Podocyturia May Signal Preeclampsia Risk Early

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SAN FRANCISCO — Urinary excretion of podocytes appears to be a highly sensitive and specific marker for preeclampsia, Dr. Brian Brost said at the annual meeting of the Society for Maternal-Fetal Medicine.

Podocytes are highly differentiated epithelial cells that line the urinary surface of the glomerular capillary tuft. As part of the glomerular filtration barrier, "they play a central role in glomerular function," according to Dr. Brost, an ob.gyn. at the Mayo Clinic in Rochester, Minn.

Because podocyturia is thought to occur earlier in the course of glomerular disease than does proteinuria, the detection of this marker may enable clinicians to identify women at risk for preeclampsia earlier than is currently possible, he said.

Preeclampsia has long been associated with pathologic renal changes, and recently published studies have linked the urinary shedding of podocytes with active glomerular disease.

"We hypothesized that viable podocytes would be present in urinary samples from women with clinically confirmed preeclampsia and would not be present in samples from normotensive pregnant women," Dr. Brost said.

To test this hypothesis, the investigators analyzed clean-catch urine samples from 15 preeclamptic women and 16 normotensive women for podocyturia. Preeclampsia was diagnosed based on the American College of Obstetricians and Gynecologists' criteria for new-onset hypertension and proteinuria in previously normotensive pregnant women.

"We also evaluated serum concentrations of circulating angiogenic factors [thought to be predictive of preeclampsia] in order to compare the diagnostic accuracy of both tests," Dr. Brost said.

In terms of patient characteristics, "maternal age in the preeclamptic group was higher than in the control group, as would be expected," Dr. Brost said.

Additionally, by design, there was a statistically significant difference in gestational age at time of analysis.

"We had done some preliminary studies looking at the degree of podocyturia based on gestational age and there was no difference in those values, so for this investigation we picked term controls to try to ensure that these women would not develop preeclampsia along the way," he commented.

For the podocyte assay, urine sediments were cultured on collagen-coated slides and incubated overnight. Urinary podocytes were identified and quantified based on their expression of the podocyte-specific protein, podocin. "Each sample was reviewed by a single renal pathologist, blinded to the diagnosis, to determine the number and percentage of cells that stained for podocin," Dr. Brost said.

The assay results showed that podocytes were present in all of the samples collected from preeclamptic women and were not present in any of the control samples, indicating "the sensitivity and specificity of the assay were both 100%," Dr. Brost reported.

Because the value of a diagnostic test depends on the pretest probability of the disease, "we estimated the diagnostic accuracy of both [the podocyte and the angiogenic factor] tests using pretest probabilities of 5% and 25%, which are the most commonly cited for low-risk and high-risk populations, respectively" Dr. Brost noted.

With use of the low pretest probability, "the negative predictive value did not differ between podocyturia and the angiogenic factor test," he said. "For patients with a pretest probability of 25%, the negative predictive value was higher with podocyturia."

In both the low and high pretest probability groups, the positive-predictive value was higher for podocyturia, he said.

Among the study's limitations is its small sample size, Dr. Brost said. "The numbers are low because this was meant to be a preliminary pilot study, but it has yielded exciting results. Our next step is to evaluate podocyturia in pregnancy with other renal processes to see what the effects would be."

Future studies are needed both to confirm the study findings "and to test the hypothesis that podocyturia predates proteinuria and would thus provide a useful screening test for preeclampsia," Dr. Brost concluded. ■