

Role for Radiation Therapy in Melanoma



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KEYWORDS

- Radiation treatment • Stereotactic radiosurgery (SRS)
- Stereotactic body radiation treatment (SBRT) • Melanoma

KEY POINTS

- Definitive radiation plays an important role in early stage ocular melanoma with high local control and organ preservation.
- Definitive radiation therapy (RT) may be a viable option for lentigo maligna, lentigo maligna melanoma, and unresectable mucosal melanoma.
- Adjuvant RT following lymphadenectomy in node-positive melanoma prevents local and regional recurrence; however, it does not improve survival.
- Palliative radiation treatment is an important treatment option for metastatic melanoma, particularly with new stereotactic radiosurgery and stereotactic body radiotherapy techniques.
- A combination of radiation treatment and immunotherapy holds promise and is being actively evaluated.

INTRODUCTION

Radiation therapy (RT) works by damaging the DNA of cancer cells.

Radiation treatment techniques are divided into the following categories.

External Beam Radiotherapy or Teletherapy

RT is delivered from a relatively distant source. The most common equipment is linear accelerators (LINAC). LINAC can produce both electron beams, suitable for superficial targets, and radiographic beams, suitable for deeper internal targets. The external beam radiotherapy (EBRT) radiation therapy treatment has been revolutionized with the advancement of computer software technology, high-resolution computed tomography (CT) and MRI imaging, and advanced delivery techniques.¹ It has evolved

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from 2-dimensional RT to 3-dimensional conformal RT, and currently, intensity-modulated RT, volumetric-modulated arc therapy as well as special techniques, such as stereotactic radiosurgery (SRS) and stereotactic body radiotherapy (SBRT) (Fig. 1).² Besides radiography (photon), proton radiation treatment is a special form of EBRT using charged particles. Protons penetrate tissue to a certain depth and deposit the energy in the tissue in a sharp peak, known as the Bragg peak. The Bragg peak of physical dose distribution permits the accurate concentration of the dose on the tumor, thus sparing the adjacent normal tissues.³ It is particularly appealing for pediatric populations, and cancers close to critical structures, such as skull base, spine, and uveal melanoma.^{4–8} Other particle radiation also has been used for clinical treatment, including neutron, and carbon ions.^{6,9–11} However, their availability is very limited.

Brachytherapy

The radiation source is placed inside or next to the treatment area. Brachytherapy (BT) has the advantage of delivering high doses of radiation to the tumor while reducing the dose to the surrounding normal tissues. However, its use is greatly limited by the location and accessibility of the tumors.^{12–14} Invasive procedures are needed for access to internal organ or deep target.

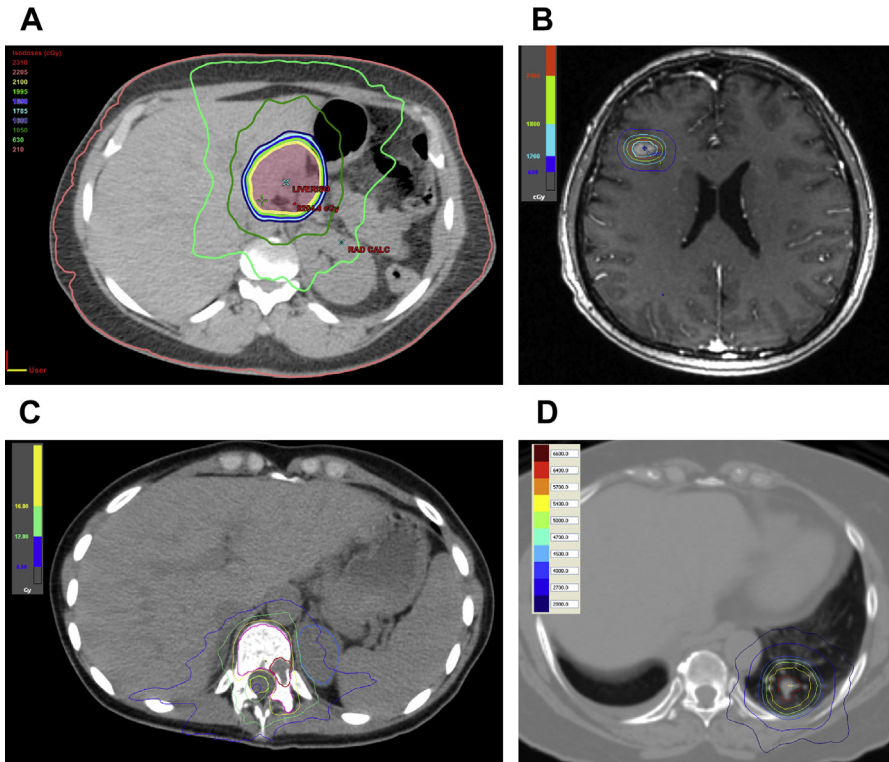


Fig. 1. Sample SRS and SBRT treatment plans for liver metastases, showing excellent radiation dose conformity and steep dose fall-off outside target. (A) SBRT for liver metastasis, (B) SRS for brain metastasis, (C) SRS for spine metastasis, (D) SBRT for lung metastasis.

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