

Use of nanoparticles for biomolecular diagnostics in chronic disease

Marco MONOPOLI - *Royal College of Surgeons, Ireland*

Due to their high surface area and binding energy, nanoparticles firmly associate with the biomolecules from the surrounding media, forming the corona. The corona formation has emerged as a recurring and important phenomenon in nanomedicine that has been investigated for potential applications in disease diagnosis. In our recent publication, we developed a platform for the characterization of the corona that also revealed the presence of the glycans bound to the backbone of the proteins forming the corona, bringing novel insight for the discovery biomarker for early warning diagnostics. By using silica nanoparticles, plasma fibrinogen was enriched to a level in which its proteomic and glycomic “fingerprints” could be traced with confidence. Despite being a more simplified glycan profile compared to full plasma, the corona glycan profile revealed a fibrinogen-derived glycan peak that was found to potentially distinguish lung cancer and cardiovascular disease patients from controls in a pilot study. We envisioned that the protein corona formation could be exploited as an enrichment step that is critically important in both proteomic and proteoglycomic workflows.