

Radiation therapy

2014-03-29

中山醫學大學附設醫院

放射腫瘤科 李岳駿

Radiation therapy

- To control or kill malignant cells
- Localized to one area of the body
- Curative 、 Part of adjuvant therapy
- Synergistic with chemotherapy
 - used before, during, and after chemotherapy

outline

- Technique
 - Mechanism of action
 - Dose

outline

- Type
 - External beam radiation therapy
 - Conventional external beam radiation therapy
 - Stereotactic radiation
 - 3-dimensional conformal radiation therapy, and intensity-modulated radiation therapy
 - Particle therapy
 - Brachytherapy

outline

- Side effects
 - Acute side effects
 - Late side effects
 - Cumulative side effects

Technique

Mechanism of action

- Damaging the DNA of cancerous cells
- Photon or charged particle
- Direct or indirect ionization of the atoms
- Oxygen is a potent radiosensitizer

Dose

- Amount of photon radiation therapy is measured in gray (Gy)
- Typical fractionation schedule
 - 1.8 to 2 Gy per day, five days a week
- Alternative fractionation
 - Hyperfractionated Accelerated
 - hypofractionation

Type

External beam radiation therapy

- Conventional external beam radiation therapy
 - 2DXRT : via two-dimensional beams using linear accelerator machines
- Stereotactic radiation
 - Stereotactic radiosurgery (SRS): a single or several stereotactic radiation treatments of the brain or spine
 - Stereotactic body radiation therapy (SBRT): one or several stereotactic radiation treatments with the body

Virtual simulation

- To delineate tumors and adjacent normal structures in three dimensions using specialized CT and/or MRI scanners and planning software

Intensity-modulated radiation therapy

- Conform the treatment volume to concave tumor shapes
- Radiation dose intensity is elevated near the gross tumor volume
- The neighboring normal tissue is decreased or avoided completely
- The customized radiation dose is intended to maximize tumor dose while simultaneously protecting the surrounding normal tissue

Particle therapy

- Energetic ionizing particles (protons or carbon ions) are directed at the target tumor
- A maximum (the Bragg peak) that occurs near the end of the particle's range, and it then drops to (almost) zero

Brachytherapy

- Placing radiation source(s) inside or next to the area requiring treatment
- Irradiation only affects a very localized area
- Reduce exposure to radiation of healthy tissues further away from the source

Side effects

Acute side effects

- Nausea and vomiting
- Damage to the epithelial surfaces
- Intestinal discomfort
- Swelling (edema or oedema)
- Infertility

Late side effects

- Fibrosis
- Epilation
- Dryness
- Lymphedema
- Heart disease
- Cognitive decline
- Radiation proctitis
- Cancer

The end