Pregnancy can pose unique challenges for patients with kidney diseases and their clinicians (1). Growing numbers of women are undergoing pregnancies while on dialysis, and their outcomes are improving (2). New tactics for managing kidney diseases during pregnancy, such as high-intensity dialysis (3) and home dialysis (4), may improve the odds of successful outcomes. Each patient's experience with pregnancy and kidney diseases is unique. Several patients with kidney diseases in Tennessee and North Carolina recently shared their pregnancy experiences and insights with *Kidney News*.

**Unexpected diagnosis**

Charlotte Hartawan, of Sparta, Tennessee, did not know she had kidney disease until she unexpectedly became pregnant with her third child. Elevated blood pressure during her first few prenatal appointments in March, April, and May 2022 led her obstetrician to order blood and urine tests, which revealed she had kidney disease. “That’s when everything kind of blindsided me,” she said. “It has been kind of a roller coaster for the past year.”

A nephrologist with Nephrology Associates in Nashville, Tennessee, Dr. Christin Giordano, joined her care team along with her original obstetrician and a high-risk obstetrician. But Hartawan felt the high-risk obstetrician did not know much about kidney diseases. “I felt like I was being dismissed,” she said. “Like we don’t know what to do, so we are just going to wait and see.”

In August 2022, she transferred her obstetric care to a team at Vanderbilt University, and at that time, the team, along with Giordano, decided that she should start dialysis. “It was scary because I did not know what to expect,” Hartawan said. The worst part was having a catheter implanted, she said. She explained that lying on her back during pregnancy left her breathless, and having the procedure with only local anesthetic felt overwhelming.

Starting in August 2022, Hartawan traveled approximately 1¼ hours from Sparta to Murfreesboro, Tennessee, 5 days a week for 5-hour dialysis sessions. To help ease the burden, she began training to perform home hemodialysis. But before she could graduate, she was hospitalized and remained August 2023 | Vol. 15,  Number 8

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**Collaboration Yields 3D Kidney Atlas, Insights on Stone Disease**

By Bridget M. Kuehn

Recently published, three-dimensional (3D) molecular atlas of the human kidney in healthy and disease states may help accelerate research to provide more personalized approaches to kidney disease care.

The results were published July 19, 2023, in *Nature* (1) and provide a detailed account of the atlas. The work is the result of a close collaboration between two large consortia: the Kidney Precision Medicine Project (KPMP) (2), which focuses on mapping kidney diseases and progression, and The Human BioMolecular Atlas Program (HuBMAP) (3), which focuses on mapping healthy human tissue, explained Sanjay Jain, MD, PhD, professor of medicine, pathology, and pediatrics and director of the Kidney Translational Research Center at Washington University School of Medicine in St. Louis, MO, and one of the study’s principal investigators.

“The goal of the KPMP is to transform kidney health for people with kidney disease[s],” said Michael Eadon, MD, associate professor of medicine and medical molecular genetics at Indiana University School of Medicine in Indianapolis and another of the study’s principal investigators. “We want to bring novel molecular insights into well-known chronic kidney disease and acute kidney injury syndromes.”

Investigators from 55 sites participated in the KPMP. Some focused on recruiting participants and collecting biopsy tissue. Others used specialized techniques to conduct Reproductive health

The second of a two-part special section explores the intersection of reproductive health and kidney diseases.

Affirmative action

Implications for diversity in nephrology

Overcorrection of hyponatremia

Letters to the Editor discussion: Is a new approach needed or not?

AI developments in precision diagnostics

Benefits of an automated histological classification system for kidney allografts
in the hospital for approximately 2 weeks to be carefully monitored until her delivery in September 2022. Her elevated blood pressure made it challenging for her clinicians to distinguish whether the cause was kidney disease or preeclampsia. During her hospitalization, she received 6 hours of dialysis, 6 days a week.

She said Giordano went above and beyond throughout her care. Giordano reached out to other nephrologists with expertise in kidney diseases and even waited with Hartawan and brought her snacks until Hartawan’s husband arrived when she went into labor.

“You could [recognize] it in her words and just simple things she would do,” Hartawan said.

Hartawan’s son was born at 31 weeks’ gestation and spent 6 weeks in the neonatal intensive care unit. She had to travel to Nashville, approximately 1½ hours away from her residence, to visit her newborn son. “It’s doing great,” Hartawan said. She continues to undergo home hemodialysis 4 days a week and had surgery in February of this year to create an arteriovenous fistula, which provides more permanent dialysis access.

She said that during her pregnancy, figuring out how to juggle her medical care, caring for her 7- and 15-year-old children, and being without a job—the she chose to quit her job in May 2022—were all challenging. “I had to listen to my body,” she said. “It was a full-time job to go back to work, I felt I would not have been able to carry this pregnancy as long as I did.”

Hartawan said, in addition to the joy her son has brought to her family, she believes her unexpected entry into their lives may have saved hers. “I feel as if he [was] a miracle to bring attention to the health issues I have,” she said. “I probably wouldn’t have had anything done [about my kidney disease] until it was too late.”

Uplifting care

Danielle Parker of La Vergne, Tennessee, was diagnosed with lupus and kidney disease in 2015 while in college. Taking mycophenolate and changing her lifestyle helped Parker experience remission quickly. “I decided to start meditating and doing yoga; I completely changed my diet from that point,” Parker said. “Over the years, I did not have a lot of flare-ups. I was very much a stickler about my medicine.”

At age 30, she and her partner began talking about having a child, and she consulted with her nephrologist, Dr. Christie A. Green, with Nephrology Associates in Murfreesboro, who agreed it was a good time, given how stable Parker was. Green referred Parker to a nephrologist in her practice who specialized in caring for pregnant women with kidney diseases and talked with Parker about what to expect, including potential flares during pregnancy. The physician advised she would have to change her lupus medication to azathioprine because it is safer during pregnancy. Parker was hesitant to make the change initially but made the switch as soon as she found out she was pregnant.

“I was told it could be a little harder to get pregnant,” she said. “It was not hard at all. It happened way faster than I thought.” By September 2022, she was pregnant. Parker said she had a little more joint pain than usual during the pregnancy. “My biggest fear during my pregnancy was my kidneys,” she said. “That was my family’s biggest fear.”

She developed cholestasis, a condition that causes a build-up of bile during pregnancy. She also had protein in her urine during pregnancy. Additionally, Parker had to stop receiving regular intravenous iron transfusions to treat severe anemia, caused by a sickle cell trait, to reduce the risk of infection. As a result, her hematocrit and hemoglobin levels dropped. She also tested positive for anti-Ro antibodies, which can affect the fetus’s heart. As a precaution, her doctors did a weekly echocardiogram of the fetus’s heart.

At approximately 35 weeks of pregnancy, Parker’s blood pressure began to rise. She was very concerned about developing preeclampsia, a life-threatening rise in blood pressure, which her sister developed during pregnancy. “I was terrified,” she said. She did not develop preeclampsia but did acquire gestational hypertension and thus, delivered her son at 37 weeks. Her son is now 5 weeks old and is doing well. Parker chose to continue treatment with azathioprine because she had fewer side effects, and her kidney health improved. She plans to undergo another pregnancy after giving her body at least 18 months to recover, as her physician recommended.

The excellent care she received from her team, which included a nephrologist, rheumatologist, cardiologist, and hematologist, and from the obstetricians at Vanderbilt University Medical Center provided her reassurance through some of the challenges she experienced. “I enjoyed going to the doctor because it was good news every time,” she said. “It made me feel so good because everybody, even Dr. Green, was excited for me.”

Parker stopped working during her pregnancy to focus on her health and to study for a master’s degree she was pursuing. She warmly remembers the time she spent “nesting” in preparation for her baby’s delivery: “I had a lot of time to focus on me, more meditation, and just uplifting myself,” she said. “I wholeheartedly feel like that contributed to me having a better pregnancy.”
Under pressure

When Atisha Colliflower, of Seagrove, North Carolina, was diagnosed with kidney failure, she asked her physician if she should use contraception. Her physician advised that she had a <1% chance of becoming pregnant because of her medical condition but was recommended to still consider contraception. But shortly after having a catheter implanted to begin peritoneal dialysis, she discovered she was 4 weeks pregnant.

“I was terrified and kept thinking about the movie ‘Sex and Magnolias,’” Colliflower said. Colliflower, like the main character, had diabetes from a young age, resulting in lost kidney function. In the movie, the main character dies from kidney failure-related complications following a pregnancy.

Colliflower felt pressure from the high-risk obstetrician she consulted to have her pregnancy aborted. But seeing the image of her fetus on the ultrasound made Colliflower determined to continue the pregnancy. “I was willing to risk myself,” she said. “It was a stressful time.”

With the help of a trained partner, she underwent home hemodialysis 7 days a week, early in the morning, to avoid disrupting her husband’s and two children’s routines. Her intensive hemodialysis regimen was developed by her nephrologist, Dr. Jennifer Klenzak-Stoddard, with Pinehurst Nephrology Associates in Pinehurst, North Carolina. “I’m very strong-willed,” Colliflower said. “I focused on what I had to do day-to-day.”

She was hospitalized at 30 weeks’ gestation and gave birth to her son via cesarean delivery at 33 weeks’ gestation. After the delivery, the obstetrician who had pressured her apologized. “She thought I was too young and didn’t have it in me to do what needed to be done to keep the baby alive,” Colliflower said. Her son was able to go home after 2 weeks of care in the neonatal intensive care unit.

Colliflower and her care team worked and learned together throughout the pregnancy. Support from her husband and mother helped her endure the challenges she encountered. She believes the early and intensive dialysis she received during her pregnancy may have helped preserve her kidney function until she received a kidney transplant from a living donor. Her son is now a healthy 7-year-old. “It’s important for patients [who] are on dialysis, who may already feel defeated in a lot of ways, to understand pregnancy is possible,” Colliflower said. “With the right guidance and resources, it can be done.”

Uneventful pregnancy

Dana Colliflower of Manchester, Tennessee, had given up on getting pregnant after unsuccessful fertility treatments. Then, she was diagnosed with immunoglobulin A (IgA) nephropathy, approximately 2 years ago, after a routine examination detected high blood pressure and protein in her urine. “My original nephrologist thought I probably had IgA nephropathy since I was 18 or 19 years old, but it is something that doesn’t get caught until you have enough symptoms,” she said.

Colliflower’s kidney function dropped to approximately 35% at its lowest. But gastric surgery in 2021 helped improve her kidney function. Giordano, the nephrologist who cared for her during pregnancy, advised that she may want to avoid taking certain medications if she was considering getting pregnant when she began treatment. While Colliflower thought pregnancy was impossible at the time, having that information up front enabled her to quickly stop the medication when she found herself unexpectedly pregnant in 2022. One of the most helpful things her nephrologist did for her was discuss the risks associated with kidney diseases during pregnancy early on, she said. “Having those risk factors presented to me right away gave me time to wrap my head around all of it and made me feel like I was prepared if something happened,” Colliflower said.

Her physicians’ primary concerns were keeping her blood pressure in the normal range and monitoring for signs of preclampsia. She met every 2 weeks with one of the members of her clinical care team, including her nephrologist, obstetrician, and high-risk obstetrician. “I’m very thankful for the doctors that I had,” she said. “They kept us informed and at ease through everything that popped up during my pregnancy.”

Colliflower had a very uneventful pregnancy. The temporary pregnancy-associated immune suppression provided a respite from some of her symptoms. Her physicians carefully monitored the fetus’s growth during the pregnancy because chronic kidney disease can affect the placenta, leading to intrauterine growth restriction. Ultimately, her son was delivered 5 days early because the monitoring showed that his growth had slowed, and he weighed 5 pounds, 3 ounces.

“He was going to get more nutrition outside of the womb,” Colliflower explained. She was not quite prepared for how small her son would be. She only had a few premature-sized outfits and no premature-sized diapers. She also did not know that premature infants can have difficulties maintaining their temperature until their first pediatrician visit. “It was just little things like that it would have helped to know,” she said. Her son is now a happy, healthy 5-month-old baby. “He’s growing too fast,” she continued.

Colliflower thinks it would be helpful for physicians caring for pregnant women with kidney diseases to help them prepare for the possibility of having a premature or a smaller, full-term infant. She also wishes she had been advised that her son would have an elevated risk of developing an autoimmune disease during childhood. Her pediatrician informed her about the risk and carefully monitors her son for potential symptoms. That information would not have changed anything, Colliflower said, but it would have provided helpful information. “We were just so blessed to have the pregnancy in the first place,” she said.

References


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