

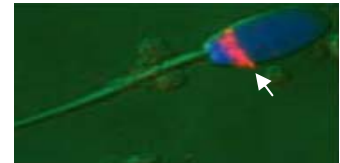
## Technology Opportunity Bulletin

### Reproductive Technology Enhanced ICSI – Sperm Oocyte-Activating Factor

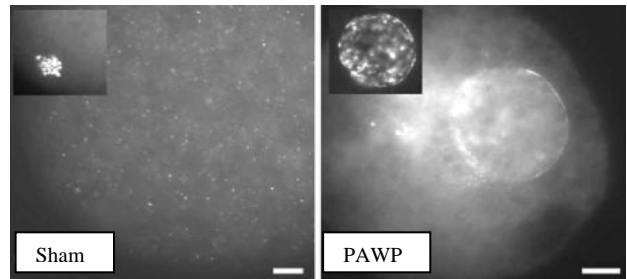
#### Description:

During early fertilization, it is believed that the perinuclear theca (PT) structure of the sperm head dissolves in the oocyte cytoplasm and releases proteins involved in activating fertilization and initiating development of the zygote.

Dr. Richard Oko from Queen's University and Dr. Peter Sutovsky from University of Missouri, have identified PAWP (postacrosomal sheath WW domain binding protein, gene WBP2NL, also known as PT32) as an oocyte-activating factor that induces fertilization events including meiotic resumption, pronuclear formation, and egg cleavage.



Through protein binding inhibition, peptide competitive assays, localization, and expression patterns, our researchers now have compelling evidence that **PAWP is the primary initiator of zygotic development**. Microinjection of recombinant PAWP into metaphase arrested *Xenopus* oocytes also induces intracellular calcium release; a key step in oocyte activation.



#### Human/Veterinary Applications and Benefits:

1. **Enhanced Male Fertility in Animals and Humans:** Intracytoplasmic sperm injection (ICSI), a treatment for male infertility, normally yields a 20% rate of oocyte activation in bovines, but adding PAWP to the ICSI medium increases bovine oocyte activation up to 80%. We have obtained similar results in swine. We are currently investigating the use of human recombinant PAWP to increase ICSI success and have promising results in the swine animal model.
2. **Targeted and Safe:** Our researchers have demonstrated that injecting recombinant bovine PAWP into a bovine oocyte results in activation and cytoplasmic nuclear events that mirror natural fertilization. Chemical agents commonly used in artificial activation protocols in animals (actinomycin and 6-dimethylamino-purine) result in abnormal patterns of nuclear pore complex formation and annulate lamellae assembly, two processes critical to normal oocyte activation. Unlike these agents, PAWP is a natural sperm protein that does not interfere with other developmental processes.

#### Status of Commercialization:

We have two issued U.S. patents: No. 6,995,252 and No. 7,384,913 and a pending patent application in Europe. PARTEQ Innovations, the technology transfer office of Queen's University, is seeking industrial partners willing to support ongoing development of the product and/or who are interested in licensing the intellectual property.

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