REFERENCES

[1]Martínez-Jacobo L, Ortíz-López R, Rizo-Méndez A, García-Molina V, Santuario-Facio SK et al. Clinical and molecular delineation of duplication 9p24.3q21.11 in a patient with psychotic behavior. Gene 2015, v. 560, 124-7.

[2]Guilherme RS, Meloni VA, Perez ABA, Pilla AL, de Ramos MAP et al. Duplication 9p and their implication to phenotype. BMC Med Genet 2014, v. 15:142.

[3]Stagi S, Lapi E, Seminara S, Guarducci S, Pantaleo M et al. Long-term auxological and endocrinological evaluation of patients with 9p trisomy: a focus on the growth hormone-insulin-like growth factor-I axis. BMC Endocrin Disord 2014, v. 14:3.

[4]El Khattabi L, Jaillard S, Andrieux J, Pasquier L, Perrin L et al. Clinical and molecular delineation of tetrasomy 9p syndrome: report of 12 new cases and literature review. Amer J Med Genet 2015, v. 167, 1252-61.

Author: Iosif Lurie, M.D., Ph.D.

Chromosome Disorder Outreach

You Are Not Alone.

Join the Conversation.

facebook join our group

CONTACT US

Chromosome Disorder Outreach
P.O. Box 724
Boca Raton, FL 33429-0724

Family Helpline 561.395.4252
info@chromodisorder.org

www.chromodisorder.org

YOU ARE NOT ALONE

Chromosome Disorder Outreach

ABOUT US

Chromosome Disorder Outreach provides support and information to anyone diagnosed with a rare chromosome change, rearrangement or disorder. CDO actively promotes research and a positive community understanding of all chromosome disorders.

CDO is a 501c3 organization founded in 1992.

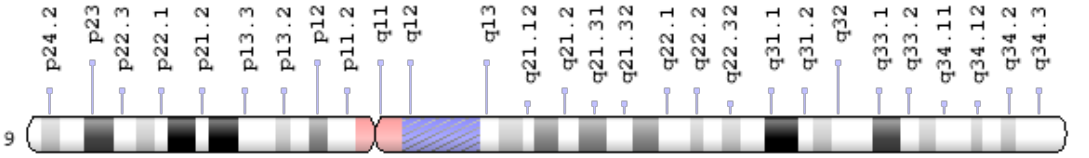
TRISOMY 9p
RETHORE SYNDROME

TRISOMY 9p
RETHORE SYNDROME

Trisomy 9p is one of the best known conditions caused by partial trisomy. It has been known as a syndrome since 1970, when Rethore et al. first described 4 patients with this disorder. Sometimes it is reported as Rethore syndrome. From the genetic point of view this syndrome is unusually heterogeneous. At least 3 main genetic sub-types of Rethore syndrome can be recognized.

1)"Pure" trisomy 9p, which may occur due to a) a duplication of the genetic material of the short arm; b) an unbalanced translocation onto the short arm of any acrocentric chromosome, or c) the presence of additional marker chromosome 9p.

2) Trisomy 9p with an associated imbalance may occur due to a) an association of duplication 9p with a deletion of the most distal part of 9p; b) mal-segregation 2:2 of a balanced translocation between the short arm of chromosome 9 and any other chromosome (except the short arm of acrocentric chromosomes); c) a 3:1 mal-segregation of a balanced translocation leading to the presence of an additional chromosome which includes material not only from 9p but a part of 9q (sometimes significant).



3) Tetrasomy 9p – a situation when a person has an additional iso-chromosome 9p. As a result such a patient has four copies of 9p material. Rethore syndrome is a relatively common condition. At least 500 patients have been reported so far.Description of the manifestations of trisomy 9p presumes a situation when the patient does not have any additional imbalance either for other chromosomes or for other segments of 9p. Surprisingly manifestations in patients with trisomy for the whole 9p and with trisomy only for its distal parts (9p21p24) are very similar[1].Typically relatively mild microcephaly and brachycephaly are associated with a complex of dysmorphic features: hypertelorism, down-slanting palpebral fissures, large bulbous nose, short philtrum, down-turned oral comissures, low-set ears, and a short neck[2]. This complex allows recognition of the syndrome (in typical cases) even before cytogenetic examination. Palate is usually high, but cleft palate occurs in less than 10% of patients and cleft lip in less than 3%.

Birth weight is usually less than normal, and almost all children reveal postnatal growth delay and delayed skeletal maturation[3]. Scoliosis and lordosis are common, but severe abnormalities of the extremities are exceptionally rare. Special examinations of the brain reveal aplasia or hypoplasia of the corpus callosum in 20-25% of patients, approximately the same percentage of patients have enlarged brain ventricles. Heart defects may be found in 20-25% patients. In most instances these defects are relatively mild and do not require surgical intervention. Defects of the lungs, gastro-intestinal system and kidneys are not characteristic. All patients reveal delay in psycho-motor development, although its degree may vary from one patient to another.

Epilepsy may occur in ~30% of affected persons. Because visceral defects are relatively uncommon and mild, life expectancy for patients with pure trisomy 9p is almost the same as for the persons with normal karyotypes.
When trisomy 9p is associated with partial monosomies for other chromosomes or with the loss of the most distal segment of 9p some additional manifestations may be expected. If (due to 3:1 segregation) the patient has an additional marker chromosome 9, including segments of the long arm from the centromere to q22 (or even more,) many other abnormalities may commonly occur, including Dandy-Walker malformation, kidney abnormalities and skeletal defects with hyperextension of the knees. Tetrasomy 9p is a relatively rare condition which may be found both in fetuses upon prenatal diagnosis and in children.

Some patients are mosaics having two groups of cells: normal cells and cells with an additional iso-chromosome 9p, some others have additional iso-chromosome 9p in all tissues. Phenotypic differences between patients with tetrasomy 9p are attributed mainly to different distributions of abnormal cells in different tissues4. However the presence of iso-chromosome 9p in fibroblasts is generally associated with more severe manifestations than in children having an abnormal cell line only in lymphocytes. Generally heart defects and brain defects are at least twice as common in patients with tetrasomy 9p than in patients with pure trisomy 9p. Vital prognosis depends on the presence of these defects. All surviving patients reveal delayed psychomotor development.

Basically all patients with tetrasomy 9p, pure duplications 9p, duplication 9p in association with terminal deletion 9p and additional marker chromosome 9p [not involving 9q material] are results of a sporadic mutation with a recurrence risk near zero. A balanced translocation in one parent is common for most patients with trisomy 9p as a result of translocation. Cytogenetic examination of the parents is necessary to evaluate recurrence risk and to select the best options for further pregnancies.