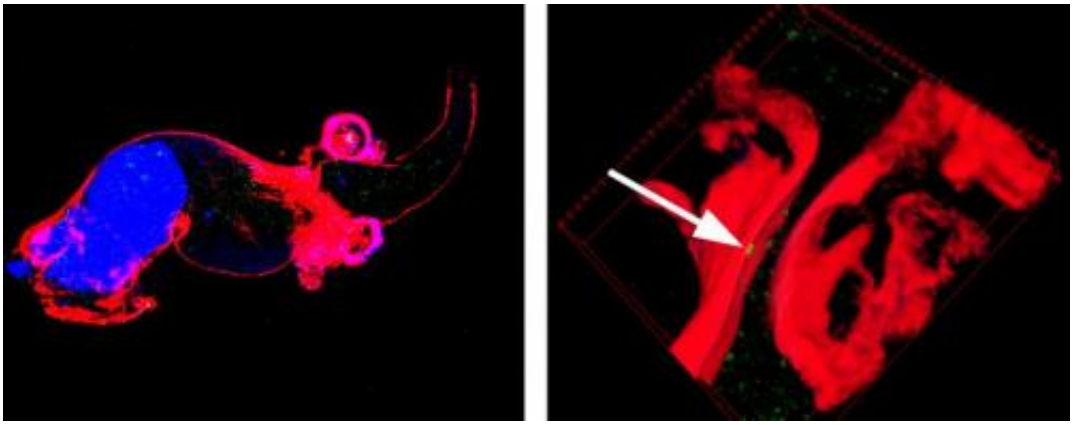
Deploying exosomes to win a battle of the sexes

August 25 2014



Male fruit flies deploy exosomes to alter the mating behavior of females. Shown here, a close-up view (right) of the female reproductive tract (left) reveals a green exosome (arrow) on the surface. Credit: Corrigan et al., 2014

There are many biological tools that help animals ensure reproductive success. A new study in *The Journal of Cell Biology* provides further detail into how one such mechanism enables male fruit flies to improve their odds by stopping females from mating with other flies.

In addition to sperm, semen carries products that foster sperm survival, promote egg fertilization, and serve other functions that optimize a male's chances of passing along his genes. In male fruit flies, for example, reproductive accessory glands (thought to be equivalent to the prostate gland in humans) secrete signaling factors into the seminal fluid

that make the recipient females less inclined to remate. But it's unclear how some of these signaling factors are produced and delivered in order to reprogram a female's behavior against her own self-interest.

Researchers from the University of Oxford identified tiny membrane-bound vesicles called exosomes that are secreted into the seminal fluid by the so-called "secondary cells" of male accessory glands. The authors showed that, after mating, the exosomes fuse with sperm and interact with cells along the female reproductive tract.

"Exosomes not only carry ligands that will bind to target cells, but they also carry receptors and intracellular signaling molecules inside them," explains senior author Clive Wilson, "so they potentially have a lot of possibilities in terms of their ability to reprogram cells."

When the researchers reduced the number of exosomes produced by secondary cells, the female flies were more inclined to remate. This indicates that the exosomes are responsible for the behavioral changes, by interacting with the targeted female cells to overpower normal signaling pathways.

When the authors reduced a signaling cascade known as the BMP pathway within secondary cells, which is known to affect female remating behavior, they observed that vesicles formed in the cells but were not secreted as exosomes. This suggests that at least part of BMP's role in regulating female behavior occurs through its role as a regulator of exosome production. The findings also raise the interesting possibility that BMP signaling might play a role in exosome secretion in human cancers of tissues that secrete exosomes, such as the prostate and breast.

More information: Corrigan, L., et al. 2014. *J. Cell Biol.* doi:10.1083/jcb.201401072

Provided by Rockefeller University