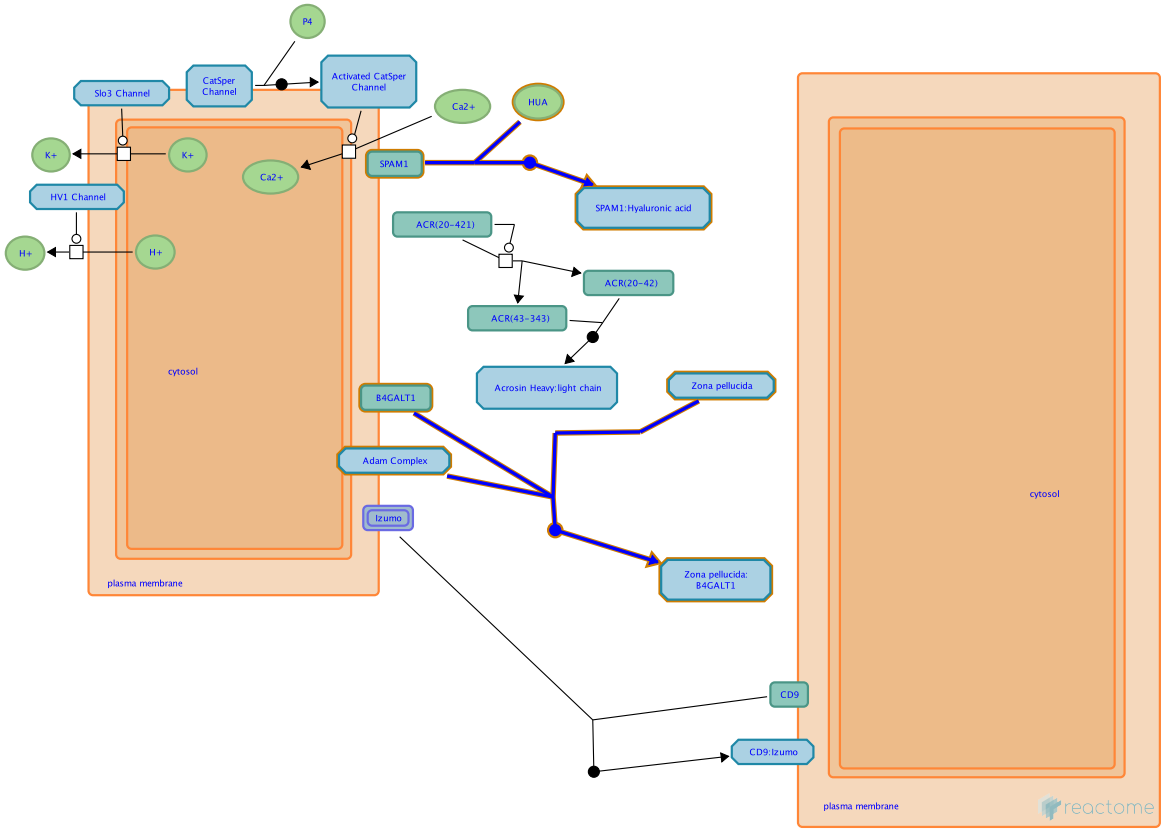
Interaction With Cumulus Cells And The Zona Pellucida



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Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

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Literature references

Fabregat, A., Sidiropoulos, K., Viteri, G., Forner, O., Marin-Garcia, P., Arnau, V. et al. (2017). Reactome pathway analysis: a high-performance in-memory approach. *BMC bioinformatics, 18*, 142. ↗

Sidiropoulos, K., Viteri, G., Sevilla, C., Jupe, S., Webber, M., Orlic-Milacic, M. et al. (2017). Reactome enhanced pathway visualization. *Bioinformatics, 33*, 3461-3467. ↗

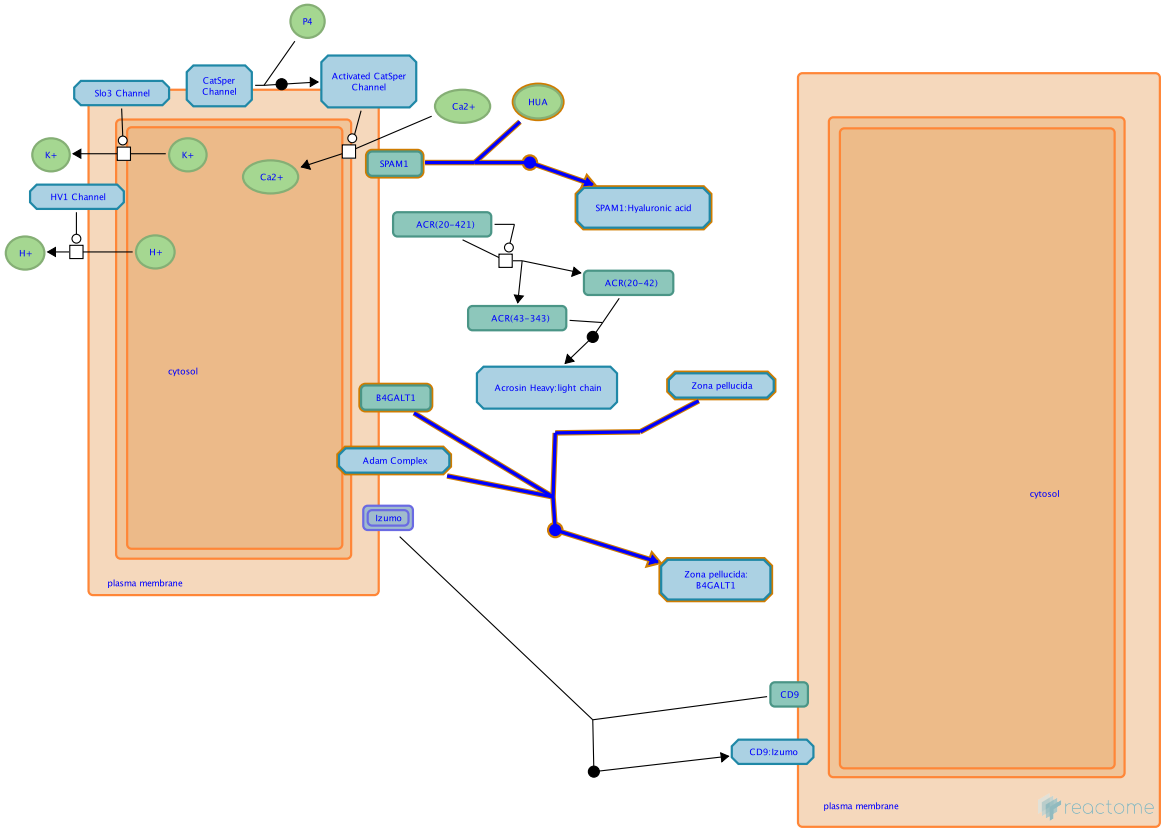
Fabregat, A., Jupe, S., Matthews, L., Sidiropoulos, K., Gillespie, M., Garapati, P. et al. (2018). The Reactome Pathway Knowledgebase. *Nucleic Acids Res, 46*, D649-D655. ↗

Fabregat, A., Korninger, F., Viteri, G., Sidiropoulos, K., Marin-Garcia, P., Ping, P. et al. (2018). Reactome graph database: Efficient access to complex pathway data. *PLoS computational biology, 14*, e1005968. ↗

Interaction With Cumulus Cells And The Zona Pellucida ↗

Stable identifier: R-HSA-2534343

Compartments: extracellular region



A typical mammalian egg is surrounded by an outer layer of about 3,000 cumulus cells embedded in an extracellular matrix rich in hyaluronic acid. It is suggested that the fertilizing sperm with it's acrosome intact, passes through the cumulus cell layer.

The zona pellucida (ZP), a glycoproteinaceous matrix surrounding the mammalian oocyte plays an important role in species specific sperm-egg binding, induction of acrosome reaction in the ZP bound spermatozoa, avoidance of polyspermy and protection of the embryo prior to implantation. The human ZP matrix is composed of 4 glycoproteins designated as ZP1, ZP2, ZP3 and ZP4.

Literature references

Ikawa, M., Inoue, N., Benham, AM., Okabe, M. (2010). Fertilization: a sperm's journey to and interaction with the oocyte. *J Clin Invest, 120*, 984-94. ↗

Lin, Y., Mahan, K., Lathrop, WF., Myles, DG., Primakoff, P. (1994). A hyaluronidase activity of the sperm plasma membrane protein PH-20 enables sperm to penetrate the cumulus cell layer surrounding the egg. *J Cell Biol, 125*, 1157-63. ↗

Editions

2013-02-13	Authored	Gillespie, ME.
2013-05-21	Reviewed	Lishko, PV.
2013-05-23	Edited	Gillespie, ME.

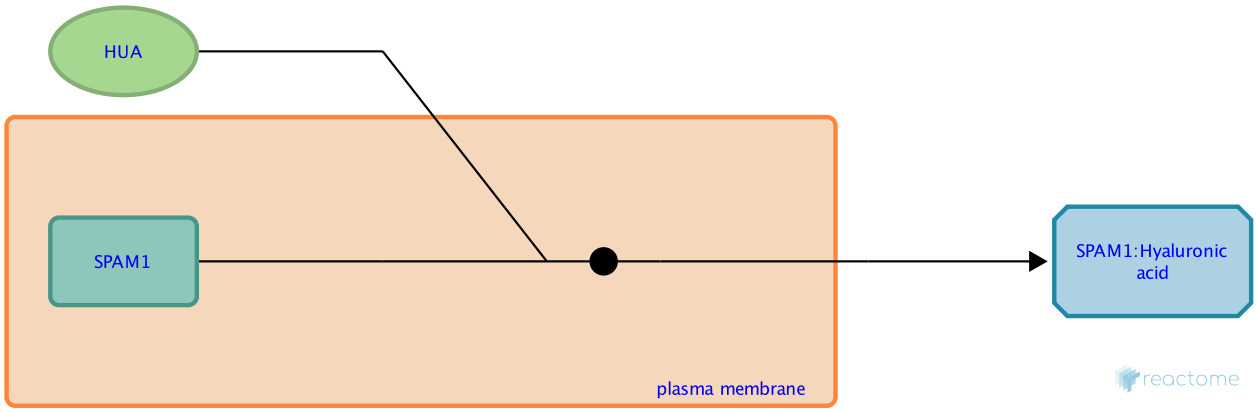
SPAM1 Binds Hyaluronic Acid ↗

Location: Interaction With Cumulus Cells And The Zona Pellucida

Stable identifier: R-HSA-2534346

Type: binding

Compartments: plasma membrane



The fertilizing spermatozoon must penetrate the surrounding cumulus mass, (or cumulus oophorus), consisting of follicular cells dispersed in a polymerized matrix composed mainly of hyaluronic acid.

Followed by: Association of ADAM and B4GALT1 With ZP3

Literature references

Lin, Y., Mahan, K., Lathrop, WF., Myles, DG., Primakoff, P. (1994). A hyaluronidase activity of the sperm plasma membrane protein PH-20 enables sperm to penetrate the cumulus cell layer surrounding the egg. *J Cell Biol, 125*, 1157-63. ↗

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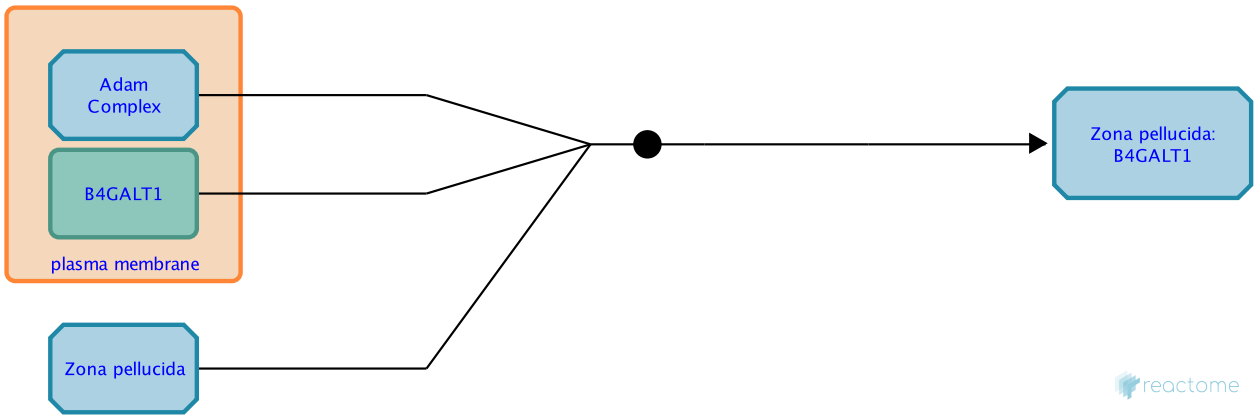
Association of ADAM and B4GALT1 With ZP3 ↗

Location: Interaction With Cumulus Cells And The Zona Pellucida

Stable identifier: R-HSA-1297338

Type: binding

Compartments: extracellular region



In humans induction of acrosome reaction is mediated by ADAM and B4GALT1 binding to ZP3 and ZP4. Binding of ZP3 to its putative sperm receptor zona receptor kinase, leads to its aggregation and downstream cAMP signaling.

Preceded by: SPAM1 Binds Hyaluronic Acid

Literature references

Ikawa, M., Inoue, N., Benham, AM., Okabe, M. (2010). Fertilization: a sperm's journey to and interaction with the oocyte. *J Clin Invest, 120*, 984-94. ↗

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