

# Radiotherapy Treatments for Head and Neck Cancer

## Research Focus for Clinicians

This is a summary of a systematic review update evaluating recent evidence on the effectiveness and adverse effects of various forms of radiotherapy (RT) as treatment for head and neck cancer. The systematic review update included 15 articles published between September 28, 2008, and May 1, 2014. The full report is available at [www.effectivehealthcare.ahrq.gov/head-neck-cancer](http://www.effectivehealthcare.ahrq.gov/head-neck-cancer). This summary is provided to inform discussions of treatment options with patients and/or caregivers and to assist in decisionmaking with consideration of a patient’s values and preferences. However, reviews of evidence should not be construed to represent clinical recommendations or guidelines.

## Background

Decisions about treatment for head and neck cancer are largely dependent on the site, stage, and histological characteristics of the disease. Treatment may include surgery, RT, chemotherapy, or some combination of these. RT is offered to nearly 75 percent of patients with head and neck cancer with curative or palliative intent, often with long-term side effects.

RT techniques have evolved over the past 30 years; two-dimensional images have been replaced with three-dimensional (3D) images with the intended purpose of improving effectiveness while reducing toxicity to normal tissues and adjacent vulnerable organs. Photon-based conformal external-beam RT modalities used to treat head and neck cancer include 3D conformal RT (3DCRT), intensity-modulated RT (IMRT),

and stereotactic body RT (SBRT). Charged particle-based conformal external-beam RT modalities, such as proton-beam RT (PBT), are also available to treat head and neck cancer, although they are not widely available in the United States.

The optimal means of delivering external-beam ionizing radiation in sufficient doses to cure a patient with head and neck cancer requires a fine balance between treatment effectiveness and associated toxicity. The generation of new clinical evidence and the emergence of a new RT technology (SBRT) prompted an update of the existing systematic review. The present review assessed the comparative effectiveness and adverse effects of 3DCRT, IMRT, SBRT, and PBT as treatment for head and neck cancer.

## Clinical Bottom Line

Summary of Key Findings and Strength of Evidence for the Benefits and Adverse Effects of Radiotherapy for Head and Neck Cancer

Outcome	3DCRT vs. IMRT	3DCRT or IMRT vs. SBRT	3DCRT or IMRT vs. PBT
Tumor control and survival	○○○	○○○	○○○
Grade ≥2 late xerostomia*	Significantly reduced incidence with IMRT (●●●)	○○○	○○○
Quality of life related to late xerostomia	Improved with IMRT (●●○)	○○○	○○○
Other RT-associated grade >2 toxicities (e.g., acute or late dysphagia, salivary gland dysfunction, swallowing dysfunction)	○○○	○○○	○○○
Effects of specific patient and tumor characteristics on the relative effectiveness of RT modalities	○○○	○○○	○○○
Effects of user experience, treatment planning, and treatment delivery on the relative effectiveness of RT modalities	○○○	○○○	○○○

\*The strength of evidence changed from moderate to high in the updated report.

3DCRT = 3D conformal RT; IMRT = intensity-modulated RT; PBT = proton-beam therapy; RT = radiotherapy; SBRT = stereotactic body RT

### Strength of Evidence Scale

- High: ●●● High confidence that the evidence reflects the true effect. Further research is very unlikely to change our confidence in the estimate of effect.
- Moderate: ●●○ Moderate confidence that the evidence reflects the true effect. Further research may change our confidence in the estimate of effect and may change the estimate.
- Low: ●○○ Low confidence that the evidence reflects the true effect. Further research is likely to change our confidence in the estimate of effect and is likely to change the estimate.
- Insufficient: ○○○ Evidence either is unavailable or does not permit a conclusion.



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## Gaps in Knowledge and Limitations of the Evidence Base

The following gaps in research and/or other issues were identified by the updated review:

- Because of insufficient evidence, high-quality studies are needed to determine the comparative effectiveness of IMRT, 3DCRT, SBRT, and PBT:
  - In achieving tumor control and improving patient survival
  - In reducing adverse events (e.g., dysphagia) and improving quality of life
  - In understanding how outcomes are affected by the characteristics of the tumor, the patient, and the physician/RT team (e.g., experience), or by radiation treatment planning (e.g., target volume delineation, dosimetric parameters), or by systemic therapy (e.g., chemotherapy)
- An important area of investigation is the potential impact of human papillomavirus-positive tumors on oncologic outcomes. Studies are needed to identify reduced-intensity RT regimens that still yield satisfactory oncologic outcomes in this patient population.
- Well-designed, multicenter, prospective observational studies—where randomized trials are not practical or advisable—would improve the usefulness and generalizability of the evidence.
- The body of evidence would be improved by studies:
  - Employing standardized patient selection to assure comparability of patients and to minimize bias
  - Using standardized intervention protocols
  - Employing prespecified follow-up criteria and methods
  - Using more rigorous standardized reporting such as prespecified systematic collection of adverse events information
  - Assessing quality of life and other patient-reported outcomes with validated instruments

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## What To Discuss With Your Patients and/or Their Caregivers

- Current RT options for treating the patient's head and neck cancer
- The potential benefits and the acute and late harms of the proposed RT for the individual patient given the type, location, and stage of the cancer
- Whether critical normal structures are present in the field to be irradiated (e.g., salivary glands, pituitary gland, optic nerve) and the potential adverse effects that might result from the RT
- How the risk of xerostomia might be reduced with the use of IMRT versus 3DCRT
- The potential long-term adverse effects of radiation on quality of life, given the patient's individual life-style and values
- The patient's and/or caregiver's preferences
- The likely out-of-pocket expense to the patient for each type of RT, depending on the patient's insurance coverage

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## Companion Resource for Patients



*Radiation Therapy for Head and Neck Cancer: A Summary for Adults and Their Caregivers* is a free companion to this clinician research summary. It can help patients and their caregivers talk with their health care professionals about the various RT options for treating head and neck cancer.

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## Ordering Information

For electronic copies of this clinician research summary, the companion patient summary, and the full systematic review, visit [www.effectivehealthcare.ahrq.gov/head-neck-cancer](http://www.effectivehealthcare.ahrq.gov/head-neck-cancer).

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## Source

The information in this summary is based on *Radiotherapy Treatments for Head and Neck Cancer Update*, Comparative Effectiveness Review No. 144, prepared by the Blue Cross and Blue Shield Association Evidence-based Practice Center under Contract No. 290-2007-10058 for the Agency for Healthcare Research and Quality, December 2014. Available at [www.effectivehealthcare.ahrq.gov/head-neck-cancer](http://www.effectivehealthcare.ahrq.gov/head-neck-cancer). This summary was prepared by the John M. Eisenberg Center for Clinical Decisions and Communications Science at Baylor College of Medicine, Houston, TX.