11 cases of alopecia. Some patients presented lower grade cardiovascular, hepatic, renal and gastrointestinal toxicity. Mild alopecia, nausea and vomiting and leucopenia were observed in all remaining patients.

In common with the experience of Kelsen *et al.* [8] and Lerner *et al.* [9], who compared EAP versus FEM-TX in a phase II study, our results suggest a poor impact as regards the benefits/toxicity ratio.

When Sparano and Wiernik (1990) and Taal *et al.* (1990) published their data [5, 6] and criticised the results of Preusser, the latter suggested that the exact dosage of drugs had probably not been administered and that an accurate selection of patients with good performance status was needed [10].

Our experience, even with a correct schedule of drugs, confirms the limited efficacy of this regimen.

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Fatal Cerebrovascular Accident Associated with Chemotherapy for Testicular Cancer

Arthur Gerl, Christoph Clemm, Michael Schleuning and Wolfgang Wilmanns

A 42-YEAR-OLD MAN underwent orchidectomy for an embryonal cell carcinoma of his left testicle. Retroperitoneal lymphadenectomy revealed no nodal involvement. The patient was normotensive. He smoked cigarettes but he had no other risk factors for arteriosclerosis. Moreover, he had no history of vascular disease, coagulopathy or endocarditis. Two months after surgery two pulmonary nodules were detected by computed tomography (CT) scan but there were no other signs of relapse. Serum tumour markers human chorionic gonadotropin and alpha-fetoprotein were not elevated at any time. Chemotherapy was administered consisting of cisplatin 20 mg/m^2 for 5 days, etoposide 100 mg/m^2 for 5 days, and bleomycin 30 mg on days 1, 8 and 15. The first cycle was uneventful but 2 days after the second course the patient became stuporous and developed global aphasia and right hemiparesis. On an immediate CT scan no abnormalities were identified. However, a second CT scan 6 h after the onset of symptoms disclosed an oedema of the left cerebral hemisphere. Angiography revealed an occlusion of the left middle cerebral artery. Local fibrinolysis with tissue plasminogen activator was performed. The thrombus resolved but the patient's neurological deficits deteriorated. He died from uncontrollable cerebral oedema 34 h after the onset of neurological symptoms. On postmortem examination pulmonary lesions or metastatic spread to any other site were not detectable. There was also no evidence of cerebral tumour embolism. Examination of the brain showed an extended softening region in the left hemisphere. Microscopically, no tumorous infiltration was identified.

Cerebrovascular complications following cisplatin-based chemotherapy of germ cell tumours have been reported infrequently [1–4]. A close temporal association between the administration of chemotherapy and the vascular event in the majority of cases suggests a causal relationship. Moreover, the young age of patients and the lack of vascular risk factors in most of the reported cases argue against coincidence. As tumour embolisation was not found in our case and was deemed improbable in previous reports [1, 2, 4], cerebrovascular accidents presumably are caused by toxic side-effects of antineoplastic agents. Platelet activation, an alteration of the clotting system and a disturbance of prostacyclin-thromboxane homeostasis may be pathogenetic factors [5]. An alteration of vascular smooth muscle tone due to cisplatin-induced renal magnesium wasting is a further possible mechanism. Recently, the endothelium of tumour vessels was recognised as a potential target of antineoplastic treatment [6, 7]. As the vascular toxic effect may be not strictly confined to the more rapidly proliferating endothelial cells in tumour tissue, an injury of normal vessels may occur which might usually be subclinical. However, in a small subset of patients vascular lesions apparently lead to acute ischaemic events. A cumulative vascular damage due to the administration of sequential chemotherapy cycles may play a role, since in the majority of reported cases patients had received more than one cycle prior to the vascular event [1, 2, 4].

Although cerebrovascular complications following cisplatin-based chemotherapy of germ cell tumours seem to occur infrequently, they are of especial clinical interest, as they arise in young patients who have a high chance of cure. Moreover, these complications may be fatal as in the case presented here and in a previously described case [4].

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Prostate-specific Antigen in Serum from Blood Donors with Subsequent Prostate Cancer Diagnosis

Elisabeth Paus, Liv Theodorsen and Anders Engeland

PROSTATE-SPECIFIC ANTIGEN (PSA) is a serine protease produced exclusively by prostatic epithelial cells. It is present in prostatic tissue and in seminal plasma as a single chain 33 kDa glycoprotein [1], while in serum it is mainly bound to serine protease inhibitors [2, 3]. Elevated serum levels are seen in 25–90% of patients with prostate cancer, and in 20–50% of patients with benign hyperplasia [4–6]. Because of the specificity, PSA provides a unique marker for function of the prostate and is regarded as the most sensitive serum marker available for monitoring the progression of prostate cancer and response to therapy. The value for early detection and staging of the cancer, however, is not yet elucidated. As nearly two thirds of prostate cancers have spread beyond the prostate when first identified, there is a need for improved methods of detecting prostate cancer while it is still confined to the gland. It has been shown that rectal examinations combined with PSA measurements increase the rate of detection of prostate cancer [7].

Most investigations concerning serum PSA and cancer are performed after a tumour has been diagnosed. The aim of our work was to study PSA values in stored sera collected from blood donors who later had prostate cancer diagnosed, and compare these with matched controls. The samples were obtained from the Janus serum bank [8], a collection of sera from various populations comprising persons not known to have cancer at the time of sampling. Persons who later developed cancer, the cases, were reported to the Cancer Registry. Control samples were from the same population with no diagnosis of neoplasia, matched according to sex, age, time of sampling and condition of storage.

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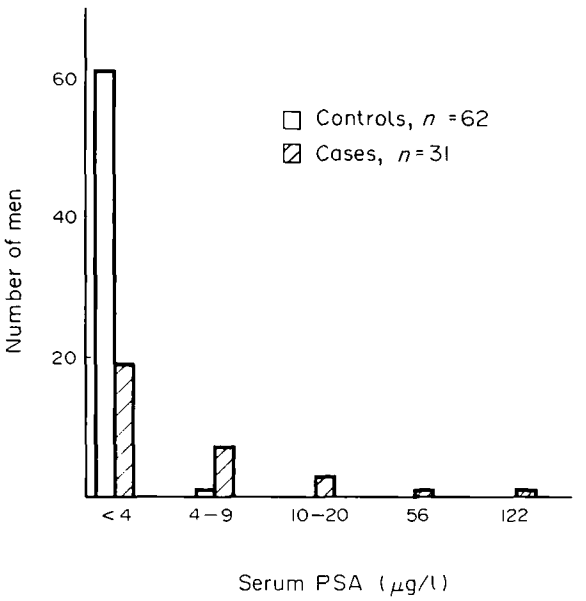

Fig. 1. Distribution of PSA values in stored sera from patients who later had a diagnosis of prostate cancer and from matched controls. All samples from the 31 cases were drawn 4–180 months prior to diagnosis. The 62 male controls were matched according to age and time of sampling. All sera were obtained from the Janus serum blood bank.

This study comprises samples from 31 cases (age 55–97 years at diagnosis) and 62 controls, all men donating blood to the Red Cross Blood Centre, Oslo. Case and control sera were identified, coded and analysed to determine PSA values in a "blind" fashion. The applied PSA assay, developed in our laboratory, was a two-site immunoradiometric assay based on monoclonal antibodies against PSA and magnetisable polymer particles as the solid phase [9]. The sensitivity of the assay is 0.5 μg/l (0 + 2 S.D.) and the interassay coefficient of variation is below 10% in the range of the standard curve, 0–150 μg/l. Statistical analysis of the datasets was carried out using the Egret program [10].

PSA was ≤ 4 μg/l in 61 of the 62 controls, while one had serum PSA of 5 μg/l. In 12 of the 31 cases PSA was > 4 μg/l

Table 1. PSA values and time before diagnosis in the 12 cases with premorbid serum PSA > 4 μg/l

Cases		PSA measurements	
No.	Age at diagnosis	PSA (μg/l)	Years before diagnosis
1	64	7	0.3
2	65	15	0.3
3	62	5	0.8
4	57	122	0.9
5	61	56	1.0
6	56	20	1.3
7	62	6	4.0
8	72	7	7.3
9	73	20	8.7
10	63	6	12.2
11	55	9	12.6
12	79	7	13.3