Identification of a recombination event narrowing the Lafora disease gene region

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Abstract

Patients affected with progressive myoclonus epilepsy of the Lafora type present during late adolescence with a characteristic EEG pattern and Lafora bodies seen on skin biopsy. The critical region for the Lafora gene has been localised to chromosome 6q24 flanked by the dinucleotide repeat markers D6S292 and D6S420. This study for linkage of markers from the candidate gene region was performed in a previously unpublished family affected with Lafora disease. EEG and skin biopsy evaluation for Lafora bodies were performed on five of eight family members followed for seizure activity. Haplotype and linkage analysis of DNA from five family members were carried out using the nine dinucleotide repeat markers reported in the common region of homozygosity by Serratosa et al in 1995. The present study of an additional family affected by Lafora disease has narrowed the 17 cM critical region for the Lafora disease gene on chromosome 6q24 to a 4 cM region flanked by markers D6S308 and D6S311.

Keywords: Lafora disease; gene linkage; chromosome 6; epilepsy

Patients affected with autosomal recessive progressive myoclonus epilepsy (PME) of the Lafora type (Lafora disease) present during late adolescence with myoclonic seizures. A characteristic electroencephalographic (EEG) pattern and periodic acid-Schiff (PAS) positive inclusions (Lafora bodies) are seen in the myoepithelial cells of the secretory acini of the apocrine glands or in the cells of the eccrine duct on skin biopsy.1-3 This is followed by neurological deterioration with death occurring within 10 years of onset. The Lafora disease gene probably encodes a protein important in carbohydrate metabolism as the Lafora bodies result from the abnormal accumulation of polyglucosans in the cytoplasm of cells in the central and peripheral nervous system.1-3 Using linkage analysis and homozygosity mapping, Serratosa et al defined a 17 cM region on chromosome 6q23-25 flanked by the dinucleotide repeat markers D6S292 and D6S420 that contained the putative Lafora disease gene (fig 1). We report the narrowing of the candidate gene to a 4 cM region by linkage analysis of markers in a previously unpublished family affected with Lafora disease (fig 2). Subjects II.1, II.2, II.3, and II.4 were evaluated for seizures. Two of the six offspring (II.1 and II.6) were diagnosed by clinical diagnostic criteria including EEG and Lafora bodies seen on skin biopsy. One subject (II.3) had a stereotactic brain biopsy for diagnosis because two skin biopsies had been normal. Subjects II.2 and II.4, aged 30 and 28 years respectively, had similar generalised paroxysmal sharp EEG activity but were negative for Lafora bodies in axillary skin biopsies. Both are mentally normal and are over the age of onset for Lafora disease. High resolution cytogenetic evaluation showed that both II.2 and II.4 had a normal karyotype.

Genomic DNA was extracted from peripheral blood of I.2, II.1, II.2, and II.4. A paraffin embedded brain biopsy specimen was used to obtain DNA from II.3. Haplotype and linkage analysis of DNA from five family members were carried out using the nine dinucleotide repeat markers (D6S292, D6S403, D6S308,
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D6S310, D6S471, D6S314, D6S453, D6S311, and D6S420) reported in the common region of homozygosity on chromosome 6q.

Figure 2 Pedigree of Lafora disease family. The results of dinucleotide repeat marker analysis from the Lafora disease critical region on chromosome 6q are listed below each subject. Markers are ordered from centromere to telomere. Brackets around results of I.1 indicate the inferred haplotype. The recombination event in II.4 occurred in I.2 between markers D6S308 and D6S310. The haplotype of each parent segregating with the disease gene is blackened.

D6S308, D6S311, D6S314, D6S453, D6S311, and D6S420) reported in the common region of homozygosity on chromosome 6q.


