



New Horizon of Radiation Therapy Molecular Imaging in Oncology

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INTRODUCTION

The basic foundation of precision medicine is to precisely and specifically attack cancer cells. Advances in our understanding of cancer biology, advances in diagnostic techniques, and expanded treatment options have all contributed to the concept of personalized cancer treatment. Theranostics refers to the systematic integration of targeted diagnosis and therapy. The treatment platform includes an imaging component that 'sees' a lesion and then delivers a combination therapeutic agent that 'treats' the same lesion. This strategy leads to increased treatment efficacy, manageable adverse events, improved patient outcomes, and reduced overall costs. Radiation therapy is the use of radionuclides in combination with imaging and therapy. Recently, there have been major and exciting advances in radiotherapy, especially for neuroendocrine tumors and prostate cancer. Regulatory approval for many radiotherapy couples is expected in the near future. Additionally, regulatory and reimbursement authorities must streamline requirements for seamlessly moving radiotherapy agents from the bench to the bedside. This paper reviews the concepts, history, recent developments, current challenges, and prospects of radiotherapy in the treatment of cancer patients.

DESCRIPTION

This concept involves diagnosing and treating cells using the same molecule, a targeted cytotoxic approach to imaged tumor cells while sparing healthy tissue. For treatment, the same "molecular spy" docks into the same tumor cell, this time delivering a cytotoxic dose of radiation (treatment). Theranostics have become an integral part of nuclear medicine and molecular imaging. The more we understand the molecular pathology of tumor biology and carcinogenesis, including specific muta-

tions and receptor expression profiles, the more specific these 'molecular spies' can be for molecular imaging and subsequent targeted radionuclide therapy. You can operate it. Appropriate selection of diagnostic and therapeutic radionuclides for theranostic couples is of great importance, taking into account not only the mode of cytotoxic radiation emission, but also linear energy transfer and physical half-lives. Advances in radiochemistry and radiopharmaceuticals with new radiolabeling techniques and chelating agents are revolutionizing the field. Thanks to all these advances, the scope of treatment with cytotoxic systemic radionuclides has expanded dramatically over the last few decades. In this article, we discuss current and potential therapeutic applications for various types of disease, including thyroid disease, neuroendocrine tumors, childhood malignancies, and prostate cancer, and look to the future. Personalized therapy based on molecular imaging is an interesting concept for personalized treatment strategies that can achieve the highest efficacy and reduce side effects in specific patients. Theranostics, which integrate diagnostic tests to detect molecular targets for specific therapies, is one of the key technologies contributing to the success of personalized medicine.

CONCLUSION

Differentiated thyroid cancer arises from the follicular cells of the thyroid gland and is the most common endocrine malignancy, and therapeutic radioiodine has been successfully used to diagnose and treat differentiated thyroid cancer and its Usage is contained in various thyroid medicine or nuclear medicine guidelines. With a better understanding of the pathophysiology of thyroid cancer and advances in nuclear technology, therapeutic radioactive iodine has become a modern individualized treatment through high therapeutic efficacy and avoidance of serious side effects in differentiated thyroid cancer.

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