Advances in Oral Cancer Radiotherapy

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The general goal of radiotherapy has been conforming the shape of a prescribed dose volume to the shape of a 3-dimensional target volume, simultaneously limiting dose to critical normal structures. Recent technological developments in radiation oncology, accompanied by advanced computer technology, are allowing better target localization, and more precise treatment delivery. Three-Dimensional Conformal Radiation Therapy (3D-CRT) and Intensity Modulated Radiation Therapy (IMRT) represent exciting and revolutionary techniques of providing more concise doses of radiation to specifically targeted volumes while minimizing radiation to surrounding normal tissues. 3D-CRT and IMRT, therefore, theoretically can improve control rates while lowering toxicity of radiation treatment. Technically these new modalities can be used in most of solid tumors including oral cancers. In addition, interstitial brachytherapy can be applicable to oral cancers such as the tongue, floor of mouth and buccal mucosa cancers. Recently, 3D planning system for brachytherapy becomes available; which help us to optimize the dose to the target and surrounding normal tissues.

Proton therapy is the most precise form of advanced radiation treatment. Most of the energy from X-rays used in conventional radiation therapy is deposited in normal tissue near the body's surface, and some undesirable energy is deposited beyond the tumor volume. This undesirable pattern of energy deposit can result in unnecessary damage to healthy tissues, often preventing physicians from using sufficient radiation to control tumor. Accelerated hydrogen atoms (protons) used in proton therapy, on the other hand, differ in physical properties from X-rays. As the protons move through the body, they slow down, causing increased interaction with surrounding tissues. Maximum interaction occurs as the protons approach their targeted stopping point. This point, where the high-dose region of energy release occurs, is called the Bragg peak. Thus, maximum energy is released within the designated target volume. The surrounding normal tissue receives significantly less injury than the target.

Research continues on the use of chemotherapy and biologic modifiers to alter cell sensitivity to radiation, decrease side effects, and improve the therapeutic ratio.

The recent technological developments in radiation oncology for the management of oral cancers will be addressed at the presentation.