Fabrication and Evaluation of Spray Dried Polymeric Nanoparticle Dry Powder for Inhalation: A Strategy to Deliver Nintedanib to Lungs

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Idiopathic Pulmonary Fibrosis (IPF) stands as a challenging and debilitating lung disorder, characterized by progressive scarring and fibrosis of the lung tissue. Nintedanib (NTB), a tyrosine kinase inhibitor, has demonstrated potential in slowing down the progression of IPF by inhibiting multiple growth factors and pathways involved in fibrosis. By harnessing the potential of nanotechnology and surface modification with ligands, better IPF therapy and survival rates may increase. By leveraging the inhalation administration, we aim to enhance drug accumulation at the fibrotic lung site, leading to higher efficacy, targeting and reduced systemic toxicity. In the current study we aim to offer a compelling case for the potential of folic acid surface modified NTB lipid carriers as a targeted and efficient treatment strategy for IPF. NTB Polymeric nanoparticles (PNPs) were prepared by single emulsion solvent evaporation and spray dried to achieve dry powders for inhalation administration. PNPs were used for various solid characterization studies, particle size, zeta potential and in vitro drug release. PNPs dry powders were administered through inhalation route to Wistar rats and concentration in plasma, lungs and other tissues were assessed. Emphasizing the significance of research done, we envision that these innovative advancements will pave the way to provide targeting efficacy as more concentration of NTB was found in lungs and shown better pharmacokinetic parameters when compared to NTB suspension

Key words: Nintedanib, Polymeric nanoparticles (PNPs), Pulmonary fibrosis, Dry powder inhalation, folic acid