ELUCIDATION OF THE MECHANISM OF AMORPHIZATION AND DISSOLUTION OF BAD GLASS FORMERS AS A FUNCTION OF DRUG-POLYMER INTERACTION AND PREPARATION METHOD: TOWARD SUSTAINABLE TECHNOLOGIES

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The majority of oral pharmaceutical products are administered orally, while most of the contemporary active pharmaceutical ingredients (APIs) have poor aqueous solubility in the gastrointestinal tract (GIT)-relevant pH. At the same time, most drugs should be absorbed from the GIT to the bloodstream to ensure a pharmacological effect. Poor solubility of API results in incomplete/insufficient absorption—low bioavailability (BA), while the non-absorbed fraction of the drug leaves the human body in a natural way and pollutes our environment. Thus, we aimed our project at increasing the apparent solubility of APIs in order to increase their BA [1]. For this purpose, as an approach, we chose a polymer-based amorphous solid dispersion (ASD) and, as a model drug, naproxen. In the context of polymer-based ASD, naproxen belongs to the hardest-case-scenario group of substances, specifically a bad-glass-former fast-crystallising substance. Fluid-bed coating and electrospinning were selected as solvent-based preparation techniques. At the pre-formulation stage, to screen the most suitable polymer and organic solvent, the solubility distance (Ra), the solvent class in accordance with ICH, the boiling point of the solvent, the experimental solubility of the API in the solvent, the dynamic vapor sorption of the solvent by the polymer, the drug solubility in the polymer, and the drug precipitation in dissolution media with pre-dissolved polymer were investigated [2, 3]. To pre-test the solvent-based coating process, the deposition of ASD on the tablet core using a pan-coater was investigated [4]. In addition, the effect of ASD drug loading and preparation conditions on naproxen dissolution was also investigated [5]. It's been almost 1.5 years since our project began, and at the next stage, we will convert our pre-formulation knowledge into the pharmaceutical dosage form preparation towards higher BA and more sustainable technologies.

References

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