Radiation therapy (RT) after breast conserving surgery decreases the risks of local recurrence and breast cancer mortality in the multidisciplinary care of patients with early stage breast cancer. However, breast cancer is a heterogeneous disease, and the absolute benefit of adjuvant RT in individual patients may vary substantially. To date, clinical trials aiming to identify patients with low-risk early breast cancer in whom adjuvant RT may be safely omitted, based on conventional clinical-pathologic variables alone, have not provided sufficiently tailored information on local recurrence risk assessment to guide treatment decisions. The majority of patients with early breast cancer continue to be routinely treated with RT after breast conserving surgery. This approach may represent over-treatment of a substantial proportion of the patients. Over-treatment comes at a price in terms of treatment toxicity, financial costs and logistical challenges. However, efforts to personalise care must be tested rigorously and supported by high level evidence in order not to compromise patient outcomes. Promising preliminary data not withstanding, the clinical impact of genomic signatures on local therapy decisions for early breast cancer has been remarkably modest due to the lack of high-level evidence supporting their clinical validity for assessment of the risk of local recurrence. This consideration underpins the importance of ongoing biomarker-directed clinical trials to generate the high-level evidence necessary for setting the future standard of care in personalised local therapy for patients with early breast cancer.