Restless Legs Syndrome – 1

P067

Automatic scoring of periodic limb movements using a threshold based algorithm

J. TILMANNE[1], P. STENUIT[2], M. KERKHOFS[2], S. DEVUYST[3] and T. DUTOIT[3]
[1]Faculté Polytechnique de Mons, Mons, [2]Sleep Laboratory, CHU Vésale, Montigny-le-Tilleul and [3]TCTS Lab, Faculté Polytechnique de Mons, Mons, Belgium

Periodic limb movement disorder (PLMD) is a very common disease whose occurrence increases with age. With movements occurring on average every 20–40 s on one or both legs for several hours during one night, hand scoring of the legs-EMG is very laborious. The algorithm presented here computes for each leg of each patient three thresholds based on the activity level of the leg-EMG at rest. All activity peaks, which are above the first threshold, indicate a potential movement. The second threshold enables us to find the beginning and the end of the supposed movements. The third is used to concatenate close bursts of activity, which are part of the same movement. The algorithm is also able to deal with short movements occurring just before or after long periods of activity (more than 15 s) but which are parts of the same movement. Short peaks of activity due to artefacts are also removed. The validation of this algorithm has been done by comparison with hand scoring realized by a professional scorer on 5 whole nights from patients suffering from PLMD, with a number of movements of 254, 968, 245, 243 and 324 for the different patients. The ratio between the total number of movements detected by our program and those hand scored is 102.3, 78.4, 100.4, 95.9 and 110.8%, respectively, with an average of 97.6%, using a more simple algorithm than that used by Wetter et al.[1], who achieved 94%. We also performed a movement-by-movement analysis to check that movements were detected at the right time. We obtained a mean of 84.3% of the movements detected correctly, 8% detected only by the scorer, and 14% detected only by the program. A validation on a higher number of patients would be needed, but our results are comparable to the inter scorer agreement rate and make our program a promising automatic detection method.

Reference:
[1] T. Wetter, G. Dirlich, J. Streit, C. Trenkwalder, A. Schuld and T. Pollma¨ cher, An Automatic Method for Scoring Leg Movements in Polygraphic Sleep Recordings and Its Validity in Comparison to Visual Scoring, Sleep, 2004, 27(2), 324–28.