Clinical application of Liquid Biopsy in early detection, predicting recurrence, target treatment choosing and therapy monitoring in cancer.

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Precision medicine aims to improve early diagnosis and treatment of cancer through the identification of predictive markers able to guide therapeutic decisions, molecular subtype classification, response to treatment monitoring and identification of resistance and disease recurrence.

Liquid biopsy technique allows for detection, isolation and analysis of components released by the tumor in blood, saliva, feces or other biological fluids such as circulating tumor cells (CTC), circulating tumor DNA (ctDNA), l circulating tumor RNA (ctRNA), long non-coding RNAs (lncRNA), messenger RNA (mRNA), microRNAs (miRNA), platelets, extracellular vesicles (microvesicles, exosomes), and proteins.

This is possible because on these components it is possible to study specific tumor biomarkers that allow an accurate distinction between healthy and ill individuals, to identify personalized therapies and monitor the treatment to identify early resistance to therapy and disease recurrences.

Liquid Biopsy is easier to access, less painful and allows assessment of spatial and temporal tumor heterogeneity as markers from all tumor sites are released into the biological fluid.

Although liquid biopsy has some advantages over tissue biopsy, it currently represents a complementary and not a substitute technique because does not provide histological evaluations.

nowadays the clinicaò applications of the liquid biopsy concern advanced stage non-small cell lung cancer, for the evaluation of the presence or absence of mutations in the EGFR (Epidermal Growth Factor) gene. The procedure is recommended as a possible alternative to tumor tissue analysis in two clinical scenarios: in patients with a new diagnosis before starting any type of treatment or in follow-ups where it is impossible to obtain biopsy tissue for the patient's condition." In this second case, blood sampling is useful for directing a possible change in treatment (with the introduction of a third generation Egfr inhibitor).

However, there are numerous innovative aspects regarding the emerging clinical applications of liquid biopsy. Numerous scientific evidences demonstrate a potential use in monitoring the response to anticancer therapy even in tumors other than lung cancer. This last aspect would allow a dynamic molecular analysis of the evolution of the disease, capable of detecting the temporal biological heterogeneity of the tumor overcoming the limits of the spatial heterogeneity of the tissue biopsy, with a view to personalizing the treatment and further evolution of “precision oncology”.