Pregnancy provides a unique opportunity to assess later life cardiovascular disease (CVD) in women. The relationship of preeclampsia to later life CVD is best established and has been recognized as such by the AHA. Preeclampsia in general predicts a doubling of risk for later life CVD but in certain subsets (preeclampsia occurring in early pregnancy or recurrently) the increase is as much as 9 fold. Less well recognized is the risk associated with other adverse pregnancy outcomes, pregnancies with undergrown infants (fetal growth restriction, FGR) and those delivered prematurely. Importantly all of these share common pathophysiological features that could provide mechanistic clues for later life CVD in women.

CVD is different in women. Ischemic heart disease occurs 10 years later and is more likely to result in mortality. Women are more likely to have ischemic disease without epicardial vascular occlusion and this reflects increased myocardial microvascular disease. Congestive heart failure is more common, especially heart failure with preserved ejection fraction (HF/pEF).

We asked if pregnancy might not only reveal risk for later life CVD but also might provide mechanistic insights. The placenta is a remarkable organ with transport, endocrine and paracrine functions mandatory for normal health of the infant at birth and in later life. It is highly vascular, is perfused by maternal vessels that undergo profound changes and accomplishes all of this across a life span of nine months. Perhaps, not surprisingly, our preliminary data suggest that placental vascular changes predict later life CVD. The pathophysiological changes of preeclampsia and to a lesser extent preterm birth and FGR resemble those of later life CVD while cardiac functional changes with preeclampsia resemble those of HF/pEF.

We are currently testing the hypothesis that pathophysiological changes we have demonstrated with preeclampsia, glycocalyx dysfunction, misfolded proteins and increased concentrations of the endogenous inhibitor of nitric oxide synthase asymmetric dimethylarginine (ADMA) may be relevant to the pathophysiology of CVD in later life. In animal studies we also begin to test whether the associations demonstrated indicate common precursors of CVD and abnormal pregnancies or whether there is a causal relationship that can be ablated therapeutically.