Accepted Manuscript

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PII: S0022-3549(18)30090-X

DOI: 10.1016/j.xphs.2018.02.008

Reference: XPHS 1080

To appear in: *Journal of Pharmaceutical Sciences*

Received Date: 7 November 2017

Revised Date: 16 January 2018

Accepted Date: 6 February 2018

Please cite this article as: Ren F, Sun H, Cui L, Si Y, Chen N, Ren G, Jing Q, Antisolvent recrystallization strategy to screen appropriate carriers to stabilize filgotinib amorphous solid dispersions, *Journal of Pharmaceutical Sciences* (2018), doi: 10.1016/j.xphs.2018.02.008.

Antisolvent recrystallization strategy to screen appropriate carriers to stabilize filgotinib amorphous solid dispersions

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Abstract

Drugs in amorphous solid dispersions (ASDs) are highly dispersed in hydrophilic polymeric carriers, which also help to restrain recrystallization and stabilize the ASDs. In this study, microscopic observation after antisolvent recrystallization was developed as a rapid screening method to select appropriate polymers for the initial design filgotinib (FTN) ASDs. Using solvent evaporation, FTN ASDs with the polymers were prepared, and accelerated experimentation validated this screening method. Fourier-transform infrared spectroscopy, Raman scattering, and nuclear magnetic resonance revealed hydrogen-bonding formation in the drug-polymer binary system, which was critical for ASDs stabilization. A Flory-Huggins interaction parameter and water sorption isotherms were applied to evaluate the strength of the interaction between FTN and the polymers. The dissolution rate was also significantly improved by ASDs formulation, and the presence of the polymers exerted solubilization effects. These results suggested the efficacy of this screening method as a preliminary tool for polymer selection in ASDs design.

Keywords: filgotinib; polymers; screening method; amorphous solid dispersions; interaction

Introduction

As an important parameter in drug formulation, solubility greatly influences drug absorption and oral bioavailability.[1,2] Currently, the majority of new chemical entities belong to