

**Skin Care during Radiotherapy  
for Breast Cancer:**  
**A summary of key research findings**

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Prepared by

National Breast Cancer Centre

*Skin care during radiotherapy for breast cancer: a summary of key research findings* was prepared by the National Breast Cancer Centre:

92 Parramatta Road Camperdown, Sydney, Australia

Locked Bag 16 Camperdown NSW 1450

Telephone +61 2 9036 3030

Facsimile +61 2 9036 3077

Website [www.nbcc.org.au](http://www.nbcc.org.au)

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## INTRODUCTION

Skin care is an important part of the management of women receiving radiotherapy. As radiation can affect healthy cells of the body, including skin cells, radiation-induced skin reactions might necessitate the interruption of treatment. Skin in the treatment area should be monitored throughout treatment and women encouraged to advise radiotherapy and nursing staff of skin reactions, or changes in severity of skin reactions.

## INCIDENCE OF SKIN REACTIONS

Radiation injury to the skin, ranging from redness to dry or moist desquamation, is a common side effect of radiotherapy for breast cancer. While the exact incidence is unknown, 92–96% of women receiving post-lumpectomy radiotherapy experience some degree of skin reaction. However, fewer than 10% experience moist skin desquamation.<sup>1</sup>

## MEASUREMENT OF SKIN REACTIONS

The Radiation Therapy Oncology Group (RTOG) and the European Organisation for Research and Treatment of Cancer (EORTC) measure acute radiation skin reactions according to the following schedule.

**Table 1** RTOG/EORTC acute radiation morbidity scoring criteria<sup>2</sup>

Score	Type of skin reaction
0	no change over baseline
1	faint or dull erythema, follicular reaction, epilation, dry desquamation, decreased sweating
2	tender or bright erythema, patchy moist desquamation, moderate oedema
3	confluent, moist desquamation other than in skin folds, pitting oedema
4	ulceration, haemorrhage, necrosis

Acute radiation reactions typically appear 10 – 14 days from commencement of radiotherapy and continue to increase in severity until about 7 – 10 days after completion of treatment.<sup>1</sup>

## **FACTORS CONTRIBUTING TO RADIOTHERAPY-INDUCED SKIN REACTIONS**

Studies have attempted to isolate the factors that increase the severity of radiotherapy-induced skin reactions. The following factors have been identified:

- chemotherapy administered before,<sup>3</sup> during<sup>3,4</sup> or after radiotherapy<sup>3</sup>
- body habitus (increasing patient weight,<sup>4</sup> size and shape of the breast resulting in higher or uneven skin dose<sup>4</sup>)
- lymphocele aspiration<sup>5</sup>
- stage of cancer<sup>5</sup> (stage II or higher tumour more than doubles the risk of a more severe skin reaction, possibly due to larger tumour sizes and more trauma to surrounding tissue)
- history of skin cancer<sup>5</sup>/sun damaged skin
- bolus use<sup>6</sup>
- smoking.<sup>5</sup>

Other predisposing factors may include more extensive surgery, surgical complications and concurrent illnesses such as diabetes and collagen vascular disease.<sup>7</sup>

All women receiving radiotherapy for breast cancer should have their skin evaluated at regular intervals throughout their breast radiotherapy treatment so that any developing skin reaction can be cared for appropriately. Women perceived to be at higher risk of developing a severe skin reaction should be monitored more closely so that their skin reaction can be managed in an effectively.<sup>4</sup> Women should be asked when their chemotherapy was completed and when, if any, further chemotherapy is due.

## **MINIMISING SKIN DAMAGE**

The aim of skin care during radiotherapy is to maintain an intact outermost layer of the epidermis. Advice should be given to all women undergoing radiotherapy about caring for their skin during treatment, with a view to reducing undue irritation and trauma, relieving discomfort and promoting healing. While there is limited evidence about the most effective ways of avoiding or minimising skin reactions, some randomised controlled trials have compared topical applications and washing regimens.

Moisturising creams significantly reduce the onset of skin breakdown and might prevent itching. It is important to note that the benefit may be related to the moisturising properties of the base agent.<sup>8</sup> Aqueous cream or a similar mild moisturising agent is recommended for use on the skin in the treatment area throughout radiation treatment (**Level II**).<sup>9</sup> Moisturising creams containing hyaluronic acid have been shown to reduce the severity of skin reactions compared with placebo,<sup>10</sup> while those containing sucralfate delay the onset of skin reactions and reduce their severity.<sup>11</sup>

Skin reactions are more common in patients who do not wash the treatment area while receiving radiotherapy (**Level II**).<sup>4</sup> Washing with a mild cleansing agent (pH = 7) provides a significant psychological benefit to patients undergoing radiotherapy to the breast or chest wall over washing with water alone (**Level II**).<sup>12</sup> However, no significant difference in acute skin reactions is apparent between washing with a mild cleansing agent and washing with water alone.

While there have been no studies of the effects of friction or other irritants on irradiated skin, clinical experience and anecdotal evidence suggest that friction and other chemical and thermal irritants exacerbate radiation-induced skin reactions.<sup>8</sup> Women undergoing radiotherapy for breast cancer are commonly advised to avoid:

- sun exposure of the treatment area without adequate protection (sun screen or a sun protective vest is usually sufficient)
- exposure to extremes of temperature
- use of chemicals on the treatment area, particularly those containing metal elements
- moisture in the skin folds
- abrasion of the treated skin.

There are no data or clinical indications to suggest the skin reaction is made worse by exercise, including swimming in either the sea or chlorinated pools.

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<sup>1</sup> See Appendix for an explanation of the levels of evidence

# TREATMENT OF RADIATION SKIN REACTIONS

## Treatment of erythema and dry desquamation (RTOG 0–2)

There is evidence that twice-daily application of sucralfate cream (containing 7% micronised sucrose sulfate) to the skin surface in the treatment area during radiotherapy and for two weeks afterwards, promotes faster recovery of skin lesions in women receiving postoperative electron beam therapy to the chest wall (**Level II**).<sup>11</sup> Twice-daily use of moisturising cream containing hyaluronic acid has also been shown to improve healing compared with placebo (**Level II**).<sup>10</sup> The cream is applied after the radiotherapy session and again in the evening over a six-week period.

Itching associated with dry desquamation is commonly treated with corticosteroids. Use of a hydrocortisone cream 0.1%, in addition to daily use of an emollient cream, significantly reduces erythema and dry desquamation compared with emollient cream alone (**Level II**).<sup>13</sup> However, there are no data to show that corticosteroids reduce the risk of progression to moist desquamation.<sup>14</sup>

## Treatment of moist desquamation (RTOG 2–3)

There is little evidence about optimal treatments for moist desquamation. Studies have evaluated topical applications and dressings such as hydrocolloids and hydrogels. Most studies have involved small numbers of patients and many findings have not been replicated.

Studies have evaluated barrier films. A noncomparative, pilot study evaluated a barrier film containing both hydrophilic and lipophilic agents. Application of the preparation appeared to improve the pain and irritation associated with acute radiation-induced skin reactions.<sup>15</sup>

Drawing on moist wound healing theory, other studies have evaluated hydrocolloid and hydrogel dressings. Preliminary reports suggest that these dressings may be effective in promoting healing and reducing discomfort.<sup>16–18</sup> Hydrocolloid and hydrogel dressings consist of a suspension of gel-forming polymer, gums and adhesive on a film or foam backing and can be used on lightly to moderately exuding wounds. Use of these dressings on radiation-induced skin reactions needs to be evaluated in further clinical trials.

Topical application of gentian violet (1% in an aqueous solution) has been shown to reduce wound size and pain (severity and frequency) and was associated with a more rapid decrease in wound size and less wound exudation compared with hydrocolloid dressing (**Level II**).<sup>19</sup>

However, gentian violet was less acceptable to patients than hydrocolloid dressing because of its drying and staining properties. As gentian violet is carcinogenic in animals, its use is restricted in some institutions.

### **Radiation-induced ulcers (RTOG 4)**

Radiation-induced ulcers can be both acute and late effects of radiotherapy. They are very rare following radiotherapy of the breast after conservative surgery and can be difficult to treat. Case studies of two treatments for radiation-induced ulcers have been reported. Hyperbaric oxygen treatments and low intensity laser irradiation might be effective in the management of radiation-induced ulcers, but require further evaluation.<sup>20,21</sup>

### **FOLLOW-UP**

Women should be advised to contact their radiation oncologist, breast care nurse or general practitioner if their skin reaction has not resolved two weeks after the completion of radiotherapy treatment. Moist desquamation resulting from radiotherapy treatment of the breast should be managed by a radiation oncologist.

**Table 2 Summary of studies evaluating skin care approaches during radiotherapy**

<b>Skin care approach evaluated</b>	<b>Authors</b>	<b>Method/Strength of evidence</b>	<b>Results</b>
Aqueous cream	Heggie et al, 20029	RCT (225 breast), aloe vera gel vs aqueous cream  Level II	Significantly less dry desquamation and pain in group using aqueous cream (p=0.004).
Washing with water and soap	Roy et al, 20014	RCT (99 breast), washing with soap vs no washing  Level II	Significantly less moist desquamation in washing group (p=0.03) and trend towards decreased symptoms.
Sucralfate cream	Maiche et al, 199411	Double-blind RCT (50 breast/chest wall), sucralfate vs base cream  Level II	Mild reactions appeared later in sucralfate group (statistically significant at 5 weeks, p>0.01 but <0.05). Itching improved in sucralfate group.
Hyaluronic acid cream	Liguori et al, 199710	RCT (134 breast, head and neck, pelvis), hyaluronic vs placebo  Level II	Significantly less severe reactions in hyaluronic acid group between weeks 3–5 of treatment (p<0.01). Improved healing in hyaluronic acid group.
Corticosteroid (mometasone furoate) cream 0.1%	Bostrom et al, 200113	Double-blind RCT (49 breast), corticosteroid vs emollient  Level II	Corticosteroid in combination with emollient cream significantly decreased erythema and dry desquamation compared to emollient cream alone (p=0.0033).
Barrier film dressing	See et al, 199815	Prospective evaluation (50 breast, head and neck, pelvis, other)  Level IV	98% of patients reported symptom relief, healing time medians between 11–16 days.
Moisture vapour permeable dressing	Shell et al, 198616	Pilot RCT (21 breast) moisture vapour permeable vs conventional dressings  Level III	Trend towards faster healing time, reduction in discomfort. Mean healing time 12 days.

Skin care approach evaluated	Authors	Method/Strength of evidence	Results
Hydrocolloid dressing	Margolin et al, 199018	Non-comparison evaluation (20 breast, mixed group)  Level IV	No wound infections. Mean healing time 12 days; 83% of patients reported their comfort to be excellent or good.
Gentian violet versus hydrocolloid dressing	Mak et al, 200019	RCT (39; 60 wounds/nasopharynx) gentian violet vs hydrocolloid dressing  Level II	No significant differences in healing. Wound size significantly smaller in gentian violet group; trend towards higher pain severity in hydrocolloid group; better comfort and aesthetic acceptance in hydrocolloid group.
Hyperbaric oxygen	Borg et al, 200120	Case report (1; early breast cancer)	Treatment of 30 hyperbaric oxygen treatments given over 6 weeks resolved the ulcer.
Low-intensity laser irradiation	Schindl et al, 200021	Case studies (3; metastatic breast cancer)	30 mW helium-neon laser treatments given 3 times per week; ulcers resolved in 5–8 weeks

RCT – randomised controlled trial

## SUMMARY

Most women receiving radiotherapy following breast conserving surgery will develop some degree of skin reaction. Damage can be minimised by applying moisturising cream, washing the treatment area and avoiding friction and irritants. Moisturisers containing sucalfate or hyaluronic acid have been shown to be superior, to those not containing one of those active ingredients, in reducing the severity of skin lesions and promoting healing of dry desquamation. The addition of a corticosteroid to an emollient cream reduces acute radiation dermatitis. Moist desquamation occurs in fewer than 10% of women treated with radiotherapy for breast cancer. Moist wound dressings, such as hydrocolloids, might be effective in promoting healing and comfort in these cases.

The information in this document is based on a literature review conducted during 2003 by the Radiation Oncology Expert Advisory Group of the National Breast Cancer Centre and the Royal Australian and New Zealand College of Radiologists – Faculty of Radiation Oncology. The information presented is based on the best available evidence at the time of publishing and is designed to assist decision making about skin care for patients. The information will be updated as new evidence becomes available, resources permitting.

Consumer information for patients receiving radiotherapy for the treatment of breast cancer and their families is also available at [www.breasthealth.com.au/treatment/skincare.html](http://www.breasthealth.com.au/treatment/skincare.html)

# APPENDIX

## Levels of evidence

The NHMRC evidence rating system<sup>22</sup> used in the review of scientific literature in this document is as follows:

- Level I** Evidence obtained from a systematic review of all relevant randomised controlled trials.
- Level II** Evidence obtained from at least one properly designed randomised controlled trial.
- Level III-1** Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
- Level III-2** Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series with a control group.
- Level III-3** Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group.
- Level IV** Evidence obtained from case series, either post-test or pre-test and post-test.

Level I evidence represents the ‘gold standard’. However, Level I and Level II evidence is not available for all areas of practice.

In this document, Level III-1, Level III-2 and Level III-3 are all referred to as Level III evidence.

If published, peer-reviewed evidence was not available at the time of preparation, expert consensus was used to provide guidance for clinical practice. It should be noted that, as further evidence emerges, opinions may change.

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