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**NEPHROLOGY**

**Discovery of New Protein Could Lead to Improved Treatment for Urinary Tract Infections**

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Discovery of New Protein Could Lead to Improved Treatment for Urinary Tract Infections

The team of clinician scientists in The Research Institute at Nationwide Children’s Hospital responsible for the discovery of RNase 7—a potent antimicrobial peptide in the human urinary tract—recently identified a protein called ribonuclease inhibitor (RI), which binds to RNase 7 and suppresses its antimicrobial activity. Identifying this potential regulatory mechanism of RNase 7 is an important step toward developing treatments to help the body naturally fight off urinary tract infections.

In the study published in *Kidney International*, John David Spencer, MD, nephrologist and principal investigator in the Center for Clinical and Translational Research at Nationwide Children’s, and colleagues examined human kidney samples with chronic pyelonephritis, a type of urinary tract infection that affects one or both kidneys. They found that the samples with chronic pyelonephritis expressed less RI and slightly more RNase 7 than samples from healthy kidneys.

“Our findings demonstrate that RI binds to RNase 7 in human kidney tissues, suppressing RNase 7’s antimicrobial activity,” says Dr. Spencer, who also is an assistant professor of Pediatrics at The Ohio State University College of Medicine. “These results identify a potential regulatory mechanism of RNase 7.” Although it is still unclear why chronic pyelonephritis causes reduced levels of RI, the effect seems to be better availability of RNase 7, which can in turn help fight the microbes causing kidney and urinary tract infections.

The sterility of the urinary tract is critical to the prevention of urinary tract infections. Learning how to regulate the expression of RNase 7 could give clinicians a way to increase the body’s production of its own antimicrobial defenses, reducing the frequency and severity of urinary tract or kidney infections.

Currently, Dr. Spencer and his team are analyzing RI expression and the mechanisms and pathways that up- and down-regulate RNase 7 production. “If we can learn to manipulate these peptides and up-regulate them, we may be able to develop them as a new treatment,” Dr. Spencer says. “These findings could have a significant clinical impact.” In time, the team hopes to use their work to define the pathophysiology of common pediatric diseases, such as urinary tract infections, and create novel diagnostic and treatment strategies to improve patient care.

NEPHROLOGY

The Section of Nephrology at Nationwide Children’s Hospital provides specialized primary and consultative care for children with kidney and urinary tract problems through age 21. The section maintains an active inpatient service and outpatient clinical program. Disorders treated include acute kidney injury, chronic kidney disease, congenital anomalies of the kidneys and urinary tract, glomerular disorders, tubular disorders, urinary tract infection, kidney stones, fluid and electrolyte disorders, hypertension, and metabolic bone disease.

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Professor of Pediatrics

John David Spencer, MD
Assistant Professor of Pediatrics

General and specialized pediatric nephrology clinics provide more than 3,000 outpatient visits each year. A full range of renal replacement therapy services are available to children with acute and chronic kidney failure including hemodialysis, peritoneal dialysis, renal transplantation, and dialysis precleanse services. The Pediatric Nephrology Fellowship provides training in the treatment of renal and urinary tract disease in children.

The section maintains an active research program at The Research Institute at Nationwide Children’s Hospital. An active collaboration between basic and clinical scientists evaluates risk factors, mechanisms, and potential treatment for renal and urinary tract disease in children. A monthly research conference among nephrology, urology, and The Research Institute faculty and trainees facilitates collaboration among these disciplines. The section participates in clinical and translational studies involving urinary tract infection, chronic kidney disease, dialysis, renal transplantation, nephropathy, hypertension, kidney stones, and metabolic bone disorders.

Section members are involved in the medical education of The Ohio State University (OSU) College of Medicine medical students, Nationwide Children’s Hospital(OSU) pediatric residents, and pediatric nephrology fellows. The section is represented among the leadership of the American Society of Pediatric Nephrology (ASPN), and the Midwest Pediatric Nephrology Consortium. Many of the faculty are members of national ASPN committees.

The section has had numerous accomplishments in the past year. In addition to the listed publications, faculty, fellows, residents, and medical students working with nephrology faculty presented their research at several national academic meetings. Six of the above faculty had funding from the National Institutes of Health during the past academic year. Andrew Schwaderer, MD, was awarded Mentor of the Year by the OSU Landauer Honor Society. William Smoyer, MD, won the Outstanding Mentor Award for Basic Research from The Research Institute at Nationwide Children’s Hospital. Brian Becknell, MD, PhD, was one of two pediatric nephrologists selected nationwide for the John E. Lewy Outstanding Mentor Award for Basic Research from The Research Institute at Nationwide Children’s Hospital. Hiren Patel, MD, was one of two pediatric nephrologists selected nationwide for the John E. Lewy Outstanding Mentor Award for Basic Research from The Research Institute at Nationwide Children’s Hospital.

PUBLICATIONS


FAX FACTS

July 2013 – June 2014

Inpatient Discharges: 234
Observation and Outpatient-in-a-Bed Discharges: 108
Total Discharges: 342
Average Length of Stay*: 5.3
Average Daily Census*: 3.4
Patient Days*: 1,234
Nephrology Clinic Visits: 2,823
Kidney Transplants**: 5

*Excludes observation and outpatient-in-a-bed patients.

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