



Department of Defense Grants Miller School Researcher \$3.25 Million to Study Male Infertility after Spinal Cord Injury

Emad Ibrahim, M.D., director of the Male Fertility Research Program at The Miami Project to Cure Paralysis and the clinical andrology lab at the Desai Sethi Urology Institute at the University of Miami Miller School of Medicine, has been awarded a \$3.25 million grant by the Department of Defense for a four-year study on the use of an oral medication to treat an infertility issue that affects most men with spinal cord injury.



Emad Ibrahim, M.D.

“The Male Fertility Program at The Miami Project is a unique program – it’s basically the only one in the country that is dedicated to study the quality and improvement of sperm in men with spinal cord injury,” said Dr. Ibrahim, who is also assistant professor of urology and neurological surgery at the Miller School. “The results of this trial could drastically improve the options for men with spinal cord injuries who want to have biological children.”

Nearly eight in 10 spinal cord injuries occur in men, and the average age that men experience such an injury is 43 – when



many might consider having families. But most men with spinal cord injuries, whether they become paraplegics or tetraplegics, suffer from erectile dysfunction and the inability to ejaculate, leading to infertility.

“These men are either unable to produce enough sperm, or the majority of sperm they do produce are dead,” Dr. Ibrahim said.

He and colleagues have been studying the fertility issues that men with spinal cord injury face since Dr. Ibrahim joined the Miller School in 2004.

Through the years, they have found that spinal cord injury leads to inflammation, and the body reacts by producing substances called cytokines.

“These cytokines are toxic to sperm,” Dr. Ibrahim said.

Probenecid Can Help Protect Male Fertility

The Miller School researchers, including neuroscientists from The Miami Project, studied ways in which to eliminate or at least minimize the effect of these cytokines on sperm, and discovered that there is another component to the cascade of events: a multi-protein complex called the inflammasome that results in activation of these toxic cytokines.

“A medication called probenecid that has been used for years to treat gout has been found to block this cascade, preventing the inflammasome complex from activation and hence lowering or minimizing the amount and concentration of cytokines in the body,” Dr. Ibrahim said. “Studies on probenecid have shown it to be safe and effective. It’s also very inexpensive.”



(From left) Zhabay and Esteban Milan consult with Dr. Ibrahim.

Miller School researchers conducted a small study of men with spinal cord injuries, published in 2018 in the *Journal of Spinal Cord Medicine*, in which they found that giving men the standard dose of probenecid for one month improved their semen and sperm quality.

“It was the first-ever treatment that was published to show that an oral medication could improve sperm quality in men with spinal cord injury. The promising results prompted us to apply for this grant in order to do a proper clinical trial comparing the effects of probenecid in different doses and to a sugar pill, or placebo,” Dr. Ibrahim said.

New Study Will Also Test for DNA Damage in Sperm

Dr. Ibrahim is the principal investigator of the grant, entitled “A Novel Therapy to Improve Reproductive Potential in Men with Spinal Cord Injury.” He and colleagues will study about 100 men with spinal cord injury during the four years of the study. During this time period, subjects will receive either three months of placebo or three months of probenecid.

“Men with spinal cord injury usually have DNA damage in their sperm. We’re going to follow these men for six months. We’re also going to do DNA testing on the sperm before and after treatment to see if there is any improvement, not just in the quantity of sperm but also with the quality, after treatment.” Dr. Ibrahim said.



Infertility is a big quality of life issue for men with spinal cord injuries, according to Ranjith Ramasamy, M.D., director, reproductive urology at Desai Sethi Urology Institute.

The only option for men with spinal cord injury now is in vitro fertilization, an expensive procedure that might not be uniformly successful. Improving the quality of their sperm with a low-cost, safe treatment could make these men and their partners candidates for less costly, more natural therapeutic options such as insemination, according to Dr. Ramasamy.

“We are proud of the recent funding that has been allocated to Dr. Ibrahim to study the reproductive potential of men with spinal cord injuries,” Dr. Ramasamy said. “At the Desai Sethi Urology Institute, we believe this funding can help us reach the ultimate goal of developing new treatments and therapies to help these men with spinal cord injury become fathers.”

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