



PII: S0959-8049(97)10127-7

Introduction

Cancer-induced Bone Diseases

E. Ogata

Cancer Institute Hospital, 1-37-1 Kami-ikebukuro, Toshima-ku, Tokyo, Japan

SCIENCE RESEARCH in the field of bone and calcium, on the one hand, and in cancer, on the other, has developed along separate paths and they have become established as independent disciplines. Table 1 shows a partial list of research objectives in each discipline. In the bone and calcium field, cell differentiation, especially that of osteoclasts, has been intensively studied and intracellular signalling, oncogenes (Src, Myc), cell-cell and cell-matrix interactions and apoptosis are currently topics of major interest. Similar approaches are being pursued in relation to the development of osteoblasts. The cytokines listed in the table are also being examined in an attempt to understand the pathophysiology of various metabolic bone diseases. Hormones too are a major focus of the work in the bone and calcium field in which calcium regulatory hormones such as parathormone (PTH), active vitamin D and calcitonin have been studied in detail. Gonadal hormones, oestrogen and androgen have attracted keen interest in relation to bone development and to the pathogenesis of metabolic bone diseases.

Table 1. Objectives in cancer research and bone and calcium research

Bone and calcium research objectives	Cancer research objectives
Cell differentiation	Regulation of cell differentiation
Osteoclasts	Regulation of cell proliferation
Intracellular signalling	Intracellular signalling
Oncogenes	Oncogenes and anti-oncogenes
src, myc	
Cell-cell and cell-matrix interactions	Cell-cycle control
Apoptosis	Apoptosis
Cytokines	Cytokines
PTH&P	PTH&P
IL-1	TNF α
IL-6 etc.	IFN α etc.
Hormones	Hormones and anti-hormones
Oestrogen	Oestrogen
Androgens	Androgens
Parathyroid hormone (PTH)	
Active vitamin D	
Calcitonin	

In the cancer field, the mechanisms for the regulation of cell differentiation and proliferation have been the most important targets for research and, in an attempt to understand these processes, cell-cycle control and intracellular signalling have been studied intensively. Many oncogenes and anti-oncogenes have been discovered together with the elucidation of some of their biological roles. Apoptosis is a subject of interest in relation to the response of cancer cells to radiation and chemotherapy. Cytokines listed here have been studied as significant modulators of cancer cell functions. Hormones, and anti-hormones, especially those of gonadal origin are of particular relevance in hormone dependent cancers.

Thus, from a first glance at the table it is apparent that most, if not all, of the research aims are remarkably similar in both bone and calcium research and research in the cancer field. More communication and, hopefully, collaboration between these two disciplines can be expected in order to achieve greater efficiency in research and a more penetrating understanding of common problems.

Clinical issues include bone metastasis, oncogenic osteomalacia and humoral hypercalcaemia of malignancy. These problems are encountered regularly at the bedside by clinical oncologists. However, the basic aspects of these conditions have been elucidated by scientists in the bone and calcium field without close collaboration with oncologists. Let us consider patients with breast or prostate cancer. These two cancers are of major clinical importance because of their high prevalence in developed countries and their incidence is also increasing in developing countries. These two cancers are remarkable for the prolonged clinical course they tend to follow and the high incidence of bone involvement. The complications arising therefrom are a major factor which adversely affects the quality of life in patients with these cancers. Development of methods to prevent, diagnose at an early stage and to treat these complications is a goal of utmost importance and urgently required for the welfare of the patients with these diseases.

A meaningful merging of the two specialities of bone and mineral research and oncology is of pressing importance and this was the motivation for the first International Conference on Cancer-induced Bone Diseases, aspects of which are reported in this issue of the *European Journal of Cancer*.