

Breast Radiation Oncology

10 High-Yield Board-Style Practice Questions

Original board-style practice questions for radiation oncology residents, written in ABR single-best-answer format with detailed rationales. These are original questions created for educational review and are not reproductions of actual ABR examination content.

Question 1

Inflammatory breast cancer is classified under which T category, regardless of the size of any underlying palpable mass?

- A. T4d
- B. T2
- C. T1
- D. Inflammatory breast cancer is not assigned a T category
- E. T3

Answer: A. T4d

Rationale: Inflammatory breast cancer is classified as cT4d based on its characteristic clinical presentation, including rapid-onset diffuse erythema, edema, and/or peau d'orange involving a substantial portion of the breast, regardless of the size of an underlying mass. The diagnosis is fundamentally clinical; pathologic demonstration of dermal lymphatic invasion is not required.

References:

Giuliano AE, Connolly JL, Edge SB, et al. Breast cancer—major changes in the American Joint Committee on Cancer eighth edition cancer staging manual. *CA Cancer J Clin.* 2017;67(4):290-303.

Fouad TM, Barrera AMG, Reuben JM, et al. Inflammatory breast cancer: a proposed conceptual shift in the UICC-AJCC TNM staging system. *Lancet Oncol.* 2017;18(4).

Question 2

Which patient population is generally considered for a 21-gene recurrence score assay to help guide the decision regarding adjuvant chemotherapy?

- A. Triple-negative breast cancer with extensive nodal involvement
- B. Hormone receptor-positive, HER2-negative breast cancer with node-negative or selected limited node-positive disease
- C. HER2-positive breast cancer regardless of hormone receptor status
- D. Metastatic breast cancer at initial diagnosis
- E. Inflammatory breast cancer

Answer: B. Hormone receptor-positive, HER2-negative breast cancer with node-negative or selected limited node-positive disease

Rationale: Genomic recurrence score assays such as the 21-gene assay are validated for selected patients with hormone receptor-positive, HER2-negative early-stage breast cancer and can help estimate recurrence risk and the potential benefit from adjuvant chemotherapy. They are well established in node-negative disease and can also guide treatment in selected patients with 1–3 positive lymph nodes. Importantly, menopausal status affects interpretation in node-positive disease. In RxPONDER, postmenopausal patients with 1–3 positive nodes and a recurrence score ≤ 25 did not derive significant benefit from chemotherapy, whereas premenopausal patients demonstrated chemotherapy benefit.

References:

Sparano JA, Gray RJ, Makower DF, et al. Adjuvant chemotherapy guided by a 21-gene expression assay in breast cancer. *N Engl J Med.* 2018;379(2):111-121.

Kalinsky K, Barlow WE, Gralow JR, et al. 21-gene assay to inform chemotherapy benefit in node-positive breast cancer. *N Engl J Med*. 2021;385(25):2336-2347.

Question 3

A patient with early-stage breast cancer undergoes breast-conserving surgery and is planned for adjuvant whole-breast radiation using moderate hypofractionation. Which dose/fractionation schedule is a well-established standard regimen?

- A. 50 Gy in 25 fractions
- B. 42.56 Gy in 16 fractions
- C. 30 Gy in 5 fractions
- D. 60 Gy in 30 fractions

Answer: B. 42.56 Gy in 16 fractions

Rationale: Moderate hypofractionated whole-breast irradiation is commonly delivered as approximately 42.5 Gy in 16 fractions or 40 Gy in 15 fractions. Large randomized trials demonstrated long-term local control, survival, and cosmetic outcomes comparable to conventional fractionation while reducing treatment duration to approximately 3 weeks.

References:

Whelan TJ, Pignol JP, Levine MN, et al. Long-term results of hypofractionated radiation therapy for breast cancer. *N Engl J Med*. 2010;362(6):513-520.

Haviland JS, Owen JR, Dewar JA, et al. The UK Standardisation of Breast Radiotherapy (START) trials of radiotherapy hypofractionation for treatment of early breast cancer: 10-year follow-up results of two randomised controlled trials. *Lancet Oncol*. 2013;14(11):1086-1094.

Question 4

When planning tangential whole-breast radiotherapy for a patient with left-sided breast cancer, which technique is specifically used to reduce cardiac radiation exposure?

- A. Deep inspiration breath-hold (DIBH)
- B. Increasing photon energy to 15 MV
- C. Treating with a single anterior field
- D. Widening the tangent field borders

Answer: A. Deep inspiration breath-hold (DIBH)

Rationale: Deep inspiration breath-hold increases lung volume and generally increases the separation between the heart and the anterior chest wall/breast. This can substantially reduce mean heart dose and exposure of cardiac structures, including the left anterior descending coronary artery, during left-sided breast irradiation. DIBH is therefore an important cardiac-sparing technique when it provides dosimetric benefit.

References:

Nissen HD, Appelt AL. Improved heart, lung and target dose with deep inspiration breath hold in a large clinical series of breast cancer patients. *Radiother Oncol*. 2013;106(1):28-32.

Smyth LM, Knight KA, Aarons YK, Wasiak J. The cardiac dose-sparing benefits of deep inspiration breath-hold in left breast irradiation: a systematic review. *J Med Radiat Sci*. 2015;62(1):66-73.

Question 5

A patient with four positive axillary lymph nodes after mastectomy is planned for postmastectomy radiation therapy (PMRT). Which regional nodal volumes are generally considered in addition to the chest wall or reconstructed breast?

- A. Supraclavicular and internal mammary nodes only, with the axilla omitted regardless of the extent of axillary surgery
- B. Supraclavicular/infraclavicular nodes, at-risk axillary regions, and internal mammary nodes as clinically appropriate

- C. Only the axillary lymph nodes
- D. No regional nodal irradiation is indicated when four lymph nodes are positive

Answer: B. Supraclavicular/infralavicular nodes, at-risk axillary regions, and internal mammary nodes as clinically appropriate

Rationale: In patients with substantial nodal involvement, such as four or more positive axillary lymph nodes, PMRT generally includes the chest wall or reconstructed breast together with regional nodal irradiation. Regional targets include the supra/infralavicular nodes, at-risk axillary regions, and internal mammary nodes as appropriate. Internal mammary node coverage should be individualized according to factors such as tumor location, tumor size, extent of nodal involvement, anatomy, and normal-tissue exposure.

Reference:

Jimenez RB, Abdou Y, Anderson P, et al. Postmastectomy radiation therapy: an ASTRO/ASCO/SSO clinical practice guideline. *J Clin Oncol.* 2025;43(30):3292-3311.

Question 6

When treating the internal mammary lymph nodes as part of comprehensive regional nodal irradiation, which planning approach is most appropriate for balancing adequate nodal coverage against cardiac and pulmonary exposure?

- A. Use a wide-open anterior electron field regardless of patient anatomy or chest-wall thickness
- B. Omit CT-based planning for the internal mammary nodal region
- C. Use CT-based volumetric treatment planning with an individualized conformal technique and respiratory management such as DIBH when appropriate
- D. Treat the internal mammary nodes to the same dose as a tumor-bed boost regardless of clinical indication

Answer: C. Use CT-based volumetric treatment planning with an individualized conformal technique and respiratory management such as DIBH when appropriate

Rationale: Internal mammary nodal irradiation should be planned using CT-based volumetric treatment planning with an individualized technique that provides adequate target coverage while minimizing heart and lung exposure. Three-dimensional conformal techniques are appropriate when treatment goals can be achieved; IMRT may be used when three-dimensional planning cannot adequately meet target coverage and normal-tissue objectives. DIBH should be considered when it improves cardiac and pulmonary sparing, particularly for left-sided treatment.

References:

Jimenez RB, Abdou Y, Anderson P, et al. Postmastectomy radiation therapy: an ASTRO/ASCO/SSO clinical practice guideline. *J Clin Oncol.* 2025;43(30):3292-3311.

Nissen HD, Appelt AL. Improved heart, lung and target dose with deep inspiration breath hold in a large clinical series of breast cancer patients. *Radiother Oncol.* 2013;106(1):28-32.

Question 7

The phase III FAST-Forward trial evaluated ultra-hypofractionated whole-breast/chest-wall radiotherapy using 26 Gy or 27 Gy in 5 fractions over 1 week versus 40 Gy in 15 fractions over 3 weeks. What did the 10-year follow-up demonstrate for the 26 Gy regimen?

- A. 26 Gy in 5 fractions resulted in significantly worse ipsilateral breast recurrence and greater late toxicity than 40 Gy in 15 fractions
- B. The trial was stopped early because of unacceptable late toxicity with 26 Gy
- C. Ten-year follow-up confirmed durable local control with 26 Gy in 5 fractions, with ipsilateral breast recurrence and long-term normal-tissue effects similar to 40 Gy in 15 fractions
- D. 27 Gy in 5 fractions demonstrated superior tumor control without increased toxicity compared with 26 Gy

Answer: C. Ten-year follow-up confirmed durable local control with 26 Gy in 5 fractions, with ipsilateral breast recurrence and long-term normal-tissue effects similar to 40 Gy in 15 fractions

Rationale: Long-term FAST-Forward follow-up confirmed the efficacy and safety of 26 Gy in 5 fractions over 1 week. At 10 years, cumulative ipsilateral breast recurrence was approximately 2.1% with 26 Gy versus 3.6% with 40 Gy in 15 fractions. Clinician-reported moderate or marked breast/chest-wall normal-tissue effects were similar between the

26-Gy and 40-Gy groups, whereas 27 Gy produced greater late normal-tissue effects. These findings support 26 Gy in 5 fractions as an effective 1-week regimen.

Reference:

Brunt AM, Cafferty FH, Kirby AM, et al. Hypofractionated breast radiotherapy for 1 week versus 3 weeks (FAST-Forward): 10-year efficacy and late normal tissue effects from a multicentre, open-label, non-inferiority, phase 3, randomised controlled trial and 5-year efficacy results from a randomised axillary substudy. *Lancet Oncol.* 2026;27(6):686-698.

Question 8

A randomized FAST-Forward nodal substudy evaluated 26 Gy or 27 Gy in 5 fractions versus 40 Gy in 15 fractions in patients requiring axillary/regional nodal radiotherapy, excluding internal mammary nodal irradiation. What did the available 5-year data demonstrate for the 26 Gy regimen?

- A. Locoregional recurrence was substantially higher with 26 Gy than with 40 Gy
- B. Five-year efficacy and normal-tissue outcomes were reassuring and broadly similar between 26 Gy in 5 fractions and 40 Gy in 15 fractions, supporting the feasibility of the 1-week regimen in appropriately selected patients requiring nodal irradiation
- C. The 5-fraction regimen produced unacceptable brachial plexus toxicity
- D. Internal mammary nodal irradiation was required for 26 Gy in 5 fractions to be effective

Answer: B. Five-year efficacy and normal-tissue outcomes were reassuring and broadly similar between 26 Gy in 5 fractions and 40 Gy in 15 fractions, supporting the feasibility of the 1-week regimen in appropriately selected patients requiring nodal irradiation

Rationale: The randomized FAST-Forward axillary substudy demonstrated reassuring 5-year normal-tissue and efficacy outcomes with 26 Gy in 5 fractions compared with 40 Gy in 15 fractions. Patient- and clinician-reported arm and shoulder effects were broadly similar, and efficacy analysis showed reassuring locoregional control. However, the nodal substudy was substantially smaller than the main FAST-Forward trial, resulting in less precise efficacy estimates. Importantly, internal mammary nodal irradiation was not included, so these findings should not automatically be extrapolated to every comprehensive regional nodal irradiation scenario.

References:

Brunt AM, Cafferty FH, Kirby AM, et al. Hypofractionated breast radiotherapy for 1 week versus 3 weeks (FAST-Forward): 10-year efficacy and late normal tissue effects from a multicentre, open-label, non-inferiority, phase 3, randomised controlled trial and 5-year efficacy results from a randomised axillary substudy. *Lancet Oncol.* 2026;27(6):686-698.

FAST-Forward Trial Management Group. Patient- and clinician-assessed five-year normal tissue effects following one-week versus three-week axillary radiotherapy for breast cancer: results from the phase III FAST-Forward trial randomised nodal sub-study. *Radiother Oncol.* 2025;207:110915.

Question 9

The phase III NSABP B-51/RTOG 1304 trial enrolled patients with biopsy-proven, initially node-positive breast cancer (cT1–3N1M0) who became pathologically node-negative (ypN0) after neoadjuvant chemotherapy. What was the key finding regarding regional nodal irradiation (RNI)?

- A. RNI was mandatory because omission significantly worsened invasive breast cancer recurrence-free interval
- B. The trial was terminated early because RNI dramatically improved survival
- C. RNI did not significantly improve invasive breast cancer recurrence-free interval, supporting omission of RNI in appropriately selected patients meeting the trial criteria
- D. All patients required postmastectomy radiation regardless of nodal response

Answer: C. RNI did not significantly improve invasive breast cancer recurrence-free interval, supporting omission of RNI in appropriately selected patients meeting the trial criteria

Rationale: NSABP B-51/RTOG 1304 demonstrated that regional nodal irradiation did not significantly improve invasive breast cancer recurrence-free interval in patients with biopsy-proven cN1 disease who converted to ypN0 after neoadjuvant chemotherapy. At approximately 5 years, freedom from invasive breast cancer recurrence or breast

cancer death was 92.7% with RNI versus 91.8% without RNI (HR 0.88; $P=0.51$). RNI also did not significantly improve locoregional recurrence-free interval, distant recurrence-free interval, disease-free survival, or overall survival. These findings support omission of RNI in appropriately selected patients who meet the trial criteria rather than indiscriminate omission in all patients who receive neoadjuvant therapy.

Reference:

Mamounas EP, Bandos H, White JR, et al. Omitting regional nodal irradiation after response to neoadjuvant chemotherapy. *N Engl J Med.* 2025;392(21):2113-2124.

Question 10

Final 20-year results of EORTC 22922/10925 evaluated elective irradiation of the internal mammary and medial supraclavicular (IM-MS) lymph nodes in patients with stage I–III breast cancer. What did the long-term results demonstrate?

- A. IM-MS irradiation reduced breast cancer mortality but did not significantly improve overall survival
- B. IM-MS irradiation had no effect on any breast cancer outcome
- C. IM-MS irradiation significantly improved overall survival at 5 years but not beyond
- D. IM-MS irradiation increased breast cancer-specific mortality

Answer: A. IM-MS irradiation reduced breast cancer mortality but did not significantly improve overall survival

Rationale: At a median follow-up of approximately 22 years, elective IM-MS irradiation significantly reduced breast cancer mortality but did not improve overall survival. Twenty-year breast cancer mortality was 18.6% with IM-MS irradiation versus 22.4% without it (HR 0.82; $P=0.006$), while 20-year overall survival was 61.0% versus 61.8%, respectively. Disease-free survival and distant metastasis-free survival were not significantly different. The long-term results demonstrate a disease-specific benefit while emphasizing the importance of careful patient selection and minimizing cardiac, pulmonary, and other long-term normal-tissue exposure with contemporary radiation techniques.

References:

Kaidar-Person O, Weltens CG, Fortpied C, et al.; European Organization for Research and Treatment of Cancer Radiation Oncology and Breast Cancer Groups. Twenty-year results of the randomized European Organization for Research and Treatment of Cancer trial 22922/10925 evaluating internal mammary chain and medial supraclavicular lymph node irradiation in stage I–III breast cancer. *CA Cancer J Clin.* 2026;76.

Poortmans PM, Weltens C, Fortpied C, et al. Internal mammary and medial supraclavicular lymph node chain irradiation in stage I–III breast cancer (EORTC 22922/10925): 15-year results of a randomised, phase 3 trial. *Lancet Oncol.* 2020;21(12):1602-1610.

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