

Liquid biopsy beyond cancer – circulating epigenetic biomarkers in cardiovascular and immune-mediated diseases

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Background & objectives

Liquid biopsies have become very popular and are increasingly used for cancer molecular profiling as they provide the opportunity of detecting, analyzing and monitoring cancer in various body fluids such as blood or urine instead of a piece of cancer tissue. Though cancer is still the major application field, the concept of liquid biopsy is also arising in other complex diseases such as cardiovascular or immune-mediated diseases. While blood is still the main liquid biopsy used, saliva has heightened interest as a promising sample matrix not least due to the COVID-19 pandemic and the given need for rapid, and non-invasive testing.

The aim and objective of the present study was to identify epigenetic biomarkers (DNA methylation and miRNAs) from liquid biopsy samples obtained from 1) cardiovascular/metabolic disease (diabetes and stenosis) and 2) immune mediated disease patients (ulcerative colitis and atopic dermatitis).

Methods

We applied different approaches for epigenetic biomarker profiling in liquid biopsies: We isolated RNA from extracellular vesicles (EVs) from plasma and cell-free saliva to perform microRNA biomarker discovery via small RNA sequencing. For parallel genome-wide DNA methylation profiling on Illumina EPIC arrays we typically used DNA derived from whole blood, except for the diabetic biomarker study where saliva EV-derived DNA was used.

Results

We could identify a variety of differentially expressed miRNAs and differentially methylated regions in the various disease settings when comparing disease groups to (healthy) controls and thereby differentiate between diseased and healthy individuals. This held true not only for diagnostic epigenetic marker identified in plasma/blood but also in saliva.

Conclusion

From our results we conclude that epigenetic biomarker profiling from liquid biopsies such as blood and saliva is a promising approach not only for cancer but also other complex diseases such as CVD, diabetes, and immune-mediated diseases.