



Vascular Disease and Pregnancy: Unraveling the Cause of Preeclampsia **March 18, 2014**

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Overview: The purpose of this presentation is to help you understand the causes of preeclampsia, methods towards diagnosis and prevention, and the surfacing research that will help unlock the biology behind the complication.

Preeclampsia is a complication that occurs during pregnancy and is characterized by high blood pressure and signs of damage to other organ systems, typically the kidneys. If untreated, preeclampsia can lead to serious and even fatal complications for the mother and fetus. Preeclampsia can be difficult to diagnose, as it sometimes develops without any symptoms. However, high blood pressure can be a significant indicator of preeclampsia. Therefore, monitoring blood pressure during pregnancy is essential for detection. Other signs of preeclampsia can include excess protein in the urine, severe headaches, changes in vision, upper abdominal pain, nausea or vomiting, impaired liver function, and shortness of breath. Preeclampsia is diagnosed after the 20th week of pregnancy. The only treatment for preeclampsia is to deliver the fetus.

The Facts about Preeclampsia:

- Preeclampsia occurs in 5-10% of all pregnancies
- Preeclampsia is the leading cause of maternal death
- Preeclampsia is caused primarily by a placental defect
- Preeclampsia causes problems throughout the body including hypertension, proteinuria, edema, neurologic symptoms, TMA, and defects in the endothelium
- Preeclampsia is most common in one's first pregnancy and is more common with twins
- Mortality is 10-15%

Causes: The cause of preeclampsia is still being researched, but it is known that it begins in the placenta. New blood vessels develop early in the pregnancy and send blood to the placenta. Women with preeclampsia are found to have narrower blood vessels that react differently to hormonal signaling. Glomeruli, which sit in the kidney, play a role in hypertension and proteinuria in preeclampsia. Healthy glomeruli have holes (open capillary loops), but in preeclamptic patients, these loops are filled up, which is why these patients spill protein and have higher levels in their urine. Normal pregnancies include normal organ function, no hypertension, normal glomerular function, no proteinuria, no brain edema, no liver edema, and no coagulation abnormalities—preeclamptic patients show signs of abnormalities in all these areas.

Surfacing research hypothesizes that VEGF inhibitors cause proteinuria and glomerular injury by local reduction of VEGF. As VEGF plays a major factor in vessel growth, this may help provide clues to the causes of preeclampsia. In pre-clinical research studies with mice, the genetic deletion of VEGF from an adult, filtering glomeruli, led to kidney failure and 100% of the mice

developed glomerular injury characteristic of TMA. These data show that the molecular basis of endothelial dysfunction in preeclampsia resembles complications of anti-VEGF therapy. Understanding this further will improve diagnosis and potentially prolong pregnancy.

The only cure for preeclampsia is delivery. Early detection is essential, and, if diagnosed with preeclampsia, your doctor will likely recommend more frequent prenatal visits to monitor the situation with frequent blood tests, ultrasounds, and nonstress tests. After delivery, patients' blood pressure is expected to return to normal within 12 weeks, but typically sooner.