Liquid biopsy, as the source of cell-free nucleic acid for the diagnosis, treatment, and monitoring of cancers

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Background: Ovarian cancer is one of the leading cause of cancer mortality among women, due to lack of early diagnostic tools for the detection of this type of aggressive malignancy. Several benefits of liquid biopsy describe its efficiency and as good source of cell-free nucleic acids which seem to be promising possible biomarkers in the diagnosis.

Methods: Ovarian cancer patients and non-cancerous controls were involved in the study. Exosomes were extracted from plasma (miRCURY™ Exosome Isolation kit), also RNAs and non-coding RNAs were isolated from plasma, plasma-derived exosomes(miRNeasy Serum/Plasma Kit, RNeasy Plus Kits) and tissue (NucleoSpin RNA kit), cDNA was synthesised and the level of expression was determined by qRT-PCR (miRCURY LNA miRNAsystem for miRNAs,RT^{2}Profiler PCR system for lncRNAs, DNA Master Hybprobe kit for CD24). Exosomes were quantified by Exo-TEST ELISA kit.

Results: We investigated some non-coding RNAs which might be possible candidates for further analysis, so our research results showed difference in the expression of miR-125a, miR-146b, miR-200b and higher expression of MALAT1 in cell-free plasma of cancer patientscompared to that of in controls, however the observed differences were not significant (p=0.082; 0.233; 0.128; 0.549), except in case of miR-146a (p=0.023). Based on the bioinformatics tools, connections were revealed among some of these microRNAs, MALAT1,which is a long non-coding RNA and also CD24, are identified as targets of miR-146a. There was a significant difference in the expression of CD24 in ovarian tissue between controls and patients (0.21 vs. 79.35, p=0.006), on the other hand it,showed expression only in some cell-free plasma and exosome samples. Higher exosomequantity was analysed in ovarian cancer patients ($2.336x10^{13}$/ml) compared to non-cancerous individuals ($1.268x10^{13}$/ml).

Conclusion: We analysed the altered expressionprofile of thesenon-coding RNAs from the plasma and tissue of healthy controls and ovarian cancer patients. Using liquid biopsy gives a great potential to analyse non-coding RNAs and our research might contribute to understand the role of these non-coding RNAs and relationship among these molecules in cancer for developing more accurate diagnostic tools and treatment options.