

## The brave new world of oncology research

Medical oncology is one of the most dynamically progressing fields in clinical medicine. Two factors responsible for the rapid ascent of this subspecialty of internal medicine are; first, the unprecedented increase in incidence of malignant disorders, and second, increased understanding of the pathogenesis of neoplasia, including identification of the molecular pathways responsible for tumor growth.

Unique to medical oncology is its multidisciplinary nature. Cancer affects all body organs and tissues. In consequence, a wide range of diagnostic and therapeutic methods are being used in the management of malignant tumors, and virtually all surgical and medical subspecialties are to a greater or lesser extent involved in the care of patients with cancer.

Advances in medical oncology are reflected in a steep increase in published papers related to this field. Although the current edition of the Science Citation Index lists in the category of oncology more than one-hundred journals, many important papers related to basic and clinical oncology research are published in journals specializing in other subjects or in general medical journals like *Biomedical Papers*<sup>1</sup>. A number of papers in the current issue of the *Biomedical Papers* highlight oncology research. These cover a broad area from investigations of molecular targets for anticancer therapy<sup>2</sup>, the activity of new anticancer drugs *in vitro*<sup>3</sup>, investigation of new biomarkers<sup>4,6</sup>, retrospective analyses of large patient cohorts<sup>1,7</sup>, description of rare tumors<sup>8</sup>, multidisciplinary management<sup>9</sup>, and epidemiological studies<sup>10</sup>.

Most advances in anticancer research rely heavily on progress in molecular biology. Laboratory methods have thus become an essential companion in the daily practice not only for medical oncologists, but also for radiation and surgical oncologists<sup>11</sup>. In reality, biomarkers often play an essential role in the management of a variety of cancers<sup>12-14</sup>. They can be targets of successful therapeutic strategy as can be demonstrated in the case of chronic myeloid leukemia<sup>7</sup>. Indeed, the development of targeted therapy in this malignant disorder that has changed the natural history of the disease may serve as a paradigm for the concept of targeted therapy as a whole.

Another tumor where targeted therapy has changed the natural history, reverting a disease that has hitherto often taken a rapidly fatal course into a chronic disorder, is renal cell carcinoma. Most cases of renal cell carcinoma are of clear cellular histology, and the efficacy of targeted therapy in patients with these tumors is well-established<sup>15</sup>. Neuroendocrine carcinomas with extrapulmonary primary are rare, and primary renal neuroendocrine carcinoma is exceptional<sup>8</sup>. While the management of small-cell lung cancer is based on large prospective phase III clinical trials, for rare or very rare tumors like primary renal neuroendocrine carcinoma, the only source of information for selecting treatments for future patients is case reports.

Unfortunately, for most tumors, we are still waiting for a “miracle” drug that, like imatinib in the case of chronic myeloid leukemia, will reverse the rapidly fatal nature of the disease. One tumor with rapidly fatal course is pancreatic ductal adenocarcinoma (PDAC). Havlik et al. suggested as an interesting prognostic biomarker in the case of this tumor, *i.e.* detection of tumor cells in the peritoneal cavity<sup>5</sup>. This is of potential significance for selection of patients for aggressive surgery and adjuvant therapy. PDAC is typically diagnosed in advanced stages, and, consequently, only a minority of patients is considered candidates for radical surgery. Moreover, only a small proportion of PDAC patients after radical surgery are cured. Thus, the treatment of this neoplasm remains a challenge, and identification of biomarkers that could help with patient selection is of great importance.

Breast cancer treatment is an example of the successful multidisciplinary approach of cancer management. Currently, the majority of patients diagnosed with breast cancer are cured by a combination of surgery, systemic therapy that includes hormonal treatments, chemotherapy/ targeted therapy, and radiotherapy. Many complex issues can be managed only through multidisciplinary collaboration as described in the review on management of internal mammary lymph nodes<sup>9</sup>. The steady improvement in outcomes for patients with breast cancer shows that strategies based on multidisciplinary approaches are successful, and serve as examples for tumors that are still associated with fatal outcome.

One aspect of anticancer research that should not be underestimated is the host response to neoplasia. It is being increasingly recognized that the activity of the immune system can determine patient outcome<sup>16</sup>. However, biomarkers of immune system activity are associated both with favorable<sup>17</sup> and unfavorable outcome<sup>18</sup>. Immune system activation can result in the suppression of cellular immunity<sup>19,20</sup>. Unfortunately, extensive research on the biomarkers of immune response have so far not been adequately translated into daily clinical practice in oncology.

In conclusion, publications in the current issue of *Biomedical Papers* provide just a brief glimpse of the multifaceted field of current anticancer investigation that is pertinent to a wide spectrum of medical and surgical subspecialties. Welcome to the brave new world of oncology research.

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