1. Merkel DE, Dressler LG, McGuire WL. Flow cytometry, cellular DNA content and prognosis in human malignancy. *J Clin Oncol* 1987, **5**, 1690–1703.
2. Kallioniemi OP, Blanco G, Alavaikko M, *et al.* Improving the prognostic value of DNA flow cytometry in breast cancer by combining DNA Index and S-phase fraction. *Cancer* 1988, **62**, 2183–2190.
3. McCaughin BC, Martini N, Bains MS. Bronchial carcinoids. Reviews of 124 cases. *J Thorac Cardiovasc Surg* 1985, **89**, 8–17.
4. Hedley DW, Friedlander ML, Taylor IW, Rugg CA, Musgrove EA. Methods for analysis of cellular DNA content of paraffin embedded pathological material using flow cytometry. *J Histochem Cytochem* 1983, **31**, 1333–1335.
5. Jones DJ, Hasleton PS, Moore M. DNA ploidy in broncopulmonary carcinoid tumors. *Thorax* 1988, **43**, 195–199.
6. Kujari H, Joensuu H, Klemi P, Asola R, Nordman E. A flow cytometric analysis of 23 carcinoid tumors. *Cancer* 1988, **61**, 2517–2520.
7. Thunnissen FBJM, Van Eijk J, Baak JPA, *et al.* Bronchopulmonary carcinoids and regional lymph node metastases. A quantitative pathologic investigation. *Am J Pathol* 1988, **132**, 119–122.
8. Graeme-Cook F, Bell DA, Flottet J, *et al.* Aneuploidy in pancreatic insulinomas does not predict malignancy. *Cancer* 1990, **66**, 2365–2368.
9. Travis WD, Linnoila RI, Tsokos MG, *et al.* Neuroendocrine tumors of the lung with proposed criteria for large neuroendocrine carcinoma. *Am J Surg Pathol* 1991, **15**, 529–553.

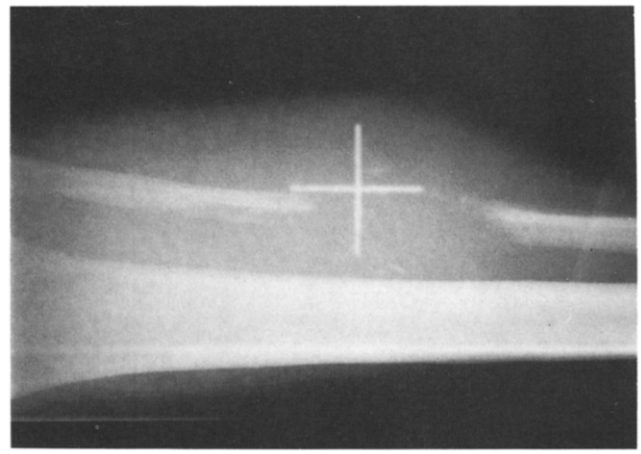

Fig. 1. Lesion in the left fibula in high-grade angiosarcoma of bone.

Eur J Cancer, Vol. 28A, No. 11, p. 1934, 1992.
Printed in Great Britain
0964–1947/92 $5.00 + 0.00

Failure of Palliative Radiotherapy in High-grade Angiosarcoma of Bone

Suresh Senan and Peter A. Canney

HAEMANGIOENDOTHELIAL SARCOMA (angiosarcoma) of bone is an uncommon tumour of vascular endothelium, comprising between 0.13 and 0.17% of primary bone tumours [1, 2]. Metastatic disease develops in almost all patients with high-grade tumours [3, 4].

A 54-year-old man presented to our unit with a 6-month history of increasing pain in his left hip and leg. X-rays revealed destructive lesions in both the left ilium and left fibula (Fig. 1). He then developed acute left ventricular failure. Haemoglobin was 8.8 g/dl. Both history and clinical examination did not suggest blood loss, and he responded to treatment for cardiac failure. Investigations revealed no other disease sites and biopsy and immunocytochemistry led to the diagnosis of high-grade angiosarcoma of bone.

Because of severe pain, he received radiotherapy on a cobalt-60 unit with parallel opposed fields. The fibula received a midplane dose of 50 Gy (in daily 3.3 Gy fractions) and the left pelvis a midplane dose of 40 Gy (in daily 2.7 Gy fractions). His pain improved only transiently and 2 months later spread to his low back. X-rays revealed collapse of the body of the fourth lumbar vertebra. The patient then developed refractory cardiac failure and died, 5 months after the initial diagnosis.

Cardiac metastases were found at necropsy and decalcified bone sections revealed areas of residual angiosarcoma at both the irradiated sites. Splenomegaly (with increased iron stores and foci of extramedullary haemopoiesis), a hypercellular bone marrow with red marrow extension and an increase in immature myeloid cells were also present. These were felt to indicate a co-existent myelodysplastic disorder, a previously unreported association with this tumour.

We found no clinical or pathological evidence of a response to irradiation and suggest that other treatments be explored for this aggressive tumour.

Correspondence to S. Senan at the Cancer Research Campaign Beatson Laboratories, Department of Radiation Oncology, University of Glasgow, Garscube Estate, Switchback Road, Glasgow, G61 1BD; P.A. Canney is at the Beatson Oncology Centre, Western Infirmary, Glasgow G11 6NT, U.K.
Revised 28 Apr. 1992; accepted 11 May 1992.

1. Dahlin DC. *Bone Tumours, General Aspects and Data on 3987 Cases*, 3rd edition. IL, Springfield, Charles C. Thomas 1978, 344–355.
2. Mirra JM. Angiosarcoma of bone: solitary and multifocal variants. In Mirra JM, Picci P, Gold RH, eds. *Bone Tumours. Clinical, Radiologic and Pathologic Correlations*. PA, Lea and Febiger, 1989, 1382–1417.
3. Campanacci M, Boriani S, Giunti A. Haemangioendothelioma of bone: a study of 29 cases. *Cancer* 1980, **46**, 804–814.
4. Unni KK, Ivins JC, Beabout JW, Dahlin DC. Haemangioma, haemangiopericytoma and haemangioendothelioma (angiosarcoma) of bone. *Cancer* 1971, **27**, 1403–1414.