Berg AT, Lin J, Ebrahimi N,Testa FM, Levy SR, Shinnar S. **Modeling remission and relapse in pediatric epilepsy: application of a Markov process.** Epilepsy Research 2004; 60: 31-40.

Abstract

Seizure outcome is frequently described in terms of patients ever attaining remission or being in terminal remission. Outcomes are more complicated and, over many years, repeated remission and relapses may occur. These are difficult to quantify with standard survival techniques used in analysis of remission and relapse. The Markov process, which allows one to track a patient's state (remission or not) over time, provides a suitable approach for studying repeated remission and relapse.

In a prospective community-based study of children followed from the point of the initial diagnosis of epilepsy, we examined the probability of repeated remission and relapse over up to three different remission episodes (minimum 1 year each) per patient. The role of epilepsy syndrome was the main determinant of remission-relapse patterns considered in the analysis. Two different Markov models were used, one involving three states and the other seven states.

Of 613 children initially recruited into the study, 602 were followed at least 1 year and thus eligible for the analysis. Almost 90% of the cohort experienced a remission; however, almost half then relapsed. Second remissions occurred in 81% of those who relapsed of whom 38% relapsed again. A third remission occurred in 82% of those after a second relapse of whom 58% relapsed yet again. After the first 2 years, ~70% of the cohort was in remission, 20% was no longer in remission having relapsed, and 10% had never been in remission. Significant differences were seen by underlying epilepsy syndrome. Children with one of the epileptic encephalopathies were least likely of all syndrome groups ever to remit. Those with symptomatic partial epilepsies were less likely to remit than children with any of the other syndromes, idiopathic partial or generalized, cryptogenic partial, and unclassified. Differences between these last groups became apparent when considering their subsequent remission and relapse histories. These differences were best seen in the seven-state model. For example, idiopathic partial epilepsies were most likely to enter remission and never relapse. By contrast, idiopathic generalized and cryptogenic partial epilepsies were more likely to remit and relapse repeatedly.

The Markov approach provides an alternative to standard survival techniques for understanding remission and relapse outcomes in epilepsy. Its advantage is that it allows one to track the individuals' outcome over time even as the condition fluctuates. The technique would also be applicable in virtually any remitting–relapsing disorder.