

Gestational diabetes

Description

Gestational diabetes is a disorder characterized by abnormally high levels of blood glucose (also called blood sugar) during pregnancy. Affected women do not have diabetes before they are pregnant, and most of these women go back to being nondiabetic soon after the baby is born. The disease has a 30 to 70 percent chance of recurring in subsequent pregnancies. Additionally, about half of women with gestational diabetes develop another form of diabetes, known as type 2 diabetes, within a few years after their pregnancy.

Gestational diabetes is often discovered during the second trimester of pregnancy. Most affected women have no symptoms, and the disease is discovered through routine screening at their obstetrician's office. If untreated, gestational diabetes increases the risk of pregnancy-associated high blood pressure (called preeclampsia) and early (premature) delivery of the baby.

Babies of mothers with gestational diabetes tend to be large (macrosomia), which can cause complications during birth. Infants whose mothers have gestational diabetes are also more likely to develop dangerously low blood glucose levels soon after birth. Later in life, these individuals have an increased risk of developing obesity, heart disease, and type 2 diabetes.

Frequency

In the United States, up to 14 percent of all pregnancies are affected by gestational diabetes. The prevalence of gestational diabetes has been increasing rapidly over the past few decades (a trend similar to the increase in obesity and type 2 diabetes).

The risk of developing gestational diabetes varies by ethnic background. Women of Native American, Asian, Hispanic, or African American heritage are more likely to be diagnosed with the disease than are non-Hispanic white women.

Causes

The causes of gestational diabetes are complex. This condition results from a combination of genetic, health, and lifestyle factors, some of which have not been identified.

A hormone called insulin is important in the development of gestational diabetes. Insulin, which is produced in the pancreas, controls how much glucose (a type of sugar) is passed from the blood into cells to be used as an energy source. Under normal conditions, when blood glucose levels are high (such as after a meal), the pancreas releases insulin to move the excess glucose into cells, which reduces the amount of glucose in the blood.

As a normal part of pregnancy, women develop a reduced ability to respond to the effects of insulin, known as insulin resistance. This process ensures that there is enough glucose to provide energy for the growing fetus. As insulin resistance develops, more and more insulin is needed to keep blood glucose levels within the normal range. As a result, insulin-producing cells in the pancreas (called beta cells) make larger amounts of insulin. These cells are usually able to keep up with the body's demand for insulin, and so most pregnant women do not develop gestational diabetes. However, in some women, pancreatic beta cells are unable to increase production of insulin enough to keep blood glucose levels within the normal range. The result is a rise in blood glucose levels (hyperglycemia) that characterizes gestational diabetes.

Common variations (polymorphisms) in several genes have been associated with the risk of developing gestational diabetes. Because they are common, these variations can be present in people with gestational diabetes and in those without. It is the combination of these changes that helps determine a woman's likelihood of developing the disease. Although little is known about the genetics of gestational diabetes, studies suggest that the genes associated with this form of diabetes overlap with those associated with type 2 diabetes. These genes are involved in the development or function of insulin-producing beta cells in the pancreas or play a role in insulin resistance.

Genetic variations likely act in combination with health and lifestyle factors to influence a woman's overall risk of developing gestational diabetes. Risk factors include having a previous pregnancy affected by gestational diabetes, being older (particularly over age 35) during pregnancy, or having previously had a baby who was large (over 9 pounds) at birth. Other health conditions that predispose to the disease include overweight or obesity, a hormonal imbalance called polycystic ovary syndrome (PCOS), and prediabetes (higher-than-normal blood glucose levels that do not reach the cutoff for diabetes). Many of the risk factors for gestational diabetes are the same factors that increase the risk of developing type 2 diabetes.

Learn more about the genes associated with Gestational diabetes

- GCK
- KCNJ11
- KCNQ1

Additional Information from NCBI Gene:

- CDKAL1
- IGF2BP2

- IRS1
- MTNR1B
- TCF7L2

Inheritance

Gestational diabetes is a complex disease without a clear pattern of inheritance. However, many affected individuals have at least one close family member, such as a parent or sibling, with this disease or another form of diabetes (most commonly type 2 diabetes).

Other Names for This Condition

- Diabetes mellitus arising in pregnancy
- Diabetes mellitus, gestational
- Diabetes mellitus, pregnancy related
- Diabetes, pregnancy-induced
- GDM
- Gestational diabetes mellitus

Additional Information & Resources

Genetic Testing Information

- Genetic Testing Registry: Gestational diabetes (<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0085207/>)

Patient Support and Advocacy Resources

- National Organization for Rare Disorders (NORD) (<https://rarediseases.org/>)

Clinical Trials

- ClinicalTrials.gov ([https://clinicaltrials.gov/search?cond=%22Gestational diabetes%22](https://clinicaltrials.gov/search?cond=%22Gestational+diabetes%22))

Catalog of Genes and Diseases from OMIM

- DIABETES MELLITUS, PERMANENT NEONATAL, 1; PNDM1 (<https://omim.org/entry/606176>)
- DIABETES MELLITUS, TRANSIENT NEONATAL, 2; TNDM2 (<https://omim.org/entry/606176>)

y/610374)

- DIABETES MELLITUS, TRANSIENT NEONATAL, 3 (<https://omim.org/entry/610582>)

Scientific Articles on PubMed

- PubMed (https://pubmed.ncbi.nlm.nih.gov/?term=%28Diabetes,+Gestational%5BAJR%5D%29+AND+%28%28gene%5BTIAB%5D%29+OR+%28genetic*%5BTIAB%5D%29+OR+%28genes%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D)

References

- Bajaj K, Gross SJ. The genetics of diabetic pregnancy. *Best Pract Res Clin Obstet Gynaecol.* 2015 Jan;29(1):102-9. doi: 10.1016/j.bpobgyn.2014.08.008. Epub 2014 Aug 26. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/25438929>)
- Catalano PM. The impact of gestational diabetes and maternal obesity on the mother and her offspring. *J Dev Orig Health Dis.* 2010 Aug;1(4):208-15. doi:10.1017/S2040174410000115. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/25141869>)
- Chen P, Wang S, Ji J, Ge A, Chen C, Zhu Y, Xie N, Wang Y. Risk factors and management of gestational diabetes. *Cell Biochem Biophys.* 2015 Mar;71(2):689-94. doi: 10.1007/s12013-014-0248-2. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/25269773>)
- Damm P, Houshmand-Oeregaard A, Kelstrup L, Lauenborg J, Mathiesen ER, Clausen TD. Gestational diabetes mellitus and long-term consequences for mother and offspring: a view from Denmark. *Diabetologia.* 2016 Jul;59(7):1396-1399. doi:10.1007/s00125-016-3985-5. Epub 2016 May 12. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/27174368>)
- Kwak SH, Kim SH, Cho YM, Go MJ, Cho YS, Choi SH, Moon MK, Jung HS, Shin HD, Kang HM, Cho NH, Lee IK, Kim SY, Han BG, Jang HC, Park KS. A genome-wide association study of gestational diabetes mellitus in Korean women. *Diabetes.* 2012 Feb;61(2):531-41. doi: 10.2337/db11-1034. Epub 2012 Jan 10. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/22233651>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3266417/>)
- Lowe WL Jr, Scholtens DM, Sandler V, Hayes MG. Genetics of Gestational Diabetes Mellitus and Maternal Metabolism. *Curr Diab Rep.* 2016 Feb;16(2):15. doi:10.1007/s11892-015-0709-z. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/26803651>)
- Wu L, Cui L, Tam WH, Ma RC, Wang CC. Genetic variants associated with gestational diabetes mellitus: a meta-analysis and subgroup analysis. *Sci Rep.* 2016 Jul 29;6:30539. doi: 10.1038/srep30539. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/27468700>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4965817/>)

- Zhang C, Bao W, Rong Y, Yang H, Bowers K, Yeung E, Kiely M. Genetic variants and the risk of gestational diabetes mellitus: a systematic review. *Hum Reprod Update*. 2013 Jul-Aug;19(4):376-90. doi: 10.1093/humupd/dmt013. Epub 2013 May 19. Citation on PubMed (<https://pubmed.ncbi.nlm.nih.gov/23690305>) or Free article on PubMed Central (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3682671/>)

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