

Airborne microbiome - characterization of microorganisms inhabiting particulate matter of urban areas and their impact on human health.

With the development of whole-genome sequencing methods, understanding the "microbial community", known as the microbiome, of different environments has become one of the major challenges of modern microbiology. Bacteria inhabit almost every niche of our planet. The Earth's diverse ecosystems are characterized by a large variety of bacteria that inhabit them, and many of them are crucial for the proper functioning of other organisms and natural processes. There is no difference with human body. Each of us hosts approximately one hundred trillion bacteria that make up our organism's microbiota. We are also highly dependent on microorganisms inhabiting our body, because their composition largely shapes human health. In extreme cases, the presence of pathogens can lead to disease.

Bacteria accompany us in almost every activity, even breathing! During each inhalation, together with the air, we also inhale dust particles and various microorganisms that reside on them. The planned research assumes finding out the types of these microorganisms, and to what extent they are able to penetrate our body with the help of dust. In addition, it is known that in polluted air (e.g. in large cities with smog) there are much more bacteria than in the air of rural areas. We want to investigate how the composition of dust and its sources (e.g. car exhaust fumes, coal combustion) shape the composition of the airborne microbiome, and whether there are strains that might negatively affect human health. It will also allow the development of an air quality bio-indicator that takes into account microbiological hazards. In addition, research on the airborne microbiome near an infectious hospital will help to answer the question of whether big city dust supports the spread of antibiotic resistance among bacteria.