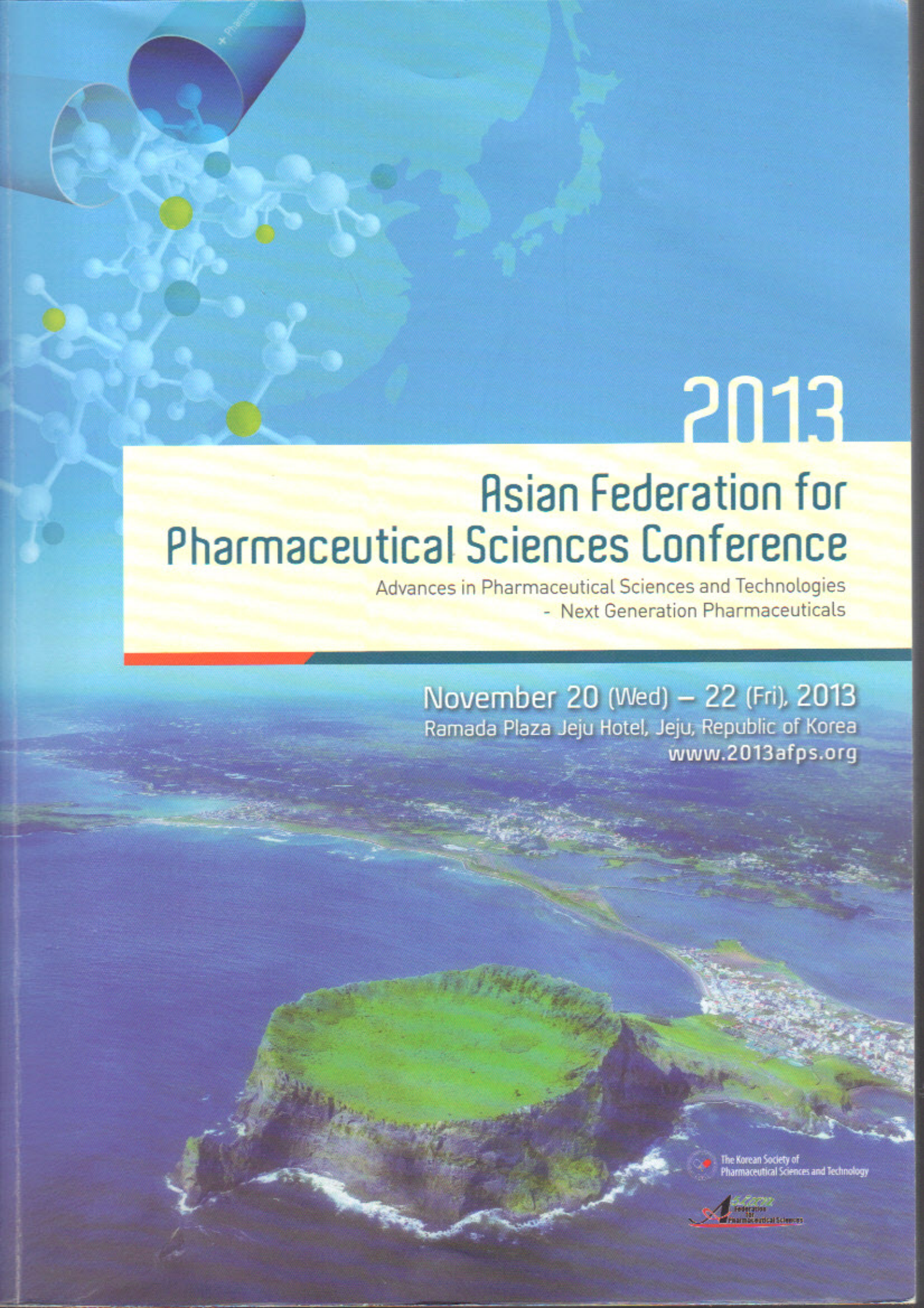

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Microencapsulation of fenofibrate with gelatin using ethanol via the solvent-evaporation method using the spray drying technique: in vivo and in vitro investigation

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Purpose. The objective of this study was the encapsulation of fenofibrate with gelatin using ethanol, and in vivo and in vitro evaluation of physicochemical properties of the encapsulated drug.

Methods. Several formulations were prepared using fenofibrate and gelatin at weight ratios of 1:1, 1:2, 1:4, 1:8, 1:10, 1:15 and 1:20. Fenofibrate and gelatin were dissolved in ethanol and water, respectively. These solutions were mixed together with magnetic stirring. The resultant clear solution was spray-dried. The solubility and dissolution tests of the encapsulated drug were performed compared to the drug powder. The PXRD, SEM, DSC and FT-IR spectroscopy were engaged to explore the physicochemical properties of the spray-dried fenofibrate-gelatin microcapsules. The oral bioavailability studies were executed compared to the drug powder.

Results. The formulation containing fenofibrate/gelatin at 1:8 (w/w) showed the highest aqueous solubility and excellent dissolution (100% at 20 minute) of the drug. Moreover, this formulation had better free flowing property as compared to other formulations. Accordingly, this formulation was selected for further investigation. The PXRD and DSC confirmed the presence of drug in the crystalline state in the microcapsules. The SEM showed smooth-surfaced spherical microcapsules. FT-IR suggested that the drug molecule was not modified after encapsulation and the drug had no interaction with gelatin. Furthermore, microencapsulated drug presented higher plasma levels after oral administration compared to the drug powder.

Conclusion. The microcrystalline state of fenofibrate in the gelatin microcapsules furnished reduced particle size of the drug. This remarkably improved the aqueous solubility, dissolution and bioavailability of the drug in rats after oral administration.