

Breast cancer

RCR consensus guidelines recommend that 'there is no indication to use more than 15 fractions for the breast, chest wall or nodal areas for standard adjuvant treatment' and NICE guidance 2018 recommends 'use [of] external beam radiotherapy (RT) giving 40Gy in 15 fractions as standard practice for women with invasive breast cancer after breast-conserving surgery (BCS) or mastectomy' (The Royal College of Radiologists, 2016; The Royal College of Radiologists, 2019; NICE guidelines, 2018)

Ductal carcinoma in situ

A meta-analysis suggests potential benefit of RT for all DCIS in terms of decreasing local relapse (EBCTCG, 2010). However, absolute benefit will vary depending on predicted risk of relapse based on if low, intermediate or high grade cancer. In general, high grade DCIS tends to have whole breast RT, intermediate grade has variable practice and for low grade, RT is more likely to be avoided. In DCIS RT is not used post-mastectomy, but may be considered if there are involved margins (McCormick & Winter, 2015). In patients with oestrogen receptor positive, node negative tumours which are less than 3cm in maximum diameter and who are aged over 70yrs, with low risk biological features e.g. low grade, no lymphovascular invasion and HER2 negativity, it may be appropriate to omit RT (The Royal College of Radiologists, 2019).

Use of adjuvant RT after BCS reduces 10 year risk of ipsilateral recurrence/progression, regardless of age at diagnosis, extent of BCS, use of tamoxifen, margin status, focality, grade or tumour size (Correa & McGale, 2010). In the EORTC 10853 trial, use of adjuvant RT (50Gy/25#) after BCS gave a 15 year reduced risk of local recurrence (Donker & Litière, 2013).

The previous standard for breast fractionation was a regimen of 50Gy/25#/5 weeks, as reported by NSABP breast cancer trials (Fisher & Anderson, 2002). However, data from the START B trial and a Canadian study has supported that hypofractionated regimens, the most commonly used being 40Gy/15#/3 weeks in the UK, are equivalent to previous standard 2Gy daily fractionation regimens and lead to fewer late effects (Haviland & Owen, 2013; The Royal College of Radiologists, 2019; Whelan & Pignol, 2010). Hypofractionated RT can improve patient convenience and overcome delays in RT administration due to limited health care resources (Nilsson & Valachis, 2015). In DCIS patients after BCS, boost does not reduce the risk of local recurrence in all patients, but may reduce the risk of local recurrence if positive margins after surgery (Nilsson & Valachis, 2015; Monteau & Sigal-Zafrani, 2009).

Invasive cancer

If low risk and post BCS, omission of RT can be considered if ≥ 60 yrs with T1N0 oestrogen receptor positive (ER+), progesterone receptor positive (PR+), HER2-ve, grade 1-2 tumour and willing to take adjuvant endocrine for minimum 5yrs and have regular mammograms for 10yrs (The Royal College of Radiologists, 2016; The Royal College of Radiologists, 2019; Kunkler & Williams, 2015). Partial breast RT (40Gy/15#/3 weeks) can also be given after BCS if ≥ 50 yrs and tumour ≤ 3 cm, ER+, HER2-ve, N0 (The Royal College of Radiologists, 2016). The IMPORT LOW trial showed partial breast irradiation does not cause increased local relapse and has equivalent or fewer late normal tissue adverse effects (Coles & Griffin, 2017). In intermediate risk patients, whole breast RT is given without boost (Bartelink & Manington, 2015). The IMPORT High is yet to be fully reported and assesses whether simultaneous integrated boost 15# is non-inferior to sequential boost. Adverse effects at 3yrs show similar rates of moderate/severe adverse effects between simultaneous integrated boost IMRT and whole breast plus sequential boost IMRT (Coles et al, 2019).

If high risk, whole breast RT (after BCS) may be accompanied by boost if <50yrs, or >50yrs and have high risk pathological features (esp. grade 3 +/- extensive intraductal component) (The Royal College of Radiologists, 2016). Hypofractionated boost doses equivalent to 16Gy/8# are acceptable, such as 13.5Gy/5# or 12Gy/4# (The Royal College of Radiologists, 2016; The Royal College of Radiologists, 2019).

Adjuvant postmastectomy radiotherapy is recommended if node-positive or there are involved resection margins (NICE guidelines, 2018). It is considered if patients have node-negative T3/T4 invasive breast cancer, but not offered if at low risk of local recurrence (e.g. most people that have lymph-node negative disease) (NICE guidelines, 2018; McGale & Taylor, 2014).

Adjuvant RT hypofractionation at 40Gy/15# has been shown to be at least as safe and effective as conventional 50Gy/25# (Haviland & Owen, 2013; The Royal College of Radiologists, 2019; Chan & Woods, 2015). The FAST study in patients ≥50yrs with low-risk invasive breast carcinoma (pT1-2 pN0) found at 3yrs that 28.5Gy in 5 once-weekly fractions was comparable to 50Gy/25#/5 weeks and at 10yrs that there was no significant difference in normal tissue effects, suggesting it is radiobiologically comparable to conventional regimes (Brunt, et al., 2020; Agrawal, et al., 2011). The FAST Forward trial demonstrates that 26Gy/5# over 1 week can be used in whole breast radiotherapy, chest wall radiotherapy and partial breast radiotherapy and is deemed non-inferior to the international standard of 15# up to 5yrs (Brunt, et al., 2020). This is for primary surgery in early breast cancer. Caution is advised in using the 26Gy in 5# for nodal radiotherapy until the 2 year normal tissue results of the FAST-Forward nodal sub-type study are reported in 2021, but can be considered in patients with co-morbidities. DCIS can be considered for 5# radiotherapy as there is no biological reason why it should be less effective (Brunt, et al., 2020).

Palliative symptomatic radiotherapy has great variability, most commonly from 20-40Gy over 5-15#, or weekly treatment of 30-36Gy over 5-6 weeks to breast, chest wall or regional nodes (The Royal College of Radiologists, 2019). 8Gy single fraction palliative RT dose may be appropriate for bone metastases (Shuja & Elghazaly, 2018).

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