



# Keeping the balance – an overview of mind–body therapies in pediatric oncology

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**Summary** This overview aims to give a brief introduction for clinicians in the wide field of Mind–Body Therapies (MBTs), to summarize the current research status of MBTs in pediatric oncology and to mention challenges for future goals. Most used techniques (relaxation, hypnosis, yoga, massage, MBSR, eurythmy) will be described and efficacy will be discussed. MBTs are an enhancement of conventional medicine to motivate the patient to participate in his recovery. Most MBTs are of low risk and are accessible for patients and their families in nearly all stadium of cancer therapy. Positive results include increased self-confidence and a more optimistic view in coping with the illness. We encourage clinicians to be more aware of the promising field of MBTs and its use in pediatric oncology.

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## Introduction

The treatment of children with cancer is one of the great medical success stories of the last half-century. In the field of pediatric oncology more than three-quarters of all children diagnosed with cancer will now be cured.<sup>1</sup> Nevertheless, the side effects like distress, fatigue or pain of the numerous and repeated painful medical procedures are

still prevalent.<sup>2,3</sup> Families report that symptoms of anorexia, nausea, vomiting and pain are not adequately treated with conventional medicine.<sup>4,5</sup> Side effects influence quality of life, months, years, even decades beyond treatment<sup>6,7</sup> and also the family functioning decreases over the first year after diagnosis.<sup>8</sup>

CAM is defined as a group of diverse medical health care system practices and products that are not presently considered to be a part of conventional medicine. In general they tend to help and re-structure the recovery of health and quality of life in cancer patients promoting symptom reduction after invasive treatments.

Mind–Body Therapies (MBTs), as part of CAM, comprise various techniques based on body work and relaxation to enhance the mind's capacity to affect bodily function and symptoms promoting cure. Mind–Body interventions have a holistic approach towards health and care. These therapies include meditation, yoga, tai chi, deep-breathing

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exercises, guided imagery, hypnotherapy, relaxation techniques and expressive therapies such as music, art, dance and movement therapy.<sup>9</sup> The National Institutes of Health (NIH) defines MBTs as practices “that focus on the interactions among the brain, mind, body, and behaviour, with the intention to use the mind to affect physical functioning and promote health”.<sup>9</sup> Coming up in the early 1960, MBTs were inspired by research into stress physiology and psychology<sup>10</sup> and the core concept of salutogenesis by Antonovsky.<sup>11</sup> MBTs are no alternatives to the conventional medicine but moreover an enlargement to focus on the individual needs of the patients and to motivate the patient to become an active part in his recovery.

In pediatric oncology MBTs have had a wide use range particularly among educated population<sup>15,16</sup> in western countries.<sup>13,14</sup> Results of previous work indicated that 31–84% of children used some form of CAM along with conventional anti-cancer therapy.<sup>16</sup>

In a survey of various complementary therapy modalities, MBTs were found to be the most used by cancer patients<sup>18</sup> and have been especially recommended to reduce pain, nausea, fatigue, sleep disturbance and avoid side effects of pharmacological treatments regularly used for these symptoms.<sup>15,19,20</sup>

General aims of MBTs are to contribute to symptom management during invasive treatments, avoid unspecific side effects in particular pain or fatigue and to improve quality of life of cancer patients. According to Post-White,<sup>7</sup> MBTs are of low risk in comparison with herbal therapies which might interfere with medical treatments. The goals of MBTs are also consistent with those of the *Initiative for Pediatric Palliative Care*, a consortium of institutions and academic centres whose aim is to enhance the care delivered to children living with life threatening illness.<sup>21</sup>

Another important goal for the use of MBTs in pediatric cancer treatment is the application of MBTs for the parents. In a group survey<sup>22</sup> of 125 families in pediatric oncology, all parents except one reported post traumatic stress symptoms and mean scores on the post-traumatic stress disorder reaction index. Interventions directed at parents should therefore be included as part of the treatment plan.<sup>23</sup>

In the following section we will discuss most used MBTs that have been applied in children with cancer.

## Relaxation techniques

Relaxation is a biological response that minimizes sympathetic nervous system activity which in turn decreases oxygen demand and slow heart rate.<sup>24</sup> Relaxation therapies are techniques designed to elicit a state of relative freedom from mental and physical tension. They have been used since the early 1900s with Jacobsen’s muscle relaxation technique.<sup>25</sup> The literature suggests that for cancer patients, symptom improvement occur as a result of eliminating physical tension, emotional stressors and aiding sleep.<sup>13,15</sup> In a study comparing progressive muscle relaxation and massage, progressive muscle relaxation showed greater pain relief in adult patients.<sup>26</sup> In one pilot study Dahlquist and collaborators<sup>27</sup> reported a decrease in distress in children to which relaxation was practiced

after a painful procedure. In another study, Kaufman and collaborators<sup>17</sup> reported a decrease in severity of nausea and vomiting, improved sleep, and increased oral intake in adolescents applying relaxation; no statistic is provided. One study describes the development of a parent educational booklet that promotes the use of distraction and relaxation techniques during invasive procedures with promising outcomes.<sup>28</sup> Many studies have investigated the use of relaxation in controlling pain in adults and children; however the results are not fully consistent.<sup>13</sup> Summarizing, relaxation is a general goal of all Mind–Body approaches helping the patient to overcome pain, fatigue and eliminate tension through the reduction of sympathetic activity and brain alertness. Relaxation can be taught through a variety of methods in different populations of patients including those in pediatric oncology. Utilization of relaxation techniques by nurses at hospitals can be of great help in coping with pain, fatigue and eliminate tension in children.

## Hypnosis

Clinical hypnosis can be defined as an altered state of consciousness, awareness and perception.<sup>29</sup> Hypnosis is a highly relaxed state in which the patients’ conscious and unconscious mind is open to therapeutic suggestion. The impact of hypnosis on pain reduction during painful procedures in pediatric oncology has been examined in several clinical trials.<sup>30–34</sup> Hypnosis is proposed to be an appropriate medium for pain management in children because they tend to be more hypnotically responsive than adults.<sup>34</sup>

Hypnotic relaxation is the most frequently cited form of non pharmacological interventions in pain control. In a panel from NIH,<sup>35</sup> Technology Assessment concluded that there was a conclusive evidence for the use of clinical hypnosis in alleviating chronic pain associated with cancer. It has also been employed for the relief of nausea and vomiting secondary to chemotherapy.<sup>29</sup> A first study in children exists from 1982 by Zeltzer and LeBaron<sup>36</sup> who examined the impact of hypnosis on pain and anxiety during bone marrow aspiration and lumbar puncture in 33 pediatric oncology patients. Authors reported a statistically significant and stronger reduction of pain after hypnosis than non-hypnotic techniques. Other studies<sup>30–32</sup> also report a reduction in anticipatory anxiety and reduced pain during lumbar punctures after hypnosis. This demonstrates that hypnosis combined with a local anaesthetic in young patients is more effective than receiving local anaesthetic alone or supportive attention. A randomized study of the efficacy of hypnosis in children receiving chemotherapy found that the children had less anticipatory nausea and vomiting compared to controls.<sup>37</sup> Hypnosis was also shown to be associated with the relief of a variety of acute and chronic cancer pains and also painful interventions in children. Another study reported a significant improvement in anxiety and discomfort in 18 children after hypnosis during painful procedures in cancer treatment.<sup>38</sup> In general, hypnosis is considered the most successful from all MBTs used in pediatric oncology in reducing pain during procedures and pain management after treatments. Available data allows to conclude that hypnosis should be considered as a first choice of MBTs in pediatric oncology.

## Meditation, mindfulness-based stress reduction (MBSR)

MBSR created in 1990 by Kabat-Zinn<sup>39</sup> is a standardized form of meditation and yoga. MBSR is rooted in contemplative spiritual traditions in which the experience of conscious awareness is actively cultivated. Meditation in particular (MBSR) has shown positive results in the treatment of cancer symptoms. We have not found available report on MBSR therapy in children suffering from Cancer. Nevertheless, a randomized controlled study in adult cancer patients revealed improvements in mood disturbances and decreased stress<sup>40</sup>. In general, MBSR improves quality of life, decreases stress symptoms, and alters cortisol and immune patterns which is consistent with less stress and decreased blood pressure. Changes were maintained at 12-months post intervention<sup>41</sup>.

The overall impression of the MBSR literature is very positive for the significant benefits of mindfulness-based meditation therapies in adult cancer survivors; therefore it should be introduced for childhood survivors.

## Yoga

The practice of yoga, an ancient Eastern tradition, comprehends various domains including ethical disciplines, physical postures, and spiritual practices with the goal of unifying body and mind. There are data on the clinical application of yoga among pediatric population<sup>42</sup> but no trial has been applied in pediatric oncology. There exist several clinical trials examining the effects of yoga in pediatrics.<sup>42–44</sup> A systematic review by Galantino and colleagues<sup>43</sup> identified 24 studies of yoga in children, including case controlled studies and randomized controlled trials, that focuses on the relevance of physical therapy and rehabilitation. One study by Kuttner<sup>44</sup> has examined the effects of yoga for chronic pain in adolescents. In this study, 25 patients with irritable bowel syndrome aged 11–18 years (mean 14, 2 years) were randomized to a 4-week home-practice of yoga, subsequent to an initial training session or to a waitlist control condition.<sup>44</sup> Adolescents in the yoga group reported lower levels of functional disability, less use of emotion-focused avoidance and lower anxiety following the intervention than adolescents in the control group. At University of California Los Angeles, it has been found that children and adolescents dealing with a range of chronic pain conditions experience a reduction in symptoms following yoga training.<sup>45</sup>

In adult cancer population Cohen et al.<sup>46</sup> reported better psychological adjustment and sleep quality after practicing Tibetan Yoga in patients with lymphoma receiving or recovering from chemotherapy. Patients reported decreased use of sleep medication. A study of yoga in distressed adults showed decreased sympathetic and increased parasympathetic activity as well as a decreased cortisol levels.<sup>47</sup> A recent controlled clinical trial examined the efficacy of Yoga for improving sleep quality, fatigue and quality of life in adult cancer survivors, demonstrated significant improvement in sleep quality, fatigue, and quality of life.<sup>48</sup> Because of promising results in the adult cancer population, yoga can safely be recommended in pediatric oncology in all stages of treatment.

## Massage

Massage is a gentle manipulation of the body through the hand and is considered a bodily based therapy according to NIH. Massage promotes pain relief and parasympathetic activity as well as restorative sleep in children and adults in normal and pathological conditions.<sup>49</sup>

A review<sup>50</sup> that examined the prevalence of CAM use in pediatric patients revealed, that 9–27% of the patients ( $n=611$ ) used MBTs and 2–17% used massage ( $n=779$ ). Because of the importance of massage in pediatric oncology in research and practice we include it in this review. Ernst<sup>51</sup> concludes that massage can bring a range of psychological and physiological changes including improvements in blood and lymph flow, reduction in muscle tension, increase in pain threshold and mood, reduction of blood pressure and relaxation of the mind.

Russell<sup>52</sup> points out that children often miss the warm and gently touch during cancer treatment, that is different by those they got from their parents before diagnosis and the ones from nurses, therefore massage would be appropriate. Field et al.<sup>53</sup> reported efficacy of a daily 15 min massage from parents versus waitlist. In this study Children's complete blood count was assessed on the first and last day of the study. Massage was associated with reduced negative mood and increased white blood cell count in children six to nine years old suffering from lymphoblastic leukaemia. One prospective study<sup>54</sup> found in 17 patients and their associated parents an improvement in anxiety (especially in parents), mood and stress reduction already after one single intervention. One prospective cohort pilot study<sup>55</sup> in pediatric oncology revealed that standardized healing touch is feasible, leads to a significant decrease of stress and is associated with a sympathetic activation. In another study, Nurse's soothing and gentle touch was reported to diminish the child's distress during lumbar puncture particularly in young children.<sup>56</sup> A review<sup>57</sup> of nine randomised controlled trials of massage in pediatrics' examined single- and multi-dose effects. Among single-dose effects, significant reductions were observed at the first session for state anxiety. Effects for salivary cortisol, negative mood and behaviour were non-significant. Three of eleven multiple-dose effects were statistically significant: anxiety, muscle tone and arthritis pain. In general massage has been recommended in various publications for reducing stress and anxiety in cancer treatment in adults and children. Massage can induce a number of psychological and physiological positive changes with a total lack of adverse events. We therefore recommend its use in pediatric oncology and encourage parents to touch and apply massage to their ill children during treatments as well as along the recovery phase.

## Music and art therapies

Art therapy is defined as the creative process of art making to improve and enhance the physical, mental, and emotional well being of individuals of all ages. It is based on the believe that the creative process (music or art) involved in artistic self expression helps people to resolve conflicts and problems.

Music therapy is the clinical use of music interventions to accomplish healing and well being and the establishment of a therapeutic relationship. Aasgaard<sup>58</sup> point that music interventions make it possible to integrate the sick child, for a moment, into play activities having a more active role than of being a patient. This indicates that music interventions may involve more than palliation, making the disease less severe and unpleasant and having the possibility to have a more active role in artistic creation. Cassileth and collaborators<sup>59</sup> performed a controlled study of music therapy for autologous stem-cells transplant recipients. They found lessened sleep disturbances in response to the therapy as compared to controls. Music-therapy on pediatric oncology outpatients was investigated by Kemper and colleagues<sup>60</sup> indicating the effects of music on parasympathetic activation but not in values of heart rate variability. In four studies music therapy demonstrated to be efficient to reduce chronic pain in cancer patients when comparing pre-and post session.<sup>59,61,62</sup> Today, music therapy is a well known and accepted MBT used in pediatrics, successfully used in the treatment of children with cancer.<sup>63</sup>

There is a dearth of controlled empirical studies of art therapy and its role in alleviating symptoms in pediatric oncology. In one of the very few studies in children, Favara-Scacco<sup>64</sup> reported a decrease in distress following the initiation of a hospital-based art therapy program in 32 children after procedural distress, no statistic is provided. In a meta-analysis of 22 music therapy trials, findings suggest that music therapy decreases stress-based arousal.<sup>61</sup>

Monti and colleagues<sup>65</sup> developed a psychosocial group program for female cancer patients entitled: Mindfulness-based-art therapy using the principles of self regulating theory by Leventhal.<sup>66</sup> The aim of the program was to reduce stress and improve participants' quality of life. Grulke et al.<sup>67</sup> found a decrease in hopelessness and fatalism after an open-therapeutic painting group in adult patients in a haematological ward. In general, patients reported being less anxious which was confirmed in the pre-post comparison test and a better integration in social groups.<sup>68</sup>

Expressive therapies, in particular music and art therapies help patients to decrease distress and improve quality of life through the creative process. Expressive therapies should be encouraged in cancer patients in particular in pediatric oncology in order to help re-structuring their internal world.

### Eurythmy therapy (EYT)

EYT is a movement therapy that belongs to the setting of anthroposophic medicine.<sup>69,70</sup> The core concept is that health depends on a harmonious relationship between the physical body, the soul and the spiritual self. EYT (Harmonious rhythm) can be described as a holistic MBT consisting of a broad range of movements and exercises that arise from human speech (e.g. vowels, consonants, rhythm). It can be described as an active exercise therapy involving, emotional and volitional elements. The central idea of EYT is to rebalance health and affected pathological functions by means of specific movements and exercises in conjunction with meditative aspects.<sup>71</sup> In a pilot study<sup>72</sup> we demonstrated that visuomotor, neuromotor and intelligence variables have

been improved after six months of EYT in children and adolescent cancer patients who were followed up for a year without any adverse effects. Considering the very few studies, EYT seems to improve mind-body balance and helps reducing stress. Therefore, we consider it a promising therapy in pediatric oncology.

### Discussion

This review gives an overview of promising MBTs in oncology, focussing on those which have already been used or might be of relevance for paediatric oncology.

The majority of studies have been conducted in adult cancer patients, and not many studies in children are available in the literature. The few clinical currently available data are in part very weak and scarcely. Nevertheless, we have attempted to summarise and evaluate published studies with regard to their potential use in pediatric oncology.

MBTs are mainly used to reduce numerous complex side-effects suffered by children with cancer. These include nausea, vomiting, fatigue, depression, cachexia and many others. Another important reason for using MBTs is the hope that they will indirectly impact the negative psychological effects experienced by children and adolescents. The aim is to create a counterbalance after invasive surgeries and restoring external and internal autonomy in children undergoing conventional cancer therapy. This includes recuperation of children's own bodies (i.e. body ownership severely affected by treatments) and the diminishing of pain during and after procedures.

According to the concept of salutogenesis<sup>11</sup> (Antonovsky), the use of MBTs tries to promote psychological and physical integrity and to restore autonomy and self-regulation. We therefore believe that MBTs are promising holistic therapies for children with cancer to restore a harmonious interaction between body, soul and spirit. Fletcher et al.<sup>73</sup> asked parents for the most important resources during childhood cancer therapy and they identified that support, hope, belief, taking care of themselves and family protection were the main factors. Furthermore, these inner beliefs represent important aspects of coping with cancer and are additional central goals of MBTs but are difficult to assess. Parents need to be provided with evidence-based information on potential benefits of MBTs that may be safely incorporate into their child's care.

In addition to children undergoing oncological treatment, the use of MBTs should also be considered for children in long-term follow-up. Survivors of childhood cancer frequently report chronic health difficulties e.g. in coping with chronic fatigue and anxiety; therefore, this population may also benefit from MBTs.

Another important topic is the education of pediatric oncologists. Medical doctors and staff need to be aware that their patients will be seeking and integrating other therapeutic approaches while undergoing conventional treatments and this should be supported.

### Conclusion

In sum, MBTs can be an enhancement of conventional medicine to motivate patients to participate in their

recovery and promote self-regulation. Furthermore, MBTs aim to ameliorate quality of life of patients and their families during the enormous difficult period of cancer treatment. MBTs in paediatric oncology attempt to manage the side effects of cancer therapy, increasing child's internal strength and providing support for coping with the illness. Most MBTs are of low risk and are accessible for patients and their families in nearly all stages of cancer therapy. Nevertheless, more research on the use of MBTs including pilot studies and controlled clinical trials is definitely warranted.

## Conflict of interest

The authors declare that they have no conflicting interests.

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