Supplementary material 2

Effect of ageing upon pathological tremor

Development of pathological tremors is known to depend upon age. For example, Parkinson's disease is rare before age 50 years (prevalence < 0.1 % [42]), and a sharp increase of the incidence is seen after age 60 years (*e.g.* prevalence *circa* 1 % [42] or more [43] at age 70 years). Likewise, essential tremor increases in prevalence with age (prevalence *circa* 2 % by age 60 years) [43]. Many other movement disorders follow a similar trend of increasing prevalence with age [15, 43].

Effect of ageing upon physiological tremor

There is disagreement in the literature as to whether the characteristics of baseline physiological tremors tend to change with age. Part of this disagreement may be due to different assessment of other age-related changes (*e.g.* hypertension [44], muscle tone) as either natural or pathological [see 45]. It appears that changes in physiological tremor upon ageing in 'normal' cohorts are practically negligible. There may be modest increases in the amplitude of physiological tremor with age in the general population, associated with the onset of other age-related conditions or changes in height or weight [39, 44, 46, 47], although several investigators reported no significant increase [21, 45, 48–50]. Several reports have also suggested a slight reduction in peak tremor frequency in the elderly [21, 46–49, 51], while others found no significant difference [45, 50]; we expect such modest changes in tremor frequency *per se* would have little influence on performance of vascular surgery or microsurgery, and furthermore few surgeons will still be practicing at age 70 or 80, when the reported changes may begin to become demonstrable.

The suggested changes in physiological tremor amplitude and the resulting degree of oscillation are still likely to be minor in comparison to the large increases in amplitude typical when the physiological tremor is 'enhanced' by factors such as mental stress, physical activity, and so forth [21]. Likewise, age-related changes in baseline physiological tremor are expected to be very minor compared to typical manifestations of pathological tremor [49, 52, 53] [*cf*. 50, 54].

References for Supplementary material 2

[15] G. Deuschl and A. Fasano. Chapter 29 — Essential tremor and other tremors. In: A. H. V. Schapira, A. E. T. Lang and S. Fahn (eds). Movement Disorders 4. Philadelphia, U.S.A.: Saunders/Elsevier, 2010:506–57.

[21] W. Growdon, J. Ghika, J. Henderson, G. Van Melle, F. Regli, J. Bogousslavsky et al. Effects of proximal and distal muscles' groups contraction and mental stress on the amplitude and frequency of physiological finger tremor. An accelerometric study. Electromyogr Clin Neurophysiol 2000; 40:295–303.

[39] C. D. Marsden, J. C. Meadows, G. W. Lange and R. S. Watson. Variations in human physiological finger tremor, with particular reference to changes with age. Electroencephalogr Clin Neurophysiol 1969; 27:169–78.

[42] L. M. L. de Lau and M. M. B. Breteler. Epidemiology of Parkinson's disease. The Lancet Neurology 2006; 5:525–35.

[43] G. K. Wenning, S. Kiechl, K. Seppi, J. Müller, B. Högl, M. Saletu et al. Prevalence of movement disorders in men and women aged 50–89 years (Bruneck Study cohort): a population-based study. The Lancet Neurology 2005; 4:815–20.

[44] S. Morrison, J. J. Sosnoff, K. S. Heffernan, S. Y. Jae and B. Fernhall. Aging, hypertension and physiological tremor: The contribution of the cardioballistic impulse to tremorgenesis in older adults. Journal of the Neurological Sciences 2013; 326:68–74.
[45] J. Raethjen, F. Pawlas, M. Lindemann, R. Wenzelburger and G. Deuschl. Determinants of physiologic tremor in a large normal population. Clin Neurophysiol 2000; 111:1825–37.
[46] S. Morrison, P. Mills and R. Barrett. Differences in multiple segment tremor dynamics between young and elderly persons. Journals of Gerontology: Medical Sciences 2006; 61A:982–90.
[47] A. T. Birmingham, H. J. Wharrad and E. J. Williams. The variation of finger tremor with age in man. Journal of Neurology, Neurosurgery & Psychiatry 1985; 48:788–98.
[48] P. Wade, M. A. Gresty and L. J. Findley. A normative study of postural tremor of the hand. Archives of Neurology 1982; 39:358–62.
[49] M. M. Sturman, D. E. Vaillancourt and D. M. Corcos. Effects of aging on the regularity of physiological tremor. J Neurophysiol 2005; 93:3064–74.
[50] R. J. Elble. Characteristics of physiologic tremor in young and elderly adults. Clin Neurophysiol 2003; 114:624–35.
[51] J. Marshall. The effect of ageing upon physiological tremor. J Neurol Neurosurg Psychiatry 1961; 24:14–17.
[52] R. J. Elble. Physiologic and essential tremor. Neurology 1986; 36:225–31.
[53] M. C. Newland. Quantification of motor function in toxicology. Toxicology Letters 1988; 43:295-319.
[54] R. J. Elble. Tremor in ostensibly normal elderly people. Mov Disord 1998; 13:457–64.