

Available data regarding properties of aerosols released from electronic cigarettes (e-cigarettes, ECs) are scarce. Therefore, the aim of this research project is detailed recognition of processes that have influence on properties of aerosol released from e-cigarettes (e.g. droplets size) and its ability to penetration of the respiratory system. The planned measurements will provide experimental data which are required for create mathematical modelling which will describe the particle deposition in different regions of the respiratory system (upper airways, tracheobronchial tree, alveoli) and at different inhalation dynamics. Gaining knowledge about these phenomena should be the starting point of further analysis of safety and dangers related to EC mists inhalation.

In the project will be analyzed e-cigarettes with different design and various e-liquids with different nicotine content. To generate aerosol, e-cigarettes will be connected to the fully controllable breathing simulator which allows to investigate the influence of inhalation intensity on aerosol properties (e.g. droplet size). In further studies, the EC aerosol will be released into the chamber with conditions imitating environment in the upper respiratory tract, and hold there with the predefined periods of time. At these conditions, aerosol parameters will be determined with the instrument based on laser diffraction phenomena.

The planned research is innovative at the international level - this subject is relatively new and poorly recognized. Additionally, the literature data are still present significant discrepancies due to, the lack of standard and correct technical approach to testing of e-cigarettes, which should be considered as specific source of inhalable aerosols. The project is focused on physical effects, whose recognition, quantitative description and inclusion into the calculations of droplets deposition in the lungs, can broaden the knowledge regarding on the impact of e-cigarettes on health and the environment. The conclusions of the project will indicate the significance of variable inhalation maneuvers, which are also partially related to the variability of EC design, on the quality of emitted aerosol, their predicted deposition in the respiratory system, and the secondary emission to the environment. This basic research should set the basis for the rational analysis of possible health effects of aerosols produced in electronic cigarettes, both for users and bystanders.