

Researchers find potential target for male infertility treatment

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Researchers from the Chinese University of Hong Kong (CUHK) recently linked male infertility to the deficiency of a protein, suggesting that fertility may be restored with the recombinant version of this protein.

Reduced sperm motility and seminal tract infection are common causes of male infertility, accounting for approximately 18 and 11 percent of all cases, respectively. Interestingly, reduced sperm motility is often associated with genital tract infection, but the pathogeneses of the two abnormalities remain largely unexplored.

A research team led by Professor Hsiao-Chang Chan of CUHK's Epithelial Cell Biology Research Center recently discovered that deficiency of a protein called human α -defensin 1 (DEFB1) may be responsible for reduced sperm motility and seminal tract infection. [Sci Transl Med 2014;249:249ra108]

Chan and colleagues first found lower levels of DEFB1 in sperm from infertile men with genital tract infection or reduced sperm motility. They then introduced anti-DEFB1 antibody to normal sperm, which caused a significant reduction in sperm motility and bactericidal activity compared with control (immunoglobulin G).

The team further discovered that treatment with recombinant DEFB1 markedly restored the bactericidal activity, quality and egg-penetrating ability of sperm from infertile patients with poor sperm motility and seminal tract infection, suggesting that recombinant DEFB1 may be a feasible therapeutic approach for restoring fertility in these patients.

Defensins are small **cysteine**-rich cationic proteins found in both vertebrates and invertebrates. They have also been reported in plants. They are, and function as, host defense peptides. They are **active against bacteria, fungi and many enveloped and nonenveloped viruses**. They consist of 18-45 amino acids including six (in vertebrates) to eight conserved cysteine residues. Cells of the immune system contain these peptides to assist in killing phagocytosed bacteria, for example in neutrophil granulocytes and almost all epithelial cells. Most defensins function by binding to the microbial cell membrane, and, once embedded, forming pore-like membrane defects that allow efflux of essential ions and nutrients.

- Cysteine is relatively rare in foodstuffs.
- **Cysteine is responsible for the biological activity of glutathione.**
- Glutathione is made from **cysteine**, glutamic acid, and glycine but limited by cysteine which is rare in our diet.
- Low glutathione particularly compromises the immune system, the nervous system, the gastrointestinal system and the lungs.
- Richie et al. published a long-term, randomized, double-blinded, placebo-controlled study that shows for the first time, daily consumption of glutathione is effective at increasing glutathione blood levels.
- Low glutathione is commonly observed in wasting and negative nitrogen balance, as seen in cancer, HIV/AIDS, sepsis, trauma, burns and athletic overtraining.