The correlation between first-trimester serum biochemical and biophysical markers and skin microvascular reactivity assessed by laser speckle contrast imaging

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Objective. To evaluate the correlation between first-trimester serum biochemical and biophysical markers and skin microvascular reactivity by using laser speckle contrast imaging (LSCI) combined with post-occlusive reactive hyperaemia (PORH).

Materials and Methods. Thirty-eight women with a singleton gestation were enrolled during routine first-trimester scans. Microvascular skin blood flow was recorded using LSCI coupled with PORH. Skin perfusion was recorded before (baseline flux), during (occlusion flux) and after (peak flux) a 3-minutes occlusion obtained with an inflated pneumatic cuff. The parameters of microvascular reactivity were compared with serum biochemical markers (Pregnancy-associated protein A, PAPP-A, free beta human chorionic gonadotropin, free β-hCG, placental growth factor, PlGF), expressed in multiple of the median, and with maternal biophysical markers (Mean arterial pressure; Uterine artery pulsatility index).

Results. PlGF showed a moderate positive correlation with base-to-peak flux ($r = 0.50$, $p < 0.01$). Furthermore, a moderate positive correlation was found between free β-hCG and peak flux ($r = 0.50$, $p < 0.01$). Additionally, weak but statistically significant correlations were observed between free β-hCG and the other markers of microvascular reactivity: base-to-peak flux ($r = 0.33$, $p = 0.045$); peak time ($r = -0.331$, $p = 0.042$) and time to half recovery ($r = -0.396$, $p = 0.014$). A positive correlation was also noted between free β-hCG and baseline flux ($r = 0.341$, $p = 0.036$). No correlation was found with the other explored biochemical and biophysical markers.

Conclusions. Our study indicates a positive correlation between microvascular reactivity indexes and PlGF and free β-hCG levels. These novel findings suggest that first-trimester skin microvascular reactivity, assessed by LSCI coupled with PORH, could serve as valuable early pregnancy marker for placental function.