

# Scalp Cooling

## A literature review of efficacy, safety, and tolerability for chemotherapy-induced alopecia

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**BACKGROUND:** More than 75% of patients with cancer cite alopecia as the most feared side effect of treatment, with as many as 10% considering treatment refusal. Despite wide acceptance in other countries, scalp cooling to reduce chemotherapy-induced alopecia (CIA) has been uncommon in the United States because of long-standing concerns of scalp metastases and a lack of reliable efficacy data.

**OBJECTIVES:** This article reviews 40 years of efficacy, safety, and tolerability literature on scalp cooling to prevent CIA.

**METHODS:** A systematic review was performed in PubMed and CINAHL®. Forty articles were reviewed, with 12 articles demonstrating high levels of evidence and meeting inclusion criteria. Comparative trials, systematic reviews, and one large single-arm trial were included.

**FINDINGS:** Scalp cooling efficacy is dependent on many factors but demonstrates better hair preservation than no cooling. No increase in scalp metastases or statistically significant difference in overall survival was seen in retrospective safety data when cooling was used. Few patients discontinue cooling early because of adverse experiences.

### KEYWORDS

scalp cooling; chemotherapy-induced alopecia; efficacy; safety; literature review

### DIGITAL OBJECT IDENTIFIER

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**CANCER TREATMENT WITH CHEMOTHERAPY MAY RESULT** in chemotherapy-induced alopecia (CIA), with rates from 10%–100%, depending on the drugs in the treatment regimen (Kadakia, Rozell, Butala, & Loprinzi, 2014; Roe, 2014) (see Table 1). Experienced oncology nurses know that, after the initial shock of diagnosis, treatment and side effect concerns are the second hurdle. Although management has improved for many other side effects (e.g., nausea and vomiting), alopecia still has no effective or widely accepted preventive intervention.

In one study, 77% of patients reported CIA as the most feared side effect of treatment (Kargar, Sarvestani, Khojasteh, & Heidari, 2011). It has been described as a greater threat to body image than mastectomy, leading to anxiety and isolation (Roe, 2011). As many as 10% of women consider refusing chemotherapy or choosing a less effective treatment to avoid CIA (Kadakia et al., 2014; Roe, 2014). Although most CIA is transient, persistent or chronic alopecia is possible. A study of women with breast cancer receiving docetaxel (Taxotere®) after doxorubicin (Doxil®) and cyclophosphamide (Cytoxan®) reported prevalence as high as 6.3% (Lemieux, Amireault, Provencher, & Maunsell, 2009). Although not common, it is impossible to know which patients will experience persistent CIA. Given the impact of CIA on patients, one might question why such a significant side effect remains without an effective management strategy.

### History and Current State of Scalp Cooling

Scalp cooling is an intervention routinely used in the United Kingdom, France, Netherlands, and parts of Canada to limit CIA (Lemieux, 2012). A registry of more than 70 Dutch hospitals demonstrated usage rates as high as 80% for scalp cooling for patients with solid tumors (van den Hurk, van de Poll-Franse, Breed, Coeberg, & Nortier, 2013). This was consistent with a medical center in Canada, which estimated usage rates of 85% (Lemieux, 2012).

Scalp cooling data dates back more than 40 years and was first summarized in a systematic review in 2005. The mechanism of action is believed to be the result of two processes: (a) vasoconstriction, decreasing blood flow to hair follicles and limiting the uptake of cytotoxic agents, and (b) decreased follicle metabolism, making follicles less susceptible to chemotherapy damage (Grevelman & Breed, 2005; Kadakia et al., 2014; Shin, Jo, Kim, Kwon, & Myung, 2015).

Scalp cooling options available in other countries include cooling machines or cold caps (see Figure 1), both of which are initiated prior to