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THE EFFECT OF MATERNAL PLATELETS ON THE DEVELOPMENT OF EXTRAVILLOUS TROPHOBLASTS USING A 3D CELL CULTURE MODEL

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During human placentation extravillous trophoblasts (EVTs) migrate into the maternal endometrium and form plugs within the lumen of uterine spiral arteries preventing maternal blood cells from entering the intervillous space. However, by the middle of first trimester, cells within trophoblast plugs become loosely cohesive leading to the formation of narrow capillary-sized channels. Due to their small size, maternal platelets may be the first amongst maternal blood cells which pass such narrow intercellular gaps of trophoblast plugs. We aimed to establish a proper 3D cell culture model to address the hypothesis if release of platelet-derived factors into the intercellular space of EVTs plays a significant role in their differentiation and behavior. The human trophoblast cell line ACH-3P was used to create spheroids which were either co-cultured with platelets directly or treated with released factors from activated platelets. The difference in the morphology of spheroids was visualized by immunofluorescence staining and transmission electron microscopy. Their diversity on the molecular level was measured using qualitative real-time PCR and western blotting as well as standard RNA sequencing analysis. Upon spheroid formation in presence of maternal platelets, the latter were enclosed into a cavity of the trophoblast spheroids. However, some platelets were also found between the trophoblasts, mirroring in vivo circumstances. Factors released by platelets showed a deregulation of certain genes of the trophoblast spheroids. In this study we aimed to establish a unique 3D cell culture model using the human trophoblast cell line ACH-3P. We pursued to show if platelets and their derived factors have an effect on the development of extravillous trophoblasts in early gestation. We could indicate that the morphology of the spheroids will change upon co-culture with platelets but equally important the release of the content of platelets will affect them on the molecular level.