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Social inequality and incidence of and survival from tumours of the central nervous system in a population-based study in Denmark, 1994–2003

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ABSTRACT

We investigated the effects of socioeconomic, demographic and health-related indicators on the incidence of and survival from tumours of the central nervous system (CNS) diagnosed in 1994–2003 with follow-up through 2006 in Denmark using information from nationwide Danish administrative registers. The analyses were based on data on 5622 patients with CNS tumours in a cohort of 2.7 million people born between 1925 and 1973 and aged ≥ 30 years. Socioeconomic and demographic factors were not associated with the incidence of CNS tumours, except for a significantly increased incidence rate ratio (IRR) amongst men in the agricultural class (IRR, 1.23; 95% CI, 1.04–1.45). The 1- and 5-year survival was significantly longer in higher socioeconomic groups, as assessed by education, income, affiliation to the work market and size of dwelling.

Socioeconomic position does not affect the incidence of CNS tumours but appears to be a prognostic factor for survival from CNS tumours in Denmark.

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1. Introduction

Tumours of the central nervous system (CNS) are rare; however, the incidence rates have increased during the past few decades in both men and women.¹ The increased incidence may be explained by improved diagnostic methods and by a lower threshold for performing diagnostic computed tomography or magnetic resonance image scanning; however, unknown risk factors may also play a role. In 2003, 922 new cases of CNS tumours were diagnosed in Denmark.² The results of studies of an association between incidence and socioeconomic position (SEP) are conflicting: several reported increased incidences of CNS tumours amongst persons with higher SEP,^{3–5} whilst others found no association with SEP.^{6,7}

Age and tumour characteristics are known to be important prognostic factors for survival,⁸ but the effect of SEP has been

investigated only rarely.^{9–11} The aim of this study was to investigate the effects of various socioeconomic indicators on the incidence of and survival from CNS tumours in Denmark on the basis of information from population-based, nationwide Danish administrative registers. It was carried out as part of a comprehensive, rigorous analysis of the role of socioeconomic position in cancer incidence and survival.

2. Material and methods

The material and methods are described elsewhere.¹² Briefly, the study population comprised all Danish residents born between 1925 and 1973 without a previous cancer and who entered the cohort at age 30 (see Fig. 1 in [12]). Information on socioeconomic, demographic and health-related indicators was obtained from various Danish administrative registers.¹² Crude, age-specific and age-standardised incidence rates

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are presented for CNS tumours (ICD-10 C70–C72, D32–D33, D42–43) diagnosed in the cohort in 1994–2003. In a subset of the data, the tumours were restricted to malignant tumours of the CNS defined as described in the WHO classification.¹³ The incidence rates were standardised by age (in 5-year age groups) and period (in two 5-year periods), with the total study population as the standard.¹⁴ Further, we used log-linear Poisson regression to model incidence rate ratios (IRRs), first adjusted for period (in 5-year periods) and age (as two continuous variables: age and age² in years) and second by adding education and disposable income to the models. For each level of each indicator, we conducted relative survival analyses, adjusting for population mortality amongst the incident CNS tumour cases in 1994–2003 with follow-up through 2006.¹² Population mortality rates were stratified by age, period and the respective indicator. Except for the analyses of ethnicity, all analyses included only residents born in Denmark to at least one Danish-born parent with Danish citizenship.¹²

3. Results

We included 5622 persons in whom a CNS tumour was diagnosed during the study period 1994–2003, of which 2391 were malignant tumours. Amongst Danish persons, the male:female ratio for all CNS tumours was 0.90, and that for malignant tumours was 1.4. The age- and period-standardised incidence rate was 20 per 100,000 person-years for men and 22 per 100,000 person-years for women.

3.1. Incidence of CNS tumours

Age was a strong risk factor for CNS tumours. There was no clear effect of level of education on the incidence rates by age, for either men or women (Fig. 1), and in fact none of the socioeconomic and demographic variables evaluated in this study had a strong effect on the IRR. Nevertheless, small but significant increases in the IRR were observed for men in the agricultural class and for those in the highest income



Incidence rate	Men			Women		
	Basic school	Vocational	Higher	Basic school	Vocational	Higher
	(n = 987)	(n = 1023)	(n = 495)	(n = 1341)	(n = 898)	(n = 534)
Crude	22	19	19	24	22	19
Standardised	20	20	21	21	23	23
Difference	0	0	1	0	2	2

Persons with unknown level of education not included

Fig. 1 – Age-specific incidence rates per 100,000 person-years for CNS tumour by education amongst persons born in 1925–1973, diagnosed in Denmark, 1994–2003. Supplementary table shows the crude incidence rate and the incidence rate standardised by age (5-year age groups) and period (two 5-year periods) with the total study population as the standard and the incidence rate difference with basic school as the reference.

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