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Preparation and pharmaceutical evaluation of acetaminophen nano-fiber tablets: Application of solvent-based electrospinning method for tabletting

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In this study, we described an application of the solvent-based electrospinning (ES) method, which is mainly employed in the textile industry, to the field of pharmaceutics. Using a modified ES instrument, nano-fiber sheet including acetaminophen (AAP, a model drug) was prepared. Where, Methacrylic Acid Copolymer S (MAC) was used as a base polymer to produce nano-fiber, and then three types of tablets were prepared and evaluated pharmaceutically. By attaching a conductor-rod made from stainless steel to the central part of nano-fiber-collection plate of the ES apparatus, MAC nano-fiber sheet with or without AAP could be produced effectively. *In vitro* release profiles of AAP from a tablet prepared by MAC nano-fiber with AAP (NFT), a tablet prepared by absorbing AAP to drug-free MAC nano-fiber (NFT_{free}) and a tablet prepared by semi-absorbing AAP to MAC nano-fiber (NFT_{semi}) showed controlled release aspects of AAP as compared to a conventional physical mixture. Moreover, these tablets showed pH and compressed force-dependent release profiles of AAP. *In vivo* pharmacokinetic study in rats after intra-duodenal administration of these tablets including MAC nano-fiber clearly demonstrated that application of nano-fibrotic technique based on the ES method is a useful one to expand drug delivery system. Moreover, tableting of MAC nano-fibers can be performed using a tableting machine without lubricants, and addition of Tween 20 into the nano-fiber enabled regulation of the release profile of AAP. Thus, the ES method reported here is a useful technique for the controlled-release of drugs and has wide-ranging potential for pharmaceutical applications.

Biography

Mami Hamori is, currently, a PhD student in Japan at Doshisha Women's College of Liberal Arts (Department of Biopharmaceutics). Her research interests focus on the drug delivery systems using nano-fibers.

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