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Editorial
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Evolution of Cancer Therapy

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Editorial

Cancer treatment has been evolved utilizing novel approaches for tackling numerous malignancies. All anticancer agents can interfere with cell growth and biology: DNA synthesis, signal transduction, gene transcription, and/or protein synthesis [1]. History of marrow and peripheral blood stem cell transplantation and the current use of these procedures take advantage of the steep dose-response relationship in many hematologic and some non-hematologic malignancies following administration of potentially lethal doses of systemic chemotherapy. Allogeneic marrow transplantation confers an antitumor effect in and of itself [2]. Finally, the development and use of hematopoietic growth factors, that have permitted safer and higher doses of chemotherapy to be given without the need for marrow transplantation support is growing. Cancer management is struck with a massive increase in the many modalities available to prevent, control, or cure cancer. In the early part of this century, surgery was the only diagnostic and therapeutic approach to cancer. Now the armamentarium includes chemotherapy, radiation therapy, immunotherapy, biologic therapy, and multimodality therapy in addition to newer surgical approaches [3].

Future therapies may involve the continued use of multiple modalities and no single ones. For example, within the field of surgery, there are newer approaches such as laser surgery and cryoablation [4]. There are fewer radical procedures in breast cancer therapy and limb preservation in skeletal and soft tissue sarcomas. Laser therapy, particularly photodynamic therapy using a photosensitizing agent, can be effective in palliation in oral, laryngeal, and esophageal cancer. Other wavelengths, such as neodymium-yttrium-aluminum-garnet and argon dye lasers, have been employed in head and neck cancer as well as gastrointestinal and cervical cancer. Combining laser therapy with standard surgery, irradiation, and chemotherapy has been quite useful in managing specific cancers [5].

In radiation therapy, increasing use of implants (brachytherapy) has led to cancer control in local sites. Intracavitary and interstitial methods are available to apply radiation sources [6]. In lung cancer, brachytherapy can prolong the duration of palliation and symptom-free intervals by treating local endobronchial disease, even at sites thought to have had the maximum allowable dose of radiation. Newer methods of brachytherapy have improved results in brain tumors and prostate cancer and other genitourinary tumors. Recent developments including use of iridium 192, a small-sized, high-activity source, ease the process of this therapeutic procedure. Radiation sensitizers can enhance the effects of both single and fractionated radiation therapies. Agents such as paclitaxel and hydroxyl urea have been found helpful in enhancing the radiation dose or the tumor radio sensitivity. For example, paclitaxel arrests cells in the radiosensitive phase of cell cycle division and enhances the irradiation given 24 h later [7]. Similarly, there are a variety of adjuvant therapies and cytoprotective agents that can lessen radiation toxicity (radiation protectors). Compounds such as amifostine and ribose-cysteine are two agents being studied in clinical research that have been shown to provide gastrointestinal protection from irradiation to the large and small bowel [8].

Perhaps the most impressive area of newer therapies is the category of biologic therapy. Besides the plethora of growth factors, there are two rather radically different and unique approaches to cancer therapy under development: Antisense oligonucleotides and anti-angiogenesis factors [9]. Antisense oligonucleotides are short pieces of DNA targeted at the genetic lesion responsible for the pathogenesis of the cancer. For example, in chronic myelogenous leukemia where the BCRABL gene product (P210) plays an important role in the pathogenesis of the disease, the use of anti-

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BCR-ABL antisense molecules may be an effective strategy in treating the disease. Similarly, studies are being carried out in cervical cancer induced by the human papillomavirus and in non-Hodgkin's lymphoma with nonrandom cytogenetic abnormalities [10]. Because proliferating tumor cells are dependent on continued vascularization and many tumors actually secrete a factor that causes new vessel formation (angiogenesis factor), any factor that interferes with new vessel proliferation can prevent tumor growth. Certain interferons as well as antibodies prepared against the angiogenesis factor provide a new strategy for treating metastases [11].

In a crux, cancer treatment in the twenty-first century will continue to evolve at the same quick pace as it has in the previous century, utilizing new discoveries and technology. Gene transfer is a new treatment modality that introduces new genes into a cancerous cell or the surrounding tissue to cause cell death or slow the growth of the cancer. This treatment technique is very flexible, and a wide range of genes and vectors are being used in clinical trials with successful outcomes. This novel treatment has the potential to change dimensions of cancer treatment.

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