

## LETTERS TO THE EDITOR

### Aetiological heterogeneity of Alzheimer's disease

EDITOR.—It has regularly been noted that familial cases of Alzheimer's disease (AD) tend to be of relatively early onset. This implies that there must be at least one further aetiological class, comprising sporadic cases that share some common exposure, and that tend to develop later in life than the familial cases. It can now be reported that cases of AD attributable to residence in areas where the public water supply has a relatively high content of aluminum do constitute such a class.

The largest data set so far studied in relation to waterborne aluminum comprises records of 2258 age and sex matched pairs of patients discharged from hospitals in the Province of Ontario during 1985, one member of each pair having a diagnosis of AD. Age at diagnosis was not documented for these cases but it is reasonable to assume that hospital patients with this diagnosis who were older at the time of discharge had also been older, on the average, at the time of onset.

Preliminary analysis of the Ontario data showed that the relative prevalence of hospitalised AD cases increased monotonically through four ranges of aluminum concentration in the public water supply (from <0.1 mg/l to >0.200 mg/l<sup>1</sup>). With the four ranges of aluminum collapsed to two (under and over 0.1 mg/l) these data have now been broken out by age and sex to obtain the results shown in table 1. Although the overall excess of AD in areas with the higher aluminum concentration was only 28%, five of the six estimates for ages beyond 75 were higher than this.

Table 1 Estimated relative risk of Alzheimer's disease associated with residence in areas having a concentration of aluminum in municipal drinking water of 0.1 mg/l or more. Based on subsets of the Ontario data classified by age and sex

Age group	Number of case/control pairs	Estimated relative risk: men	Estimated relative risk: women
<70	325	1.06	1.05
70-74	381	1.05	1.22
75-79	507	1.60	1.29
80-84	547	1.29	1.47
>85	498	1.24	1.46

Table 1 Smoking habits among a representative sample of 501 Italian doctors, 1999

Smoking status	Total %	Number	Sex		Age group, years							
			Men %	Women %	≤40		41-50		>50			
			Number	Number	%	Number	%	Number	%	Number	%	
Current smokers	24.2	121	24.5	94	23.1	27	22.8	43	26.8	53	21.9	25
Occasional smokers*	3.4	17	3.6	14	2.6	3	4.2	8	3.0	6	2.6	3
Ex-smokers	26.5	133	29.4	113	17.1	20	14.8	28	31.8	63	36.8	42
Never smokers	45.9	230	42.4	163	57.3	67	58.2	110	38.4	76	38.6	44

\*Less than one cigarette per day.

The statistical significance of the apparent age pattern is readily assessed by means of a permutational test procedure. Considering that there are  $4+3+2+1 = 10$  older-younger comparisons available within each sex, and a further 20 between older and younger age groups of unlike sex, we note that 29 of 40 such comparisons in table 1 show a higher relative risk in the older age group. A computer program was used to generate re-assignments of the estimated relative risk values to the 10 non-overlapping cells of table 1 and to count, for each such permutation, how many of the 40 older-younger comparisons had the higher value for the older group. After drawing a random sample (but with replacement) of 30 000 from the total of 3 628 800 possible permutations, there were found to have been only 1209 (4.03%) in which 29 or more comparisons had the higher value in the older group. Thus there is conventionally significant evidence against the null hypothesis of no age related aluminum effect and favouring the alternative hypothesis of an aluminum effect more strongly expressed in the age range where it has been judged—on completely separate evidence—that cases of AD are less genetically determinate.

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<sup>1</sup> Neri LC, Hewitt D. Aluminum, Alzheimer's disease and drinking water. *Lancet* 1991;338:390.

### A survey of smoking among Italian doctors

EDITOR.—A survey of smoking in a representative sample of Italian doctors was conducted by the Istituto Doxa (the Italian branch of the Gallup Group) between 20 and 22 January 1999, within the framework of a European project coordinated by the British Medical Association. The sample was obtained from the official lists of the Federazione Nazionale degli Ordini dei Medici Chirurghi e degli Odontoiatri, stratified by age, sex and geographical area.

A total of 501 doctors (384 men, 117 women, mean age 45 years) were interviewed; 218 were general practitioners. Table 1 gives their distribution according to smoking status, sex and age group. Of these, 121 (24.2%) were current smokers of  $\geq 1$  cigarettes per day, 17 (3.4%) were occasional smokers, 133 (26.5%) ex-smokers, and 230 (45.9%) never smokers. With reference to number of cigarettes smoked, 12.8% reported smoking <15 cigarettes per day, 9.4%

15 to 24, and 2.0%  $\geq 25$  cigarettes per day. The prevalence of current smoking was similar in men (24.5%) and women (23.1%), and in subsequent age groups. Women, however, were more frequently never smokers (57.3% versus 42.4%), and less frequently ex-smokers. Likewise, younger doctors ( $\leq 40$  years) were more frequently never smokers (58.2%).

The overall smoking prevalence among Italian doctors is thus similar to that of the general population of Italian adults (25.3% in 1995).<sup>1</sup> While male doctors smoked less frequently than the male general population (24.5% versus 34.1%), female doctors smoked more frequently than the female general population (23.1% versus 17.2%).<sup>1</sup>

The main message of this survey is that smoking prevalence remains exceedingly high among Italian doctors, and comparable to the general Italian population for both sexes combined,<sup>1</sup> although it has declined since the mid-1980s.<sup>2</sup> Indeed, female Italian doctors smoke more than their general population counterpart.

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- Franceschi S, Serraino D, Talamini R, et al. Personal habits and attitudes towards smoking in a sample of physicians from the North-East of Italy. *Int J Epidemiol* 1986;15:584-5.

### Correction

An authors' error occurred in the paper by Dr Eachus and others (1999;53:603-11). The index of inequality is incorrectly called the relative index of inequality, while what is reported is the slope index of inequality.