Psycho-Oncology
Psycho-Oncology **17**: 317–328 (2008)
Published online 22 August 2007 in Wiley InterScience (www.interscience.wiley.com). **DOI**: 10.1002/pon.1245

Review

Chemotherapy-induced alopecia and effects on quality of life among women with breast cancer: a literature review

Julie Lemieux[1,2,3,4,5]*, Elizabeth Maunsell[1,2,6] and Louise Provencher[1,2,7]

[1]*Unité de recherche en santé des populations, Centre hospitalier affilié universitaire de Québec, Quebec, Que., Canada*
[2]*Centre des maladies du sein Deschênes-Fabia, Hôpital St-Sacrement du centre hospitalier affilié universitaire de Québec, Que., Canada*
[3]*Centre d'hématologie et d'immunologie clinique, Que., Canada*
[4]*Samuel Lunenfeld Research Institute of the Mount Sinai Hospital, Toronto, Canada*
[5]*Département de médecine, Université Laval, Que., Canada*
[6]*Département de médecine sociale et préventive, Université Laval, Que., Canada*
[7]*Département de chirurgie, Université Laval, Que., Canada*

**Correspondence to: Unité de recherché en santé des populations, Hôpital St-Sacrement du Centre hospitalier affilié universitaire de Québec, 1050 Chemin Sainte-Foy, Quebec, Que., Canada G1S 4L8. E-mail: julie.lemieux@uresp.ulaval.ca*

Received: 6 March 2007
Revised: 8 June 2007
Accepted: 9 June 2007

Abstract

***Background*: Alopecia is a common side effect of chemotherapies used in the treatment of breast cancer. The aim of this review is to describe the effects of alopecia on quality of life (QOL) in this population.**

***Methods*: We conducted a literature review using Medline, Embase, Cumulative Index to Nursing and Allied Health Literature and PsycInfo databases. We searched for studies on the effects of alopecia on various aspects of QOL in breast cancer patients including anxiety and distress, body image, sexuality, self-esteem, social functioning, global QOL and return to work outcomes.**

***Results*: A total of 38 articles were included in the review. Hair loss consistently ranked amongst the most troublesome side effects, was described as distressing, and may affect the body image.**

***Conclusions*: We found very little quantitative data on other aspects of QOL. More research is needed to determine the presence and extent of negative effects on chemotherapy-induced alopecia on various aspects of QOL.**

Keywords: chemotherapy-induced alopecia; breast cancer; psychological distress; body image; quality of life

Introduction

Chemotherapy-induced hair loss (alopecia) is a common side effect of adjuvant and metastatic chemotherapy regimens. The likelihood of alopecia is related to the type of drug used and its schedule of administration.

Alopecia is often assumed to be an unavoidable and transient side effect that can be dealt with using wigs. A review of the consequences of alopecia published in 2001 [1] indicated that alopecia was a distressing side effect but found conflicting results on body image. As hair is an integral part of human identity, it seems intuitively reasonable to think that loss of hair might have negative repercussions on a variety of aspects of quality of life (QOL) in addition to being distressing.

Scalp cooling can be used to prevent or reduce the degree of hair loss associated with chemotherapy and is used predominantly in Europe. A review of scalp cooling showed that efficacy depends to some extent on the type of chemotherapy regimen [2]. The authors suggested that more psychological research be done to determine the indications for scalp cooling. In fact, most of the trials of scalp cooling only graded the degree of alopecia but did not assess other patient outcomes like psychological distress.

We undertook a literature review to assess the relationship between chemotherapy-induced alopecia and several QOL outcomes in women with breast cancer. The objective is to describe the extent of evidence of chemotherapy-induced hair loss and its effects on diverse aspects of QOL and return to work.

Materials and methods

A literature search was conducted up to August 2006 using MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases and PsycInfo. A combination of the following search terms was used: (alopecia OR hair loss) AND (chemotherapy or cancer) AND (QOL OR psychological OR body

image OR anxiety OR sexuality OR employment OR social OR self-esteem) AND (breast). The terms were exploded when appropriate. The complete search strategy can be obtained by contacting the authors.

We did not restrict the search strategy to a particular type of research design. Articles were selected if they assessed the relationship between alopecia and psychological distress (based on different concepts from questionnaires used in each study), anxiety, body image, sexuality, self-esteem, social functioning, global QOL and return to work. Case reports, opinions, reviews, books, theses and articles reporting only rate/degree of alopecia with no relationship with the above-mentioned outcomes were excluded (articles on the importance of hair loss as reported by the patient were included). The target population was breast cancer patients; however, articles with a mixed cancer population including breast cancer patients were included. Articles in any language were considered. We also did a manual search for any relevant references in the bibliographies of articles identified by the search strategy and of articles already in the authors' files. Data were abstracted by one of the authors (J.L.).

Since the vast majority of studies did not have alopecia as the primary outcome, we did not apply a formal quality assessment for studies included in our review. A meta-analysis could not be conducted, given the absence of a unique outcome. Therefore, the literature was summarized using a table format.

From a total of 430 articles retrieved, 28 were considered relevant and were included in the review. Reasons for exclusion of other articles can be found in Figure 1. From the manual search of references of selected articles or the authors' files, 10 were added, bringing the total articles included in this review to 38.

In the majority of articles (32/38), the study of the effects of alopecia on some aspects of QOL was not the primary objective. For these studies, we will focus on the available data on alopecia but without reporting other findings unrelated to our objective in the review. When available, the effect of other factors (e.g. age) on patient-reported outcomes was entered in the table. Study designs and results are summarized by year of publication in Tables 1 (qualitative studies) and 2 (quantitative studies).

Results

The main findings that emerged from this review have been summarized in three themes: the relative importance of hair loss among chemotherapy-related side effects, the distress associated with alopecia and the effect of alopecia on QOL and other patient-reported outcomes.

Relative importance of hair loss among chemotherapy-related side effects

We already know that alopecia is a common side effect. However, the importance of hair loss from the patient's perspective has been infrequently reported. We found evidence that chemotherapy-induced alopecia is a problem considered important by cancer patients and frequently ranks among the top most distressing/troublesome side effects of chemotherapy [19,25,26,29,30,39]. Moreover, some women have refused chemotherapy because of the risk of alopecia [3]. In one study, 8% of the women considered refusing chemotherapy because of the expected hair loss [20].

In studies where women with breast cancer were asked to report and rate their side effects, alopecia ranked 1st to 5th among all the side effects [19,25,26,39], even in studies where high-dose chemotherapy, which is associated with more toxicities, was used [29]. Interestingly, the degree of alopecia (partial vs total) does not seem to be directly related to the rank of alopecia as a distressing side effect, and this was found in three studies [25,26,37].

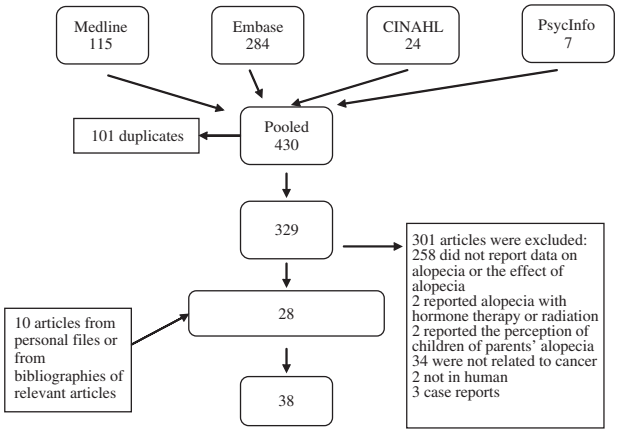

Figure 1. Results of the search strategy and reasons for excluding articles

DOI: 10.1002/pon

Table 1. Qualitative studies

Study (author, year of publication)	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results relevant to hair loss
Freedman [3] 1994	(a) 32 (b) Not specified (c) All (d) All (e) Mean 53 (36–75)	Discover what a woman's own experience of her illness meant to her—how she thinks of herself as a woman and a person with a health problem	Hair loss was associated with: • Change in the concept of self • Loss of privacy • Being a reminder of cancer • Change in sensuality/sexuality • Diminished self • Sign of societal failure (health failure)
Beisecker *et al.* [4] 1997	(a) 21 (b) Early (c) All (d) All (e) Mean 49 (32–66)	Determine the side effects that persisted after chemotherapy	• Shortly after chemotherapy: three most significant side effects from patient's perspective were nausea, hair loss and fatigue • Six months after chemotherapy, 86% of women had problems with hair, 33% were worried about it and it interfered with functioning in 28%
Williams *et al.* [5] 1999	(a) 15 (b) Not specified (c) Unknown (d) 13 (e) 41–72	Describe the experience of alopecia in people undergoing chemotherapy	Identified 10 themes related to the experience of alopecia: • Preparing for hair loss • Experiencing hair falling out • Realizing an altered sense of self • Trying to look normal • Being reminded of disease • Joking about alopecia • Sharing being bald • Having problems with wig • Taking control • Experiencing hair growing back The experience of hair falling out was traumatic for many patients
Maunsell *et al.* [6] 1999	(a) 13 (b) Early (c) All (d) All (e) 33–59	Explore the nature of work problems among breast cancer survivors who previously reported problems at work after breast cancer	One woman apprehended her return to work because hair loss is interpreted as being related to cancer
Cowley *et al.* [7] 2000	(a) 12 (b) Early (c) All (d) All (e) Mean 48 (33–59)	Explore experience of breast cancer patient after adjuvant chemotherapy	Women (four) feared hair loss. It was seen as significant because of the possible impact on social activities
Richer *et al.* [8] 2002	(a) 10 (b) Early: 8 Advanced: 2 (c) All (d) All (e) Mean 56 (44–69)	Explore meanings assigned to the experience of receiving chemotherapy among women recently diagnosed with breast cancer	Six patients had alopecia. Two themes from it: • They all reported 'intense' reactions to hair loss • It was a reminder of cancer
Luoma and Hakamies-Blomqvist [9] 2004	(a) 25 (b) Advanced (c) All (d) All (e) Not reported	Investigate the meaning of advanced breast cancer patients' QOL	• Women reported alopecia as distressing and that the change in appearance associated with it affected the social activities and willingness to continue employment • Hair loss was also associated with loss of control and was distressing

DOI: 10.1002/pon

Table 1. (*continued*)

Study (author, year of publication)	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results relevant to hair loss
Rosman [10] 2004	(a) 35 (b) Unknown (c) 19 (d) 26 (e) Average 52 for the breast cancer group	Explore the history of illness and experience of fatigue. The subject of hair loss was added after a few interviews because patients brought it up	• Hair loss was a traumatic experience (more for women than men) • Hair loss confronts patients with the seriousness of cancer and identifies them as a 'cancer patient' • Some patients saw hair loss as a normal consequence of chemotherapy and as a positive event • Two strategies are used to cope: Camouflage (e.g. wig) Banalization • Some people wore a wig to protect their family
Boehmke *et al.* [11] 2005	(a) 20 (b) Early (c) All (d) All (e) Mean 47 (32–66)	Identify symptoms, symptom experiences, and resulting symptom distress	• Nausea and hair loss were the two predominant distressing symptoms of the AC chemotherapy • Even if hair loss was expected, women found it was a traumatic experience and felt a change in their sense of self • One woman was not bothered by hair loss and took it positively
Rosenblatt [12] 2006	(a) 11 (b) Advanced (c) All (d) All (e) 37–76	Present perception of 'body' and 'self' in women treated for advanced cancer	One woman reported decreased self-image because of the wig and loss of eyebrows and eyelashes
Browall *et al.* [13] 2006	(a) 20 (b) Early (c) All (d) All (e) Mean 61	Describe experience of post-menopausal women with breast cancer who undergo adjuvant chemotherapy treatment	• Women were afraid of change in their look (e.g. if hair loss) • Hair loss was considered as one of the worst experiences of chemotherapy and was often considered worse than losing a breast

AC: doxorubicin, cyclophosphamide.

Table 2. Quantitative studies

Study (author, year of publication)	Design	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results
Wagner *et al.* [14] 1979	Cross-sectional	(a) 77 (b) Unknown (mixed cancer) (c) Unknown (d) 39 (e) Mean 55 (18–83)	Determine how alopecia affects body image and social activity level of individuals receiving cancer chemotherapy	• No difference in body image, social activity and perception of hair between the groups with alopecia vs no alopecia • In a subgroup of patients who considered hair as important, those who had alopecia had a decreased body image compared with those with no alopecia (body image score 3.46 vs 3.64, $p < 0.05$). No difference in social activities

DOI: 10.1002/pon

Table 2. (*continued*)

Study (author, year of publication)	Design	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results
Meyerowitz *et al.* [15] 1979	Cross-sectional	(a) 50 (b) Early (c) All (d) All (e) 20 women less than 50 years old	Describe psychosocial implications of adjuvant chemotherapy (CMF)	• 40% of patients reported alopecia as disruptive of their lives • No significant relationship between the level of distress and symptoms that had had major influence on patient's life
Coates *et al.* [16] 1983	Cross-sectional	(a) 99 (b) Advanced (c) 23 (d) 60 (e) Median 52 (18–78)	Describe what patients considered to be physical and non-physical side effects of chemotherapy	• Loss of hair was ranked 3rd in severity (after nausea and vomiting) but ranked 1st in subgroup of breast cancer patients • The rank for various subgroups (sex, age, marital status, domestic situation) was between 2 and 5 (e.g. ranked 1st for patients with breast cancer and 5th for those with lymphoma)
Baxley *et al.* [17] 1984	Cross-sectional	(a) 40 (b) Unknown (c) 1 (d) 21 (e) 26–65	Examine relationship between chemotherapy-induced alopecia and body image	• Lower body image (5-point-Likert scale, 2.91 vs 1.91 $p = 0.0001$) and self-image (2.69 vs 1.79, $p = 0.0001$) in the group of patients with alopecia vs no alopecia • Within the group of patients with alopecia, males had a lower self-image than females (3.06 vs 2.22, $p = 0.009$). No other difference between males and females
Nerenz *et al.* [18] 1984	Cross-sectional	(a) 121 (b) Mixed (c) 60 (d) All patients with breast cancer were women (e) Not reported	(i) Gather descriptive data about the side-effects associated with treatment for breast cancer and lymphoma; (ii) Identify aspects of the treatment experience associated with high levels of distress or disruption in life and; (iii) Identify individual differences between patients which modify the links between side-effects and distress	Alopecia associated with lower ratings of distress but not statistically significant

DOI: 10.1002/pon

Table 2. (*continued*)

Study (author, year of publication)	Design	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results
Kiebert *et al.* [19] 1990	Subgroup of patients enrolled in the EORTC trial 10854 (one cycle of chemotherapy 36 h after surgery vs no chemotherapy)	(a) 53 (b) Early (c) All (d) All (e) Mean 46 (chemo) and 50 (no chemo)	Assess the impact of chemotherapy on physical, psychological, social well-being and activity level	• No difference in QOL 1 year after surgery • Hair loss was the symptom associated with the most distress 2 months after surgery in those who received chemotherapy and considered the most burdensome by 88% • Hair loss and the need to wear a wig were the most common reasons to cite chemotherapy as the most burdensome part of treatment
Tierney *et al.* [20] 1992	Prospective cohort	(a) 60 (b) Mixed early and advanced (c) All (d) All (e) Mean 43.3 (24–66)	Identify ways in which nurses could improve the preparation and support of patients undergoing chemotherapy	*Baseline*: when patients asked about which side effect they could get, all recalled alopecia • 58% of patients expected that alopecia would be the most difficult side effect but was so in 22% of patients • 8% said they had considered refusing the treatment because of expected hair loss
Carpenter *et al.* [21] 1994	Cross-sectional (combined with qualitative method)	(a) 30 (b) Unknown (c) 11 (d) All (e) Mean 53 (27–69)	Examine the concept of self-esteem as it relates to female patients with cancer before diagnosis and while experiencing chemotherapy-induced alopecia	Decrease in self-esteem during chemotherapy compared with pre-diagnosis (obtained retrospectively, effect size 0.94, $p = 0.008$) but no influence according to the degree of hair loss
Griffin *et al.* [22] 1996	Cross-sectional	(a) 155 (b) 65% advanced (c) 70 (d) 118 (e) Median 49	(i) Identify the main symptoms experienced while receiving chemotherapy; (ii) Describe changes that may have occurred since previous study; and (iii) Identify priorities for research into ways of helping patients cope with current chemotherapy	Loss of hair was ranked in the top five most severe symptoms by 33% of patients. No difference between males and females
Macquart-Moulin *et al.* [23] 1997	Cohort	(a) 50 (b) Early (three had local relapse) (c) All (d) All (e) Median 51 (32–70)	Compare assessment of side effects made by patients and physicians	• As reported by patients, 77% experienced hair loss and 50% were 'quite a bit' to 'very much' distressed by it • Hair loss correlated with distress ($r = 0.51$, $p < 0.05$) • Hair loss associated with distress (4-point Likert scale) increased over time (cycles 1–6) (1.9 vs 2.7, $p < 0.05$)

DOI: 10.1002/pon

Table 2. (*continued*)

Study (author, year of publication)	Design	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results
Genre *et al.* [24] 1997	Cohort	(a) 44 (b) Early (c) All (d) All (e) Median 51 (32–70)	Measure patient-reported side effects of chemotherapy	Alopecia was the most common side effect and was associated with quite a lot of discomfort in 46% of women (compared with 78% for vomiting)
Sitzia *et al.* [25] 1997	Prospective cohort	(a) 13 (b) Unknown (c) All (d) All (e) Mean 46 (31–62)	Investigate side effects experienced by patients receiving FEC chemotherapy in the treatment of breast cancer	Alopecia ranked 1st for incidence and 3rd as being troublesome
Sitzia [26] 1998	Prospective cohort	(a) 52 (b) Unknown (c) All (d) All (e) Mean 48 ± 10.8	Describe the range of side effects experienced by a sample of patients receiving CMF	Alopecia ranked as the 5th most troublesome side effect. Even if 91% of cycles were accompanied by hair loss, only two patients had total hair loss (mean hair loss was 50% as scored by patients)
Lindley *et al.* [27] 1999	Cross-sectional	(a) 146 cancer patients (various types of cancer) 224 non-cancer patients (b) Unknown (c) % unknown (d) 88 cancer, 148 non-cancer (e) Mean 54 (cancer) and 43 (non-cancer)	Identify and compare perceptions regarding disruption of QOL caused by chemo-therapy side effects in patients with cancer receiving chemotherapy and in non-cancer patients	• Among 41 symptoms, loss of hair ranked 1st as 'bothering' cancer patients and 7th for non-cancer patients • Women were significantly more likely to be bothered by hair loss than men for cancer patients (59% vs 33%, $p = 0.002$)
Macquart-Moulin *et al.* [28] 1999	Cohort	(a) 109 (b) Early (c) All (d) All (e) Mean 51 ± 11.8	Investigate patients' experience with non-metastatic breast cancer who were treated with the concurrent administration of radiotherapy and chemo-therapy in terms of side effects and QOL	Hair loss was present in 74% of chemotherapy cycles and it caused distress in 54% of cycles
Macquart-Moulin *et al.* [29] 2000	Pilot multicentre trial Intervention: neoadjuvant chemotherapy and stem cell support Report on QOL sub-study in this article	(a) 95 (b) Early (inflammatory breast cancer) (c) All (d) All (e) Median 46 (26–59)	Assess QOL of patients enrolled in a trial of high-dose chemotherapy with stem cells support	• Alopecia ranked 2nd after fatigue for symptoms that were 'quite or very distressing' • Hair loss was present in 95% of chemotherapy cycles and it caused distress in 62% of cycles

DOI: 10.1002/pon

Table 2. (*continued*)

Study (author, year of publication)	Design	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results
Carelle *et al.* [30] 2002	Cross-sectional	(a) 100 (b) Advanced (c) 40 (d) 65 (e) Median 58 (27–89)	(i) Investigate change in patient's perception of side effects (compared to similar survey done in 1983 and 1993) and; (ii) Evaluate the impact of treatment on side effect profile	• Alopecia ranked the 2nd most severe side effect • Comparing women and men, it ranked 2nd for women and 10th for men • Alopecia ranked 1st and 2nd in patients >60 y.o. and 45–60 y.o. and 9th in patients < 45 y.o • Alopecia ranked 2nd in breast and lung cancer patients and >10th in gastro-intestinal cancers
Del Mastro *et al.* [31] 2002	QOL sub-study of a phase III Randomized trial comparing two chemotherapy regimens (CEF-21 with CEF-14)	(a) 392 enrolled (363 were evaluable for QOL) (b) Early (c) All (d) All (e) Mean 53 in CEF-21 and 52 in CEF-14	Evaluate the effect of an increase in the dose–intensity of adjuvant chemotherapy on patient-reported psychological distress compared with a standard regimen	Increased psychological distress with increased degree of alopecia (scores of the Psychological Distress Inventory 25.4–28.4–31.3, $p = 0.003$ for alopecia grade 1–2–3, respectively, $p = 0.023$), but not significant in multivariate analysis
Benjamin *et al.* [32] 2002	Pilot trial Intervention: pulsed electrostatic fields to reduce alopecia	(a) 14 (b) Early (c) All (d) All (e) Mean 43 (25–59)	Determine if pulsed electrostatic fields could prevent chemotherapy-induced hair loss	Patient-reported QOL and efficacy were high
Protière *et al.* [33] 2002	Prospective study of scalp cooling (group who received scalp cooling was compared with a group where no scalp cooling was offered)	(a) 214 (data on distress for 136 patients) (b) Early (c) All (d) All (e) Median 50 (25–73)	Report efficacy and applicability of scalp cooling	No statistically significant difference in the degree of distress caused by alopecia in the group who received scalp cooling compared with the group who did not
Macduff *et al.* [34] 2003	Randomized controlled trial (intervention = scalp cooling)	(a) 40 (b) Early (c) All (d) All (e) Not specified	Establish effectiveness of scalp cooling in preventing alopecia for patients with breast cancer who received the trial combination chemotherapy of epirubicin and docetaxel	No significant differences in the amount of upset experienced in relation to hair loss or in terms of negative feelings about appearance
Kissane *et al.* [35] 2004 and Kissane *et al.* [36] 1998	Two randomized control trials of psychosocial group therapy (one localized and one metastatic)	(a) 502 (b) 303 early and 200 metastatic (c) All (d) All (e) Mean 48 early and 51 in the metastatic	Report psychological morbidity in women with breast cancer and to compare rates between early and advanced stages	Less distress caused by hair loss in the metastatic population (39% vs 77%, $p = 0.000$)

DOI: 10.1002/pon

Table 2. (*continued*)

Study (author, year of publication)	Design	(a) Total number of patients (b) Proportion of patients with early or advanced cancer (c) Number of patients with breast cancer (d) Number of patients who are women (e) Age (years)	Objective(s)	Results
Land *et al.* [37] 2004	QOL sub-study of a phase 3 randomized trial comparing AC to CMF (NSABP B-23)	(a) 160 (b) Early (c) All (d) All (e) 51% $\leqslant$ 49 33% 50–59 17% $\geqslant$ 60	Explore QOL implications of the differences in the two regimens	• Cycle 2: 94% 'at least a little bit bothered' by alopecia in AC vs 73% for CMF • Weeks 16–18: 12% were severely bothered by alopecia in AC vs 40% for CMF (despite the fact that the degree of alopecia was more severe in AC vs CMF)
Lyons *et al.* [38] 2004	Cross-sectional	(a) 60 (b) Early (c) 53 (d) All (e) Mean 50 (27–72)	Understand emotional impact of diagnoses of breast or cervical cancer on low-income rural Southern women	Lower QOL on FACT-B associated with hair loss (no mention if adjusted or not)
Duric *et al.* [39] 2005	Cross-sectional	(a) 97 (b) Early (c) All (d) All (e) Median 55 (25–69)	Assess patients' preferences regarding chemotherapy and to find the level of benefit they consider worthwhile to support choosing chemotherapy	• Hair loss was the side effect that most troubled women during chemotherapy • 68–84% judged chemotherapy worthwhile for a 1-year gain in life expectancy and 52–55% for a 1-day gain • Women who were less troubled by hair loss would be more likely to accept chemotherapy for small gains in life expectancy to accept chemotherapy ($p = 0.05$)
Fobair *et al.* [40] 2006	Combination of data from a cross-sectional and baseline questionnaire of a randomized controlled trial of a support group intervention	(a) 549 (b) Early (c) All (d) All (e) 20% $<$40 and 80% 40–50	Determine the frequency of body image and sexual problems in the first months after treatment among women diagnosed with breast cancer at age 50 or younger	Hair loss was not related to a decrease in sexual activity compared with no hair loss but was associated with body image problems

CMF: cyclophosphamide, methotrexate, 5-fluorouracil; EORTC: European Organisation for Research and Treatment of Cancer; FEC: 5-fluorouracil, epirubicin + cyclophosphamide; CEF-21: cyclophosphamide, epirubicin and 5-fluorouracil every 21 days; CEF-14: cyclophosphamide, epirubicin and 5-fluorouracil every 14 days; NSABP: National Surgical Adjuvant and Bowel Project; FACT-B: Functional Assessment of Cancer Therapy-breast module; AC: doxorubicin, cyclophosphamide; CES-D: center for epidemiologic studies-depression.

In a population of mixed cancer patients where the majority had advanced cancer, three articles used the same methodology [16,22,30] to determine which chemotherapy side effects patients had experienced and their relative importance to the patient. Alopecia ranked 3rd in 1983 and 2nd in 2002 [16,30]. When data were reported in the subgroup of breast cancer patients, hair loss ranked 1st and 2nd in 1983 and 2002, respectively [16,30]. Alopecia ranked 2nd in breast and lung cancer, two cancer types with chemotherapy-associated alopecia as a side effect [30]. When age was compared, alopecia ranked higher (more important) in older vs younger population [16,30]. There was no difference according to the marital status [30].

DOI: 10.1002/pon

Psychological distress associated with hair loss

Patients described hair loss as traumatizing and distressing [5,8–11,13,35,36]. Indeed, it was described as harder than losing a breast [3,13].

However, the effect on overall psychological distress has not been fully documented. For example, in a randomized trial comparing two dose-intensive chemotherapy regimens among 363 women with breast cancer, general psychological distress was potentially associated with the degree of alopecia, although the significant association became non-significant in multivariate analysis that adjusted for other toxicities and the two different chemotherapy regimens [31]. Distress associated with hair loss seems to increase with the number of chemotherapy received [23].

Data were also obtained from trials testing scalp hypothermia to prevent chemotherapy-induced alopecia. In a clinical trial on the efficacy of scalp cooling, 27 women with breast cancer who received scalp cooling rated their distress from alopecia lower than did the 109 women who did not use scalp cooling, but the difference was not statistically significant [33].

Finally, there is some evidence that alopecia causes less distress in metastatic disease than in early breast cancer [35,36]. In two different clinical trials of group therapy, one in the adjuvant setting and the other in the metastatic setting, the percentage of women distressed by hair loss was 77 and 38.6 for early and metastatic breast cancer, respectively.

Effects of hair loss on anxiety, body image, sexuality, self-esteem, social functioning, global QOL and return to work

Hair loss has been reported to be associated with lower QOL as measured with the FACT-B [38]. However, little is known about the effect of alopecia on specific components of QOL.

In qualitative studies, women have reported that alopecia is associated with a loss of privacy because it makes the environment aware that the person is receiving chemotherapy [3,9]. It is also a visible reminder of the disease [5,8,10] and confronts patients with seriousness of cancer [10].

Some patients commented on hair loss negatively affecting social activities and interactions and as having an influence on willingness to continue working or creating apprehension about returning to work [6,9]. Hair loss was also feared because of the anticipation that it would affect social activities [7].

A change in the perception of the sense of self and self-esteem was also reported [3,21]. The decrease in sensuality and sexuality was also felt to be related to hair loss [3].

In qualitative studies, women anticipated changes in their looks with hair loss [13] and reported decreased body image [12]. In quantitative studies, alopecia has been associated with poorer body image [17] in women younger than 50 years old in some studies [40] but not all [14,34].

Discussion

This literature review provides some information on the consequences of chemotherapy-induced alopecia. The findings can be summarized as follows. Firstly, chemotherapy-induced hair loss is considered to be the most important side effects of chemotherapy, frequently ranking among the first three for breast cancer patients [16,19,25,26, 29,30,39] and can lead to refusal of chemotherapy [3,20]. Secondly, it is described by breast cancer women as causing distress and as being traumatizing [5,8–11,13,31,35,36]. Thirdly, there might be an impact on body image [17,40] although not all studies reported this association [14]. However, for a minority of women, alopecia is seen positively and perceived as a sign of the efficacy of chemotherapy.

This review has limitations. Firstly, the number of articles found was relatively small. Secondly, most of the studies were not designed to specifically address the question of alopecia. Therefore, they were not powered to detect a significant change in QOL outcomes in relation to alopecia or to control for potential confounding factors like age. Thirdly, some chemotherapy regimens used in studies are no longer used. However, alopecia is still a relevant problem since most chemotherapy combinations currently used in breast cancer are associated with alopecia. Fourthly, even though we restricted our search to breast cancer, some studies had a mixed population of different cancers at different disease stages.

In the past two decades, we have seen a considerable growth in intensive research conducted on other side effects related to chemotherapy, including nausea (e.g. new anti-nauseous drugs) and fatigue (e.g. erythropoietin). This has led to improvement in these symptoms. For example, nausea ranked 2nd in 1983 but 11th in 2002 [16,30]. During this same period, alopecia remained highly ranked among side effects, specifically 3rd in 1983 and 2nd in 2002 [16,30]. Despite the importance of hair loss, alopecia is rarely the subject in the survivorship literature [41].

In spite of the above-mentioned limitations, this review confirms that alopecia is problematic for women. However, the presence of associated distress and effects on other aspects of a woman's life need to be systematically evaluated. We suggest the following areas to be explored in future research. Firstly, we need to measure the effect of alopecia with valid, reliable and responsive questionnaires on perceptions of hair loss, QOL, psychological distress, anxiety, body image, anxi-

DOI: 10.1002/pon

ety, sexuality, employment, social functioning and self-esteem. Attention should be given to ensuring a sufficient sample size in order to explore potential confounding factors. Research in various types of cancers is encouraged since most data come from breast cancer patients. It would be also important to study the effect on men. Secondly, new prospective studies on possible benefits of scalp cooling are needed. A study to assess the effect of scalp cooling on QOL in women with breast cancer is being planned and should help in determining the extent of effects of alopecia among women with breast cancer. Thirdly, we need to educate medical professionals about the effects of chemotherapy-induced alopecia, a side effect that is often minimized.

In conclusion, chemotherapy-induced alopecia has the potential to affect various aspects of patient's life, but the extent of impact and available methods used to decrease alopecia need to be prospectively studied.

References

1. Batchelor D. Hair and cancer chemotherapy: consequences and nursing care—a literature study. *Eur J Cancer Care* 2001;**10**(3):147–163.
2. Grevelman EG, Breed WPM. Prevention of chemotherapy-induced hair loss by scalp cooling. *Ann Oncol* 2005;**16**(3):352–358.
3. Freedman TG. Social and cultural dimensions of hair loss in women treated for breast cancer. *Cancer Nurs* 1994;**17**(4):334–341.
4. Beisecker A, Cook MR, Ashworth J *et al*. Side effects of adjuvant chemotherapy: perceptions of node-negative breast cancer patients. *Psycho-Oncology* 1997;**6**(2): 85–93.
5. Williams J, Wood C, Cunningham-Warburton P. A narrative study of chemotherapy-induced alopecia. *Oncol Nurs Forum* 1999;**26**(9):1463–1468.
6. Maunsell E, Brisson C, Dubois L, Lauzier S, Fraser A. Work problems after breast cancer: an exploratory qualitative study. *Psycho-Oncology* 1999;**8**(6):467–473.
7. Cowley L, Heyman B, Stanton M, Milner SJ. How women receiving adjuvant chemotherapy for breast cancer cope with their treatment: a risk management perspective. *J Adv Nurs* 2000;**31**(2):314–321.
8. Richer MC, Ezer H. Living in it, living with it, and moving on: dimensions of meaning during chemotherapy. *Oncol Nurs Forum* 2002;**29**(1):113–119.
9. Luoma M, Hakamies-Blomqvist L. The meaning of quality of life in patients being treated for advanced breast cancer: a qualitative study. *Psycho-Oncology* 2004;**13**(10):729–739.
10. Rosman S. Cancer and stigma: experience of patients with chemotherapy-induced alopecia. *Patient Educ Couns* 2004;**52**(3):333–339.
11. Boehmke MM, Dickerson SS. Symptom, symptom experiences, and symptom distress encountered by women with breast cancer undergoing current treatment modalities. *Cancer Nurs* 2005;**28**(5):382–389.
12. Rosenblatt L. Being the monster: women's narratives of body and self after treatment for breast cancer. *Med Humanit* 2006;**32**(1):53–56.
13. Browall M, Gaston-Johansson F, Danielson E. Postmenopausal women with breast cancer: their experiences of the chemotherapy treatment period. *Cancer Nurs* 2006;**29**(1):34–42.
14. Wagner L, Gorely M. Body image and patients experiencing alopecia as a result of cancer chemotherapy. *Cancer Nurs* 1979;**2**(5):365–369.
15. Meyerowitz BE, Sparks FC, Spears IK. Adjuvant chemotherapy for breast carcinoma: psychosocial implications. *Cancer* 1979;**43**(5):1613–1618.
16. Coates A, Abraham S, Kaye SB *et al*. On the receiving end—patient perception of the side-effects of cancer chemotherapy. *Eur J Cancer Clin Oncol* 1983;**19**(2): 203–208.
17. Baxley KO, Erdman LK, Henry EB, Roof BJ. Alopecia: effect on cancer patients' body image. *Cancer Nurs* 1984;**7**(6):499–503.
18. Nerenz DR, Leventhal H, Love RR, Ringler KE. Psychological aspects of cancer chemotherapy. *Int Rev Appl Psychol* 1984;**33**:521–529.
19. Kiebert GM, Hanneke J, de Haes CJ, Kievit J, van de Velde CJ. Effect of peri-operative chemotherapy on the quality of life of patients with early breast cancer. *Eur J Cancer* 1990;**26**(10):1038–1042.
20. Tierney AJ, Taylor J, Closs SJ. Knowledge, expectations and experiences of patients receiving chemotherapy for breast cancer. *Scand J Caring Sci* 1992;**6**(2): 75–80.
21. Carpenter JS, Brockopp DY. Evaluation of self-esteem of women with cancer receiving chemotherapy. *Oncol Nurs Forum* 1994;**21**(4):751–757.
22. Griffin AM, Butow PN, Coates AS *et al*. On the receiving end. V: patient perceptions of the side effects of cancer chemotherapy in 1993. *Ann Oncol* 1996;**7**(2):189–195.
23. Macquart-Moulin G, Viens P, Bouscary ML *et al*. Discordance between physicians' estimations and breast cancer patients' self-assessment of side-effects of chemotherapy: an issue for quality of care. *Br J Cancer* 1997;**76**(12):1640–1645.
24. Genre D, Macquart-Moulin G, Bouscary ML *et al*. Adjuvant chemotherapy with mitoxantrone, cyclophosphamide and 5-fluorouracil in breast neoplasms: therapeutic life. *Bull Cancer* 1997;**84**(3):240–246.
25. Sitzia J, Dikken C. Survey of the incidence and severity of side-effects reported by patients receiving six cycles of FEC chemotherapy. *J Cancer Nurs* 1997;**1**(2):61–73.
26. Sitzia J, Huggins L. Side effects of cyclophosphamide, methotrexate, and 5-fluorouracil (CMF) chemotherapy for breast cancer. *Cancer Pract* 1998;**6**(1):13–21.
27. Lindley C, McCune JS, Thomason TE *et al*. Perception of chemotherapy side effects cancer versus noncancer patients. *Cancer Pract* 1999;**7**(2):59–65.
28. Macquart-Moulin G, Viens P, Genre D *et al*. Concomitant chemoradiotherapy for patients with nonmetastatic breast carcinoma: side effects, quality of life, and daily organization. *Cancer* 1999;**85**(10): 2190–2199.
29. Macquart-Moulin G, Viens P, Palangie T *et al*. High-dose sequential chemotherapy with recombinant granulocyte colony-stimulating factor and repeated stem-cell support for inflammatory breast cancer patients: does impact on quality of life jeopardize feasibility and acceptability of treatment? *J Clin Oncol* 2000;**18**(4): 754–764.
30. Carelle N, Piotto E, Bellanger A, Germanaud J, Thuillier A, Khayat D. Changing patient perceptions of the side effects of cancer chemotherapy. *Cancer* 2002;**95**(1):155–163.
31. Del Mastro L, Costantini M, Morasso G *et al*. Impact of two different dose-intensity chemotherapy regimens on psychological distress in early breast cancer patients. *Eur J Cancer* 2002;**38**(3):359–366.

32. Benjamin B, Ziginskas D, Harman J, Meakin T. Pulsed electrostatic fields (ETG) to reduce hair loss in women undergoing chemotherapy for breast carcinoma: a pilot study. *Psycho-Oncology* 2002;**11**(3):244–248.
33. Protiere C, Evans K, Camerlo J *et al*. Efficacy and tolerance of a scalp-cooling system for prevention of hair loss and the experience of breast cancer patients treated by adjuvant chemotherapy. *Support Care Cancer* 2002;**10**(7):529–537.
34. Macduff C, Mackenzie T, Hutcheon A, Melville L, Archibald H. The effectiveness of scalp cooling in preventing alopecia for patients receiving epirubicin and docetaxel. *Eur J Cancer Care* (*Engl*) 2003;**12**(2):154–161.
35. Kissane DW, Grabsch B, Love A, Clarke DM, Bloch S, Smith GC. Psychiatric disorder in women with early stage and advanced breast cancer: a comparative analysis. *Aust N Z J Psychiatry* 2004;**38**(5):320–326.
36. Kissane DW, Clarke DM, Ikin J *et al*. Psychological morbidity and quality of life in Australian women with early-stage breast cancer: a cross-sectional survey.[see comment]. *Med J Aust* 1998;**169**(4):192–196.
37. Land SR, Kopec JA, Yothers G *et al*. Health-related quality of life in axillary node-negative, estrogen receptor-negative breast cancer patients undergoing AC versus CMF chemotherapy: findings from the National Surgical Adjuvant Breast and Bowel Project B-23. *Breast Cancer Res Treat* 2004;**86**(2):153–164.
38. Lyons Shelton M. Psychosocial impact of cancer in low-income rural/urban women: phase II. *Online J Rural Nurs Health Care* 2004;**4**(2):27.
39. Duric VM, Stockler MR, Heritier S *et al*. Patients' preferences for adjuvant chemotherapy in early breast cancer: what makes AC and CMF worthwhile now? *Ann Oncol* 2005;**16**(11):1786–1794.
40. Fobair P, Stewart SL, Chang S, D'Onofrio C, Banks PJ, Bloom JR. Body image and sexual problems in young women with breast cancer. *Psycho-Oncology* 2006;**15**(7):579–594.
41. Lemieux J, Bordeleau L, Goodwin P. Medical and psychological issues in breast cancer survivors. In *Oncology*, *An Evidence-based Approach* (1st edn), Chang AE, Ganz PA, Hayes DF *et al*. (eds). Springer, Science & Business Media Inc: New York, 2006; 1836–1858.

DOI: 10.1002/pon