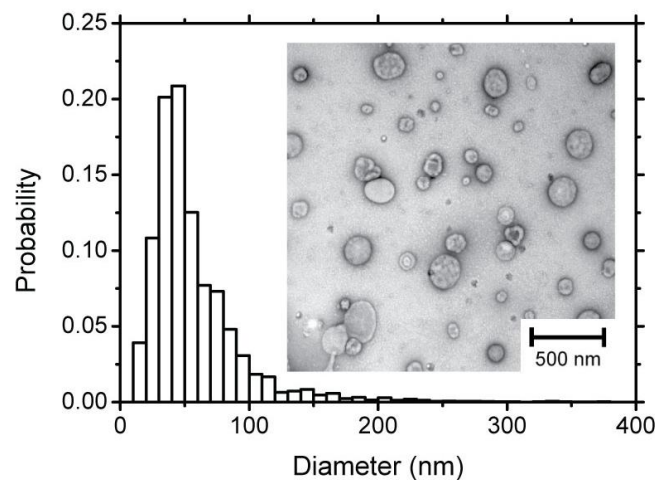


## The first traceable refractive index measurements of reference particles and extracellular vesicles

*An internship position is available at the Amsterdam UMC, Laboratory for Experimental Clinical Chemistry and VSL, the National Metrology institute. Research will be performed in an interdisciplinary team including biologists, physicists, engineers, and metrologists, and at two locations: in the hospital (Amsterdam) and at a company (Delft).*

**Background:** All body fluids contain extracellular vesicles (EVs, Figure 1), which are nanoparticles released by cells. EVs have the potential to be a biomarker to distinguish between health and disease, but EV measurements need more standardization before they can be used in the clinic. In the European project METVES II ([www.metves.eu](http://www.metves.eu)), we further standardize concentration, refractive index, size, and fluorescence measurements of EVs by development and characterization of new reference materials.



**Problem:** We have produced state-of-the-art reference particles to calibrate light scattering signals of flow cytometers. However, there is currently no technique to traceably determine the refractive index of the reference particles.

**Solution:** As part of METVES II, we will determine the refractive index of newly developed reference particles and EVs using a newly developed set-up and the most accurate goniometer worldwide.

**Tasks:** Your aim is to develop and apply a procedure to determine the refractive index of reference particles and, if feasible, EVs. Tasks involve experimental design, sample preparation, optical alignment, software development and goniometer measurements.

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