globozoospermia

Globozoospermia is a condition that affects only males. It is characterized by abnormal sperm and leads to an inability to father biological children (infertility).

Normal sperm cells have an oval-shaped head with a cap-like covering called the acrosome. The acrosome contains enzymes that break down the outer membrane of an egg cell, allowing the sperm to fertilize the egg. The sperm cells of males with globozoospermia, however, have a round head and no acrosome. The abnormal sperm are unable to fertilize an egg cell, leading to infertility.

Frequency

Globozoospermia is a rare condition that is estimated to affect 1 in 65,000 men. It is most common in North Africa, where it accounts for approximately 1 in 100 cases of male infertility.

Genetic Changes

Globozoospermia is most commonly caused by mutations in the *DPY19L2* gene, which are found in about 70 percent of men with this condition. Mutations in other genes likely also cause globozoospermia.

The *DPY19L2* gene provides instructions for making a protein that is found in developing sperm cells. The DPY19L2 protein is involved in the development of the acrosome and elongation of the sperm head, which are integral steps in sperm cell maturation. Mutations in the *DPY19L2* gene result in a loss of functional DPY19L2 protein. As a result, sperm cells have no acrosome and do not elongate properly. Without an acrosome, the abnormal sperm are unable to get through the outer membrane of an egg cell to fertilize it, leading to infertility in affected men. Researchers have described other characteristics of the abnormal sperm cells that make fertilization of an egg cell difficult, although it is not clear how changes in the *DPY19L2* gene are involved in development of these characteristics.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- acrosome malformation of spermatozoa
- round-headed spermatozoa
- spermatogenic failure 9

Diagnosis & Management

These resources address the diagnosis or management of globozoospermia:

- Association for Reproductive Medicine: Semen Analysis
  http://www.reproductivefacts.org/topics/detail.aspx?id=1713
- Centers for Disease Control: Assisted Reproductive Technology (ART)
  https://www.cdc.gov/art/index.html
- Genetic Testing Registry: Globozoospermia
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0403825/
- MedlinePlus Encyclopedia: Semen Analysis
  https://medlineplus.gov/ency/article/003627.htm
- MedlinePlus Health Topic: Assisted Reproductive Technology
  https://medlineplus.gov/assistedreproductivetechnology.html

These resources from MedlinePlus offer information about the diagnosis and management of various health conditions:

- Diagnostic Tests
  https://medlineplus.gov/diagnostictests.html
- Drug Therapy
  https://medlineplus.gov/drugtherapy.html
- Surgery and Rehabilitation
  https://medlineplus.gov/surgeryandrehabilitation.html
- Genetic Counseling
  https://medlineplus.gov/geneticcounseling.html
- Palliative Care
  https://medlineplus.gov/palliativecare.html

Additional Information & Resources

MedlinePlus

- Encyclopedia: Semen Analysis
  https://medlineplus.gov/ency/article/003627.htm
- Health Topic: Assisted Reproductive Technology
  https://medlineplus.gov/assistedreproductivetechnology.html
- Health Topic: Male Infertility
  https://medlineplus.gov/maleinfertility.html

Genetic and Rare Diseases Information Center

- Globozoospermia
  https://rarediseases.info.nih.gov/diseases/12502/globozoospermia

Additional NIH Resources

- Eunice Kennedy Shriver National Institute of Child Health and Human Development: How Common Is Male Infertility and What are its Causes?
  https://www.nichd.nih.gov/health/topics/menshealth/conditioninfo/Pages/infertility.aspx

Educational Resources

- American Society for Reproductive Medicine: Sperm Shape (Morphology): Does it Affect Fertility?
  http://www.asrm.org/FACTSHEET_Sperm_Shape_Morphology/
- Centers for Disease Control: Infertility FAQs
  https://www.cdc.gov/reproductivehealth/Infertility/
- Cleveland Clinic: Male Infertility
  http://my.clevelandclinic.org/services/urology-kidney/diseases-conditions/male-infertility
- Johns Hopkins Medicine: Male Factor Infertility
  http://www.hopkinsmedicine.org/healthlibrary/conditions/adult/kidney_and_urinary_system_disorders/male_factor_infertility_85,P01484/
- MalaCards: spermatogenic failure 9
  http://www.malacards.org/card/spermatogenic_failure_9
- Merck Manual Professional Version: Sperm Disorders
  http://www.merckmanuals.com/professional/gynecology-and-obstetrics/infertility/sperm-disorders

- Orphanet: Male infertility due to globozoospermia
  http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=171709
- University of California San Francisco Medical Center: Infertility in Men
  https://www.ucsfhealth.org/conditions/infertility_in_men/

Patient Support and Advocacy Resources

- RESOLVE: The National Infertility Association: Male Factor Infertility
  http://www.resolve.org/about-infertility/medical-conditions/male-factor.html

Genetic Testing Registry

- Globozoospermia
  https://www.ncbi.nlm.nih.gov/gtr/conditions/C0403825/

ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?term=%22globozoospermia%22+%5BDISEASE%5D+OR+NCT01954498+%5BID-NUMBER%5D+OR+NCT02006446+%5BID-NUMBER%5D

Scientific articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28Infertility,+Male%5BMAJR%5D%29+AND+%28globozoospermia%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D

OMIM

- SPERMATOGENIC FAILURE 9
  http://omim.org/entry/613958

Sources for This Summary

- Coutton C, Zouari R, Abada F, Ben Khelifa M, Merdassi G, Triki C, Escalier D, Hesters L, Mitchell V, Levy R, Sermondade N, Boitrelle F, Vialard F, Satre V, Hennebicq S, Jouk PS, Arnoult C, Lunardi J, Ray PF. MLPA and sequence analysis of DPY19L2 reveals point mutations causing globozoospermia. Hum Reprod. 2012 Aug;27(8):2549-58. doi: 10.1093/humrep/des160. Epub 2012 May 24.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22627659
- Escoffier J, Yassine S, Lee HC, Martinez G, Delaroche J, Coutton C, Karaouzène T, Zouari R, Metzler-Guillemain C, Pernet-Gallay K, Hennebicq S, Ray PF, Fissore R, Arnoult C. Subcellular localization of phospholipase Cζ in human sperm and its absence in DPY19L2-deficient sperm are consistent with its role in oocyte activation. Mol Hum Reprod. 2015 Feb;21(2):157-68. doi: 10.1093/molehr/gau098. Epub 2014 Oct 29.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/25354701
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311148/

- Harbuz R, Zouari R, Pierre V, Ben Khelifa M, Kharouf M, Coutton C, Merdassi G, Abada F, Escoffier J, Nikas Y, Vialard F, Koscinski I, Triki C, Sermondade N, Schweitzer T, Zhioua A, Zhioua F, Latrous H, Halouani L, Ouafi M, Makni M, Jouk PS, Sèle B, Hennebicq S, Satre V, Viville S, Arnoult C, Lunardi J, Ray PF. A recurrent deletion of DPY19L2 causes infertility in man by blocking sperm head elongation and acrosome formation. Am J Hum Genet. 2011 Mar 11;88(3):351-61. doi: 10.1016/j.ajhg.2011.02.007.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/21397064
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3059422/
- Koscinski I, Elinati E, Fossard C, Redin C, Muller J, Velez de la Calle J, Schmitt F, Ben Khelifa M, Ray PF, Kilani Z, Barratt CL, Viville S. DPY19L2 deletion as a major cause of globozoospermia. Am J Hum Genet. 2011 Mar 11;88(3):344-50. doi: 10.1016/j.ajhg.2011.01.018. Erratum in: Am J Hum Genet. 2011 Apr 8;88(4):517. Ray, Pierre [corrected to Ray, Pierre F].
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/21397063
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3059416/
- Ounis L, Zoghmar A, Coutton C, Rouabah L, Hachemi M, Martinez D, Martinez G, Bellil I, Khelifi D, Arnoult C, Fauré J, Benbouhedja S, Rouabah A, Ray PF. Mutations of the aurora kinase C gene causing macrozoospermia are the most frequent genetic cause of male infertility in Algerian men. Asian J Androl. 2015 Jan-Feb;17(1):68-73. doi: 10.4103/1008-682X.136441.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/25219909
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4291881/
- Perrin A, Coat C, Nguyen MH, Talagas M, Morel F, Amice J, De Braekeleer M. Molecular cytogenetic and genetic aspects of globozoospermia: a review. Andrologia. 2013 Feb;45(1):1-9. doi: 10.1111/j.1439-0272.2012.01308.x. Epub 2012 May 10. Review.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22571172
- Pierre V, Martinez G, Coutton C, Delaroche J, Yassine S, Novella C, Pernet-Gallay K, Hennebicq S, Ray PF, Arnoult C. Absence of Dpy19l2, a new inner nuclear membrane protein, causes globozoospermia in mice by preventing the anchoring of the acrosome to the nucleus. Development. 2012 Aug;139(16):2955-65. doi: 10.1242/dev.077982. Epub 2012 Jul 4.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/22764053
- Yassine S, Escoffier J, Martinez G, Coutton C, Karaouzène T, Zouari R, Ravanat JL, Metzler-Guillemain C, Lee HC, Fissore R, Hennebicq S, Ray PF, Arnoult C. Dpy19l2-deficient globozoospermic sperm display altered genome packaging and DNA damage that compromises the initiation of embryo development. Mol Hum Reprod. 2015 Feb;21(2):169-85. doi: 10.1093/molehr/gau099. Epub 2014 Oct 29.
  Citation on PubMed: https://www.ncbi.nlm.nih.gov/pubmed/25354700
  Free article on PubMed Central: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311149/

Reprinted from Genetics Home Reference:
https://ghr.nlm.nih.gov/condition/globozoospermia

Reviewed: April 2015
Published: December 28, 2016

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services