RING CHROMOSOME 14

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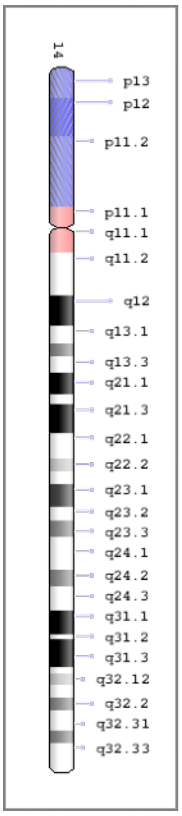
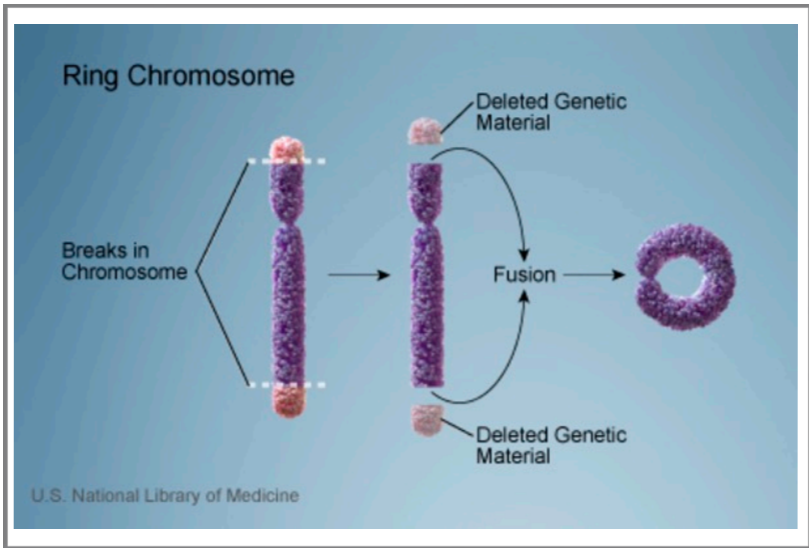


Ring chromosome 14 or r(14) is a chromosomal abnormality caused by terminal deletions on both the short and long arm of the chromosome, followed by fusion of the two ends. First reported in 1971, these rings often cause mitotic instability and can lead to some cells lacking some or all parts of the original chromosome. While they are formed de novo, it is not certain if the mutation occurs in gametes or very early in embryonic development[1].

Individuals with r(14) will have symptoms of developmental delay, intellectual delay, and seizures. Other main features frequently seen include craniofacial dysmorphisms, ocular abnormalities, and an increased susceptibility to infections. However, it appears that deletion size does not necessarily affect the overall severity of symptoms[1]. It has been seen that individuals with similar linear deletions of those with r(14) have several of the same phenotypes except for the seizures[2].

Ring chromosome 14 tends to cause mostly severe developmental delay and intellectual disabilities. For example, many children take their first steps between the ages of two and three, while some never do[1]. Several behavior disorders are also associated with r(14). This includes hyperactivity, some mild bursts of aggressiveness, some motoric stereotypes, and other autistic behaviors[3]. It has been theorized that the onset and the severity of seizures has a correlation to the severity of developmental and intellectual delays. Those that have seizures earlier in life tend to have more severe delays[1].

Patients with r(14) have some form of epilepsy and, in many cases, it will be drug resistant. These seizures can range in when they begin but will typically occur as the individual is falling asleep or waking up[1]. The epilepsy can include generalized, partial, and mixed seizures[4]. As of late, it is unknown what specific genes are contributing to the widespread epilepsy seen in patients[5].



Individuals are also seen to have a variety of different craniofacial dysmorphisms. This can include, but is not limited to, microcephaly, long and slightly asymmetric face, high forehead, deep set eyes, down slanting eyes, and palpebral fissures[3].

Another main feature of the syndrome is ocular or retinal abnormalities. The most reported ocular abnormality associated with r(14) syndrome is abnormal retinal pigmentation[6]. However, other ocular abnormalities can include myopia, cataract, microphthalmia, coloboma, glaucoma, and maculopathy[7].

It has also been shown that individuals with the syndrome are at an increased susceptibility to infections. Many of these infections seem to occur in the respiratory tract and may require consistent or repeated hospitalization[3].

To get the most adequate care, it is recommended that patients with ring chromosome 14 syndrome see a multidisciplinary team consistently. This includes their normal physician along with specialists like an immunologist, neurologist, ophthalmologist, gastroenterologist, and nutritionist[1].

Clinical variability in patients with ring chromosome 14, as well as in patients with other ring chromosomes, depends on the size of the deleted segment, mechanism of the origin (zygotic or postzygotic), and on the presence of some additional rearrangements within the

ring chromosome, which are relatively common for persons with ring chromosomes. Size of the lost segment of 14q in the patients is relatively small. The mean size of the deleted segment in 15 reported individuals, where this information was available, was only 2.36 Mb and the maximal size of the lost segment was 5 Mb. In two out of 15 patients, deletions of the terminal segment were associated by duplications of the some segments in the distal part of 14q.

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