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## Massage Techniques for Cancer Patients – Final Exam

1. With respect to *The Use of Massage Therapy for Reducing Pain, Anxiety, and Depression*, massage therapies are among the most frequently used complementary treatments.
  - a. True
  - b. False
  
2. Considering *The Use of Massage Therapy for Reducing Pain, Anxiety, and Depression - Discussion*, massage therapy has \_\_\_\_\_ to reduce the subjectively perceived symptom of pain in oncological patients receiving palliative care:
  - a. failed
  - b. appeared
  - c. been assumed
  - d. proven
  
3. Regarding *Massage therapy for cancer patients*, therapeutic massage is \_\_\_\_\_ used in medical treatment programs to reduce symptoms, improve coping, and enhance quality of life:
  - a. seldom
  - b. increasingly
  - c. occasionally
  - d. rarely
  
4. With respect to *Massage Techniques, 2.2.1 Western Tradition*, Swedish massage consists of continuous systematic strokes and deep kneading and stretching to loosen tight muscles and to reduce stress.

True  
False
  
5. Considering *Clinical Evidence for the Effectiveness of Therapeutic Massage*, the main indications for massage in general practice are back symptoms (20%), relaxation (19%), neck symptoms (17%), \_\_\_\_\_ (7%), and leg symptoms (4%):
  - a. mood disorders
  - b. digestive disorders
  - c. headaches
  - d. blurred vision

6. According to *The Neuro-myofascial Biology of Touch and Massage*, 2.6.1 *Potential Mechanisms*, therapeutic massage improves local musculoskeletal symptoms and function and can also \_\_\_\_\_ affect mood state and pain threshold:
- adversely
  - negatively
  - positively
  - occasionally
7. With regards to *Reflexology versus Swedish Massage*, complementary therapy interventions have \_\_\_\_\_ promise in reducing distress and promoting comfort in cancer survivors:
- shown no
  - never shown
  - sometimes shown
  - shown great
8. Considering 2. *Materials and Methods*, an experimental, repeated-measures, crossover design study of 75 older cancer survivors residing in nursing homes was conducted from 2009–2011.
- True
  - False
9. As per the *Background for Massage for Children*, \_\_\_\_\_ qualitative research exists about the effects of therapeutic massage with children hospitalized to undergo hematopoietic cell transplantation (HCT):
- no in-depth
  - a wealth of
  - a limited amount of
  - an unknown quantity of
10. Thinking about *Parent-Perceived Benefits of Massage for Patients*, without exception, parents said that massage brought relief, comfort, and even pleasure to their children, although the effectiveness of massage in relieving specific treatment related symptoms was variable among patients.
- True
  - False

# Section 2:

# Massage Techniques for Cancer Patients

(4 CE credits)

- *The Use of Massage Therapy for Reducing Pain, Anxiety, and Depression in Oncological Palliative Care Patients: A Narrative Review of the Literature*
- *Massage therapy for cancer patients: a reciprocal relationship between body and mind*
- *Reflexology versus Swedish Massage to Reduce Physiologic Stress and Pain and Improve Mood in Nursing Home Residents with Cancer: A Pilot Trial*
- *Massage for Children Undergoing Hematopoietic Cell Transplantation: A Qualitative Report*

## Review Article

# The Use of Massage Therapy for Reducing Pain, Anxiety, and Depression in Oncological Palliative Care Patients: A Narrative Review of the Literature

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A considerable number of cancer patients use complementary medicine therapies in order to alleviate different symptoms such as pain, anxiety, and depression, occurring in connection with cancer. This paper explores the question to what extent massage therapies are able to reduce the amount of pain, anxiety, and depression. For this purpose, a systematic literature analysis was carried out in the electronic databases and specialist journals. There is already evidence that massage therapies can influence the symptoms of pain, anxiety, and depression in a positive way.

## 1. Introduction

Cancer is the second most frequent cause of death after cardiovascular diseases, leading to unbearable and hardly controllable symptoms in 70 to 80% of the cases, especially when the healing phase is over and the therapy has to be continued with palliative intent [1].

Depending on the type of cancer and the stage of the disease, different physical and mental symptoms can be noted, with pain, anxiety, and depression playing a central role in the care and treatment of critically and terminally ill patients as the disease progresses [2].

In order to alleviate severe pain, opioid analgesics are administered because of their high efficacy and the absence of specific organ toxicity. Despite their good effectiveness, several side effects such as nausea and vomiting, drowsiness, confusion, respiratory depression, antitussive effect, urinary retention, itchiness, constipation, hyperalgesia, tolerance, and dependency can be noted [2, 3].

Due to the progression of cancer and the simultaneous presence of severe pain, there is an increased risk of mental

complications such as anxiety and depression [2, 4]. Ten to 20% of oncological patients suffer from a depression [2]. Anxiety disorders can be found with a prevalence of 13 to 79% in this group of patients [5]. Anxiety is a multifactorial disorder which can be connected with other symptoms such as depression, and its pharmacological treatment mainly consists of benzodiazepines, antidepressants, neuroleptics, and opioids [1, 6, 7]. The side effects of these medications include ataxia, respiratory problems, amnesia, cardiac muscle fatigue, psychomotor and cognitive impairments, sleep disorders, and paradoxical reactions [1, 5].

As pharmacological treatment causes a number of side effects, oncological patients frequently turn to complementary medicine therapies as an adjunctive treatment to ease the symptoms [8]. Massage therapies are among the most frequently used complementary treatments. Their effectiveness with regard to the reduction of symptoms of pain, anxiety, and depression in oncological patients has been examined in several studies [8–12].

As far as nursing practice is concerned, it is currently difficult to consult scientific works clearly illustrating the

influence and effectiveness of this method in oncological patients [8, 13, 14].

## 2. Objective and Questions of the Literature Review

The aim of this literature review is to examine the effectiveness of massage therapy for reducing pain, anxiety, and depression in patients receiving palliative oncological care.

Questions.

- (i) Can massage therapy reduce the level of pain in patients receiving palliative oncological care?
- (ii) Can massage therapy reduce the level of anxiety in patients receiving palliative oncological care?
- (iii) Can massage therapy reduce the level of depression in patients receiving palliative oncological care?

## 3. Methodical Approach

In order to respond to the above questions in narrative literature review was conducted from March to July 2010 in the following databases: The Cochrane Library, CINAHL (Cumulative Index to Nursing and Allied Health Literature), PsychInfo (Ebsco), Medline (National Library of Medicine), Embase, Amed (Ebsco), and Tripdatabase. The review was limited to studies published between 2000 and 2010. In addition, the bibliographical references of the authors and the selected journals were examined for further references. The literature was selected according to the inclusion and exclusion criteria stated in Table 1.

## 4. Selection of the Studies

By applying the described strategy, a total of 69 articles were found, 38 of which were relevant hits. After carefully sorting through the relevant hits, the duplicates were removed. Applying the in- and exclusion criteria, 20 articles were found appropriate.

The search strategy and the selection and quality rating of the relevant studies were carried out and analysed separately by two persons in a first step and jointly synthesised and discussed in a second step. The studies that had been found were selected according to the inclusion criteria and the quality criteria of the Jadad Score (2000) for RCTs and the checklist of Downs and Black (1998) for randomised and nonrandomised studies. Using these criteria, six articles were eventually included in the final analysis (see Figure 1). Table 2 shows the eight Studies excluded after examination of the full versions. The classification of the studies according to evidence level was carried out according to Kunz et al. [15], with four studies corresponding to evidence level I [12, 13, 16, 17] and two to evidence level III [18, 19].

The analysis of the publications and the data extraction was done using a tabular format (see Table 3).

## 5. Results of the Literature Review

*5.1. Characteristics of the Population.* The six selected studies comprised a total of  $n = 1,558$  adult oncological patients receiving palliative care.

The six analysed studies included both female and male patients, with female patients accounting for a higher percentage share in four of the examined studies [12, 13, 17, 18]. Male patients outnumbered females in the two other studies [16, 19]. The patients were between 30 and 88 years of age. The average age was between 65 and 66 years in five studies [12, 13, 16, 17, 19]. The average age in the study of Jane et al. [18] was considerably lower, namely, 52 years. The patients suffered from lung, breast, pancreas, prostate, and colorectal cancer [12, 13, 16–19]. All patients were diagnosed with metastases. The studies of Jane et al. [18] and Kutner et al. [13] also included patients diagnosed with bone metastases.

The probable life expectancy of the patients which took part in the studies was estimated at less than six months. In five studies, the patients received palliative care in a hospice or in an oncological centre [13, 16–19]. Cassileth and Vickers [12] had also included additional patients living and receiving palliative care at home. Kutner et al. [13] found that 49% of the patients were in a relationship.

Four of the selected studies were conducted in the USA [12, 13, 16, 17]. The two other studies were carried out in Asia [18, 19].

*5.2. Interventions.* The patients participating in the different studies mainly received a full-body massage or partial massage [13, 16–18]. Cassileth and Vickers [12] also offered a foot massage or a gentle touch massage. Osaka et al. [19] administered a hand massage only.

*5.3. Effect of Massage Therapy for Reducing Pain.* The symptom of pain was examined in five out of the six included studies [12, 13, 16–18]. The analgesic effect of massage therapy in oncological patients receiving palliative care could be shown in four out of these five studies [12, 13, 16, 18]. In four studies, the amount of pain reduction reached a statistically significant value (see Table 3) [12, 13, 16, 18]. The results also showed that massage therapy yielded a considerably better effect in patients with strong pain perception (VAS >4) [12, 13, 18]. However, Downey et al. [17] could not prove the effectiveness of massage therapy in terminal oncological patients through their study results (see Table 3).

Three out of six studies examined the long-term effects of massage therapy [13, 16, 18]. It is notable that the results turned out to be very divergent. Jane et al. [18] provided the longest followup of all analysed studies with a period of 16 to 18 hours. However, Jane et al. [18] found that massage therapy yielded no statistically significant effect on pain perception after this period (see Table 3). Kutner et al. [13] and Wilkie et al. [16] also analysed the lasting effect of massage therapy, and these authors found the immediate effects to be higher and the longer-term effects to be lower.

TABLE 1: Inclusion and exclusion criteria applied to the literature research (own illustration).

	Inclusion criteria	Exclusion criteria
Population	(i) Oncological patients older than 18 years of age	(i) Oncological patients younger than 18 years of age
	(ii) Advanced disease stage (terminal phase)	(ii) Oncological patients also suffering from a psychosis
Intervention	(i) Massage therapy	(i) Acupuncture and acupressure
	(ii) Full-body massage	(ii) Reflexology
	(iii) Partial massage	(iii) Aroma therapy massage
	(iv) Hand massage	(iv) Lymphatic drainage and all other forms of complementary medicine therapies
Outcome	(i) Pain	(i) All other disease symptoms and result parameters
	(ii) Anxiety	
	(iii) Depression	
Setting	(i) Palliative care in hospice facilities, at home or in an oncological centre	(i) Acute and intensive care unit
		(ii) Patients not receiving palliative care
Year of publication	(i) From 2000 to 2010	(i) Before the year 2000
Language	(i) English	(i) All other languages
	(ii) German	
	(iii) Italian	

Key words. Advanced cancer, terminal neoplasms, end-of-life, terminal disease, massage, massage therapy, Swedish massage, hand massage, palliative care, hospice care, end of life care, pain, anxiety, depression, mood.

TABLE 2: Studies excluded after examination of the full versions (own illustration in alphabetical order).

Study	Reason
Ernst [8]	Population comprises oncological children as well as adults. The intervention of massage therapy does not only refer to palliative care but also to curative and rehabilitative care.
Fellowes et al. [20]	This systematic review was published in 2004 and mainly refers to studies published before the year 2000.
Gorman et al. [21]	The aim initially set does not correspond to the results. The results of the initial aim will be published in a future study.
Gray [22]	Literature review of poor methodical quality (interventions and results were only partly stated).
Polubinski and West [23]	Practice report of poor methodical quality (data analysis, presentation of the results and description of the intervention).
Russell et al. [9]	This systematic review includes both children and adult oncological patients.
Smith et al. [24]	The intervention of the massage therapy refers to the characteristics of the massage therapy. The massage therapist is supposed to take into consideration, that is, the type of massage, the position of the patient, and so forth.
Wilkinson et al. [11]	This systematic review refers to adult oncological patients receiving care in any health care facility.

In addition to the lasting effect of massage therapy, Wilkie et al. [16] also examined the change in pain. Wilkie et al. [16] found a transformation from constant pain perception to intermittent or episodic pain perception in 14% of the participating patients. Summing up, it can be stated that massage therapy can achieve a reduction of pain lasting up to 18 hours [13, 16, 18].

Massage therapy shows a favourable effect in both the immediate and the continuous analysis of the results. In order to further support this effect, Kutner et al. [13]

and Wilkie et al. [16] studied the patients' consumption of analgesics after they had received massage therapy and compared it with the previous dosage. While the decrease in the consumption of analgesics was not statistically significant, the dosage of analgesics was subject to less fluctuation [16].

*5.4. The Effect of Massage Therapy for Reducing Anxiety and Depression.* The presence of pain can cause anxiety and depressions to develop or to become more pronounced [4]. For this reason, the effect of massage therapy in view of these

TABLE 3: Table summarising the results of the data extraction (own illustration in alphabetical order).

Author	Design and sample	Intervention	Assessment instrument	Results	Remark
Cassileth, Vickers, [12]	Quasiexperimental study Three groups: (i) classic massage: $n = 560$ , (ii) therapeutic touch: $n = 90$ , (iii) foot massage: $n = 585$ .	Three sessions lasting 30 minutes each with institutionalised patients and lasting 60 minutes with patients living at home.	(i) VAS (for measuring pain, fatigue, stress/anxiety, nausea, and depression)	Immediate effect: (i) VAS (reduction of pain): mean average value of change $-1.7$ ( $SD \pm 2$ ); $P = 0.05$ (ii) VAS (reduction of anxiety): mean average value of change $-2.8$ ( $SD \pm 2.5$ ) (iii) VAS (reduction of depression): mean average value of change $-1.2$ ( $SD \pm 1.9$ ) VAS $>4$ : highest effect (mean average value of change: pain: $-2.9$ ; anxiety: $-4$ ; depression: $-3$ )	No randomisation
Downey et al., [17]	Randomised controlled study Three groups: (i) massage: $n = 56$ , (ii) meditation: $n = 56$ , (iii) control group: $n = 55$ .	35-minute massage therapy or meditation	(i) MSAS (Memorial Symptom Assessment Scale); immediate pain reduction	(i) MSAS (immediate pain reduction): $P = 0.573$ Massage therapy does not show a statistically significant reduction of pain.	
Jane et al.; [18]	Observational study: (i) Intervention group: $n = 30$	Administration of a full-body massage. Duration: 45 minutes.	(i) PPI-VAS (present pain intensity using a vertical visual analogue scale: immediate change of pain intensity) (ii) MSF-MPQ (Short-Form McGill Pain Questionnaire and the Brief Pain Inventory): Quality and localisation of pain (iii) VAS (Anxiety-VAS)	Immediate effect: (i) PPI-VAS: $P = 0.001$ (ii) VAS: $P = 0.001$ Medium-term effect: (i) PPI-VAS and VAS at 15 minutes: $P < 0.002$ (ii) PPI-VAS and VAS at 20 minutes: $P < 0.000$ Long-term effect (at 16–18 hours postintervention) (i) MSF-MPQ for pain quality: $P = 0.08$ (ii) MSF-MPQ for pain localisation: $P = 0.04$	Control group missing



TABLE 3: Continued.

Author	Design and sample	Intervention	Assessment instrument	Results	Remark
Kutner et al., [13]	Multicentred randomised clinical study and meta-analytical trial Two groups: (i) intervention group: $n = 188$ , (ii) control group: $n = 192$ .	Six full-body massages administered within two weeks. Duration: 30 minutes each.	Immediate effect: (i) MPAC (Memorial Pain Assessment Card 0–10 scale): Immediate change in pain (ii) MPAC (Memorial Pain Assessment Card 0–10 scale): Immediate and lasting effect of mood Long-term effect: (i) BPI (Brief Pain Inventory BPI 0–10 scale): Long-term change in pain	Immediate effect: (i) MPAC (pain): mean average value of change $-1.87$ (ii) MPAC (mood): mean average value of change $-1.58$ Long-term effect: (i) BPI (mean average value of pain): mean average value of change $-0.33$ (ii) BPI (maximum pain intensity): mean average value of change $-0.74$ (iii) BPI (pain interference): mean average value of change $-0.33$	
Osaka et al., [19]	Observational study (i) Intervention group: $n = 34$	5-minute massage of the upper extremities	Immediate effect (i) STAI-state-score: Perception of anxiety	Immediate effect (i) STAI-state-score: $P < 0.001$	Control group missing
Willkie et al., [16]	Randomised controlled pilot study Two groups: (i) intervention group: $n = 15$ , (ii) control group: $n = 14$ .	Full-body massage twice a week over a period of two weeks. Duration: 45 minutes.	(i) PAT (Pain Assessment Tool, 0–10 Scale)	Immediate effect (i) PAT: $P < 0.05$ (after the first and third massages); $P < 0.09$ (after the fourth massage) Long-term effect (at two weeks postintervention) (i) Perception of pain: transition from constant pain to intermittent episodes of pain in 14% of the patients (ii) Intensity of pain: $P > 0.26$ ; reduction of pain in 42% of the patients	

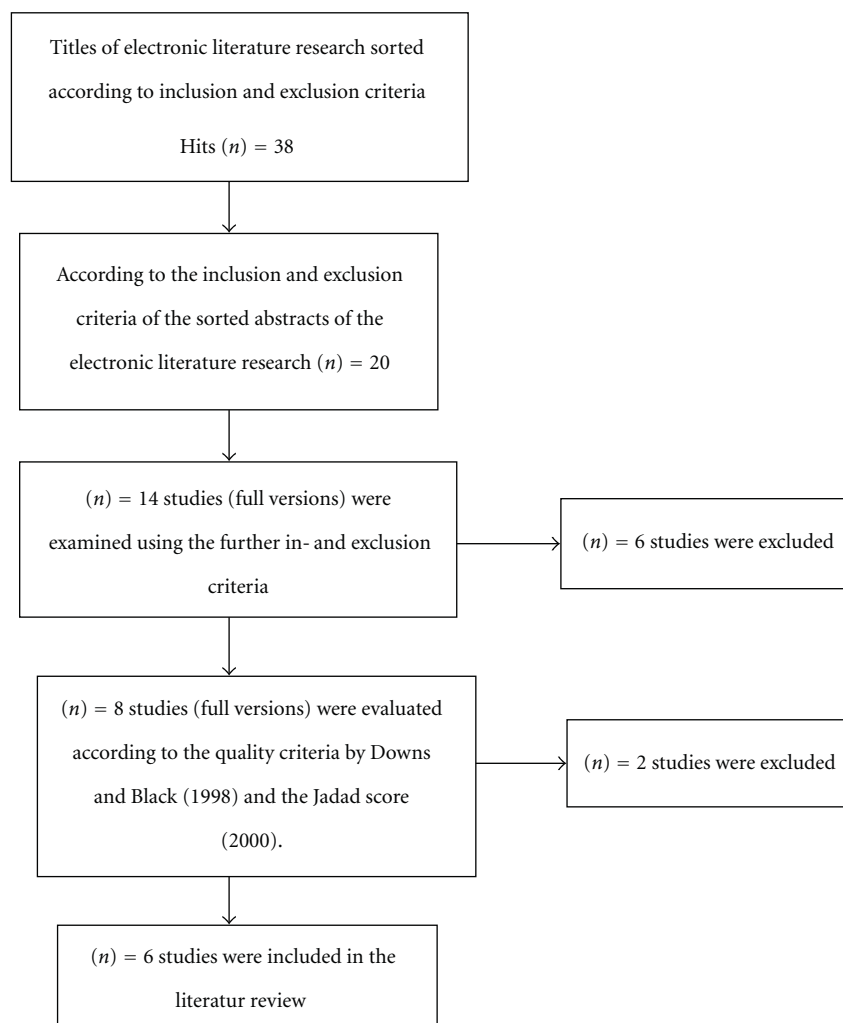


FIGURE 1: Synthesis of the literature selection (own illustration).

both disease symptoms was assessed in four out of six studies [12, 13, 18, 19].

The symptom of anxiety was examined in three out of six studies; however, the authors did not give a definition of anxiety [12, 18, 19].

The authors found physiological relaxation to be closely connected with the immediate reduction of anxiety, and they also found it to be of importance for a lasting effect [12, 18, 19]. Monitoring the heart and respiratory rate after the respective massage therapy may indicate a relaxation. While Jane et al. [18] were able to note a reduction of the rates, the results were not statistically significant. However, the patients' perception of anxiety immediately after the intervention had decreased statistically significantly (see Table 3) [18].

The study of Osaka et al. [19] was limited to the administration of a hand massage. Despite the short duration of only five minutes, a statistically significant reduction of the perception of anxiety could be achieved (see Table 3). Cassileth and Vickers [12] provided evidence for a considerably higher reduction both with regard to the perception of pain

and with feelings of anxiety in those patients who had stated a higher initial value of anxiety (VAS >4) before the intervention.

Physical contact plays an important role in reducing anxiety. During a massage, there is physical contact between the massage therapist (the caregiver) and the patient. A prerequisite for the effectiveness of the intervention is that the patient can accept this close physical contact [16, 17].

##### 5.5. The Effect of Massage Therapy for Reducing Depression.

The effectiveness of massage therapy for reducing depression and depressive states of mind was analysed in two of the selected studies as a secondary outcome [12, 13]. These two studies provided evidence for an improvement of the depressive mood through massage therapy. However, the authors of these two studies noted that the type of massage and the setting are to be taken into consideration as important influencing factors. The analysis of the results of Cassileth and Vickers [12] showed that a gentle touch massage or full-body massage provides for clearly better results in easing symptoms ( $P = 0.03$ ) than a foot massage. There

was no significant deviation ( $P = 0.12$ ) between the results of full-body massage and gentle touch massage.

Massage therapy thus has a favourable influence with regard to reducing anxiety and depression [13, 18].

None of the six studies found negative effects of massage therapy. There were not any incidents either in patients who already had bone metastases [13, 18]. However, limitations were indicated regarding the administration and the duration of massages. Some patients were unable to find a pleasant position causing the duration of the massage to be shortened [18]. Other patients were in a poor general state of health making it impossible to administer a full-body massage. For this reason, the massage therapist had to be flexible in carrying out the massage and concentrate on a partial massage if necessary [16, 17]. The massage sessions only had to be interrupted, if at all, due to telephone calls or visitors the patient wanted to receive [13].

## 6. Discussion

Massage therapy has proven to reduce the subjectively perceived symptom of pain in oncological patients receiving palliative care. Remission of the symptoms of anxiety and depression, examined secondarily, was also achieved.

Despite the different characteristics of the population, similar results with respect to reducing pain were achieved in four out of six studies [13, 16–18].

The qualitative data gained from the analysed studies has shown that interventions such as massage therapy only seem to be effective if the patient is treated with empathy and if a relationship between the massage therapist and the patient had been formed beforehand [13, 16]. This observation may support the hypothesis that desired or undesired effects of a massage are not only dependent on the interventions themselves but also on the time of the day, the setting, the position of the patient, and the type of massage; in addition, the attitude of the therapist plays an important role [13].

The perception of pain in the analysed studies was found to have different initial values, with the highest initial value being the one in the study of Jane et al. [18]. This study was conducted in Taiwan. While all patients were diagnosed with bone metastases, the cultural aspect may influence the subjective assessment of pain.

The assumption of Kutner et al. [13] and Wilkie et al. [16] that massage therapy can achieve substantial pain reduction and consequently lower the use of analgesics was not confirmed. Patients require sufficient pharmacological pain treatment; otherwise a state of relaxation before the beginning of the massage treatment cannot be achieved [18].

Only one study [16] found an increase of pain perception as a negative effect. Direct negative effects of massage therapy were not shown in the remaining examined studies. Fellowes et al. [20] note that possible digestive problems might be a negative effect of massage therapy and that patients should therefore be examined for this condition.

The assumption that massage therapies are to be considered contraindicated with malign tumours because tumour growth and metastasizing may be accelerated was refuted by

several authors [8, 16, 18]. In the analysed studies, both the authors and the patients mainly aimed at a full-body massage [12, 13, 16–18]. It had to be noted that some patients were unable to find a comfortable position or that the position needed to be changed permanently, thereby disturbing the massage and reducing its effect [18]. This suggests the conclusion that the duration of a massage plays a crucial role for achieving the desired effect and enabling the patient to experience relaxation during the massage therapy [22].

Kutner et al. [22] state that seriously ill patients might associate physical contact and touch with painful invasive techniques such as taking a blood sample. For this reason, the patient should be in a relaxed state before the beginning of the massage therapy and thoroughly informed about the massage therapy and the kind of physical contact.

As a matter of principle, thoroughly informing the patients and their relatives is of utmost importance in treating various symptoms of people who are to be provided with palliative care. Apart from information, direct communication gives the patient trust and a feeling of security, thus additionally increasing the amount of self-determination of the patient with respect to the treatment of potential symptoms [8]. A lack of information provided to the patient by the caregivers concerning the effect of massage entails the risk of the patient refusing massage therapy. In addition, the patients might gain the impression that they are robbed of the time they have left in a senseless way [16]. Massage therapy also enables the caregivers and the patients to deepen their relationship through mutual physical contact and to strengthen mutual trust [22]. The importance of thoroughly counselling and informing the patient cannot be estimated high enough.

Offering massage therapy is felt as a relief by hospice and palliative care patients. Patients whose social network is poor especially consider massage therapy a precious offer [25]. Those patients who experience little physical contact, affection and security may be more responsive to massage therapy. Therefore, it should especially be made available for socially isolated patients [9, 26].

Summing up, it can be stated that massage therapy is to be considered a cost-efficient, noninvasive intervention positively influencing and contributing to the reduction of pain, anxiety, and depression in seriously ill cancer patients [12, 17].

## 7. Implications for Research

Further studies are necessary in order to confirm the effectiveness of massage therapy with respect to reducing the symptoms in patients receiving palliative care. Future studies should deal with different kinds of massage therapy in order to be able to provide solid data for nursing practice within the vulnerable group of terminal oncological patients. Furthermore, uniform interventions, assessment instruments, and designs should be used for collecting the results to enable comparability.

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## Massage therapy for cancer patients: a reciprocal relationship between body and mind

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### ABSTRACT

Some cancer patients use therapeutic massage to reduce symptoms, improve coping, and enhance quality of life. Although a meta-analysis concludes that massage can confer short-term benefits in terms of psychological wellbeing and reduction of some symptoms, additional validated randomized controlled studies are necessary to determine specific indications for various types of therapeutic massage. In addition, mechanistic studies need to be conducted to discriminate the relative contributions of the therapist and of the reciprocal relationship between body and mind in the subject. Nuclear magnetic resonance techniques can be used to capture dynamic *in vivo* responses to biomechanical signals induced by massage of myofascial tissue. The relationship of myofascial communication systems (called “meridians”) to activity in the subcortical central nervous system can be evaluated. Understanding this relationship has important implications for symptom control in cancer patients, because it opens up new research avenues that link self-reported pain with the subjective quality of suffering. The reciprocal body–mind relationship is an important target for manipulation therapies that can reduce suffering.

### KEY WORDS

Massage, cancer, clinical trials, mechanistic studies, functional magnetic resonance imaging, magnetic resonance spectroscopy, meridians, brain

### 1. INTRODUCTION

Therapeutic massage is increasingly used in medical treatment programs to reduce symptoms, improve coping, and enhance quality of life<sup>1,2</sup>. Cancer patients use therapeutic massage to improve symptom control and their personal sense of wellbeing.

The largest published report on therapeutic massage is a prospective, nonrandomized, observational study of patients treated at the Memorial Sloan–Kettering Cancer Center in New York City<sup>3</sup>. That

study evaluated changes in symptom scores for pain, fatigue, stress and anxiety, nausea, and depression. Participants included 1290 cancer patients and 12 licensed massage therapists. Three variations of massage (selected mainly by the patients) were used: Swedish, light touch, and foot massage. The main outcome measures were data from symptom cards collected by independent observers that were recorded before and after the first session of massage. Symptom scores declined in severity by approximately 50%. Swedish and light touch massage were found to be superior to foot massage. However, the effects of massage were short-term.

This intriguing observational study illustrates many of the challenges in the research into therapeutic massage. The results indicated that the size of the effect for massage in cancer patients is clinically important, and the authors have since begun a randomized controlled trial.

The strength of the pilot study was the systematic collection of data from a large number of patients. Its main weakness was that it lacked a randomized control group, and therefore uncertainty remains regarding whether the intervention (massage) was the only factor that led to the improvement in the patients' symptom scores. The patients were mainly self-selected and probably believed that the intervention would be of benefit. Symptom improvement may be a consequence of conscious belief of benefit (the placebo effect) rather than the physical manipulation or touch. In addition to the manual therapy, other ambient factors such as verbal communication, background music<sup>4,5</sup>, and the scent of massage oils or aromatherapy products<sup>6,7</sup> may have influenced outcome. The largest effect of massage therapy may be on the reduction of trait anxiety and depression, with a course of treatment providing benefits similar in magnitude to those of psychotherapy<sup>8,9</sup>.

Currently there is a dearth of randomized controlled trials of massage therapy in cancer patients. The ones that have been reported show conflicting results that may be a consequence of variation in technique and use of non-validated symptom scores<sup>10–13</sup>.

A recent prospective randomized trial completed by the department of radiation oncology, CHUM Hôpital Notre-Dame, and the Canadian Touch Research Centre in Montreal<sup>14</sup> evaluated the effects of massage therapy on anxiety levels in patients undergoing radiation therapy. In a 6-month period, 100 patients undergoing radiation therapy were randomly assigned to either massage sessions or control sessions. The massage group received a 15-minute massage session before radiotherapy over 10 consecutive days. The control group did not receive massage. The State-Trait Anxiety Inventory and a Visual Analog Scale were used to evaluate both groups.

Following massage, anxiety scores in the patients were significantly reduced (by 43%) as compared with pre-massage scores. In both groups, patients experienced an average 20% reduction in anxiety between the first and the last radiotherapy session, but that result did not reach statistical significance. The massage therapy was associated with an immediate significant decrease in anxiety scores before radiotherapy (procedural anxiety), but it appeared to have no major impact on situational anxiety. However, the period of intervention and assessment was quite short, and so no conclusions can be drawn regarding long-term outcomes.

The most recent publication of a randomized controlled trial of massage for cancer patients is a multicentre study from four U.K. cancer centres and a hospice<sup>15</sup>. A total of 288 cancer patients, referred to complementary therapy services for clinical anxiety or depression, or both, were allocated randomly to a course of aromatherapy massage or to usual supportive care alone. Reduction in anxiety and depression was significant at 2 weeks after the intervention, but not at 6 weeks. The authors concluded that aromatherapy massage is an effective therapeutic option for the short-term management of mild-to-moderate anxiety and depression in patients with cancer. They suggested that the benefits of aromatherapy massage need to be compared with those of psychological interventions for this patient group.

To be able to design appropriate randomized controlled clinical trials, a better mechanistic understanding of therapeutic massage is required. In particular, the physiologic pathways involved need to be understood, including the connection between myofascial manipulation, blood flow, and central nervous system adaptations. Prolonged intervention with massage therapy may possibly induce more permanent neurophysiologic adaptations because of neural plasticity.

## 2. DISCUSSION

### 2.1 Clinical Relevance of Therapeutic Massage

Massage therapy involves the administration of combinations of specific physical manipulations applied in a systematic way, with varying intensity, direction,

rate, and rhythm, to the soft tissues of the body. The therapist may work within a particular theoretical model or framework, but the application of the manipulations is usually varied to fit the subject's health status, desired outcomes, and preferences, and the therapist's eclectic approach.

Various types of massage have evolved from various cultural traditions (Table 1). The Eastern techniques are usually based on theoretical systems that involve energy movement through channels called "meridians" or energy centres called "chakras." The classification and uniform practice of massage therapy techniques are not completely established. Validated definitions are a requirement for research protocols.

### 2.2 Massage Techniques

#### 2.2.1 Western Tradition

**Swedish massage** consists of continuous systematic strokes and deep kneading and stretching to loosen tight muscles and to reduce stress. The manual techniques specifically include *effleurage* (smooth gliding movements intended to evoke the relaxation response), *petrissage* (lifting, squeezing, wringing, or kneading of soft tissues to stimulate deep muscle and to increase circulation), *friction* (penetrating pressure with fingertips to reduce muscle spasm), and *tapotement* (rapid striking to stimulate tissues). Myofascial release techniques are employed to stretch and relax muscles that are tense or in spasm. Chronically tense muscles restrict blood flow and may be associated with fatigue. By applying specific pressure to connective tissues or fascia, normal alignment and function can be restored and chronic pain eliminated. The technique stretches and releases the fascia to release constriction and spasm, which causes pain.

**Soft-tissue release** is a technique that uses specific compression and precise extension, administered in a systematic manner, to release muscle spasm and scar tissue.

TABLE 1 Taxonomy of therapeutic massage

Western tradition	Swedish Myofascial Soft-tissue release Trigger-point (myotherapy) Neuromuscular Reflexive Circulatory, lymphatic Craniosacral Movement re-education
Eastern tradition	Shiatsu <i>Tui na</i> Acupressure Reflexology <i>Jin shin-do</i> Thai massage Polarity therapy

**Trigger-point therapy (myotherapy)** consists of stretching the myofascial tissue through sustained specific contact with pressure points, which helps to release tension and pain. Myotherapy is the diffusion of trigger points in muscles and the retraining of muscles to relieve pain. Trigger points are usually found in tight bands of muscle, which may radiate pain to other areas of the body. For instance, relieving a tense trigger point in the back could help to ease pain in the shoulder or to reduce headaches.

**Neuromuscular therapy** uses static pressure on specific myofascial points to relieve pain. This technique manipulates the soft tissue of the body (muscles, tendons, and connective tissue) and is thought to balance the central nervous system.

**Lymphatic drainage** is a very slow, light-touch, rhythmic massage that helps the body move lymph throughout the lymphatic vessels. It reduces edema and is described as removing toxins and boosting immunity.

**Craniosacral therapy** is a treatment approach that focuses on a gentle, hands-on technique used to evaluate and enhance the function of the cranial–sacral system. This hypothetical physiologic body system comprises the membranes and cerebrospinal fluid that surround and protect the brain and spinal cord. Craniosacral treatment is said to enhance the body’s natural healing processes, improving the operation of the central nervous system, dissipating the negative effects of stress, enhancing health, and strengthening resistance to disease.

**Movement re-education** uses slow, rhythmic movements and sustained stretches to help restore and increase the normal range of motion in a joint and surrounding structures, while assisting with muscle relaxation.

### 2.2.2 Eastern Tradition

**Shiatsu**, meaning “finger pressure,” is a Japanese massage, a form of physical manipulation of acupuncture points and meridians. The latter are thought to channel vital energy. Working on the same principle as acupuncture, practitioners apply pressure to key points known as *tsubos* (Chinese acupuncture points) on the surface of the body to stimulate the flow of energy, called *ki* (*qi* or *chi* in Chinese).

The *ki* flows in meridians beneath the skin. The practitioner works with fingers, thumbs, elbows, knees, and feet along the meridians to remove *ki* blockages or overactivity (called *jitsu*), to restore areas of *ki* depletion (called *kyo*), and to stretch and mobilize limbs to facilitate the flow of *ki*. **Tui na** is a similar system derived from Traditional Chinese Medicine.

**Acupressure** is an ancient Asian healing art that uses the fingers on the surface of the skin to press key

points that modulate energy flow through meridians and chakras. Manipulation of energy flow is speculated to stimulate the body’s immune system and enhance self-healing.

**Reflexology** consists of firm pressure to specific points on the feet, hands, or ears. Reflexology is based on the principle that these regions contain links that correspond to every other part of the body.

**Jin-shin do** is a form of acupressure that was developed in Japan by Jiro Muraim, who mapped out a healing system based on his own body’s acupressure points and their responses to energy flow. A combination of acupressure points called “safety energy locks” is held with the fingers for a minute or more.

**Thai massage (*nuad bo-rarn*)**, is an ancient bodywork system designed to unblock trapped energy and to improve vitality by applying pressure along the meridian channels.

**Polarity therapy** is a complete system developed by Randolph Stone, a chiropractor and osteopath who believed that illness or pain in the body was cured more readily in concert with awareness and relaxation. The treatments combine therapeutic bodywork, healing intent, dietary adjustments, counselling aimed at awareness, and yoga-style exercises. The term “polarity” describes the basic nature of the hypothesized “electromagnetic force field” of the body.

## 2.3 Safety of Massage Therapy

Massage administered by a registered (or licensed) massage therapist is very safe; complications are rare<sup>16</sup>. Healthy patients may occasionally experience bruising, swelling of massaged muscles, a temporary increase in muscular pain, or an allergic reaction to skin lubricants. Case reports have documented serious adverse events that include fractures and dislocations, internal hemorrhage and hepatic hematoma<sup>17</sup>, dislodging of deep venous thromboses and resultant embolism of the renal artery<sup>18</sup>, and displacement of a ureteral stent<sup>19</sup>. Adverse effects were associated mainly with massage delivered by laypeople and with techniques other than Swedish massage.

Practitioners need to be aware of the following special situations with cancer patients:

- Coagulation disorders, complicated by bruising and internal hemorrhage
  - Low platelet count
  - Medications: coumadin, acetylsalicylic acid, heparin
- Metastases to bone, complicated by fracture
- Open wounds or radiation dermatitis, complicated by pain and infection

In these situations, avoiding massage or lightening the touch over regions of risk may prevent com-

plications. No evidence suggests that massage therapy can spread cancer, although avoiding direct pressure over a tumour is a sensible precaution.

#### 2.4 Qualifications of the Massage Therapist

Requirements and laws for training and licensing vary from one U.S. state to another and from one Canadian province to another. Education, experience, certification, and licensing are all important credentials. Variation in philosophy and education is typical, and some massage therapists hold the mistaken belief that cancer is a contraindication to massage.

The Commission on Massage Therapy Accreditation in the United States considers 500 hours of training to be a minimum basic requirement. If a therapist is licensed in the United States, the initials LMT (licensed massage therapist) or LMP (licensed massage practitioner) are used after the therapist's name. In non-licensing states, a therapist should have a CMT (certified massage therapist) as the minimum qualification. The letters NCTMB indicate that the therapist has voluntarily taken and passed an examination given by the National Certification Board of Therapeutic Massage and Bodywork.

In Canada, the "gold standard" for massage therapy education, as set out by the Canadian Massage Therapists Alliance, demands a minimum of 2200 hours. However, considerable diversity exists in the number of hours of education and in the curricula and the types of educational institutions across the country. Some educational institutions have articulation agreements with universities for degree completion in science at the baccalaureate level.

Increasingly, massage therapy education in Canada is embracing an evidence-informed, outcomes-based model for curricula. Massage therapy is currently a regulated health profession in Ontario, British Columbia, and Newfoundland and Labrador. In the regulated provinces, students must successfully complete written and practical entry-to-practice examinations based on standards of practice set by the regulatory body. Successful applicants are eligible to use the designation MT (massage therapist) or RMT (registered massage therapist) and to qualify for third-party insurance coverage for services. In unregulated provinces and territories, well-organized professional associations impose educational standards similar to those in the regulated provinces. Membership in provincial associations may also include title designation and access to third-party insurance coverage for services.

For massage therapists working with cancer patients, specialized education and experience is essential. Programs for advanced training in massage care of patients with cancer are integrated into undergraduate curricula in the regulated provinces in Canada, and they are also available in continuing education programs in Canada and the United

States—for example, at Memorial Sloan–Kettering Cancer Center<sup>20</sup>. Important elements include safety, communication with oncologists, and recordkeeping. Massage therapists are also urged to participate in clinical trials, and courses on research methodology are encouraged.

#### 2.5 Clinical Evidence for the Effectiveness of Therapeutic Massage

The main indications for massage in general practice are back symptoms (20%), relaxation (19%), neck symptoms (17%), mood disorders (7%), and leg symptoms (4%). Therapeutic massage can be effective in treatment programs for pain. The mechanisms for reducing pain may consist of local effects on muscle and effects on the subconscious parts of the brain that control the experience of pain and emotions.

The most common current use of therapeutic massage is in back pain and sports-related injuries. In North America, back pain is reported to occur at least once in 85% of adults under the age of 50. Nearly all of these patients will experience at least one recurrence. Back pain is the second most common illness-related reason given for a missed workday and the most common cause of disability.

Back pain is non-specific in 70%–90% of cases and is associated with overuse or underuse of the back<sup>21</sup>. It manifests as tightening or spasm of the paraspinal muscles. Inflammation and swelling often occur in the joints and ligaments. Injured muscles often meet the diagnostic criteria for the so-called myofascial pain syndrome. Myofascial pain is characterized by muscles in a shortened or contracted state, with increased tone and stiffness. They often contain trigger points (tender, firm, 3-mm to 6-mm nodules that are identified on palpation of the muscles).

The Cochrane Collaboration has reviewed therapeutic massage for non-specific low back pain<sup>22</sup>. The authors concluded that massage therapy may be beneficial for patients with subacute and chronic non-specific low back pain, especially when combined with exercise and education.

The Cochrane Collaboration has also reviewed the role of therapeutic massage and aromatherapy for cancer-related symptoms<sup>6</sup>. They concluded that massage or aromatherapy plus massage confer short-term benefits on psychological wellbeing, with the effect on anxiety supported by limited evidence. Effects on physical symptoms may also occur.

Available evidence is sufficient to indicate that therapeutic massage is a useful discipline for the relief of a variety of symptoms that affect both the body and the mind. Clinical trials of better design are required to determine precise indications for massage and to ascertain whether specific techniques are more beneficial than others for particular symptoms. Mechanistic studies are required to understand the



psychophysiological effects of massage and the influence of those effects on clinical practice.

## 2.6 The Neuro-myofascial Biology of Touch and Massage

### 2.6.1 Potential Mechanisms

Therapeutic massage improves local musculoskeletal symptoms and function and can also positively affect mood state and pain threshold. The mechanisms by which massage exerts these multiple therapeutic effects are not yet known.

Manipulation of affected muscles and fascia (as in Swedish massage) induces local biochemical changes that modulate local blood flow and oxygenation in muscle. These local effects may influence neural activity at the spinal cord segmental level and could modulate the activities of subcortical nuclei that influence mood and pain perception. In addition, massage of acupuncture points away from the painful muscles, fascia, and facet joints (as in Japanese shiatsu massage) can also modulate the activities of the limbic system and subthalamic nuclei through poorly understood somatic pathways called meridians. Beneficial late effects are possible through neural plasticity and remodelling.

A meta-analysis of massage therapy research has discussed the limitations of using a medical model and suggests the use of a psychotherapy perspective<sup>8</sup>. The authors concluded that multiple applications of massage therapy reduced delayed assessment of pain and that reductions of trait anxiety and depression are massage therapy's largest effects, with a course of treatment providing benefits similar in magnitude to those of psychotherapy.

It is unclear whether the therapeutic benefits of massage occur primarily as a result of manipulation of muscle and ligaments, or through the brain as a result of interaction with subcortical components of the nervous system. Those components modulate autonomic functions that influence mood and the perception of pain via the limbic system and brainstem nuclei.

The multiplicity of symptoms relieved suggests that subconscious mechanisms are involved in the therapeutic effects of massage<sup>23-25</sup>. The subconscious or subcortical effects are to be distinguished from the placebo response, which stems from conscious awareness of the procedure. The relative contributions of the body-brain reciprocal relationship have not yet been delineated.

Like acupuncture, some types of massage may influence pain when applied to acupuncture points that are distant from the perceived site of the pain. Unlike therapy applied to pain at the level of the corresponding segment of the spine or dermatome, stimulation of acupuncture points influences central nervous system activity through pathways called meridians, which seem to follow musculoskeletal fascia

planes<sup>26,27</sup>. Functional magnetic resonance scanning (fMRI), positron emission tomography, and single-photon emission tomography have all demonstrated the effects of acupuncture on subcortical nuclei and the limbic system<sup>28-33</sup>. However, the influence of massage on those locations has not yet been evaluated in the published literature.

We hypothesize that massage alleviates pain through at least two pathways. The first pathway is direct manipulation of soft tissue and its innervations at the level of the involved dermatome. Manipulation of the muscle and fascia may induce local biochemical changes (lactic acid, adenosine triphosphate and phosphocreatinine) and can modulate blood flow and oxygenation of muscle<sup>34-36</sup>. Local changes may influence neural plasticity at the associated segmental level of the spinal cord and the release of neuropeptides (such as calcitonin gene-related peptide) that increase perfusion<sup>37,38</sup>. Myofascial stretching may transduce into electrophysiologic activity that can reduce pain and other symptoms through both a myofascial communication system and afferent neural pathways that modulate the subcortical nuclei and limbic system in the brain<sup>39</sup>.

When a peripheral source of pain persists, intrinsic mechanisms that reinforce nociception influence the pain. Chronic pain may be seen as part of a central disturbance accompanied by disinhibition or sensitization of central pain modulation. For example, patients with chronic whiplash syndrome may have a generalized central hyperexcitability from a loss of tonic inhibitory input, contributing to dorsal horn hyperexcitability<sup>40</sup>.

Transduction is the process whereby noxious afferent stimuli are converted from chemical to electrical neural messages in the spinal cord that communicate cephalad to the brainstem, thalamus, and cerebral cortex. Noxious mechanical, thermal, and chemical stimuli activate peripheral nociceptors that transmit the pain message through lightly myelinated A-delta fibres and unmyelinated C-fibres. Nociceptors are present in the outer annular fibrosis, facet capsule, posterior longitudinal ligament, associated muscles, and other structures of the spinal motion segment. Nociceptive modulation first occurs in the dorsal horn, where nociceptive afferents converge to synapse on a single dorsal root neuron. Hyperalgesia and allodynia initially develop at the injury site. However, when central sensitization occurs, the area of pain expands beyond the initial region of tissue pathology. Attachment to emotion may increase the perception of pain and could conceivably translate into exacerbation of somatic symptoms<sup>23-25,41,42</sup>. Pain is motivational and is not only a conscious somatosensory perception but also a motivational feeling attached to the limbic system<sup>43</sup>.

Swedish massage may have a direct effect primarily on muscle physiology and metabolism that, in turn, may communicate with the central nervous

system through the dorsal horn afferents at the particular dermatome level. In turn, spinothalamic fibres may later activate subcortical nuclei. On the other hand, by manipulating acupuncture points that lie on meridians, shiatsu massage may initially activate subthalamic nuclei that can reduce pain and combat other symptoms through both subcortical gating and modulation of the limbic system. Needling of acupuncture points *away* from a painful muscle may have a similar effect on reducing muscle pain through undefined mechanisms<sup>44</sup>. Studying time-dependent changes in the pain behaviour of low back tissues following massage therapy would provide valuable information to compare with time changes associated with mechanisms within the subcortical brain and the spinal segmental level<sup>45</sup>.

### 2.6.2 Noninvasive Techniques to Evaluate the Neuro-myofascial Biology of Touch and Massage

Magnetic resonance spectroscopy (MRS) and fMRI are powerful, noninvasive, non-radioactive techniques that may be used to evaluate the biology of manual therapies<sup>46</sup>. These techniques are based on the mechanics and theory of nuclear magnetic resonance (NMR). Signals can be detected only from atomic nuclear species having the quantum mechanical property of spin. The <sup>1</sup>H hydrogen atom is the most abundant of these. It provides the signal for routine MRI scanning, which produces images using the contrast of water and fat. The MRS technique measures levels of particular chemical species within an acquired tissue volume. It is especially useful for evaluating the physiology of myofascial tissue.

Currently the nuclei of greatest interest are <sup>1</sup>H, <sup>13</sup>C, and <sup>31</sup>P. Techniques that can be used to evaluate muscle physiology include

- <sup>1</sup>H MRS of myoglobin to assess the intracellular partial pressure of oxygen ( $pO_2$ ),
- <sup>31</sup>P MRS to assess metabolic capacity, and
- the combination of <sup>31</sup>P chemical shift imaging to assess local metabolic demand (oxygen uptake:  $VO_2$ ).

Blood oxygenation level–dependent (BOLD) fMRI can be used to image the neural correlates of touch and pain within the subcortical nuclei of the brain. This technique allows for indirect estimation of neural activity by detecting local hemodynamic changes, which are closely related to the integrated synaptic activity of nerve cells under physiologic circumstances<sup>46–48</sup>.

The pathways and neural centres involved in processing information from low-threshold mechanoreceptors of the skin, carried by fast-conducting myelinated afferent fibres, have been extensively investigated in nonhuman primates. Various cortical regions, including the anterior parietal cortex (primary somatosensory cortex), the lateral and poste-

rior parietal cortices, and motor-related areas responding to mechanical stimuli have been identified<sup>49</sup>. Humans appear to have an expanded somatosensory cortical network. Brain regions showing increased activity during vibrotactile input and tactile recognition extend beyond the parietal lobe to include portions of the frontal, cingulate, temporal, and insular cortices<sup>50</sup>. Available evidence suggests that the central correlates of tactile stimuli vary according to their hedonic qualities. Pleasant touch induces greater activation in the medial orbitofrontal cortex than does more intense, but affectively neutral tactile stimuli<sup>51</sup>. Additional areas activated by pleasant but not by neutral stimuli include a rostral portion of the midcingulate cortex and an area in or near the amygdala. These findings begin to identify parts of the limbic system that may underlie emotional, hormonal, and affiliative responses to skin contact.

The forebrain pain system partly overlaps structures involved in processing non-noxious input, but painful stimuli induce higher fMRI signal increases than non-noxious stimuli do. A direct comparison between the cortical correlates of touch and pain using event-related fMRI showed that, besides common activations in the contralateral postcentral gyrus and parietal operculum, pain is associated with stronger involvement of the contralateral midanterior insula, anterior portion of the midcingulate cortex, and dorsolateral prefrontal cortex<sup>52,53</sup>.

The autonomic responses to acute pain exposure usually habituate rapidly; the subjective ratings of pain remain high for more extended periods of time. Thus, systems involved in the autonomic response to painful stimulation—for example the hypothalamus and the brainstem—would be expected to attenuate the response to pain during prolonged stimulation. Areas in the brainstem are involved in the initial response to noxious stimulation, which is also characterized by an increased sympathetic response.<sup>54</sup> The perigenual anterior cingulate gyrus is a crucial location for integrating cognitive, emotional, and subconscious activities in the affective dimension of pain<sup>55,56</sup>. Pain-related modulation of fMRI signals in other regions involved in reward and emotion circuitry, such as the nucleus accumbens–ventral striatum and the orbitofrontal cortex, has also been demonstrated<sup>51</sup>. Evidence for amplified processing of mechanical stimuli in parietal, insular, and cingulate cortices has been obtained in patients with fibromyalgia, who show characteristically lowered pain thresholds. These studies have begun to shed light on the neural systems involved in central sensitization of nociceptive circuits in pathophysiologic conditions<sup>57,58</sup>.

The relative role of cognitive awareness versus subcortical modulation may be deciphered by using distraction and attention methodologies during an fMRI examination<sup>58–63</sup>. Attentional effects may be exerted

at various levels of the somatosensory system and involve activation of brainstem modulatory centres<sup>62,64</sup>.

In a study that employed covariation analysis, a functional interaction was found between the orbitofrontal cortex and perigenual anterior cingulate gyrus, the periaqueductal gray matter and posterior thalamus during pain stimulation and distraction, but not during pain stimulation *per se*<sup>61</sup>. Placebo-induced anticipation of pain relief treatment decreases brain activity in pain-related brain regions<sup>65</sup>.

When evaluating the physical effect of massage, psychophysiological techniques to discriminate between conscious attention and subconscious neurologic interaction are important. The brain networks underlying somatosensory perception are complex and highly distributed. A deeper understanding of perceptual-related and subconscious brain mechanisms therefore requires new approaches suited to investigate the spatial and temporal dynamics of activation in various brain regions and the functional interaction of those regions.

The development and application of refined tools for evaluating functional connectivity between neural populations will provide new insights into bottom-up and top-down mechanisms in somatosensory perception<sup>53</sup>. Current evidence from fMRI suggests that positive and negative tactile stimuli are both represented in the orbitofrontal cortex. The brain region in or near the amygdala is activated by pleasant touch. Most studies of the amygdala have tended to concentrate on its role in negative emotions, such as fear, but other imaging studies have found amygdala activation in response to affectively positive stimuli<sup>51</sup>.

Therapeutic massage may transduce mechanical signals through skin sensation, proprioception, and non-noxious muscle perception<sup>60</sup>. How this process translates into local electrophysiologic and chemical changes within muscle and fascia is not clear. Similarly, how therapeutic massage interacts with the central nervous system is not known, although some leads are emerging from research on touch. Preliminary physiologic investigations of muscle and the brain using NMR techniques suggest that therapeutic massage may have distributed effects that can reduce various unpleasant symptoms.

### 3. CONCLUSION: CHALLENGES FOR THERAPEUTIC MASSAGE RESEARCH

The mechanistic links between manipulation of body tissues and corresponding relief from a broad range of symptoms are not fully understood. The effects are distributed, and reciprocal interplay between the body and mind is evident. We have literally just “touched” the surface of meridian research, but the meridian system appears to be an important communication link between myofascial tissue and the nervous system. This traditional communication system

appears to link biochemical, electrical, and physiologic changes in the myofascial tissue with subcortical neurologic activity and changes in cognitive experience. The implications for symptom control in cancer patients are important, opening up new research avenues that link self-reported pain with the subjective quality of suffering. The reciprocal body–mind relationship and its manipulation is an important target for therapies that can reduce suffering.

The U.S. National Center for Complementary and Alternative Medicine held a conference titled *The Biology of Manual Therapies* during June 9–10, 2005, at the National Institutes of Health (NIH) in Bethesda, Maryland<sup>66</sup>. The goal was to define three to five of the most critical research questions involved in gaining an understanding of the biology of manual therapies. Table II outlines the research recommendations. Table III lists current clinical trials involving massage and cancer (found by searching the NIH clinical trials database at [clinicaltrials.gov](http://clinicaltrials.gov)). At June 2006, seven studies investigating the effects of massage therapy in cancer patients were registered and active.

More work is required on the methodology for conducting clinical trials of therapeutic massage. Validation of the massage technique is essential. In clinical practice, both the site of massage and the technique may vary according to the practitioner’s personal judgment. In an intent-to-treat study, such variation may be valid, but excellent records should be kept to determine that the therapy was within acceptable degrees of freedom. When comparing various massage-therapy techniques, rigorous validation of the practitioners’ interventions is necessary. The design of sham massage is challenging. The control may involve touching non-therapy sites only, using untrained volunteers, providing education only, or employing a waiting list control. In addition, because thoughts of intent to heal are considered important, sham therapists may be asked to use personal distraction techniques. Defined subject populations (with appropriate inclusion and exclusion criteria) and validated outcome scales are essential.

In addition to the manual therapy itself, ambient factors such as environment, music, and aroma can influence outcome. The objectivity of research is complicated by the relationship and transference between therapist and client. The possibility exists that benefits may come about more from factors such as the recipient’s attitude toward massage therapy, the therapist’s personal characteristics and expectations, and the interpersonal contact and communication that take place during treatment than from the specific form of massage therapy used or the site to which it is applied.

Only a combination of mechanistic research and well-designed clinical trials will clarify the reciprocal relationship between body and mind and will determine the utility of manual therapies for symptom control in cancer patients.

TABLE II Recommendations from the Conference on the Biology of Manual Therapies, National Institutes of Health, National Center for Complementary and Alternative Medicine; Bethesda, Maryland; June 9–10, 2005

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1. General questions relating to mechanisms of action for manual therapy.
    - Determine the effects of manual therapy in normal experimental animals and in animal models of tissue injury, including
      - behavioural responses to painful stimuli,
      - fibroblast response,
      - gene expression.
    - Does applying very superficial manual therapies, such as light massage, that mainly activate skin afferents produce different effects on the nervous system, immune system, and endocrine system compared with manual therapies that also involve activation of muscle afferents?
    - Does paraspinal tissue have any unique physiology compared to appendicular tissues? Is this related to the reported clinical efficacy of manual therapies?
    - Do manual therapies produce long-lasting changes in the biomechanics of the spine, torso, or limbs? Are these changes associated with altered activity in the nervous system? Immune system? Endocrine system?
    - Identify valid, reliable biomechanical measures (for example, posture, kinematics, kinetics, functional imaging) that can be used to
      - distinguish between healthy and non-healthy tissues.
      - subcategorize patients/clients with musculoskeletal disorders.
    - Develop imaging techniques that can be used to capture dynamic *in vivo* responses to biomechanical signals in healthy and non-healthy tissues.
  2. Questions relating to peripheral mechanisms of action for manual therapy.
    - Determine and compare the discharge characteristics (that is, the pattern or frequency of action potentials) of primary sensory neurons in response to various types of manual therapies (for example, high-velocity loading compared with slower loading rates). Is there any correlation with reported efficacy?
    - How do various manual therapies affect peripheral nerve biomechanics?
    - What path of mechanical load transmission do various manual therapies take through the body?
  3. Questions relating to central mechanisms of action for manual therapy.
    - Determine how different types of manual therapies affect the signalling properties of neurons in the central nervous system or autonomic nervous system. That is, do they produce long-lasting changes?
    - Do different types of manual therapies evoke different patterns of neural activity in the central nervous system or autonomic nervous system?
    - Determine effects of peripheral mechanical stimuli (for example, manual therapies) on spinal cord gating mechanisms and synaptic plasticity.
    - Develop and use human models of experimental pain to determine the role of the nervous system, if any, in explaining how manual therapies work. Specific areas of investigation could include
      - the effects of temporal summation,
      - the effect of manual therapies on windup,
      - quantitative sensory testing.

Non-neural outcomes might include

    - heart rate and heart rate variability,
    - laser Doppler blood flow and blood pressure changes,
    - respiratory frequency,
    - CO<sub>2</sub> levels,
    - catecholamine levels,
    - circulating cells (numbers/subsets/response),
    - cytokines,
    - vaccine response (immunoglobulin response),
    - contact hypersensitivity,
    - C-reactive protein,
    - lymphatic flow.
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TABLE III Current North American clinical trials involving therapeutic massage and cancer patients

1. Phase II randomized pilot study of massage therapy in patients with cancer pain
  - Memorial Sloan–Kettering Cancer Center, New York, New York
  - Principal investigator: Barrie R. Cassileth PhD (telephone: 646-227-2149)
  - To determine whether the effects of massage therapy in patients with cancer pain are sufficiently promising to warrant a definitive trial
  - Interventions:
    - Arm I (massage therapy): Patients receive a light touch (“Reiki”) massage over 45 minutes
    - Arm II (volunteer visit control): Patients receive a 45-minute visit from a trained volunteer who will be available to sit quietly or talk with the patient to discuss issues of concern, as desired by the patient. Volunteers will not touch the patient except to pat their shoulder or briefly hold their hand.
    - Arm III (quiet time control): Patients receive 45 minutes of quiet time.
  - Pain and mood are assessed at baseline, immediately after treatment, at 6 hours and 24 hours after treatment, and then daily for the next 5 days after treatment.
2. Randomized study of hypnosis, massage therapy, and healing touch in patients undergoing chemotherapy for ovarian epithelial or primary peritoneal cavity cancer.
  - University of Minnesota Cancer Center, Minneapolis, Minnesota
  - Chair: Patricia L. Judson MD (telephone: 888-226-2376)
  - Interventions:
    - Arm I (standard therapy): Patients undergo standard chemotherapy for ovarian epithelial or primary peritoneal cancer.
    - Arm II (standard therapy with complementary alternative medicine): Patients undergo chemotherapy as in arm I. Patients also undergo massage over approximately 30 minutes and healing touch therapy over approximately 30 minutes once during courses 1–6, and hypnosis once over 30–60 minutes during courses 1, 2, and 4.
  - Primary aim: To determine whether quality of life is improved in patients with ovarian epithelial or primary peritoneal cavity cancer receiving hypnosis, massage therapy, and healing touch and standard chemotherapy as compared with patients receiving standard chemotherapy alone.
  - Secondary aim: To determine changes in immunologic response markers, chemotherapy side effects, and complication rates in the patients.
3. A randomized study of polarity or massage therapy to reduce fatigue in breast cancer patients during radiation therapy.
  - University of Rochester, Rochester, New York
  - Principal investigator: Karen Mustian PhD (telephone: 585-275-0690)
  - A randomized three-arm clinical trial of an intervention examining the efficacy of polarity therapy for the relief of fatigue associated with radiation treatments in breast cancer patients. Patients who meet the eligibility criteria and who have signed consent will be randomized to one of three trial arms:
    - Polarity treatment
    - Massage treatment
    - Standard care
  - Three treatments will be administered in the 4th, 5th, and 6th calendar weeks of radiation treatment. Weekly blood draws will assess cytokine levels. In addition, 6 saliva samples will be gathered per day for 2 days of each of the 4 study weeks to assess cortisol levels. An actigraph will be worn for the 28 study days to assess activity and sleep. Patients randomized to the standard care arm will receive a polarity or massage treatment gratis following the completion of the study.
  - Primary outcomes: Fatigue, subjectively by the Brief Fatigue Inventory and the Multidimensional Fatigue Symptom Inventory and objectively by actigraphy; mood by the Fatigue/Inertia subscale of the Monopolar Profile of Mood States.
  - Secondary Outcomes: Health-related quality of life (Functional Assessment of Chronic Illness Therapy–Fatigue); quality of sleep assessed subjectively with the Pittsburgh Sleep Quality Inventory and a sleep diary.
4. Does scar massage improve postoperative pain and function in women with breast cancer? A randomized controlled study.
  - University of British Columbia (BC Cancer Agency), Victoria, British Columbia
  - Principal investigator: Pauline Truong MD (telephone: 250-519-5512)
  - A prospective randomized controlled trial design involving women who have undergone breast cancer surgery. Subjects will be randomized into two cohorts: scar massage (intervention group) and no scar massage (control group).
  - Primary outcomes: Scar-related pain (scored using the McGill Pain Questionnaire–Short Form)
  - Secondary outcomes: Upper-body range of motion, physical parameters of the scar (pliability, scar height, vascularity, and pigmentation scored using the Vancouver Scar Scale), lymphedema (evaluated by arm circumference measurements), and quality of life.
5. Massage therapy for breast cancer-related lymphedema.
  - University of Arizona, Tucson, Arizona
  - Principal investigator: Marlys Witte MD (telephone: 520-626-6118)
  - Randomized, single-blind, active-control, parallel-assignment efficacy study
  - Patients will be randomly assigned to either treatment with manual lymph drainage alone or a combination of manual lymph drainage and compression bandaging. Patients will be treated in 10 one-hour sessions over 2 weeks. They will also undergo lymphangioscintigraphy to depict the function of their lymphatic system. Patients will continue self-treatment at home and will be followed for 6 months.

*continued*

TABLE III *continued*

- Purpose is to examine the short-term and long-term efficacy of massage therapy alone as compared with massage therapy plus compression bandaging in the treatment of breast cancer treatment-related swelling of the arms and legs.
6. DELTA: A randomized trial of decongestive lymphatic therapy (DLT) for lymphedema in women with breast cancer.
    - Ontario Clinical Oncology Group, Hamilton, Ontario
    - Principal investigator: Ian Dayes MD (telephone: 905-527-2299, ext. 42610)
    - Randomized patients receive either
      - standard of care, or
      - standard of care plus DLT (five massage sessions per week during 4 consecutive weeks).
    - Primary evaluation of all patients is recorded 6 weeks after randomization by measuring the affected limb and comparing with the unaffected one. Extended follow-up of one year will be conducted.
    - Primary outcomes: Percent reduction in excess arm volume at 6 weeks as calculated from circumferential arm measurements.
    - Secondary outcomes: Measurement of arm function, quality of life
  7. REST (reducing end-of-life symptoms with touch): Efficacy of massage at the end of life.
    - University of Colorado, Denver, Colorado
    - Principal investigator: Jean S. Kutner MD (telephone: 303-372-9088)
    - Participants will be randomly assigned to receive 6 sessions of either moving or non-moving touch therapy, in addition to usual hospice care, for 2 weeks. Moving touch therapy consists of massage therapy in which a trained therapist continually touches a person's body. The non-moving touch therapy will be conducted by volunteers who have no previous experience in massage. Participants in this group will have a volunteer rub specific body parts for three-minute intervals. Because current evidence suggests that thoughts of healing may influence the effectiveness of touch therapy, volunteers in the non-moving therapy group will distract their minds to avoid thinking of healing processes. In both groups, the person administering the touch therapy will note all interruptions during a session, including talk, music, and television. Interviews about medication use, pain, and quality of life will be used to assess participants; these interviews will be conducted at study start, immediately before and after each therapy session, and at weeks 1, 2, and 3.
    - Primary outcome: Decreased pain level.
    - Secondary outcomes: Less total analgesic medication use, improved quality of life, decreased physical symptom distress, decreased emotional symptom distress

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## Research Article

# Reflexology versus Swedish Massage to Reduce Physiologic Stress and Pain and Improve Mood in Nursing Home Residents with Cancer: A Pilot Trial

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*Objective.* The purpose of this pilot study was to investigate and compare the effects of reflexology and Swedish massage therapy on physiologic stress, pain, and mood in older cancer survivors residing in nursing homes. *Methods.* An experimental, repeated-measures, crossover design study of 18 nursing home residents aged 75 or over and diagnosed with solid tumor in the past 5 years and following completion of cancer treatments. The intervention tested was 20 minutes of Swedish Massage Therapy to the lower extremities, versus 20 minute Reflexology, using highly specified protocols. Pre- and post-intervention levels of salivary cortisol, observed affect, and pain were compared in the Swedish Massage Therapy and Reflexology conditions. *Results.* Both Reflexology and Swedish Massage resulted in significant declines in salivary cortisol and pain and improvements in mood. *Conclusions.* Preliminary data suggest that studies of Swedish Massage Therapy and Reflexology are feasible in this population of cancer survivors typically excluded from trials. Both interventions were well tolerated and produced measurable improvements in outcomes. Further research is needed to explore the mechanisms underlying the potential benefits of these CAM modalities in this patient population.

## 1. Introduction

Cancer is a leading cause of morbidity and mortality in the older population. Demographic trends in the aging of the population, coupled with trends in cancer diagnoses and treatment, will shift much of the care of older cancer survivors to the nursing homes setting. Older cancer survivors suffer many long-term side effects of cancer and its treatment that threatens their quality of life [1]. Pain and distressing symptoms are common and often difficult to treat pharmacologically. Thus, investigations into the care of nursing home cancer survivors are particularly relevant.

Complementary therapy interventions have shown great promise in reducing distress and promoting comfort in cancer survivors [2, 3]. Two of the most widely accepted manual

CAM therapies are reflexology and massage therapy. Recent reviews suggest that these modalities may have beneficial effects such as decreasing pain and increasing quality of life in patients who have cancer [4, 5]. However, study limitations (small sample size, lack of adequate control groups) and conflicting results made firm conclusions impossible [6, 7]. Moreover, while results of earlier studies are encouraging, these studies have not compared the physiologic responses to these treatments and have typically excluded older cancer survivors. Thus, in order to advance this area of research, the next step is to test the feasibility and compare the efficacy of these interventions using physiological and behavioral measures of distress. This pilot study served as a first step to evaluating the use of a Swedish Massage and a Reflexology

protocol for relief of distress in nursing home cancer survivors.

## 2. Materials and Methods

An experimental, repeated-measures, crossover design study of 18 older cancer survivors residing in nursing homes was conducted from 2009–2011. This design was selected because it offered advantages over parallel group trials including: (a) that each subject acted as his or her own control, eliminating among-subject variation; (b) that fewer subjects were required to obtain the same power; (c) that every subject received both conditions [8].

Directors of nursing at 3 large nursing home facilities in Pennsylvania approached residents for permission to be contacted for the study. The medical director at each facility gave final approval to contact the residents, and their responsible party for consent. Subjects were included if they were (a) residents of the nursing home for at least 6 months, (b) aged 75 or over, (c) diagnosed with a solid tumor (lung, prostate, colorectal, breast) in the last 5 years (d) completed cancer treatments, and (d) capable of giving informed consent, or had an acceptable surrogate capable of giving consent on the subjects behalf. Exclusion criteria were based on the relevant literature that outlines suitability for elders receiving massage-based treatments and included [9, 10] (a) evidence of rapid terminal decline, recent traumatic injury, or hospitalization within the 2 weeks, (b) skin diseases: acute psoriasis, eczema, severe bruises, skin infection or ulceration, open wound, recent burn or fracture, (c) inflammatory conditions: acute rheumatoid arthritis, systemic lupus erythematosus, ankylosing spondylitis, Reiter's syndrome, (d) cardiovascular conditions: history of deep vein thrombosis, phlebitis, angina, a pacemaker, (e) recent discontinuation (less than 2 weeks) of physiotherapy that included massage therapy, (f) fever (recent temperature  $>102^{\circ}$  within past 24 hours), or (g) currently prescribed anticoagulant medication (e.g., Coumadin, Heparin, or derivative substances).

Consenting subjects were randomized into two conditions. Those assigned to the first group received one week of friendly visits (for baseline assessment) followed by four weekly sessions of Swedish Massage, a one-week washout period, then 4 weekly sessions of Reflexology. Those assigned to the second group received one week of friendly visits followed by four weekly sessions of Reflexology, a one-week washout, then 4 weekly sessions of Swedish Massage. The protocols were developed based on Standards of practice and expert guidelines of the American Massage Therapy Association (AMTA) and National Certification Board for Therapeutic Massage and Bodywork standards of practice [11]. To reduce the extraneous effects of multiple interventionists, the friendly visits, massage, and reflexology were provided by a single, certified, reflexology/massage therapy provider. The protocols were offered at the same time (between 2 and 4 pm) on the same day each week. All subjects received an equal number and duration of sessions in the privacy of their room in the nursing home. There was no script for any of the sessions. It was normal for the practitioner to converse with the subject and give a brief

overview of the session. The subject would normally "lead" the conversation.

*2.1. Intervention Protocols.* The Swedish Massage protocol was prespecified and involved a combination of 10 minutes of light stroking and light pressure using the whole hand to plantar and dorsal surfaces and all tissue from the toes to the knee of each leg (20 minutes total). The Reflexology Intervention was based on the original Ingram method and used a combination of finger pivot and thumb walking techniques to the base of the foot and the toes that correspond with reflex points. The sole, instep, and lateral aspects of the foot were stimulated 5 times, each foot for a total of 10 minutes per foot (20 minutes total). The interventionist was licensed and certified in both modalities and underwent additional training in the detailed protocols and was assessed for fidelity as random intervals [12].

*2.2. Study Outcomes.* Baseline data collection began in September 2009 and included an intake assessment of demographic and medical information. Data collectors blind to group condition performed follow-up data collection. Each data collection encounter was designed to take less than 15 minutes and was completed at four intervals across the day: (1) early morning: 7–7:30 am, (2) mid morning: 11–11:30 am, (3) early afternoon 1–1:30 pm, (4) late afternoon: 4–4:30 pm. These times were selected to maximize the opportunities to observe the subjects mood and to capture the diurnal variation in salivary cortisol, while avoiding interruption of the interventionists' presence.

Over the course of the intervention day, 3 distinct types of data were collected: (1) saliva samples from which salivary cortisol was measured; (2) 5-minute observation of affect (e.g., positive and negative mood) using the Apparent Affect Rating Scale (AARS) [13, 14]; (3) pain using the checklist of nonverbal pain indicators (CNPI) [15, 16]. Measures were then averaged to provide daily mean values for each outcome of interest.

*2.2.1. Salivary Cortisol.* The primary outcome of interest was physiologic distress as measured daily average salivary cortisol [17]. Since cortisol possesses diurnal qualities, samples (of .5–1 mL volume each) were collected across the day to capture the circadian patterns. Assays were collected using oral swabs made of a nontoxic, inert polymer shaped into a  $30 \times 10$  mm cylinder designed to help filter mucus and other matter from the sample. The swabs were held under the tongue for one minute starting on awakening (7–7:30 am) and at 3 additional intervals (midmorning, early afternoon, late afternoon). Care was taken when collecting saliva to avoid collection after mouth cleaning, meals, snacks, or medications. Saliva samples were transferred to 2 mL cryovials and stored frozen (at least  $-20^{\circ}\text{C}$ ) until assayed. All samples were assayed for cortisol using a highly sensitive enzyme immunoassay 510 K cleared for use as an in vitro diagnostic measure of adrenal function (Salimetrics, PA). The test had lower limit of sensitivity of .007 ug/dL, range of sensitivity from .007–3.0 ug/dL, and an average intra- and

TABLE 1: Group means and SDS for outcomes, difference scores (change in treatment values), and effect size estimates.

Outcome of interest	Arm	Means $\pm$ SD			ES	$P^{\circ}$
		Baseline	Post-treatment	Change from baseline		
Salivary cortisol (ug/dL) <sup>1</sup>	R	.257 $\pm$ 1.1	.157 $\pm$ .09	-0.10*	-.13	0.23
	M		.209 $\pm$ .08	-0.05*	-.10	
Positive affect <sup>2</sup>	R	1.58 $\pm$ 0.93	2.25 $\pm$ 0.9	+0.67*	+.73	0.16
	M		1.94 $\pm$ 1.0	+0.36*	+.30	
Negative affect <sup>3</sup>	R	1.17 $\pm$ .95	.823 $\pm$ .72	-0.35*	-.42	0.16
	M		.941 $\pm$ .82	-0.23*	-.30	
Pain <sup>4</sup>	R	2.29 $\pm$ 1.2	2.00 $\pm$ .79	-0.29*	-.35	0.22
	M		1.58 $\pm$ 1.2	-0.71*	-.77	

<sup>1</sup>Higher score: higher physiologic stress.

<sup>2</sup>Higher score: higher positive affect.

<sup>3</sup>Higher score: worse negative affect.

<sup>4</sup>Higher score: higher observed pain

R: Reflexology, M: Swedish Massage; SD: standard deviation; ES: standardized effect sizes.

<sup>o</sup> $t$ -test comparing Reflexology and Swedish Massage Conditions.

\*Indicates paired  $t$ -test results demonstrating significant change from baseline ( $P < .05$ ).

interassay coefficients of variation of less than 5.0% and 10.0%.

**Observation of Affect.** Positive and negative mood was measured by the AARS scale which consists of five items (positive mood: alertness, pleasure; negative mood: sadness, anxiety, anger), requires 5 minutes of observation, and provides reliable and valid readings of positive and negative affect and levels of alertness for both cognitively intact and impaired nursing home residents [13, 14]. Psychometric properties have been well demonstrated in the sample population and documented in earlier studies, including interobserver reliability (ICC = 0.91 for the current study), convergent and discriminant validity, and support for its two-factor (positive mood, negative mood) structure [14].

**Pain.** The CNPI, a behavioral observation scale for non-verbal older adults with cognitive impairment, is one of the more rigorously tested pain assessment instruments [15, 16]. The CNPI is composed of six items (nonverbal vocal complaints, facial grimacing/wincing, bracing, restlessness, rubbing, and verbal vocal complaints), that are rated as presence or absence of pain and has good face validity with verbal, horizontal visual, vertical visual, and faces pain scales, and established interrater reliability for periods of rest and movement [15, 16].

**2.2.2. Statistical Analysis.** The feasibility of the study was assessed by examining the rates of recruitment, retention and suitability of the outcome measures. The efficacy of Swedish Massage Therapy versus Reflexology were compared to baseline values for each outcome variable based on subjects

who had available data for both pre- and post-treatment time points. The treatment effect size was computed on all change scores with a Cohen's  $d$  [18], based on difference between the averages of the post-treatment values minus the average of the baseline values for each condition. Paired  $t$ -tests were used to compare Swedish Massage Therapy versus Reflexology with respect to their mean change baseline to post-treatment values as described above (Table 1). Since cortisol is not normally distributed, all analyses used the log-transformed hormone values; however, nontransformed data are reported in the tables and text to facilitate interpretation.

### 3. Results and Conclusion

Of the 45 residents approached for consent, 20 consented, 12 declined, 11 did not return consents, 1 resident died, and 1 resident was hospitalized while invitations to participate were in the mail. Of the 20 that consented, 2 were hospitalized prior to baseline data collection and were unable to participate, thus we randomly assigned 18 individuals to the 2 groups. The ages of participants averaged 90 years and ranged from 85 years to 98 years. Approximately 66% ( $N = 12$ ) were female and 33% ( $N = 6$ ) were male. Mental status as measured by the Mini-Mental State score ranged from 0 to 18 with an average score of 10.17, indicating significant cognitive impairment. The types of cancer represented in the sample were: breast cancer ( $n = 7, 39\%$ ), prostate cancer ( $n = 5, 28\%$ ), colorectal cancer ( $n = 5, 28\%$ ), and lung cancer ( $n = 1, 5\%$ ). All study procedures were well tolerated by the study participants. No drop outs occurred during the study period and no adverse events or outcomes were observed.

Table 1 shows the group means and difference scores associated with the outcomes of interest for the Reflexology and Swedish Massage conditions, along with Cohen's  $d$  effect size estimates. Within group, comparison of the treatment results revealed that both conditions were associated with a statistically significant changes in salivary cortisol, negative affect, positive affect, and pain ( $P < .05$ ), when post-treatment values were compared to the baseline values, with a slight advantage indicated for Reflexology. Cohen's  $d$  effect size estimates ranged from  $d = .1$  to  $d = .77$ , and on average were in the medium range of effect [18]. According to between-group  $t$ -tests, no significantly greater improvement in outcomes resulted when the two treatment conditions were compared.

#### 4. Discussion

The results demonstrated the feasibility of providing and studying manual CAM modalities in nursing home residents with cancer and indicate the need for larger trials. Although our sample size was small, the data suggested some efficacy of the Massage and Reflexology intervention, particularly related to a reduction in observed pain, observed affect, and measures of stress. Although most of the effectsizes noted were in the medium range, a larger study would be needed to determine whether the effect sizes suggested in this pilot study can be confirmed with statistically significant results. Reflexology appeared to offer a slight benefit on outcomes when compared to Swedish Massage, although this benefit was not significant. The mechanism underlying this potential benefit may be attributed to the stimulation of the acupressure points during Reflexology treatments. This hypothetical mechanism may deserve further investigation in a larger trial.

The study has several important limitations. Participants may not be representative of nursing home residents with cancer. The three recruitment sites served a relatively homogenous population of Caucasian older adults. Also, by design the study included only English-speaking residents who were medically stable and not actively undergoing cancer treatments. Thus the subjects may systematically differ from residents with cancer who did not meet eligibility criteria. Moreover, because the sample was not randomly selected from the nursing home population, it is unclear whether the responses we observed are generalizable to other groups of older cancer survivors. In addition, we were unable to assess clinically significant improvements in cortisol, pain, or mood since clinically significant change of the measures used in this study has not been determined. Moreover, the lack of normative data on measures of salivary cortisol in this population limited our ability to test for clinical meaningful changes in this biomeasure. The sample size did not permit us to explore the interaction of covariates in this sample. We were unable to include a usual care control group due to sample size and budget restrictions. Another limitation of this study is the concern that small samples may not be truly representative of the range of subject heterogeneity that can be observed in a larger sample; thus, the effect-size estimates may be larger than would be observed in a larger replication study [19].

These limitations notwithstanding, this pilot study had a number of strengths, which included a randomized design, stringent manualized conditions, and evaluations that were blind to treatment assignment. The results suggest that both Swedish Massage and Reflexology were well tolerated and potentially beneficial in reducing distress and pain and improving mood in older cancer survivors residing in nursing homes. Previous research has supported the value of CAM modalities such as massage and reflexology for relieving distress in older adult patients with cancer and offer guidelines for therapists [20, 21]. For example, the REST study demonstrated significant benefits of massage on pain and mood in adults with advanced cancer [22]. However, given that few clinical trials of massage or reflexology in a frail, institutionalized, older patient population have been published, few direct comparisons are available. Nonetheless, our results confirm earlier studies on CAM modalities in cancer survivors and extend the findings to a sample of participants typically excluded from earlier trials.

These preliminary findings support further study of manual CAM modalities as part of a palliative approach to institutionalized cancer survivors. Developing additional insights into physiological effects and mechanisms of manual CAM interventions is a crucial component of the scientific evidence base needed to guide future clinical practice for older cancer survivors.

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## Research Article

# Massage for Children Undergoing Hematopoietic Cell Transplantation: A Qualitative Report

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*Background.* No in-depth qualitative research exists about the effects of therapeutic massage with children hospitalized to undergo hematopoietic cell transplantation (HCT). The objective of this study is to describe parent caregivers' experience of the effects of massage/acupressure for their children undergoing HCT. *Methods.* We conducted a qualitative analysis of open-ended interviews with 15 parents of children in the intervention arm of a massage/acupressure trial. Children received both practitioner and parent-provided massage/acupressure. *Results.* Parents reported that their child experienced relief from pain and nausea, relaxation, and greater ease falling asleep. They also reported increased caregiver competence and closeness with their child as a result of learning and performing massage/acupressure. Parents supported a semistandardized massage protocol. *Conclusion.* Massage/acupressure may support symptom relief and promote relaxation and sleep among pediatric HCT patients if administered with attention to individual patients' needs and hospital routines and may relieve stress among parents, improve caregiver competence, and enhance the sense of connection between parent and child.

## 1. Introduction

Therapeutic massage, a term that encompasses a wide variety of techniques of touch and tissue manipulation, has deep roots in the world's oldest medical practices, including both traditional Chinese medicine and Western medicine. In the late 19th century, a rift between massage and Western medical practice grew with the rise of scientific medicine, and physicians relinquished massage as a routine clinical practice. By the second half of the 20th century, massage had become professionalized and was increasingly associated with the alternative medicine movement [1].

More recently, a growing body of scientific literature on therapeutic massage—bolstered by its widespread popular use—has led to the reintroduction of various forms of massage as an adjunct to biomedical therapies. This shift is situated in growing popular and scientific interest in nonpharmacologic approaches to symptom management [2].

Research on therapeutic massage has shown benefits in managing adult and pediatric patients' distress related to cancer and cancer treatment [3–7], and hematopoietic cell transplantation (HCT) [8, 9], although results are not consistent [10]. Acupressure massage has shown benefits for

chemotherapy-related nausea [8, 11, 12], anxiety [13], and fatigue [8, 14]. In addition, performing massage on a family member with cancer has been shown to reduce anxiety and fatigue [9, 15] among caregivers, and to increase their sense of well being and confidence in managing their family member's symptoms [16–18].

To date, most studies on therapeutic massage have measured predefined patient outcomes, usually medical and psychological symptoms. This growing body of research can be complemented by more in-depth investigations of patients' and caregivers' lived experiences of receiving and performing massage. Qualitative research has demonstrated, for example, that massage practices contribute to improvements in patient-caregiver relations [19] and to the "meaningful relief" of suffering among cancer patients [20]. Through open-ended interviews and close attention to the perceptions and interactions of participants, clinicians, and researchers, qualitative methods can examine aspects of massage practices that may go undetected by quantitative methods. This study focuses primarily on the perceptions and experiences of parent caregivers of pediatric HCT patients at an academic hospital. Parents living with and caring for a pediatric HCT patient typically spend weeks and even months in an isolated hospital room with filtered air and limited access to visitors. Parents are neither patient nor clinician; they are witness to their child's pain, suffering and confinement, as well as healing and resilience.

This study is one component of a mixed-method, randomized controlled pilot study introducing a combined Swedish and acupressure massage intervention in a pediatric HCT hospital unit. The overall aim of the pilot study was to assess whether conducting a study of such an intervention is feasible in the HCT unit, whether massage/acupressure alleviates patients' and parent-caregivers' distress and discomfort associated with HCT and accompanying chemotherapy, and to explore the effects of caregivers' experiences performing massage. Quantitative outcome measures of this feasibility study are reported separately [21]. The study described here examined caregivers' experiences learning to perform massage for their child and observing their child receive massage from a professional massage practitioner. Building on recent, more quantitatively oriented research assessing the effects of massage for pediatric HCT patients [6, 9], this study offers important new findings through the most in-depth, descriptive analysis to date of parent-and practitioner-provided massage for children undergoing HCT.

## 2. Methods

The massage intervention provided (1) practical, hands-on training for parents to provide massage/acupressure for their child; (2) professional practitioner-performed massages and acupressure treatments for children undergoing HCT. Professional massage practitioners provided up to three massages/acupressure sessions per week to the children during their entire hospital stay (days of hospitalization: median 37, range 23–110). They demonstrated massage/acupressure

techniques to the parents for additional parent-provided massages for approximately ten minutes whenever the parent was present and amenable to it and provided a detailed hand-out with locations of and indications for specific acupressure points. The massage practitioners received training in several sessions with the research team (EAL, WEM) and received additional consultation from Traditional Chinese Medicine practitioners at the academic medical center. The massage intervention was a semistandardized integration of Swedish massage (gentle to moderately firm strokes, light pressure, holding touch to the back, shoulder girdle, hands, and legs) and acupressure based on traditional Chinese medicine using points on the feet, lower legs, wrist, and chest that are commonly used for nausea, pain and distress (9 points: PC6, ST36, LI4, LV3, BL62, KI6, SP6, HE7, CV17) [22]. Massage practitioners had more than ten years of experience each with Swedish massage and acupressure in a hospital setting. Variations in pressure, strokes, and massaged body areas were permitted within the frame of the intervention manual according to the child's needs and response. Symptom-specific acupressure points were selected according to patient needs and the massage protocol instructions. Foot massage (Swedish and acupressure) was routinely given for relaxation. In what follows, we will use the shorter term "massage" for the combination of Swedish massage elements, including foot massage, with acupressure as it was applied in this study. Massage duration was typically 10 to 30 minutes. Children wore hospital gowns during massage. Massage practitioners produced written reports on the type and duration of each massage, their impression of the child's response to the massage, and how they adapted their technique to accommodate this response.

We decided to interview parents and massage practitioners exclusively in order to reduce the burden of research participation on the children. Data collection was restricted to the intervention arm using interviews with parents after hospital discharge, detailed hand-written notes by massage practitioners about each massage session, and interviews with two massage practitioners.

Semistructured interviews with twelve mothers and three fathers were conducted by telephone approximately one week after hospital discharge. Each interview lasted approximately 30 minutes. Semistructured interviews with two massage practitioners were conducted by phone and lasted approximately 45 minutes. Interviews were conducted by two authors (ED and SA) who were not directly involved with the study intervention or the medical and nursing care on the unit. Practitioner interviews asked massage practitioners open-ended questions about their experiences performing massage for study participants, and their impressions of the children's experiences receiving massage and parents' experiences performing massage. The questions asked in the parent interviews were as follows.

"Can you tell us in a few words how it was for you to learn some massage and to massage your child?"

"What was the best thing about the massage experience for you?"

"Was it possible for you to give massages?"

(If yes:) “How did that go for you and your child?”  
 (If no:) “What was the biggest barrier for giving a massage?”  
 “What was the best thing for you when you were giving your child a massage?”  
 “What do you think was the best thing about the massage experience for your child?”  
 “Was it the same with the practitioner and with you?”  
 “What do you think was the hardest thing about the massage experience for your child?”  
 “What was the hardest thing about the massage experience for you?”  
 “What was the hardest thing about the massage study?”

**2.1. Participants/Context.** English-speaking children, 5 to 18 years of age, and their parents were invited to participate in the randomized controlled trial (RCT) as they were consecutively admitted to the transplant unit over a twelve month period (November 2008 to December 2009, patient characteristics in Table 1; additional details in [21]). Participation in the RCT was offered to child and parent during their preadmission consenting visit with a nurse manager and attending physician. No children over age 5 were excluded. Twenty-three children and their parents (rooming in with the child in the same hospital room) signed informed consent, enrolled and were randomized 2 : 1 to intervention versus control. The RCT was registered with clinicaltrials.gov NCT00843180. The qualitative study reported here included 15 of the 16 parents in the intervention arm. No payment was offered to participants in this group. Both the RCT and the qualitative study were approved by the university’s Human Subjects Review boards.

Children under age twelve signed assent forms, children twelve years and older signed consent forms, and parents signed consent for their own participation and their children under age 18. Seven child-parent dyads were assigned to the control arm, sixteen child-parent dyads to the intervention. One child subsequently declined all massages. The remaining 15 dyads are the subjects of this qualitative study (Table 1): eight were mother-son or father-daughter and seven were mother-daughter or father-son. Children in the intervention arm underwent autologous or allogeneic HCT for treatment of malignancies and other diseases listed in Table 1. Participants remained on the unit in their individual hospital rooms, behind double doors with high-level infection precautions. Massage group participants received 8.5 professional massages (median) during their hospitalization, at an average of 1.6 massages per week.

**2.2. Analysis.** Qualitative data analysis was conducted collaboratively by three of the authors (SA, EAL, WEM). The interpretive process was iterative and multistaged and included coding and thematic development [23, 24]. Data included transcripts of audio-recorded interviews, massage

TABLE 1: Patient characteristics.

<i>N</i>	15
Demographics:	
Age (mean) [Range 5–18]	11.3
Sex	
Female	7
Male	8
Ethnicity	
White	8
Asian	3
Hispanic	3
Other	1
Diagnoses:	
Congenital or acquired bone marrow failure	5
Hematologic malignancy	5
Congenital immune deficiency	3
Solid tumor	2
Hemoglobinopathy	0
Transplant type:	
Autologous	3
Allogeneic	12

practitioners’ written reports on massage sessions and study activities. First, interview recordings were listened to, and interview transcripts and massage therapists’ report cards were read repeatedly, in order to form an overall impression of participants’ and practitioners’ experiences. Recurrent themes and patterns were identified in the data—particularly in terms of massage’s effects on patients’ and caretakers’ experiences at the intersection of cognitive, affective, and physical states. Descriptive categories, or codes, were then developed for each emerging theme, and data fragments were systematically assigned codes. After the data were organized by code, key concepts were reworked through further discussion and analysis. This process included linking data extracts back to their original narrative context and conceptually situating ambivalent and contradictory statements.

### 3. Results

Three major themes were developed: (1) perceived benefits of massage for patients; (2) massage’s effects on parents and family dynamics; and (3) impact of the timing and duration of massage therapy over the period of hospitalization. Each theme, along with related subthemes and examples, is described below. The voices of participants (parents of patients), massage practitioners, and researchers are included; their words are reported verbatim, revealing differing levels of English fluency among participants. Quotes are identified as follows:

P = parent of pediatric HCT patient,

R = research assistant/interviewer,

M = massage practitioner.



#### 4. Parent-Perceived Benefits of Massage for Patients

Without exception, parents said that massage brought relief, comfort, and even pleasure to their children, although the effectiveness of massage in relieving specific treatment-related symptoms was variable among patients. The particular strength of the massage intervention appeared to be in promoting pleasurable sensations and a state of relaxation, with many children dozing off near the end of massage sessions. Most parents reported that their child looked forward to massages performed by parents and/or practitioners, and several parents continued to perform massage on their child after completion of the study. According to a massage practitioner, nurses on the transplant floor also described children's eagerness for the massage visits.

**4.1. Symptom Relief.** Parent caregivers reported that massage—performed by the professional massage therapist and/or a parent—provided relief from or support with symptoms, including nausea, pain, and inflammation.

##### 4.1.1. Pain.

*(P6) We still use the pressure points. She loves the foot pressure points for the pain. She enjoys it.*

*(P17) I think it was very beneficial to have massage during the time when he was in a lot of pain and very uncomfortable. It was a good distraction and comforting.*

##### 4.1.2. Nausea.

*(P1) It was amazing, especially with the nausea points. It worked.*

*(P20) Even though she's got headache or even though she's got vomiting, she wanted to have massage.*

##### 4.1.3. Inflammation.

*(P21) When he had the joint inflammation, they were able to relieve—to help him through that.*

However, according to parents, not all patients found consistent symptom relief through massage.

*(P6) For pain it did not work as well, but the nausea—it really did, at times, alleviate all the nauseous feeling.*

*(P17) I cannot say that, you know, when I press on a certain area that it really made it [nausea] go away.*

**4.2. Positive Feelings, Relaxation, and Sleep.** Although relief from acute physical symptoms was reported by parents to be variable among patients, massage was uniformly associated with relaxation, comfort, positive physical sensation, and greater ease falling asleep. Whereas physical contact is often associated with uncomfortable treatments and procedures

for children on the transplant unit, massage offered more pleasurable, calming sensations, which was seen by the massage providers as a way for children to “be in their bodies” instead of dissociating from them. A massage practitioner reported, for example, that a patient told her he felt like he was “floating on air” after massage.

*(P12) [Massage] make her more comfortable. At least make her have a better sleep.*

*(P7) The best thing about the whole experience was knowing that it helped him to relax.*

*(P14) Best thing is that it was making him relax, feel calm, and then he went to sleep.*

*(P21) He was really in a lot of pain, and for him to fall asleep during that 15 to 20 minutes was amazing. . . so that's—I took pictures [laughs].*

*(M) Some of the kids were trying not to be in their bodies because the whole thing was so unpleasant. The massage was a way for them to be in their bodies in a way that was pleasurable.*

**4.3. Special Treatment.** Parent caregivers often experienced massage as a practice situated outside of the transplant unit's routine activities, and as a kind of nonmedical therapy—or gift—that attended to the patient as a complex, feeling person, in contrast to the biomedical emphasis on treating disease as an entity belonging to the body and distinct from the person.

*(P21) It really is one of the few things outside of medicine that I saw work. You know, right before your eyes you can see the results.*

*(P20) I learned that giving a massage to my daughter was kind of changing atmosphere. It made more comfortable and safe. . .that was not the kind of giving medicine, but giving a kind of touch. There is big difference between medicine and massage.*

*(P13) When the therapist came in. . .she [the daughter] was getting the royal treatment. . . It was a person that was bringing peace to her versus an injection or taking blood from her. [The massage therapist] was not taking from her, but giving. . .I think it's just good for their soul. . .*

**4.4. A Heightened Sense of Control.** Hospital patients are subject to frequent and unannounced invasions of their privacy and bodies, and they often experience a sense of loss of control. This may be particularly true of pediatric patients, for whom cooperative decision making is limited. Massage sessions offered through this study, in contrast, took place only with patients' consent. Participation gave patients the opportunity to say “yes” or “no” and to shape the course of therapy, in a context in which their control over their environment and bodies is greatly diminished.

*(P12) Sometimes she do not want anybody to bother her. . .and I'm not bother her. . .only when she want it [massage] and she needs it.*

(P22) *Sometimes she did not want to be touched, so I would just leave her alone.*

(M) *Massage is the one thing in the hospital regimen that is voluntary, where the kids have the power to say “no.” It is the one time where how they feel is the most important thing. I think this made them feel empowered.*

4.5. *Tailoring the Massage Protocol.* Not only were patients able to choose whether to undergo a massage when a session was offered to them, at each session the patient was asked by the massage practitioner to describe in detail how he or she was feeling. Following a semistandardized protocol with specific instructions on how to choose acupressure points, practitioners would tailor the massage based on the patient’s self-reported key symptoms, making adjustments throughout the session according to the patients’ response. This process of tailoring within a given frame of techniques and specific acupressure points was described as essential to massage’s efficacy by practitioners. Although parents were not asked directly about adapting massage techniques to their child’s current physical and emotional state, their use of this approach was implicit in interview narratives.

(M) *Mom said they’d used the P6 point when she was feeling nausea earlier in the day and it had helped. Mom said she wished she would move around more so I showed them some gentle stretches she could do in bed—knees pulled up to belly and knees going to either side. . . so she could do ST36 point herself.*

(M) *I think it is really important. . . that the massage therapist be able to determine what the patient needs at the moment because their needs do change.*

(P4) *On last Sunday when he feel his body ached, so I just rub him. Most of the time he do not feel like getting massage.*

## 5. Massage’s Effects on Parents and Family Dynamics

5.1. *Performing Massage Improved Parents’ Confidence as Caregivers.* Most parents reported that they were able to learn massage techniques, and that they performed massage for their child intermittently or regularly—particularly parents of younger patients. Feelings of helplessness and anxiety are common among parents with hospitalized children, and parents expressed satisfaction and pride at being able to offer comfort and symptom relief to their children.

(P21) *It was great. It was one of the few things I could do to help him through everything he was going through.*

(P23) *It felt good because I was able to put her at peace, relax, help her to go to sleep, help her with the pain.*

(P13) *For me it was, as a parent, taking control of her pain and just providing the peace that she needs. So just creating an environment of peace that you normally do not find in a hospital. . . I was reassuring her that. . . it was going to be all right.*

5.2. *The Social Effects of Massage.* Parents reported that performing massage contributed to a heightened sense of intimacy and connection with their child.

(P10) *When I give her massage, I just feel closer to her. I feel we’re like one.*

(P13) *When you massage someone, you’re touching them, and you’re loving them at the same time. . . it gives you the desire to love your child, to touch them, to let them know that you are there for them.*

(R) *What was the best thing for you when you were giving your child a massage?*

(P3) *Well, that bond that occurs between two people when there’s comforting happening.*

(P22) *To be able to talk to her and touch her at the same time, and just talk about how she was feeling.*

At least two parents, however, reported that they did not readily learn or perform massage for their child, either due to the parent’s perceived lack of competence or a missed opportunity for instruction in massage because she welcomed the opportunity for respite outside the hospital room when the massage practitioner arrived.

(P6) *It helped when the massage therapist would show me and do it on my child, and then I would do it with her there. After she left, I kind of forgot where those [pressure points] were.*

(M) *She seemed amenable to learning the points and doing massage, but in practice she wasn’t often there when I came. . . Some of the parents used the time when I came as respite time to leave the room.*

Indeed, practitioner-provided massage offered parents a respite from caretaking and worry about their child, particularly since individual massage therapists became known and trusted by patients and parents over the course of the intervention. The knowledge that their children were experiencing comfort or pleasure provided stress relief for the parent and an opportunity to relax and take a break from the confines of the hospital room.

(P4) *Sometime when she’s give him massage, I was like out for a walk. Sometime when the therapist come in, I was like tired and fall asleep and nap.*

(P7) *It was actually relaxing. Knowing that it was helping him to relax, then it also helps me to relax.*

(M) *It gave the kids a sense of nurturing when their parents were absent or too overwhelmed or exhausted to provide physical touch.*

Although most parents reported feeling closer to their child as a result of learning and performing massage, it is important to note that parent-child or broader social dynamics can also be a barrier to massage as a beneficial practice for children undergoing HCT. For example, one child mentioned to the professional massage practitioner that she preferred the professional massage to her father’s

massage, but felt uncomfortable communicating this to her father. Once this was revealed, the massage practitioner was able to help the father to improve his technique. Also, two teenage boys in this study declined to receive massage from parents or massage practitioners (all women), which may suggest possible discomfort with touch or embarrassment of female touch.

## 6. Impact of Timing of Massage and Length of Hospitalization

The timing of massage treatments was an important factor in parents' perception of the efficacy and desirability of massage. The concept of timing includes how a massage session fit into a patient's daily schedule, and whether massage was perceived as more or less beneficial at particular phases of an individual's journey through the transplant process. In addition, participants who remained hospitalized—and therefore enrolled in the study—for a longer period of time often moved from initial skepticism to becoming strong advocates for massage.

*6.1. Fitting Massage into the Daily Clinical Routine.* Patients on the unit follow a busy schedule of tests and treatments, and the degree to which massage was welcomed by patients and their parents was contingent on how well it was coordinated with clinical routines and family visits. Massage practitioners were attuned to these scheduling issues, and often tried to schedule their visits to the unit during the late afternoon lull in clinical activity.

*(R) What was the hardest thing about the massage study?*

*(P2) Scheduling...when they were ready, [my daughter] wasn't ready sometimes, or when [she] was ready, they were far away.*

*(P12) ...it's evening, it's nighttime, so they're [massage practitioners] all gone. I would like to call them back [laughs].*

One parent felt that she had to “stand guard” at her child's hospital room door so that her massage would not be interrupted by hospital staff.

*(P13) ...[the practitioner] coming in was very important to her...and that's when I had to step in and say, "She's getting a massage"...I had to be the keeper of the door.*

*6.2. Massage during Periods of Acute Symptoms.* During periods of acute discomfort or nausea, generally during the first week after chemotherapy, children varied in their response to massage, and some did not want it.

*(P6) I think the hardest thing was just being open to it when she really felt miserable.*

*(P17) ...As he got more sick and was feeling worse, he wasn't able to have the massage therapist come in...So*

*I would say at the beginning it's nice, and maybe at the end as they're getting back into normal life again, it's good. But there in the middle of the transplant, it's not so necessary.*

*(R) And what was the biggest barrier for giving a massage?*

*(P2) Basically, I do not know, if she's in deep pain or if she's not in the mood or she's sick and tired of the whole situation, you know?*

Several parents, however, reported that massage was particularly beneficial for their child during periods of acute discomfort.

*(P12) I remember one day she said she hardly to sleep. The whole body is miserable and tired. And I have a really gentle massage for her, but it help.*

*(P4) It's only whenever he feels nauseous and, yeah, vomiting, then he agree he want to have physical therapy [massage]. Most of all, he's always like not agree with the physical therapies.*

*6.3. Length of Participation in the Study and Being “Won Over”.* Most parents in the study were new to massage. Some were immediately convinced of the potential benefit of massage while others were initially doubtful about whether massage could be helpful for their child. However, through the course of the study most parents came to value massage as an important component of the healing process.

*(P21) Well, it's just something that he never really experienced before and was hesitant about in the beginning. But once they started, he looked forward to it every night that it was available.*

*(P13) ... You tend to be in the hospital and you do not want extra people coming into your room. But once [the practitioner] came in and we realized the benefits that she was getting from it, J. welcome her in...*

## 7. Discussion

HCT has resulted in improved survival rates among children with certain cancers, immune deficiency syndromes, or bone marrow failure, but it can be an agonizing ordeal for patients and their families. Indeed, in 1998 bone marrow transplantation was described as “the most devastating treatment that the human body could be subjected to” [25]. Medical advances in intervening years have resulted in a less punishing regimen, but transplantation still remains arduous and disruptive of the lives of patients and their caregivers. This study contributes to a growing body of research suggesting that massage can help alleviate the distress associated with HCT among both patients and their family caregivers. The qualitative methods employed by this study reveal outcomes that were undetected—and undetectable—by the broader study's quantitative design, including several that have not yet been reported in the literature. New findings include reported benefits for patients

in promoting sleep and providing symptom relief; benefits for parents in an increased sense of competence and respite from caregiving; and increased closeness between parent and child and a demonstrated willingness by parents to perform massage on their child

According to parent caregivers, massage provided varying degrees of relief from pain, nausea, and other symptoms associated with HCT for most, but not all, participants. Nearly all parents reported that massage sessions facilitated a general state of comfort, relaxation, and pleasure for their child. These findings are consistent with a study that reported reduced pain and increased relaxation among pediatric cancer patients who received massage [6], and with the results of a study suggesting that massage for cancer patients promotes positive feelings, relaxation, and a sense of being special and cared for [26]. Whether these benefits are sustained over time is an important question for future research, given the long-term suffering among survivors of childhood cancer and family caregivers described in numerous studies [27–31].

Massage helped children fall asleep. This finding is notable because HCT patients often find sleep elusive in the midst of chronic pain, nausea, and discomfort, yet sleep is rarely mentioned in the literature on massage and symptom management. Moreover, the promotion of comfort and sleep—states not easily reduced to dualistic conceptions of mind or body—suggest that the positive effects of massage are not physical *or* affective, but rather both simultaneously. This result is in line with previous research reporting that massage alleviates physical symptoms while also addressing the “existential suffering” associated with cancer and cancer treatments and improving patients’ “quality of life” [20, 32, 33].

It should not be assumed, however, that massage is relaxing and pleasurable for all patients at all times. As demonstrated by our results, patients’ request for, and response to, massage varied widely throughout the different stages of HCT, with some patients declining massage during periods of acute pain and nausea, and others requesting massage at precisely these times. Massage enabled children undergoing HCT to become coagents in the therapeutic process, and most children embraced this agency without reserve—electing massage only when it suited them. While most children appeared to appreciate parent massage, one child felt unable to decline her father’s massages when she did not want them. Individual patients’ needs, and the specific ways in which family dynamics mediate these needs, should be carefully determined and addressed in any pediatric massage intervention so as to avoid coercion and the perception among patients that massage is obligatory.

This study suggests that it is important to adapt a semistandardized massage protocol to the immediate, and always mutable, sensations and perceptions of individual patients; when it offers respite from long periods of tedium and inactivity; and when it does not interfere with treatment schedules and hospital routines. This is not to suggest that a carefully constructed protocol with clear instructions on acupressure and massage techniques for typical HCT-related symptoms is not important. However, a massage protocol that does not allow for flexibility within a semistandardized

frame runs counter to the study’s findings and may undermine some of massage’s reported benefits.

Parents in this study were, for the most part, amenable to learning massage techniques that they could perform for their child, and the resulting interactions tended to have a positive effect on parent-child relations and to mitigate parents’ and patients’ suffering. These findings are in alignment with a nascent body of research suggesting that learning to perform massage for a family member can alleviate caregivers’ anxiety and feelings of helplessness [16, 17], and that caregiver-provided massage for chronically ill family members increases a sense of intimacy and connection between the provider and recipient of massage [19]. More broadly, these results offer support for an understanding of disease and healing as social and material processes that extend beyond the individual, physical body [34].

Moreover, providing parents with a means of actively participating in their child’s treatment and recuperation—and children with a sense of control over their bodies—may represent a shift in what one of the study’s massage practitioners described as a hospital culture in which “the professionals are taking care of the children and the parents try not to get in the way.” Parents felt comforted and strengthened when they were able to alleviate their child’s suffering through massage. What are the broader implications, then, of parents playing a more active role in supportive care? Future research on massage and its increasing inclusion in biomedical treatment regimes could help elucidate these processes.

The success of parent-provided massage was dependent not only on parents’ desire to help their child, but on the nature of the interaction between patient, parent, and massage practitioner, and on the development of trust and recognition within this triad. Massage is an inherently social practice, and for most of the children participating in the study, who was touching them was as important as which massage techniques were used. For example, in addition to the two teenage boys who decided not to enroll in the study, some older children, particularly boys, declined massage from their parent and/or from a massage practitioner (who were all women). These children’s reluctance emerged postintervention in conversations between researchers and massage practitioners, rather than in interviews with participants, so the causes have not been explored in depth. In a study on massage for children with cancer, Post-White et al. reported no gender differences in response to massage, but 8 boys (over 30 percent of enrolled participants) failed to complete the study [6]. It is clear that more research is needed to examine how factors such as the child’s age, sex, and ethnicity mediate the perception and experience of massage.

The limitations of this investigation are primarily related to it being a small pilot study without data from direct interviews with patients. There are also limitations in the study’s data collection methods. First, conducting interviews by telephone limited the interviewer’s ability to establish rapport with participants. In addition, scheduling the interviews after parents and children returned home from the hospital meant that participants’ perspectives were restricted to recall.

Future research would be enriched by a series of in-depth, in-person interviews with both caregivers and patients over the course of treatment.

While parent reports indicate that massage may offer some short-term symptom relief, and that teaching massage to a parent may increase her or his sense of self-efficacy in managing a child's symptoms, longer-term benefits for both symptom relief and parent-child relationships were beyond the scope of this study. Questions that could be explored in more detail in follow-up studies include whether massage mitigates long-term, posttreatment suffering associated with HCT among both patients and caregivers, including post-traumatic stress. If massage/acupressure can provide relief from symptoms and even provide pleasurable feelings, it may reduce parental feelings of helplessness in the face of their child's pain and discomfort, a key symptom of posttraumatic stress. [35] Future research could also investigate the extent to which massage influences children's perceptions of their bodies [36] as they struggle with chronic disease and prolonged, invasive treatments for these diseases.

## 8. Conclusion

This study suggests that parent- and practitioner-provided massage may reduce suffering associated with HCT among pediatric patients and their parent caregivers. According to parent caregivers, massage relieved symptoms associated with HCT, and promoted sleep, relaxation, and comfort for their child. The data suggest that massage also may enhance the experience of intimacy and connection between children and parents; offer relief from prolonged periods of social isolation, boredom, and anxiety that characterize life for families in the pediatric HCT unit; and enable both patients and parents to play a more active role in managing symptoms. As a simultaneously physical and social practice, massage as applied in the context of this study's hospital setting is a therapy whose effectiveness among children requires family support, practitioner flexibility, coordination with clinical routines, and affinity among those who perform and receive it.

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