Basic science and clinical frontiers of sarcoma treatment

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Hiroyuki Tsuchiya
Department of Orthopaedic Surgery, Graduate School of Medical Science, Kanazawa University, 13-1 Takara-machi, Kanazawa 920-8641, Japan
e-mail: tsuchi@med.kanazawa-u.ac.jp

In 2008, 12.7 million cancer cases and 7.6 million cancer deaths are estimated to have occurred worldwide. Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females, accounting for 23% of the total cancer cases and 14% of the cancer deaths. Lung cancer is the leading cancer site in males, comprising 17% of the total new cancer cases and 23% of the total cancer deaths [1].

In contrast, bone and soft tissue sarcomas are relatively rare, comprising fewer than 1% of all cancers. In turn, the incidence rate of bone sarcomas is approximately one tenth that of soft tissue sarcomas.

Whereas carcinomas are derived from epithelial cells, sarcomas are derived from mesodermal (middle layer) cells. Efforts to devise a useful and comprehensive histological classification for the various forms of sarcoma have proven difficult, in part because of their mesodermal origins. Complicating the classification efforts are the diagnostic difficulties that some sarcomas pose at the histological level, and the relative paucity of pathologists (2% in Japan) who specialize in bone and soft tissue tumors.

Over the past four decades, the treatment strategy for sarcomas of the extremities has significantly changed. Forty years ago, limb amputation surgery was the standard treatment for osteosarcoma, despite which the 5-year survival rate was only about 10%. After the introduction of multimodal therapies including chemotherapy, 5-year survival rates have improved to over 60%, and limb preservation surgery has now become the standard surgical approach. Osteosarcoma thus no longer has a dismal prognosis, and indeed, in selected cases, marginal excisions of the tumor are now being performed to provide patients with even better limb function [2, 3]; multicenter studies have been indispensable to the basic science and clinical advancements that have been occurring.

Among the several staging systems that have been developed for sarcoma, the MSTS (Musculoskeletal Tumor Society) surgical staging system [4] has become the preferred one for sarcoma of the extremities. Compartment theory is a key concept behind current surgical approaches to sarcomas of the extremities: recognition that the various tissues in the extremities can be separated into multiple compartments which

constitute anatomical barriers (i.e., periosteum, cartilage, and fascia) allows surgeons to perform wide curative excision without exposure of the malignant neoplasm.

It is also important for oncologists in other fields to understand the biological behavior and treatment strategies for malignant bone tumors. One consequence of advances in multimodal therapies against various cancers—and the resultant improvement in prognoses—is that the number of patients with metastatic bone tumors increases every year. Although medication and/or irradiation therapy can help control the pain caused by metastatic bone tumors, only surgical treatment can securely restore the biomechanical strength of the affected bone, which in turn can provide an important improvement in patient quality of life.

This issue of the International Journal of Clinical Oncology contains a series of review articles by Japanese authorities in the field of sarcoma that together should provide a comprehensive description of the current status of basic science research and clinical treatment approaches to sarcoma. I trust that these review articles will become bridges between sarcoma oncologists and oncologists in other fields.

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