S U M M A R Y

In recent years, the significant advances in pathology, radiology, chemotherapy, radiotherapy and surgical and biomechanical techniques have contributed to a better understanding of bone tumours, and have provided the necessary techniques to achieve local tumour control without amputation.

Without a classification, the correct diagnosis will frequently be inadvertently omitted from the differential diagnosis, particularly if the radiographic appearance is atypical. Although several excellent classifications of bone tumours are available, none can be entirely satisfactory. Because of the need of cancer workers all over the world for an internationally accepted classification to compare their findings, the World Health Organization (W.H.O.) adopted the scheme of classification of bone tumours formulated by Schajowicz et al. (1972).

A common surgical staging system has been devised by Enneking and coworkers (1980). It is clear-cut, straightforward and clinically practical because it helps the surgeon reach the optimal surgical treatment of a primary sarcoma as it relates the stage of the disease to selection of the surgical procedure and adjunctive measures. The staging system is simple and utilizes assessments of the grade of the tumour [G], anatomic location (intracompartmental or extracompartmental) [T], and presence or absence of regional or distant metastases [M].

The tumour cells appear spontáneously in the host, probably from only a single or a few transformed cells. These tumour cells, like allografts, have some antigenic similarity to host cells, but are not antigenically identical to them. Antigens of the tumour cells are found in the circulation, and may stimulate the immune response in the host. Cells, rather than immunoglobulins, are believed to dominate

tumour immunity. Tumour markers fall into two broad categories: those that originate in the tumour, e.g. tumour surface antigens, and those that are produced by normal tissue in response to the presence of the tumour, e.g. fibrin degradation products. These biological markers serve to indicate the presence, progression, response to therapy or recurrence of malignancy.

Even under the best circumstances, the diagnosis and grading of bone tumours are difficult tasks. The diagnosis of a bone tumour demands considerable care on the part of the pathologist, radiologist, and orthopaedist, in the assessment of historical data, scrutiny of the imaging studies, study of the gross appearance of the specimen, and a careful and thorough appraisal of the histologic characteristics of the lesion. Often, a skeletal lesion is first detected on a well-penetrated radiograph, and should be compared with old radiographs, if available. If the condition is still suspicious, a nuclear bone scan is advised, which is very sensitive for the detection of bone destruction. If the nuclear bone scan is positive, the margins, matrix, periosteal reaction and site of the lesions should be assessed by different imaging modalities, such as C.T., M.R.I., angiography, arthrography, ...etc. Debate about the "best" imaging technique is unproductive, since each technique has its own advantages and disadvantages. For example, images obtained by C.T. are inferior to plain radiographs for the identification of the precise site and nature of a tumour involving a long bone.

Adaptive histogram equalization in digital radiography of destructive skeletal lesions helps in the determination of cortical breakthrough, and the presence or absence of periosteal reaction.

Generally, a systemic evaluation by chest radiographs, C.T. scan and blood chemistry, should be done before proceeding with biopsy, because general anaesthesia needed for the biopsy procedure may be associated with changes in the results of these investigations. Transverse biopsy incisions on the extremities should be avoided because almost all limb-salvage procedures require vertical rather than

transverse incisions. Biopsy of the lesion should always include the active portion of the lesion to avoid missing a "changing margin" or a lytic area.

The recent development of histochemical, immunohistochemical and immunofluorescent microscopic studies, using type-specific antisera, particularly against collagen and cells of probable histocytic origin, have become an increasingly important adjunct in the diagnosis of human neoplasms.

Flow cytometric analysis of DNA concentration and kinetics provides an index of the cellular activity of the tumour and can serve as a valuable adjunct in the diagnosis, staging and determination of the tumour virulence, as well as a possible predictor of metastasis.

The ideal therapeutic goals for managing the patient with a primary bone tumour are incorporated in the triad: do not "overtreat" a benign bone tumour, do not "undertreat" a malignant bone tumour, and do not misdirect the biopsy approach to the lesion, so as to convert a more conservative operation into a more radical one.

Curettage, cryotherapy and bone grafting for giant cell tumours reduce the clinical recurrence and incidence of amputation. There is increasing enthusiasm for performing surgery that spares the patient's limb. This enthusiasm is due, in part, to the development of newer and more reliable orthopaedic procedures, and also to the expectation that adjunctive or neoadjunctive treatment will allow for less mutilating surgery. In the growing child who meets the adult criteria for limb-sparing surgery as a treatment for a malignant bone tumour of the extremity, an expandable internal prosthesis is preferably used instead of amputation.

Pulmonary surgery, to resect pulmonary metastases in patients with osteosarcoma, is indicated only when the operation does not compromise pulmonary function below the patient's threshold for survival.

Because the improvement in both survival and quality of life in patients with bone tumours has been so rapid and dramatic, research must be continued, aiming at controlling the malignant process with as little iatrogenic damage possible.