Spontaneous necrosis in osteosarcomas

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Summary. In the treatment of osteosarcoma pre-operative chemotherapy has assumed considerable importance in helping improve survival, and enabling limb-sparing procedures. The quantitative assessment of tumour necrosis in the resected specimen by morphological means has become a significant step in judging therapeutic response and in helping determine post-operative management. Different systems of grading tumour regression have been proposed. Little is known, however, about the morphology or degree of spontaneous necrosis in osteosarcomas, in particular to what extent necrosis can be considered to be due to cytotoxic treatment. For this purpose, 13 osteosarcomas, taken from patients treated by surgery alone, were examined by the same method we routinely employ in assessing chemotherapeutic response. The results demonstrate that the extent of spontaneous necrosis does not approach that achieved in response to chemotherapy. Sub-total necrosis may be due to spontaneous regression, inadequate therapeutic response, or to a combination of both. Hence, only two categories of response, good and poor, appear relevant and these terms should be used in preference to good, intermediate and poor.

Key words: Osteosarcoma – Necrosis – Surgery, operative – Drug therapy, chemotherapy

Materials and methods

Our osteosarcomas were taken from our collection of wet specimens, preserved over many years in fixative. Clinical information in all cases indicated that there had been no adjuvant therapy. The quality of tissue preservation was excellent.

Our method of assessing the degree of tumour destruction by light microscopic means has been described elsewhere (von Hochstetter et al. 1983; Honegger et al. 1984). Essentially, an entire cross-sectional tumour surface is screened at low to medium magnification and the amount of necrosis in each visual field is plotted on a grid overlaying a polaroid composite photomosaic which reproduces the topography of the specimen.

Several systems of classifying the amount of necrosis have been described (Fig. 1). Ours uses the original categories of "absent, partial, predominant, and total tissue necrosis", defining the two middle categories as necrosis of less and of more than 50% of the tumour cell population per visual field. The resultant figures express the percentage of the cross-sectional tumour surface that is totally or largely necrotic, or vital (Figs. 2, 3).
**Results**

Our specimens were derived from eight male and five female patients, aged 9–31 years, with an average and median of 17 years. Five tumours each were located in the femur and tibia, two in the humerus, and one in the fibula. There was one parosteal and one periosteal osteosarcoma, both in the distal femur. The tumour in the fibula was of the telangiectatic type.

Histologically, there were eight osteoblastic tumours, one of which was largely telangiectatic in appearance. Three were chondroblastic, including the periosteal lesion, and two other were largely fibroblastic, including...