Multidimensional evaluation of circulating tumor DNA

Umberto Malapelle, University of Naples Federico II, Department of Public Health

Liquid biopsy has significant revolutionized the management of cancer patients. In particular, the adoption of liquid biopsy as a complementary tool to tissue specimens is widely accepted in different clinical settings, from cancer interception to early detection, monitoring minimal residual disease and predict response and resistance to target treatments. From a clinical point of view, the term liquid biopsy stands for circulating tumor DNA (ctDNA), a small fraction of the total cell free DNA (cfDNA) extracted from plasma samples. However, a number of different analytes, including circulating tumor cells (CTCs), circulating tumor RNA (ctRNA), extracellular vesicles (EVs), have to be taken into account to evaluate the complex molecular landscape of solid tumors. In addition, the concept of liquid biopsy, which is most frequently associated to blood samples, can be extended to other body fluids, including cerebrospinal fluid (CSF), pleural effusion (PE), lymph, saliva and urine. In particular, the adoption of tumor nucleic acids extracted from fluids more closely related to the metastatic site demonstrated a higher sensitivity than blood in detection of clinically relevant alterations for targeted treatments. In this scenario, using different body fluids other than blood as well as the analysis of different analytes in addition to ctDNA may impact on diverse aspects of patient care, including cancer detection and screening, staging, prognostication, treatment selection, therapeutic response monitoring and early detection of treatment resistance or cancer recurrence.