Evaluation of a new plasma stabilisation technology for circulating cell-free DNA

Vlasta Korenková[1], Lucie Langerová[1], Pamela Pinzani[2], Mikael Kubista[1]

[1] Institute of Biotechnology, Academy of Sciences in Prague, v.v.i., Czech Republic
[2] University of Florence, Italy

A wealth of scientific evidence has shown that the circulating, cell-free nucleic acids (ccfNA), present in human blood plasma, have great potential in providing diagnostic markers. Over the last years, it also became clear that this evolving molecular diagnostic field requires new pre-analytical tools and procedures in order to ensure valid results. When blood is drawn according to the standard methods, blood cells and nucleic acids are not stabilized which leads to two processes occurring over time (hours to days): (1) Nucleic acids may degrade due to the presence of nucleases in whole blood or the plasma fraction, respectively. (2) Blood cells (e.g. leukocytes) will die and disintegrate over time, releasing comparatively large amounts of genomic, chromosomal DNA into the plasma fraction. This will reduce the fractional concentration of the ccfDNA originally present in the samples and, most importantly, will dilute potential diagnostic targets such as a fetal DNA markers or rare tumor-derived DNA fragments. The presented study aims to demonstrate proof of concept for a new stabilization technology which is under development within the SPIDIA project, both in healthy population and in clinical blood samples derived from pregnant women and oncology patients.

This work was supported by the Large-Scale Integrating Project Standardisation and Improvement of Generic Pre-Analytical Tools and Procedures for In Vitro Diagnostics (SPIDIA) within the 7th European Community Framework Programme HEALTH-F5-2008-222916, 7E09019 via IBT, Prague and by the Research Project AV0Z50520701.