was widely dilated and unreactive to light and accommodation. Adduction, elevation and depression of the right eye were decreased. There was no ptosis. Remaining neurological examination and examination of other systems revealed no abnormality.

She was admitted to hospital with a view to doing a carotid angiogram to rule out a compressive lesion of the right third nerve. On the day after admission, examination showed the right pupil to be equal to the left and reactive to light and accommodation. Extraocular movements remained weak in the right eye.

A CT scan with double dose contrast showed multiple enhancing periventricular lesions suggestive of multiple sclerosis. VER testing revealed a latency of 119 ms on the right and 136 ms on the left (normal upper limit: 103). Octupus perimetry revealed a superior paracentral scotoma in the right eye and an inferior paracentral scotoma in the left eye. On Farnsworth-Munsell 100 Hue colour vision testing the gross error score was 28 in the right eye and 63 in the left eye (both within normal limits). The inter-ocular difference in score is abnormal at the 95% confidence level.[2]

Three weeks later the neurological examination was normal. This clinical course was consistent with a diagnosis of probable MS. Isolated third nerve palsy as an initial presentation of multiple sclerosis may be more common than recognized.[3] Invasive procedures like angiograms may be voidable in these cases.

Hiren B. Desai, M.D.
D.J. MacFadyen, M.D.
Department of Clinical Neurological Sciences
University of Saskatchewan
Saskatoon, Saskatchewan

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Age of Onset of Parkinson's Disease

To the Editor:

Teravainen and his colleagues[1] have reported data on the age of onset and age-specific prevalence of Parkinson's disease in 551 parkinsonian patients in Vancouver and Helsinki. They concluded that Parkinson's disease may be starting at an earlier age than in the past. They found the mean age of onset of Parkinson's disease to be 57.8 years in Helsinki and 57.9 years in Vancouver. Other studies quoted have suggested a later age of onset and greater prevalence in later life. However, as early as 1883, Gowers[2] reported a mean age of commencement of 52 years. He stated that onset after 65 was uncommon and that the disease did not belong to "extreme senility." Prior to the encephalitis lethargica era, large series from several countries between 1885 and 1922 found mean ages of onset from 51.8 to 59.6 years.[3-8]

In order to determine whether the age of onset of Parkinson's disease is changing, and to explore the concept that aging plays an important contributory role to the development of parkinsonism (which might suggest that age-specific incidence rates should increase with increasing years) we performed a study similar to that of Teravainen et al involving 1092 patients in six centres located in Canada, Europe and the United States.[9] Similar to the results of Teravainen and colleagues, as well the early studies mentioned above, the mean age of onset in our cases was 57.1 years. 5.4% of our patients had onset before age 40 (in comparison to 7.8% of the Helsinki-Vancouver cases), 27.5% began before age 50 and 62.9% after age 50 years. The peak incidence occurred between ages 60 and 69. Age-specific incidence curves showed a decreased susceptability in the older ages.

We do not believe that our study of over 1000 parkinsonian patients or that of Teravainen et al[1] supports the impression that Parkinson's disease is occurring with an earlier age of onset. Previous studies of the age-specific incidence rates in much smaller numbers of patients have revealed contrasting results. Some show an increase with each advancing decade (for example, [10,11]) while others suggest a decline in late life (for example [12,13]). Although age-related nigral cell loss may contribute to the development of parkinsonism in patients who have previously sustained subclinical damage to this region, the shape of our age-specific incidence curve suggests that individuals who reach later life may be more resistent to the etiological factor(s) which cause Parkinson's disease.

W.C. Koller,
Loyola University Stritch School of Medicine,
Chicago, Illinois
A.E. Lang,
University of Toronto,
Toronto, Ontario

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Authors' Reply

Koller and Lang have challenged our suggestion that Parkinson's disease may be starting at an earlier age than was previously reported.[1] Our hypothesis is based on the calculation of *minimal* age-specific prevalence ratios for cases seen at the University of British Columbia Health Science Centre Hospital (Vancouver) and the University Central Hospital (Helsinki). In order to obtain a more accurate estimate of prevalence, only those cases derived from well-defined populations serving the area were included. Patients referred from outside these communities were not part of the prevalence calculations. Finally, to obtain a point prevalence ratio, only those cases alive on July 31, 1985, were counted. These data allowed us to calculate *minimal* age-specific prevalence ratios. We regarded these figures as minimal estimates, since patients seen by other medical care providers, or those not coming to medical attention would not be counted. If we compare the tabulations derived from this method to data from properly conducted population-based studies, it appears that the prevalence ratios for those under age 50 are similar, whereas the minimal prevalence ratios from Vancouver and Helsinki for those 50 years of age and older are considerably lower than the figures from the complete population surveys. These findings are compatible with two interpretations: a) the study hospitals in Vancouver and Helsinki have seen all or nearly all subjects from the study area with young onset Parkinson's disease together with a relatively small proportion of patients with a later onset of their disease, or b) Parkinson's disease may be starting earlier than hitherto reported. Which of these possibilities is correct can only be answered in a properly conducted population-based survey.

In contrast to this, Koller and Lang conclude that Parkinson's disease is not occurring at an earlier age at onset. In support of their view they offer the 1883 observations of Gowers who noted that the onset of Parkinson's disease after age 65 was uncommon. However, it is difficult or impossible to draw conclusions concerning the epidemiologic patterns of disease distribution from the experience of a single clinician. The possibilities for selection bias are enormous. Furthermore, the life expectancy in the 1880's was quite different from the present figures. The elderly comprised a much smaller absolute number of individuals and constituted a much smaller proportion of the total population 100 years ago compared to the present. Hence, it is no surprise that clinicians would have seen fewer elderly patients with Parkinson's disease.

As a second line of evidence consistent with their view, Koller and Lang quote their own analysis of nearly 1100 patients seen in six medical centers in North America and Europe.[2] Incidence measures the frequency of addition of new cases of a disease within a specific population and is calculated for a given time interval and a given place.[3] Based on cases seen at these six centers, they calculated age-specific incidence rates. However, there are several major problems with the methods used as stated in their published report.[2] They note that all patients included in their study ". . . were seen in movement disorder clinics drawing from local and referral populations." They make no further mention of whether the referral patients coming from outside the communities served by the six medical centers were excluded from their calculations. If not, it is difficult or impossible to determine the population at risk from which the cases are derived. A second problem in meeting the definition of incidence is that there is no mention of the precise calendar years that constitute the time period over which incidence was measured. It is methodologically difficult to estimate incidence based on cases seen at a given medical center. One must be able to accurately measure onset. If we calculate incidence during 1980, we must be able to determine whether or not the disease began during 1980. If we accumulate all cases seen at a given institution between 1980 and 1983, some people with onset of their disease in 1980 may not have yet had a confirmed diagnosis in 1983. Furthermore, some patients with onset in 1980 may have moved out of the community or may have died before being evaluated at the medical center. Finally, patients may have been seen by other medical care providers serving the community or may not have been correctly diagnosed. Because of all of these major problems, we felt it was impractical to attempt to measure incidence based on cases seen at a particular medical center. If one compares the data derived from this approach to properly conducted population-based studies, marked discrepancies (particularly among the elderly) are apparent. Basing conclusions on the mean age of onset is not valid under these circumstances. If older onset cases were missed out of proportion to younger onset cases, one would expect the mean age at onset to be reduced.

In summary, one cannot answer the question as to whether the age at onset of Parkinson's disease is truly changing without a properly conducted population-based study. We have presented some preliminary evidence suggesting the need to readdress this issue with such a study.

H. Teräväinen,
University of Helsinki,
Helsinki, Finland
Bruce S. Schoenberg,
NINCDS, National Institutes of Health,
Bethesda, Maryland
D.B. Calne,
University of British Columbia,
Vancouver, British Columbia, Canada

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Critères de Mort Cérébrale

Monsieur l'Editeur,

Je voudrais féliciter les membres du comité qui ont établi les "critères de mort cérébrale" que vous avez publiés dans votre