Natural Secreted Nano Vesicles as a Source of Novel Biomass Products for Circular Economy (Nano Biomass)

This BioFuture2025 project targets the nano- and micro vesicles that are called collectively here as the exosomes. The exosomes represent a new humoral, systemic layer that controls homeostasis. Since the exosomes are around the size of viruses and that they are also present in saliva, the exosomes may function as a novel bio aerosol class. The exosomes transmit various types of relevant cellular biomolecules such as proteins, RNA/DNA and the metabolites. Due to these reasons the exosomes may offer openings to target (biological) drugs, image tissues and organs in *vivo* and ways to develop even non-invasive surgery therapies at the end. The exosomes can be expected to offer fundamental opportunities for disease diagnostics. Individual exosomes may themselves serve as biological drugs when produced in mass quantities for medical practise. In summary the exosomes offer important opportunities to develop significant bio economically valuable products.

In the project we will enrich exosomes from the air, milk and certain other biological fluids. We will define the composition of the exosomes, their nucleic acids and proteins. We will develop better ways to purify the exosomes and to methods to define their molecular signatures. With the identified molecular tools we aim to enrich specific types of exosomes. We will then use the enriched exosomes in assays to learn more about their cellular functions and mechanisms of action. We will use nano level filters to analyse air and to study if the exosomes may serve as a novel way to characterize quality of air. We will develop technologies to enrich and characterize exosomes from milk. We will go on to target the roles of the milk-derived exosomes in wealth in defined model assay systems. The aim is to reveal the mode of their cellular entry and roles in metabolic control. Moreover, we will study how nutrition may reflect to the composition of the exosomes and quality of milk and if the milk offers ways to obtain large amounts of exosomes and to generate custom made exosomes for

the different sectors of bio economy. Form the obtained data sets we will generate a data bank.

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