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## Serum cholesterol concentration and risk of primary brain tumours

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Several studies have reported raised serum cholesterol concentrations in patients with brain tumours.<sup>1,4</sup> On the other hand, a large number of studies have reported an inverse association between serum cholesterol concentration and risk of cancer at various other sites.<sup>5</sup> The only cohort study of the relation between cholesterol and brain tumours examined relatively few patients.<sup>4</sup> We examined the possibility of an association in a larger cohort.

### Subjects, methods, and results

During 1966-72, 48 325 people (26 001 men and 22 324 women) aged 20-75 years and apparently free of cancer participated in the Finnish Social Insurance Institution's mobile clinic health survey. Serum cholesterol concentration was determined at the initial visit and during follow up until 31 December 1984. In all, 72 people were diagnosed as having a brain tumour according to the Finnish Cancer Registry.<sup>5</sup> Of these 44 had malignant tumours and 28 non-malignant tumours.

The mean age of those with brain tumours was 45.1 years, that of the rest of the subjects being 41.7 years. The age adjusted mean cholesterol concentration in those with malignant brain tumours was 6.54 mmol/l in men and 6.70 mmol/l in women. The corresponding values in those without brain tumours were both 0.03 mmol/l lower (differences were not significant). In men with non-malignant tumours the mean concentration was 0.31 mmol/l lower and in women with non-malignant tumours it was 0.21 mmol/l higher than in those without tumours. These differences were also not significant.

Morbidity\* from brain tumours per million person years by tertiles of serum cholesterol concentration and relative risk\* of brain tumours between highest and lowest tertiles

	No of cases	Serum cholesterol (mmol/l)			Relative risk	95% Confidence interval
		<5.95	5.95-7.09	≥7.10		
Men:						
All tumours	42	110	157	112	1.02	0.45 to 2.31
Malignant tumours	30	58	130	78	1.36	0.47 to 3.88
Non-malignant tumours	12	54	27	35	0.64	0.17 to 2.41
Women:						
All tumours	30	104	73	101	0.97	0.39 to 2.41
Malignant tumours	14	52	27	49	0.95	0.26 to 3.56
Non-malignant tumours	16	51	49	52	1.02	0.28 to 3.66
Men and women:						
All tumours	72	110	117	101	0.93	0.50 to 1.69
Malignant tumours	44	57	81	60	1.05	0.47 to 2.34
Non-malignant tumours	28	53	37	41	0.78	0.31 to 1.94

\*Adjusted for age based on Cox's life table regression model.

The table gives the age adjusted morbidity associated with brain tumours by tertiles of serum cholesterol concentration and the relative risks of brain tumours in the highest compared with the lowest tertile. The relative risk of a malignant or non-malignant brain tumour was 1.02 in men and 0.97 in women, which suggests there was no association between serum cholesterol concentration and the occurrence of brain tumours. The relative risk of a malignant tumour was higher (1.36) among men, but it did not differ significantly from unity. Further adjustment for body mass index and occupation did not notably alter the results; neither did exclusion of tumours occurring during the first two years of follow up, except in women with non-malignant tumours, in whom the association was strengthened, with the relative risk rising from 1.02 to 1.44 (95% confidence interval 0.37 to 5.64).

### Comment

We investigated the possibility of an association between serum cholesterol concentration and the incidence of malignant and non-malignant brain tumours in a large cohort with relatively high serum cholesterol concentrations. No notable association was found. Thus our study does not confirm the findings of previous studies.<sup>1,4</sup>

In the present cohort the mean serum cholesterol concentration was approximately 1.5 mmol/l higher than in the Whitehall population.<sup>4</sup> A possible association between the presence of brain tumours and serum cholesterol concentration might, therefore, have been missed in our study if it existed only at low serum cholesterol concentrations, but this is unlikely. The possibility cannot be excluded that the results of the previous case-control studies may be artefactual because an existing brain tumour may have caused a spurious increase in the serum cholesterol concentration.<sup>1,3</sup>

In conclusion, our results, which are based on the largest population reported so far, do not support the conclusion that a high serum cholesterol concentration is a risk factor for brain tumours.

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