

Evolutionary phenomenon in mice may explain human infertility

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Scientists at the University of Liverpool have found that field mice have evolved a unique way of ensuring faster fertilisation, a phenomenon which could explain some cases of infertility in humans.

The team, in collaboration with Charles University, Prague, found that field mice sacrifice some of their immunity protection in favour of a more rapid fertilisation process. This occurs due to the absence of a protein, called CD46. Present in both animals and humans, it helps protect the body's cells from attack by its immune system. Over time, field mice have lost the ability to produce this protein, resulting in instability of a cap-like structure, called the acrosome, present over the head of the sperm.

This instability allows the acrosome to be shed from the sperm head to create a new surface essential for sperm to be capable of fusing with an egg. This is a natural process that can take days to occur in humans, but field mice have developed a way in which this can occur rapidly.

Immunologist, Professor Peter Johnson, explains: "Field mice have traded the production of an immunologically important protein in favour of this faster fertilization process in order to compete with other mice more successfully. Female mice produce multiple eggs and if there are a lot of male mice competing for her, then it is an advantage to an individual mouse for its sperm to react quickly in order to beat other male competitors to fertilisation."

“By improving our understanding of defects in CD46 we may improve treatments for infertility in men. Humans normally produce a single egg each month and there is no evolutionary necessity to develop rapid sperm reaction to egg fertilisation. The process is therefore much slower and so any defect in CD46 could result in sperm being destabilised too early.

“Interestingly the rapid reaction caused in mice is similar to that in IVF treatment in humans where the acronome is artificially expelled from the sperm head before it is introduced to the egg to speed up the fertilisation process. Field mice appear to do this naturally.”

Source: University of Liverpool

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