

Male Infertility

One of the first academic medical centers in the nation to create a sperm bank continues to lead the way in male infertility research and in complex clinical care.

An andrology lab and sperm bank were created more than 30 years ago at the University of Rochester Medical Center (URMC). Grace M. Centola, Ph.D., H.C.L.D., former associate professor of Obstetrics and Gynecology at URMC, was instrumental in creating the bank, in collaboration with Robert Davis, M.D., and Abraham Cockett, M.D., from the Department of Urology.

Building on the groundbreaking sperm

bank, today URMC's Urology department now boasts two fellowship-trained male infertility specialists—Jeanne H. O'Brien, M.D. and J. Scott Gabrielsen, M.D., Ph.D.

A nationally recognized male-infertility expert, O'Brien has received numerous awards and recognitions for both her clinical and basic science research work. Gabrielsen focuses on male reproductive health, including male infertility, erectile dysfunction, male sexual dysfunction and

low testosterone.

Both are fellowship-trained, male reproductive urologists prepared to deal with the most complex infertility cases and to perform complex microsurgeries, such as vasectomy reversals and testicular-sperm extraction.

Partnering with URMC's female infertility experts, the male infertility clinic is part of a designated in-vitro fertilization center of excellence in New York state.

Complex Care

URMC's male infertility clinicians see a growing number of patients with male-factor infertility, such as decreased sperm counts, motility or morphology. The first steps in the care process are a baseline semen analysis, coupled with an understanding of a patient's health



history. Hormonal and other testing may be obtained based on these results to try to identify the cause of infertility and how it may be best treated.

Male fertility is complex and requires a number of genetic, hormonal, anatomical, environmental and other factors. As such, abnormalities in any of these areas can result in infertility. Additionally, many lifestyle factors, medications, drugs and environmental exposures can impair a man's fertility. "Given all the factors that can impact fertility, it's a wonder people ever get pregnant at all," O'Brien said.

Infertility affects 10 to 15 percent of couples. It is estimated that a male factor contributes to 50 percent of cases. Nonetheless, it is often viewed as a "female disease," and with only a few sperm needed in order to do in-vitro fertilization, most men do not undergo evaluation.

Evaluation of the male partner is critical to improve the likelihood of successful pregnancy. "You can tell a lot from a physical exam and from patient history," O'Brien added. "The information gleaned

from those help us to determine which type of testing to pursue. From there, we can recommend a solution, whether pharmacological or surgical."

Medications can be used to help boost sperm production and quality. Microscopic surgical treatments range from sperm retrieval for patients with cystic fibrosis and vasectomy reversals on an outpatient basis, to microscopic testicular sperm extraction in an operating room. These treatments, combined with advances in assisted reproductive techniques, allow many men to become fathers.

The benefits of evaluating the male partner goes beyond just successful pregnancy. Both URMIC male infertility specialists believe strongly that the time has come for a men's reproductive health assessment to be part of a routine internal medical exam. There is evidence that men with infertility have higher rates of chronic disease, cancers and genetic abnormalities compared to fertile men. While evaluation can help identify the cause and guide treatment, it is also an opportunity to identify problems that could affect the health of the man or his future children.

Innovative Research

Despite the advances in understanding male infertility, much remains that is not understood. To address this gap, URMIC's specialists are conducting a series of innovative research studies on male infertility.

About 1 percent of the adult male population is sterile because they don't make sperm. For many of these men, no sperm are found in the testicle and so there are no options for them to have their own children. Gabrielsen, who also has a Ph.D. in Biochemistry, is looking to better understand why some men do not make sperm and how we might help them move from "no sperm to some sperm" — research that began during his andrology fellowship at Baylor College of Medicine.

Prior studies have had difficulty identifying new genetic abnormalities that contribute to infertility, in part because of the number of different potential causes. For example, more than 3,000 genes are necessary to make sperm, abnormalities

in any of which could potentially disrupt the process. Meaning that in a group of men with infertility, each man could have a potentially different cause. Gabrielsen is using bioinformatics and machine learning to identify specific causes for infertility in hopes that future treatments can be personalized to the individual.

Discovering why some men do not make sperm may also provide more global insight into other causes of male infertility and how fertility and general health are linked. "Up to 87 percent of men who undergo sperm extraction won't ever father a child," says Gabrielsen. "Understanding the underlying etiology is critical to helping these men become fathers and understanding the health of the father and child."

This is only part of the department's innovative clinical and basic science research in male reproductive health. Gabrielsen also is exploring why testosterone levels and fertility decrease with age in men, specifically looking at how body iron levels affect the male reproductive axis. O'Brien is looking at how vitamin D levels may affect testosterone levels. Both are collaborating to understand how blood sugar and body mass index affect testosterone and sperm levels, and how metformin may improve these parameters.

Preserving Testicular Tissue

The institution that created one of the nation's first sperm banks now is working to expand fertility preservation options beyond conventional sperm banking. Gabrielsen advocates for the development of a protocol to store testicular tissues.

"By preserving tissue ahead of a hormonal or surgical transition, it may be possible to preserve fertility or to treat infertility down the road," Gabrielsen said. "Such a bank could have enormous future benefits for children and for the transgender population who undergo fertility-threatening surgery, hormonal therapy or chemotherapy before they enter puberty and have the opportunity to bank sperm."

URMIC's infertility experts will continue to provide innovative patient care and to achieve major advances in research.



Left Scott Gabrielsen, M.D., Ph.D.
Right Jeanne H. O'Brien, M.D.