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Breast cancer-derived extracellular vesicles are the source of functional metabolic enzymes as potential targets for cancer therapy

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Abstract. In this work, intracellular vesicles (MVs) of breast cancer were studied. These vesicles are a source of potential targets for breast cancer therapy. This study shows that MVs carry functional metabolic enzymes and provides a framework for future studies of their biological role in BC and potential in therapeutic applications.

Key words: microvesicles, metastatic breast cancer, ornithine aminotransferase, transaldolase, bleomycin hydrolase.

Conflict of interest. The authors declare the absence of obvious and potential conflicts of interest associated with the publication of this article.

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Membrane-derived extracellular vesicles, referred to as microvesicles (MVs), have been proposed to participate in several cancer diseases [1]. In this study, MV fractions were isolated by differential ultracentrifugation from a metastatic breast cancer (BC) cell line MDA-MB-231 and a non-cancerous breast cell line MCF10A, then analysed through nano-liquid chromatography coupled to tandem mass spectrometry. A total of 1519 MV proteins were identified from both cell lines. The data obtained were compared to previously analysed proteins from small extracellular vesicles (sEVs), revealing 1272 proteins present in both MVs and sEVs derived from the MDA-MB-231 cell line. Among the 89 proteins unique to MDA-MB-231 MVs, three enzymes: ornithine aminotransferase (OAT), transaldolase (TALDO1) and bleomycin hydrolase (BLMH) were previously proposed as cancer therapy targets. These proteins were enzymatically validated in cells, sEVs, and MVs derived from both cell lines. The specific activity of OAT and TALDO1 was significantly higher in MDA-MB-231-derived MVs than in MCF10A MVs. BLMH was highly expressed in MDA-MB-231-derived MVs compared to MCF10A MVs. This study shows that MVs carry functional metabolic enzymes and provides a framework for future studies of their biological role in BC and potential in therapeutic applications.

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