

The Role of Sperm in Facilitation of Fertilization

(or what does Daddy do anyway?)

Professor Gerald Schatten

This lecture will present new discoveries and conceptual challenges in the functioning of the sperm and the hardship imposed on couples in who the sperm under-performs. Further we will consider the normal events for successful reproduction, events during conception, as well as abnormalities which cause infertility. We will discuss the IVF revolution and that of ICSI (intracytoplasmic sperm injection). These clinical breakthroughs in ART (Assisted Reproductive Technologies) now permit insemination using micromanipulation in which a single, even immotile, immature or misshapen, human sperm is directly injected into the human oocyte with successes in generating healthy babies. While many forms of idiopathic male infertility are now treatable, there is also a significant population of infertility patient-couples who are unable to enjoy success. Intractable infertility is unique in medicine for several reasons. First, it is the only therapy in which an unaffected person (i.e. the fertile woman) undergoes clinical procedures whereas the actual patient (the man as long as he can produce a sperm sample) does not. Additionally, the treatment has consequences for another person, i.e. the anticipated baby. Furthermore, there may well be generational and even transgenerational implications. There are compelling justifications to better understand why conception fails since they will lead to better diagnostics, innovative treatments and discovery of causal genetic and epigenetic mechanisms. At the least, they might help some couples move more swiftly and less expensively to alternatives to avoid failures and thereby improve ART rates even more. We will explore the creation of man-made artificial gametes, i.e. manufacturing sperm *in vitro*, and previously unanticipated essential contributions from the sperm to the zygote for normal development.

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