Recoil wobbler 2 Jackson: a remutation to recoil wobbler

Belinda S. Harris, Patricia F. Ward Bailey, Roderick T. Bronson, Kenneth R. Johnson, and Muriel Davisson

Source of Support:This research was supported by grants RR01183 to the Mouse Mutant Resource (M.T. Davisson, PI) and Cancer Core Grant CA34196.

Mutation (allele) symbol: *Grm1*$^{rcw\text{-}2J}$

Mutation (allele) name: recoil wobbler 2 Jackson

Gene symbol: *Grm1*

Strain of origin:B6.129X1-Bax^{tm1Sjk}/J

Current strain name:B6(129X1)-*Grm1*$^{rcw\text{-}2J}$/J

Stock #: 005271 (this strain is only available as DNA)

Phenotype categories: neurological: motor capabilities/coordination/movement

Abstract
A neurological remutation to recoil wobbler (*rcw*) has been identified. A direct test for allelism between mice from the B6.129X1-Bax^{tm1Sjk}/J-*rcw* ^{2J}/J strain and the C3FeLe.Cga-*rcw*/J strain confirmed that the two mutations are allelic.

Origin and Description
Mice displaying a wobbly gait were found by Nancy Goodwin in a production colony of B6.129X1-Bax^{tm1Sjk}/J mice at The Jackson Laboratory and were brought to the Mouse Mutant Resource (MMR) in November 2000. This spontaneous remutation has recessive inheritance as shown by mating a homozygous mutant female to an unrelated +/+ male of the CAST/Ei strain. The F1 progeny from this mating were unaffected, but affected animals were observed in the F2 progeny. Although initial analysis was done while the Bax*tm1Sjk* mutation was still segretating in this strain, it has now been bred out. Visibly, *rcw*^{2J}/*rcw*^{2J} mice are classified by 2 weeks of age by their wobbly gait and smaller body size. Like *rcw*/*rcw* mice (Cook et al), homozygous *rcw*^{2J}/*rcw*^{2J} mutants appear to roll side to side when walking and when seated the rear legs almost touch the front paws and the mutant rocks forward to backward. This remutation is maintained by mating heterozygous siblings or by mating female homozygotes with untested male littermates. Male homozygotes usually do not breed. Female homozygotes may not raise their young and many pups need to be fostered.

Genetic Analysis
Using our standard mapping protocols an intercross between B6.129X1-Bax^{tm1Sjk}/J-*rcw*^{2J}/J and CAST/Ei was used to map this mutation. Linkage was first determined to be on Chromosome 10 using the microsatellite marker *D10Mit183 (17cM)*. This marker and

two others; *D10Mit281* (9 cM) and *D10Mit167* (*4 cM*), showed no recombination in 19 F2 animals (38 meioses) typed. Because the chromosomal location of the recoil wobbler (*rcw*) mutation maps in this region (at 3 cM) a direct test for allelism was done. Two female heterozygotes from the C3FeLe.Cga-*rcw*/J strain were mated to a male heterozygote from the B6.129X1-Bax^{tm1Sjk}/J-new mutant strain. These matings produced 3 recoil wobblers out of 30 born with 2 unclassifiable missing animals, confirming that the two mutations are allelic.

Pathology

Hearing as assessed by auditory-evoked brainstem response threshold testing in two mutants and two controls at 1 month of age was normal. Whole mounts of inner ears appeared grossly normal. The eyes of mutant and control mice screened with an ophthalmoscope were determined to be normal. In a routine pathological screen of two homozygous mutants at 5 months and 9 months of age and two controls at 13 months, no lesions were observed.

Discussion

A direct test for allelism confirmed that this mutation is allelic with recoil wobbler (*rcw*). This remutation is available from JAX® Mice and The JAX DNA Resource. Embryos are being cryopreserved.

Acknowledgements

We wish to thank Coleen Marden for excellent technical skills, Norm Hawes for vision screening, and Heping Yu and Sandra Gray for hearing assessment.

References

MGD 2003, Mouse Genome Database, Mouse Genome Informatics Project, The Jackson Laboratory, Bar Harbor, ME.

Cook SA, Bronson RT, and Davisson MT. (2003) Recoil Wobbler, *rcw*, a new neurological mutation in the proximal region of mouse Chromosome 10. The Mouse Mutant Resource Website and MGI Reference J:83427.