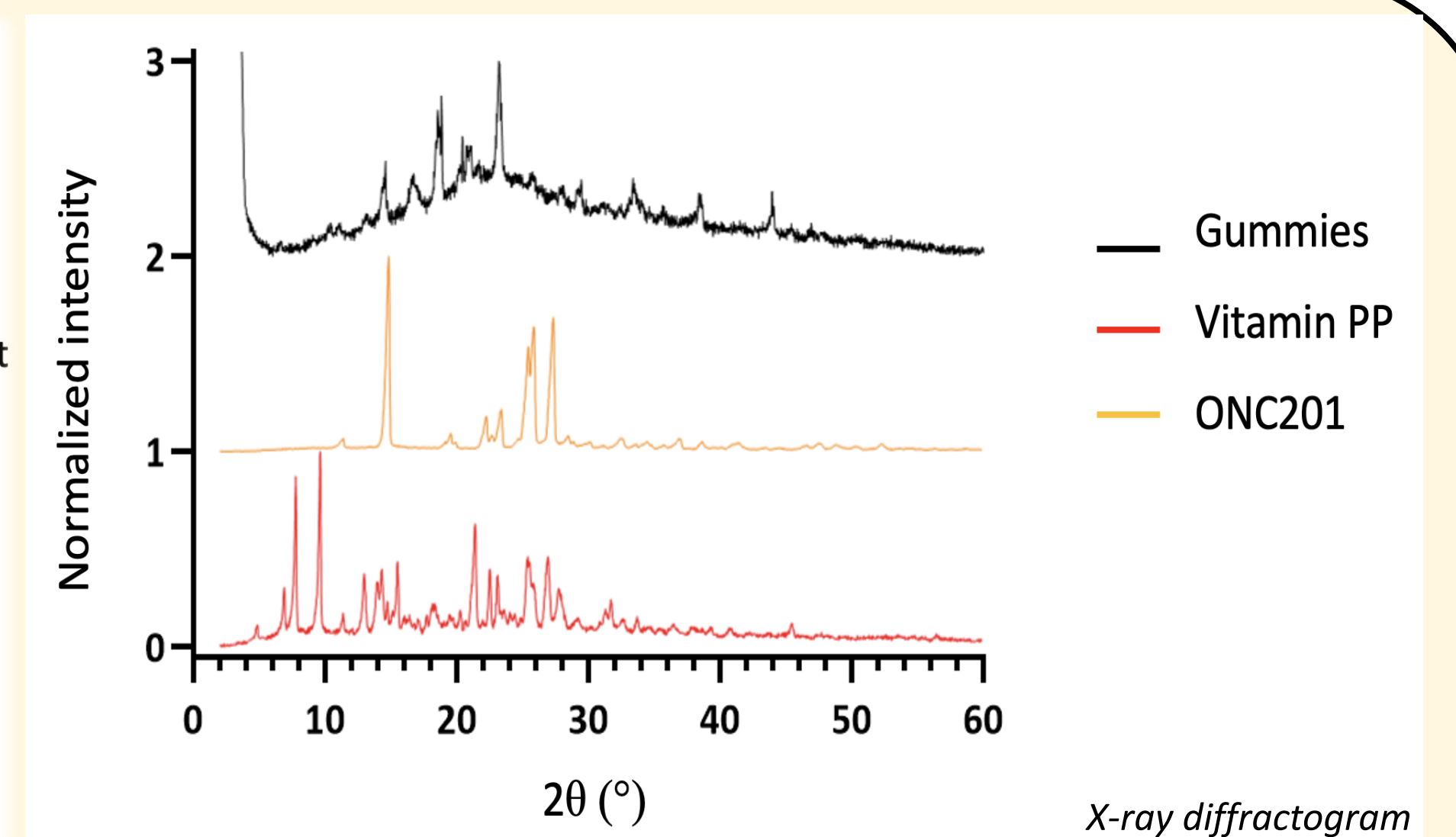


Oval, self-supporting, reproducible chewable forms dosed at 100 mg active ingredient with :

- **Uniformity** of mass and content
- Retention of the solubilized form of ONC201
- **Homogeneous distribution** of ONC201
- A **fast dissolution profile**
- **Physicochemical stability** after 1 month of storage



Form in compliance with regulatory requirement



Conclusion and Relevance

Use of a promising new technology to manufacture pediatric pharmaceutical forms that are stable over time and meet the regulatory requirements of the European Pharmacopoeia. To complete our study, the hardness and the friability of the printed forms remain to be proven.