Novel method to profile surface proteins of individual exosomes.

Press release

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There is an ever growing demand for novel diagnostic markers for early disease detection and prognosis. Exosomes convey protein and nucleic acid cargos between cells as a form of intercellular communication, and therefore are potential circulating biomarkers for tumor progression and metastasis, as well as for early detection of neurodegenerative disease. In order to investigate this new class of biomarkers it will be vital to detect and differentiate the different subtypes of exosomes associated with disease. Researchers at Uppsala University and Vesicode AB, along with other collaborators, have now developed a novel method for the characterization of surface membrane proteins on individual exosomes in order to better stratify, quantify and identify single exosomes.

Exosomes are a subclass of membrane-coated extracellular vesicles with sizes ranging from 30 to 100 nm, which are released from cells by exocytosis. Exosomes are found in most body fluids, and have been shown to play key roles in processes such as coagulation, intercellular signaling, the immune response, and cellular waste management. Because of the heterogeneity of exosomes it is desirable to investigate them individually, but this has so far remained impractical.

In this new study, published in Nature Communications, researchers describe a novel proximity-dependent barcoding assay (PBA) to profile surface proteins of exosomes using antibody-DNA conjugates and next-generation sequencing. To barcode individual exosomes this method combines affinity probes with amplifiable oligonucleotides, and micrometer-sized single-stranded DNA clusters. Concurrently, the protein composition on the surface of individual exosome is converted to DNA sequence information via bound antibody-DNA conjugates and decoded by next-generation sequencing.

The developed PBA method allows for the simultaneous detection of 38 surface proteins, thus providing a high throughput, and highly multiplexed analysis. This then confers the possibility of a more accurate, reliable and sensitive technique for the study of exosomes; and enables analysis of different populations of exosomes in heterogeneous samples. Resulting from the success of this study Vesicode AB has sought to further develop and commercialize the PBA technique.

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