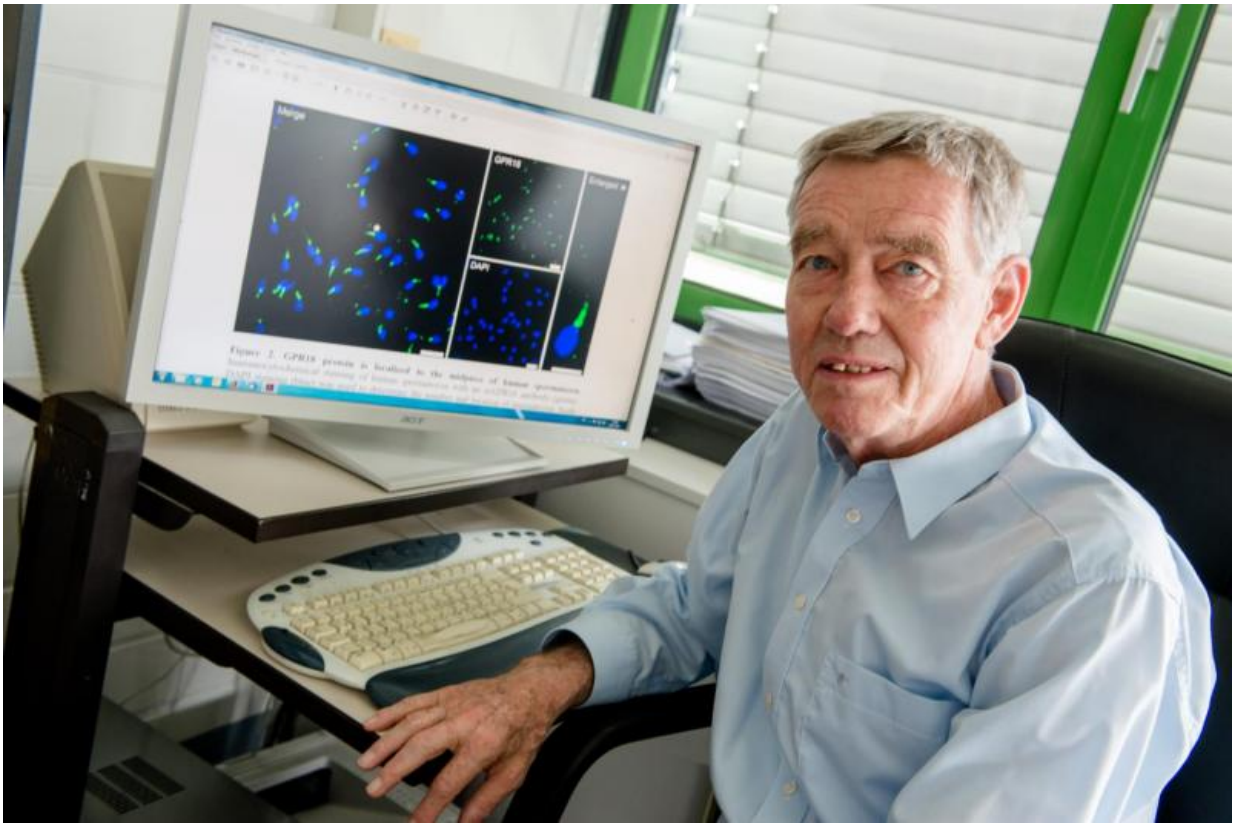
Cannabinoid receptor activates spermatozoa

August 30 2016



Hans Hatt's colleagues marked the cannabinoid receptor GPR18 using antibodies. Shown green in the image, that receptor is located in the centre of spermatozoa. Credit: RUB, Marquard

Biologists from Bochum and Bonn have detected a cannabinoid receptor in spermatozoa. Endogenous cannabinoids that occur in both the male and the female genital tract activate the spermatozoa: they trigger the so-

called acrosome reaction, during which the spermatozoon releases digestive enzymes and loses the cap on the anterior half of its head. Without this reaction, spermatozoa cannot penetrate the ovum. The researchers published their findings in *Scientific Reports*.

During fertilization, a sperm must first fuse with the plasma membrane and then penetrate the female egg in order to penetrate it. To this end, sperm cells go through a process known as the acrosome reaction which is the reaction that occurs in the acrosome of the sperm as it approaches the egg. In the lab, this so-called acrosome reaction is considered a test for analysing the ability of semen to accomplish fertilisation. A receptor for an endogenous cannabinoid plays a crucial role in this process. A team of biologists from Bochum and Bonn, headed by Prof Dr Dr Dr Hanns Hatt, have been the first one to provide a proof of the so-called G protein-coupled receptors 18 (GPR18) in spermatozoa, following a comprehensive analysis. They published their findings in *Scientific Reports*.

Researchers find 223 additional receptors

Specialised in olfaction research, the team from Bochum had detected as many as 60 olfactory receptors in spermatozoa early this year, and has activated and localised ten of them. "In the current study, we have focused on the remaining G protein-coupled receptors, which, rather than being olfactory receptors, bind other substances," explains Hanns Hatt. Analysing samples by numerous donors, the researchers investigated which genes are expressed in spermatozoa; their conclusion was that the number of receptors totalled 223. The three most common ones include receptor GPR18, a cannabinoid receptor that has recently been described for the first time.

New receptor is more sensitive to NAGly than

classical ones

"The receptor reacts to the herbal cannabis agent THC as well as to the endogenous fatty acid NAGly, which is associated with the cannabinoid system," says Hatt. "It is much more sensitive to NAGly than the classical, long-known cannabinoid receptors." Activating the receptor, which is situated in the centre of spermatozoa, can trigger the so-called acrosome reaction. In the course of this process, the spermatozoon's surface is altered as it approaches the egg. Without this reaction, the spermatozoon cannot penetrate the egg cell.

Cannabinoids in female reproductive tract

Scientists know that endocannabinoids occur in both the male and the female genital tract. Studies suggest that in women their concentration increases during the fertile days. "The endocannabinoid activates the spermatozoa for fertilization" concludes Hanns Hatt. The GPR18 receptor also occurs in other tissues in the human body, for example in the brain and in the heart. However, its function was not known until now.

More information: Caroline Flegel et al. Characterization of non-olfactory GPCRs in human sperm with a focus on GPR18, *Scientific Reports* (2016). DOI: 10.1038/srep32255

Provided by Ruhr-Universitaet-Bochum

Citation: Cannabinoid receptor activates spermatozoa (2016, August 30) retrieved 27 April 2024 from https://medicalxpress.com/news/2016-08-cannabinoid-receptor-spermatozoa.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.