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How & Why Sperm Move: A Closer Look

By Lila Abassi — March 21, 2016

Sperm cell via Shutterstock [1]

The rhythmic whipping of a sperm's tail (flagella) as it strives to reach the egg for fertilization depends on the ability of calcium to enter the sperm cell. Up until now, the factor(s) involved in allowing for this calcium movement have been unknown.

A recent study [2], published in the journal *Science*, reveals several key regulatory steps that are involved in sperm motility. Progesterone [3] plays several physiological roles with respect to sperm function. In fact, the inability of sperm cells to respond to progesterone has been linked to male infertility *in vitro*.

Progesterone is a female sex hormone that plays an important role in signaling to the sperm as they navigate the female reproductive tract. Progesterone is a steroid hormone [4] and thus can only be secreted by steroid glands such as the adrenal cortex, testes and ovaries (and the placenta during pregnancy). It is released by the ovaries and the cells that surround the oocyte (egg).

Steroids effect changes in a cell via two mechanisms. One is entering the nucleus of the cell, binding the DNA and resulting in gene expression. The other way in which a steroid (in this case progesterone) affects cellular changes occurs by binding to receptors on the sperm cell membrane – what is referred to as non-genomic or genome-independent, signaling. Many aspects of the latter method remain unknown and have yet to be elucidated.

In this particular study, researchers have discovered an enzyme, ABHD2, in sperm cells that is dependent on progesterone. When progesterone binds to its receptor on the sperm cell, ABHD2 causes breakdown of a key hormone, 2-arachidonlyglycerol or 2AG. 2AG acts like a gate that blocks calcium from entering the sperm cell, therefore, if you break down this gate, you would observe an increased influx of calcium via a calcium channel called CatSper, which results in sperm activation and motility – a process referred to as hyperactivation. The sperm are concomitantly primed for fusion with the oocyte via hyperactivation.

“This is an important advance in explaining how sperm become hypermotile in the female reproductive tract. Developing new compounds that block ABHD2 ultimately may yield new contraceptive methods to prevent sperm from reaching the egg,” according to Stuart Moss [5], PhD, director of the male reproductive health program at the National Institutes of Health’s (NIH) Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD).

Sperm abnormalities account for 90 percent of cases of infertility in males which include either a low sperm count, decreased motility and abnormal shape. Hopefully, this will pave the road for successful fertility for these men or perhaps, potentially allow for men to take birth control pills – something many women would likely appreciate.
