# THE CHARACTERISTICS OF SLOW EYE MOVEMENTS DURING SLEEP ONSET

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Slow eye movements (SEMs) during sleep onset have been recognized for many years but have received very little attention in comparison with the rapid eye movements of REM-sleep. The aim of this investigation was to describe the occurrence and characteristics of SEMs as recorded during overnight polysomnography. Methods: The subjects were 73 consecutive patients having polysomnography at Epworth Sleep Centre during a 2-week period in Sep 2001 or June 2002.The electro-oculogram (EOG) was recorded separately from each eye by a gold electrode one cm below and lateral to the outer canthus, referred to the nasion. The high-pass filters of the Compumedics recording equipment were set at 0.3 Hz, as is usual, which may have attenuated the amplitude of some SEMs. Five consecutive SEMs for each subject were measured manually from print-outs of 30-sec epochs. Results: SEMs occurred in all 73 subjects after eyelid closure and with the appearance of alpha waves in the EEG, before the onset of theta waves and R&K Stage-1 sleep. SEMs had a mean peak-to-peak amplitude that was very different in different subjects, ranging from 44 to 236 microV with an overall mean of 95+/- 42 (SD) microV. The wavelength of individual SEMs was also variable, with a mean of 2.5 +/-0.9 sec and a range from 0.7 to 5.4 sec. In some subjects SEMs began a few sec after they settled down and closed their eyes. In others, SEMs followed a variable period of ocular quiescence. SEMs often continued for several min before R&K Stage-1 began, and ended either in Stage-1 or sometimes Stage-2 with reduced amplitude. The binocular coordination of SEMs was much weaker than that of saccades or blinks in alert subjects. Conclusion: SEMs are ubiquitous during sleep onset as an early sign of drowsiness, before Stage-1 sleep. They reflect active inhibition of vision and oculomotor control in the sleep-onset process. SEMs could provide a basis for monitoring the alertness/drowsiness of active people.

Key words: eye movements, drowsiness, sleep onset.