

General information about positive NIPT results: Trisomy 6

My patient's NIPT is positive for trisomy 6. What does this mean?

Your patient's noninvasive prenatal testing (NIPT) result suggests the presence of an extra copy of chromosome 6. NIPT is a screening test; false positives can occur. The actual chance for the pregnancy to have trisomy 6 depends on many factors, including the patient's clinical and family history.

Next steps to consider: You should discuss the results and the potential clinical implications with your patient. Globally, professional medical societies recommend that all women with a positive screening result should have genetic counseling and a comprehensive ultrasound evaluation with an opportunity for diagnostic testing to confirm the results.^{1,2} Confirmation prior to birth can also help with pregnancy and neonatal management.

See below for more information about trisomy 6.

What is trisomy 6?

Trisomy 6 is a condition that is caused by an extra chromosome number 6 (three copies instead of two).

What are the features of trisomy 6?

Most pregnancies with trisomy 6 will miscarry spontaneously. If a developing fetus has mosaic trisomy 6 (where some cells are normal and some cells have trisomy 6), there is an increased chance for the pregnancy to progress and possibly survive to term. However, liveborn infants with full or mosaic trisomy 6 are expected to have serious medical problems. Key features include congenital heart defects, minor facial dysmorphism, and hand/feet malformations. Mosaic trisomy 6 is associated with growth anomalies, intellectual disability, birth defects, and reduced lifespan. In reported cases of prenatally diagnosed trisomy 6, the outcomes have ranged from normal to live births with clinical sequelae. The variability in clinical presentation is believed to be due to confined placental mosaicism (CPM; when trisomic cells are present in the placenta, but not in the fetus) or the degree of fetal mosaicism.

What is the prevalence of this condition?

Unknown, but very rare. For this reason, positive predictive value (PPV) cannot be calculated.

What testing could be considered?

Specialized genetic tests such as karyotyping, fluorescence *in situ* hybridization (FISH), quantitative polymerase chain reaction (qPCR), and microarray are available to confirm the presence of trisomy 6. Uniparental disomy (UPD) analysis is performed by specialized testing, such as SNP microarray, methylation testing, and short tandem repeat (STR) marker testing.

These confirmatory tests are generally performed on cells from chorionic villus sampling (CVS) or amniocentesis during pregnancy, on cord blood or peripheral blood sample after the baby is born, or on products of conception (POC) in the case of a miscarriage. The type of invasive procedure and diagnostic testing should take into account the underlying chromosome anomaly.^{3,4}

Ultrasound evaluation may be useful in aiding with a prenatal diagnosis of trisomy 6, but a normal ultrasound cannot exclude this condition.

Special considerations

Chromosome 6 is an imprinted chromosome and UPD for chromosome 6 has specific consequences. Paternal UPD 6 has been associated with clinical findings, most commonly transient neonatal diabetes mellitus. Maternal UPD 6 may be associated with congenital anomalies. There may also be an increased risk for certain recessive conditions if UPD is present.⁵

The American College of Medical Genetics and Genomics (ACMG) states that specialized UPD testing should be considered for patients when there is discordance noted between the NIPT result and diagnostic testing.³

Resources for trisomy 6:

MedlinePlus Genetics
medlineplus.gov/genetics/chromosome/6

Unique, The Rare Chromosome Disorder Support Group
rarechromo.org

References

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4. Van Opstal D, Srebniak MI. Cytogenetic confirmation of a positive NIPT result: evidence-based choice between chorionic villus sampling and amniocentesis depending on chromosome aberration. *Expert Rev Mol Diagn.* 2016;16(5):513-520.
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Additional resources

Chen CP, Chern SR, Lee PY, Town DD, Wang W. Prenatal diagnosis of low-level mosaic trisomy 6 by amniocentesis. *Prenat Diagn.* 2006;26(11):1093-1096.

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Gardner RJM, Amor DJ. *Gardner and Sutherland's Chromosome Abnormalities and Genetic Counseling.* 5th ed. Oxford University Press; 2018.

Malvestiti F, Agrati C, Grimi B, et al. Interpreting mosaicism in chorionic villi: results of a monocentric series of 1001 mosaics in chorionic villi with follow-up amniocentesis. *Prenat Diagn.* 2015;35(11):1117-1127.

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