Waltzer 7 Jackson, a remutation of the *Cdh23* gene

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Mutation (allele) symbol: *Cdh23*$^{v\text{-}7J}$

Mutation (allele) name: waltzer 7 Jackson

Gene symbol: *Cdh23*

Strain of origin: CbyJ.Cg-*Foxn1*^{nu}/J

Current strain name: CByJ(Cg)-*Cdh23*$^{v\text{-}7J}$/GrsrJ

Stock #003761 (8-18-06 available only as DNA from The Jackson Laboratory DNA Resource)

Phenotype categories: circling, hearing loss, head tossing

Abstract

We have identified a new remutation to the cadherin 23^{v} (otocadherin) gene by first mapping the remutation to the region of Chromosome 10 where the mouse mutation waltzer (*v*) is located and then by performing a direct test for allelism.

Origin and Description

The waltzer 7 Jackson (*v-7J*) remutation was discovered by Belinda Harris in a research colony of CByJ.Cg-*Foxn1*^{nu}/J mice at the Jackson Laboratory in November 1999. Like other waltzer (*v*) mutant mice, homozygotes show typical circling, head-tossing, deafness, and hyperactivity. All homozygous mutants are deaf. Abnormalities of the inner ear include degeneration of the organ of Corti, spiral ganglion, stria vascularis, and saccular macula, as previously described for other mutations of the cadherin23^{v} gene (MGD, 2005).

Genetic Analysis

In order to determine the mode of inheritance, a female homozygous for this remutation was mated to an unrelated CAST/Ei male. There were no affected progeny observed in the F1 generation. Mice from this F1 generation were then mated together to produce F2s, and in this cross both affected and unaffected animals were produced, proving that the mutation is recessive. Using our standard mapping protocols F2s produced from an intercross with CAST/Ei were used to map this remutation to Chromosome 10 in the region where the mouse mutation waltzer is located. A direct test for allelism was performed by mating a C57BL/J-*v*^{2J}/J heterozygote with a mouse homozygous for this new remutation. This mating produced 5 progeny, of which 3 were affected with the (*v*)

phenotype, proving the new mutation to be an allele of the cadherin 23 (otocadherin) gene.

Pathology
Routine pathological screening of a homozygote at 8 months of age showed glaucoma in one eye. Abnormalities of the inner ear include degeneration of the organ of Corti, spiral ganglion, stria vascularis, and saccular macula (MGD, 2005). All other tissues were normal in appearance.

Hearing as assessed by auditory brainstem response testing on individual animals showed that all mutants tested were deaf, and all controls had normal hearing.

Eyes screened with an ophthalmoscope showed one homozygote had small retinal vessels, which is characteristic of the C57BL/6J background strain and similar to waltzer 2 Jackson (another waltzer allele of cadherin 23 on a C57BL/6J background). An electroretinogram (ERG) done on a homozygote waltzer 7 Jackson at 32 weeks of age was normal, which differs from waltzer 2 Jackson because *Cdh23*$^{v\text{-}2J}$ has age onset reduced rod ERG at one year of age, as well as large areas of retinal depigmentation.

Discussion
We report here a remutation to waltzer that is similar to other waltzer alleles except the ERG is normal in *Cdh23*$^{v\text{-}7J}$ mice, unlike the ERG in *Cdh23*$^{v\text{-}2J}$, which is on the same background strain.

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