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Novel microarray analyzer to predict major obstetric syndromes using surface markers of maternal plasma containing Extracellular Vesicles (EVs)

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Background/Objectives: Placental-derived extracellular vesicles (EVs) are nano-organelles that facilitate intercellular communication between the feto-placental unit and the mother. The main objective was to evaluate a novel microarray analyzer for profiling the differential expression of surface biomarkers on circulating plasma EVs with a power to predict preterm delivery (PTD) and preeclampsia (PE) compared to term delivery (TD) controls.

Methods: Maternal blood was collected from pregnant women with PTD, PE and matched TD controls. Plasma samples were overlayed on the microarray glass slides previously printed with a wide panel of antibodies to EV surface receptors. For detection, captured EVs were marked with biotinylated antibodies specific to EVs (CD9, CD63, CD81) or to placental EVs (PLAP and PP13), and labelled by cyanine five–streptavidin. The fluorescent signal was measured and analyzed for sensitivity and specificity using area under the receiver operating characteristic curves (AUROCs). Results were validated by comparison with EVs purified using standard procedures.

Results: Distinct profile of surface receptors expressed on total EVs and PEVs of PE, PTD, and TD were identified. Similar results were obtained with EVs purified by UC when compared to raw plasma EVs.

The multiple marker analysis generated high prediction accuracy with 90% sensitivity and specificity according to surface receptor relevant to inflammation (TNF RII), relaxation (PP13), and immune-modulation (LFA1), cell adhesion (ICAM), immune suppression and general EV markers (CD81, CD82, and Alix), the complement activation cascade (C1q) and autoimmunity.

Conclusion:Novel, simple, fast, robust EV microarray analyzer is a new platform that reveals novel surface biomarkers of placental and total EVs for a differential prediction of major pregnancy complications – preeclampsia and preterm delivery compared to normal term delivery controls.

Keywords: Placental extracellular vesicles, biomarkers, pregnancy, preeclampsia, preterm delivery

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Biography

Hamutal Meiri is developing biomarkers and advanced means and tools for predicting and preventing the major obstetrics complications, - preeclampsia, preterm birth and gestational diabetes mellitus. This work focuses on the new micro array that uses surface receptors of extracellular vesicles (EVs) I the prediction of preeclampsia and preterm delivery, to enable differential diagnosis and clinical managements.* complications Deanna Mulvihill has her expertise in evaluation and passion in improving the health and wellbeing. Her open and contextual evaluation model.