

### III. Symposium of Young Researchers on Pharmaceutical Technology, Biotechnology and Regulatory Science

January 20-22<sup>nd</sup> 2021 Szeged, Hungary

OP-46

DOI: [10.14232/syrptbrs.2021.op46](https://doi.org/10.14232/syrptbrs.2021.op46)

#### Preparation and characterization of carrier-free dry powder inhalers containing nanosized active ingredient

Petra Party, Rita Ambrus

Institute of Pharmaceutical Technology and Regulatory Affairs, Faculty of Pharmacy, University of Szeged, Szeged, Hungary



Pulmonary drug delivery provides rapid onset of action, large surface area for absorption and limited drug degradation. With the development of innovative dry powder inhalers, we could improve the therapeutic effect. The non-steroidal anti-inflammatory meloxicam was the active ingredient, which could be useful for the treatment of lung cancer, cystic fibrosis and chronic obstructive pulmonary disease.

Our aim was to produce dry powder inhalers containing nanonized meloxicam. We targeted different regions of the lung with micrometric particles prepared by Mini Spray-Dryer and nanometric samples produced by Nano Spray-Dryer.

We used a two-step preparation method. The nanosuspension was prepared with wet milling, using meloxicam and polyvinyl alcohol. The powders were obtained with spray-drying of the nanosuspension and using leucine. We measured the following properties: particle size (laser diffraction, DLS), morphology (SEM), true density, structure (XRPD), thermoanalytical properties (DSC), *in vitro* dissolution, *in vitro* absorption, *in vitro* lung deposition (Andersen Cascade Impactor).

We worked out a powder preparation method, using wet milling and spray drying. We managed to nanonize the active ingredient and prepare 3-4  $\mu\text{m}$  particles by Mini Spray-Dryer and 500-800 nm particles by Nano Spray-Dryer. The particles were spherical with low density. Thanks to the improved surface area and amorphization, released and absorbed amount of meloxicam increased. The *in vitro* aerodynamic measurements proved that with the microsized particles we targeted the bronchioles and with the nanosized we reached the alveoli.

The samples are suitable for pulmonary delivery; therefore, our products could treat different respiratory diseases in the future.

**Acknowledgments:** Richter Gedeon's Talentum Foundation, Gedeon Richter Ltd – GINOP project (2.2.1-15-2016-00007), Ministry of Human Capacities, Hungary grant, TKP-2020, EFOP 3.6.3-VEKOP-16-2017-00009 project

*Supervisor: Rita Ambrus*