

## Abstract

Mammalian sperm must undergo the process of capacitation - series of physiological and biochemical modifications prior fertilization. In last stage of capacitation sperm undergoes acrosome reaction (AR). During AR the cell membrane of the sperm fuses with the outer acrosomal membrane and the contents of acrosomal vesicle are released into extracellular space. Sperm which did not undergo AR or sperm missing acrosome at all are unable to fertilize. AR results into dramatical changes in the sperm head. Most of the proteins present in plasmatic and outer acrosomal membrane are reorganized or lost. There are also significant changes in cytoskeletal and intraacrosomal proteins are released to extracellular space uncovering new surface domains.

Some sperms undergo AR even without presence of inductor of AR during capacitation *in vitro*. This event is called spontaneous (accelerated) AR. The latest research indicates that spontaneous AR is natural part of the process of fertilization. Field mice (*Apodemus*) show high level of promiscuity leading to significant risk of sperm competition. Unique reproduction strategy where the sperms form so-called sperm trains was evolved in field mice. Spontaneous AR is probably enabling the dissociation of sperms from the sperm train.

The spontaneous AR rate is dependent on the presence of CD46 protein on the acrosomal membrane. CD46 is expressed in many types of mammalian cells including sperm. In rodents, CD46 is expressed mostly on acrosomal membrane. Sperm of field mouse (*Apodemus*) produce alternatively spliced transcript leading to failure to express CD46 protein. Absence of CD46 protein leads to higher rate of spontaneous AR in house mice and field mice sperm. So CD46 protein probably plays important role in stabilization of acrosomal membrane.

In mammalian sperm, there are expressed two other complement regulating proteins, CD55 and CD59. In house mice and field mice, CD55 and CD59 are localized on plasma membrane and thus they could play the key role in the protection of sperm from complement attack in female reproductive tract. However in human sperm those proteins are expressed on inner acrosomal membrane. Moreover usage of monoclonal antibodies against CD59b inhibits mouse sperm motility. These facts suggest that CD55 and CD59 may play a more complex role in process of reproduction.