Assessment of skin microvascular function in pregnancy using laser speckle contrast imaging

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Objective. To assess variations in skin microvascular response during pregnancy by employing laser speckle contrast imaging (LSCI) coupled with post-occlusive reactive hyperaemia (PORH), and to compare results with those of non-pregnant healthy controls.

Materials and Methods. Thirty-two pregnant women were prospectively enrolled in the first trimester. Microvascular skin blood flow was recorded in each trimester (T1, T2 and T3) using LSCI. Skin perfusion was measured at baseline, during a 3-min occlusion obtained with an inflated pneumatic cuff, and after occlusion release (peak flux). Changes in these parameters throughout gestation were evaluated. Recordings from T1, T2 and T3 were then compared to parameters obtained in thirty-two non-pregnant controls.

Results. Baseline flux significantly increased from T1 to T3 ($p = 0.03$). The peak flux after occlusion release and the base-to-peak flux significantly increased from T1 to T3 (median change 29.06 Perfusion Units, 95%CI 19.48-40.1, $p < 0.0001$, and mean change 40.77%, 95%CI13.34-68.2, $p = 0.005$, respectively), and both parameters were higher in T3 compared to controls ($p < 0.001$). The base-to-peak flux was also higher in T1 and T2 compared to controls ($p < 0.01$). The time to reach peak perfusion since cuff release and the half recovery time decreased from T1 to T3 ($p < 0.01$) and were lower in pregnant women at T3 compared to controls ($p < 0.001$).

Conclusions. Microvascular reactivity improves from the first to the third trimester and is heightened in pregnant compared to non-pregnant women. Using LSCI, we presented measures of microvascular function in pregnancy, that can be utilized to explore deviations from the typical microvascular response in conditions such as preeclampsia.