Chapter 1

THERAPIES AND MOTOR FUNCTION ASSESSMENTS IN LONGSTANDING PAIN SYNDROMES: THE EFFECT OF SOMATOCOGNITIVE THERAPY IN A RANDOMIZED, CONTROLLED INTERVENTION STUDY OF WOMEN WITH CHRONIC PELVIC PAIN

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ABSTRACT

Introduction. Longstanding pain syndromes are among the greatest threats to health and welfare in the western world. The etiologies of these syndromes are often complex and unclear. For instance, chronic pelvic pain (CPP) is affecting up to 4% of all women, leading to excess

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therapies, and even futile surgical interventions. In the context of contemporary approaches to assessments of motor functions and therapeutic interventions, we present the results of a novel approach to assessment (Standardized Mensendieck Test, SMT) and a hybrid of Mensendieck physical therapy and cognitive psychotherapy: somato-cognitive therapy.

Methods. 40 women with CPP (average age 32.3 years) were recruited from the Department of Obstetrics and Gynecology of a tertiary care teaching hospital, and randomized into two groups (control and intervention). The intervention consisted of somatocognitive therapy, 1 session per week for 12 weeks. At inclusion (baseline), after 3 months and after 1 year the women were assessed for motor patterns (using SMT), pain load (using a visual analogue scale of pain, VAS) and for psychological distress (using the general health questionnaire, GHQ 30).

Results. The intervention group showed significant (p < 0.01) improvement for motor patterns (up to 71% increase in SMT scores), pain load (up to 64% reduction in VAS scores) and psychological distress (up to 36% reduction in GHQ-30 scores), as well as increased coping, compared to the control group. 9 months after end of therapy, the outcomes were improved as compared to end of therapy scores.

Conclusions. The results demonstrate that somatocognitive therapy is efficient in improving motor function, pain load and psychological distress in women with CPP. The further reduction in symptom load after therapy may indicate that the women had been given tools through therapy that they could utilize in daily living outside of therapy. The outcomes of this study are discussed in light of contemporary approaches to therapy in longstanding pain syndromes.

**CHRONIC PELVIC PAIN**

Chronic pelvic pain (CPP) in women\(^1\) is defined as lower abdominal pain unrelated to pregnancy that has lasted for at least six months. The pain may be described as dull aching, sharp, cramping or a feeling of painful pressure or heaviness deep within the pelvis. Pain during intercourse is rather common, and some also report experiencing pain while having a bowel movement, while lifting heavy burdens or even during the performance of simple movements of normal daily life activities, such as sitting down, and even while

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\(^1\) Medically unexplained chronic pain in the pelvic area also occurs in males (Cornel et al. 2005, FitzGerald 2005, Anderson et al. 2005, 2006, and Giubilei et al. 2007). “Prostatitis” is an alternative diagnosis sometimes used for CPP in males (Bergman & Zeitlin 2007). We have not addressed CPP in male patients in this study.
walking and standing. It may be relieved while lying down, and particularly so while taking a hot tub bath. The patients often think that the origin of the pain is a disease or dysfunction in the genital organs such as the uterus or the ovaries. The majority claim that the pain is the worst during the second part of the menstrual cycle. Pollakisuria may occur and some degree of menstrual disturbance is not uncommon. However, pain occurring exclusively around menstruation (dysmenorrhoea) or with intercourse (dyspareunia) is excluded from the definition (Zondervan 2001). CPP very often leads to extensive medical or even surgical treatment (Howard 2003). Years of disability and suffering are common outcomes (Jaimeson & Steege 1996, Horwitz-Stern & Smolin 2006).

The exact point prevalence of chronic pelvic pain in the female population is not known, but consultations recorded in UK primary care show that the prevalence of CPP was 3.8% in women aged 15–73, a prevalence higher than the prevalence of migraine (2.1%) and almost similar to those of asthma (3.7%) and low back pain (4.1%) (Zondervan et al. 1999, Howard 2003, Warnock & Clayton 2003). Up to 40% of women consulting gynecologists complain of chronic pain in the lower abdomen. Fertile women more often report this type of pain than menopausal women (Zondervan 2001, Grace & Zondervan 2004, Duffy 2001).

It has been estimated that women with chronic pelvic pain use approximately three times more medications of any type than healthy women, and the most commonly used health resource overall was pain medication (Mathias et al. 1996). The resulting costs for health service are considerable, amounting to USD 880 million per year in the US alone (Mathias et al. 1996). The women suffering from CPP present a major challenge to health care, and the lack of treatment success in spite of high costs is frustrating.

Gynecological examination may reveal endometriosis, uterus pathology, ovarian cysts or peri-ovarial peritoneum irritation as the cause of CPP. However, gynecological dysfunction or diseases are frequently not found and about 80% of the patients with chronic pelvic pain have a negative laparoscopy. Thus most authors underscore the need to consider non-gynecological causes of these chronic pain disorders (Slocumb et al. 1984, Beard et al. 1988, Baker 1993, Gunter 2003, Hetrich et al. 2003, Shaeffer 2004, Winkelstein 2004, Jarell 2004). These include disorders that affect the bladder and other parts of the lower urinary tract, diseases of the large bowel, disorders of the lower spine, lumbar plexus, sacrum and pelvis (table 1). Occasionally one of these disorders is present and treatment may be curative. However, even when syndromes or disorders of these organ systems are adequately
handled, chronic pain may still persist. Some authors limit the definition of CPP in women to such biomedically unexplained CPP only (Grace 1995; Ehlert & Heim 1999; Bodden-Heidrich et al. 1999, 2001, 2004; Sidentopf & Kentenich 2004; Berberich & Ludwig 2004).

### Table 1. Some non-gynecological somatic disorders reported to be associated with CPP

<table>
<thead>
<tr>
<th>Disorder</th>
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<tr>
<td>Interstitial cystitis</td>
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<tr>
<td>Chronic relapsing urinary tract infections</td>
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<tr>
<td>Irritable bowel syndrome</td>
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<tr>
<td>Diverticulosis</td>
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<td>Inflammatory bowel disease</td>
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<td>Neural affection</td>
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<td>- Post surgical</td>
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<td>- Vertebral disc herniation</td>
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<tr>
<td>- Neoplasms affecting nerve roots or plexa</td>
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<tr>
<td>Joint and/or muscular affection of the sacrum or pelvis</td>
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The precise diagnostic classification of biomedically unexplained pain syndromes represent great challenges, as is the case with chronic pelvic pain. Thus, in most cases, CPP will be included in the concept “persistent somatoform pain disorder”. International Classification of mental and behavioural Disorders (ICD-10) define such pain as a “persistent severe and distressing pain (which) cannot be explained by evidence of a physiological process or a physical disorder, and the pain is consistently the main focus of the patient’s attention” (F.45.4) (WHO 1993, page 108). Accordingly, in CPP no correlation has been found between reported pain and somatic pathology (Ehlert & Heim 1999). However, the pain is exacerbated or occurs in association with emotional distress, conflicts or psychosocial problems (ICD-10 1992, Anonymous, IASP Task on Taxonomy 1994, Sharpe & Carson 2001). By ICD-10 definition, somatoform persistent pain should not occur in the presence of schizophrenia or related disorders, or only during any of the mood disorders; somatization disorder (Briquet’s syndrome) or hypo-chondriacal disorder.

If the patient reports other bothersome biomedically unexplained somatic symptoms as well that has lasted for several years and pain is not the dominating symptom—and there is a refusal to accept medical reassurance that there is no adequate physical cause for the physical symptoms—the patient may qualify for the diagnosis undifferentiated somatoform disorder.
In parallel with the concept of alexithymia (the lack of ability to feel or express emotions), women with chronic pelvic pain often lack normal qualities of sensations, exteroceptive as well as proprioceptive (Haugstad 1999, 2000; Kirste et al. 2002). Thus they often lack the ability to be aware of usual somatic sensations, which again leads the patients to exaggerated occupation with the pain that they clearly experience, and further into emotional states of fear or anxiety related to situations that exacerbates pain. This process may be called “alexisomia” (Kanbara et al. 2004). The patients may thus be characterized by an inability to integrate body sensations with relevant emotions and cognitions, suggesting that dissociative processes also may occur in CPP (Nijenhuis 2004). This lack of normal integration of body awareness and functional cognitive processing may lead the patient into fear for motion (kinesophobia) (Moseley 2003).

**SOME ASPECTS OF MECHANISMS IN LONGSTANDING PAIN**

Pain is a unique experience that is perceived differently by everyone. The spectrum of conceptions of pain may be illustrated by the following two definitions: The first says: “Pain is whatever the experiencing person says it is, existing whenever she says it does” (McCaffery 1968, McCaffery & Pasero 1999, Crooks 2002). This definition acknowledges the uniqueness of pain and makes the patient’s self-report the key to pain assessment (Crooks 2002). The other definition of pain used by the International Association for the Study of Pain (IASP) states that: “Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (Merskey & Bogduk 1994). This definition states the complexity of pain and the existence of both a physical and an emotional component to pain.

Pain can be acute or chronic. Acute pain is usually short-lived and subsides as healing proceeds. The acute pain generally responds well to analgesics, the anatomy and physiology of acute pain is generally well understood and for the most part we are able to manage acute pain effectively (Crook 2002, Gallagher 2005). Chronic pain is generally referred to as lasting longer than 6 months, and may be persisting, intermittent, recurrent or continuous (Breen 2002). In general, antecedent life events, either physical or psychological, seem to change the response to pain, either amplifying or
diminishing it. The evaluative or cognitive component is influenced by past experience with pain. Every new episode or change in pain intensity, character or localization activates cognitive processes and emotions that are influenced by the current context and meaning, which are again affected by past pain experiences (Crook 2002, Green 2004, Ursin 2005). In contrast to our ability to manage acute pain, the management of chronic pain often presents a daunting challenge to clinical practice.

In chronic pain the pain threshold is often reduced. The mechanism often referred to, is that signals from the afferent myelinated fibres of the dorsal roots activate spinal neurons normally activated by the thin, unmyelinated nociceptive fibres, second to the plastic changes in spinal and supraspinal structures referred to above, like “memory traces” conveyed by long-term potentiation and similar mechanisms. Minimal stimuli thus lead to the same type of pain that has earlier been associated with painful stimuli. Co-localization of stimuli in space (from anatomical structures adjacent to each other) or time (repeated stimuli) is also conducive of pain formation.

There also seems to be a genetic susceptibility to development of chronic pain syndromes (Kirste et al. 2002). Further, there seems to be an increase in both chronic pain and anxiety in depressed patients, the symptom load increasing with increased severity of depression (Ohayon & Schatzberg 2003; Silverstein 1999, 2002). This phenomenon may be attributed to the influence of input related to affective states (from nuclei known to be involved in emotions like anxiety, i.e., the amygdala) on the sensory “relay stations” such as the thalamus. Such phenomena, often referred to as “gating” of signals, occur at different levels on the signal route from dorsal roots to cortex (Campbell et al. 2003). Sensitization can be understood as an increase in response to a stimulus as function of repeated presentations of that stimulus. Increasing evidence is accumulating in support of the notion that physiological mechanisms of sensitization play an important role in the development of chronic pain syndromes (Russel et al. 1994, Banic et al. 2004).

The lack of an explanation for the causes of the pain can be frightening and frustrating. This can contribute to increased perceived stress and negative interpretations of the symptoms, which in turn may sensitize body and mind (Ursin 1997, Eriksen & Ursin 2002, Lidbeck 2002). Pain behaviour can be considered as a behavioural response to this process. Pain behaviour in chronic pain states is different from the behaviour of acute pain (Breen 2002, Weiner 1999). It can be categorized into expressive behaviours, movement behaviours and functional behaviours. The effects of living with chronic pain adversely
alter life patterns resulting in negative physical, psychological, and social effects.

**Comorbidity of Chronic Pain**

Chronic pain in most instances is associated with other physical or mental symptoms or disorders (such as depression). Psychological modulation of pain is of great importance (Apkarian et al. 2005). For example, negative emotional states have been shown to enhance pain-evoked activity in limbic regions, such as the anterior cingulate and insular cortices (Philips et al. 2003). Further, the anticipation or expectation of pain, activate pain-related areas (see for example Villemure & Bushnell 2002). These facts have led to the development of more complex pain theories. Neuroimaging studies of the human cortical and subcortical physical pain response have identified neural networks consistently referred to as the “pain neuromatrix” (Kelly 2006).

The brain areas that are normally referred to, include the mid/anterior insula, anterior parts of the cingulate cortex, the orbitofrontal cortices and the frontal pole, amygdala and hypothalamus, in addition to the periaqueductal grey matter (Chang 2005, Kulkarni, 2005). It has been hypothesized that activity in the pain inhibition circuits (including those of the corticopontine projections) are reduced when pain is facilitated, together with activation of the limbic and paralimbic circuits (Chang 2005). Kelly et al. (2006) even describe that left caudal anterior cingulate cortex and the left inferior frontal gyrus are activated in persons retrieving autobiographical memories of painful events. Such findings clearly have implications for the understanding of disease mechanisms of chronic pain. Contemporary development in theories of physical therapy and rehabilitation also take these new insights from the neurobiology of pain into consideration in the theoretical frameworks of understanding of chronic pain (Mosely 2003, Tu et al. 2005).

However, additional physical distress symptoms are frequently reported by patients with chronic pain including CPP. Ehlert & Heim (1999) found that CPP patients were suffering from a variety of unexplained bodily symptoms in addition to low abdominal pain, such as vague, diffuse, or overlapping symptoms involving the genitourinary, gastrointestinal, and musculoskeletal systems. They conclude that somatic examinations should not only focus on the predominant pain but also on the additional complaints. Baker (1993), Hetrich et al. (2003), Fitzgerald & Kotarinos (2003) and Tu et al. (2005, 2006) all describe musculoskeletal dysfunction in patients with CPP. Beard (1988)
described accumulation of tissue fluids in the hypogastric and inguinal regions. King (1991) described that these patients even had posture and gait disturbances. These findings are corroborated by later studies (Haugstad 2006, Montenegro 2009).

All of this strongly indicates that CPP in most women is a syndrome affecting more than the pelvic area, in particular muscular tension, respiration and functions such as movement and gait. However, despite these reports we are not aware of any study which in a systematic and reliable way has assessed these body functions in women with CPP.

METHODS FOR ASSESSING POSTURE, RESPIRATION, MOVEMENT PATTERNS, AND BODY AWARENESS

In order to study posture, respiration, movement patterns, and body awareness in women with chronic pelvic pain, the need for a standardized instrument to assess motor functions of the patients and the effect of therapy is apparent. Several instruments to measure motor functions have been developed in the Nordic countries over the course of years. Wilhelm Reich, who stayed in Norway in the 1930s, emphasized the close relationship between repressed emotions and posture, respiration, movements and consistency of muscles (Reich 1968). Following discussions with Reich, the psychiatrist Braatøy and the physiotherapist Bülow-Hansen collaborated to develop the Norwegian psychomotor physiotherapy from the principles formed by Freud and Reich (Bunkan 2001, Bunkan et al. 2002, Bunkan et al. 2003) and also developed a tradition of body examinations.

The most extensive examination is the “Global Physiotherapeutic Muscle Examination” (GPM) developed by Sundsvold and co-workers (1982, 1985). The GPM provides somatic information on the impairment level, and through a scoring system, information about degree of problems (Kvåle et al. 2002, Kvåle et al. 2003a, Kvåle et al. 2003b, Kvåle 2003c, Kvåle et al. 2005). In its most common version it consists of 78 items that cover five main domains: Posture, Respiration, Movement, Muscle and Skin (Kvåle 2003c). It takes a full 45 minutes to perform (Sundsvold et al. 1982, Sundsvold et al. 1985, Kvåle 2003c). Kvåle herself suggest that “a less time-consuming and sounder test battery could be developed, suitable for patients with long-lasting musculoskeletal pain” (Kvåle 2003c). In an effort to simplify this very complex test, Kvåle reduced the test battery from 78 to 52 tests (GPE-52), and
was able to demonstrate that this abbreviation could be performed without hampering the reliability or different aspects of the validity (Kvåle et al. 2002, Kvåle 2003c). In spite of this effort to reduce the test size and the amount of time it takes to perform the test, GPE-52 still is quite comprehensive, and takes at best 30 minutes to perform. Moreover, in the GPE-52 test passive elements are dominant, even though it also contains of some active movements performed by the test subject.

Another test battery for body functions likewise developed from the psychomotor physiotherapy tradition, with many features similar to the GPM, is the “Comprehensive Body Examination” (CBE) developed by Bunkan and co-workers (Friis et al. 1998, Bunkan et al. 1999, Bunkan et al. 2001, Bunkan et al. 2002, Friis et al. 2002). Bunkan describes CBE as a refinement of an earlier clinically based body examination (ROBE). Fourteen sub-scales have been developed: two for posture, five for respiration, three for movements and four for muscular consistency (Bunkan 2003). The examination takes about 45 minutes to perform (Bunkan et al. 2002). GPM and CBE are somewhat similar in that they measure ranges of movements and resistance to passive movements in upright and supine positions within a framework of psychodynamic theory formation (Bunkan 2003).

“Body awareness therapy” (BAT) has been independently developed in Sweden (Roxendal 1985). The main aim of this therapy is to integrate the body in the total experience of the self and to restore body awareness and body control (Roxendal 1995). One important aspect of this therapy is the focus on the patient’s awareness of sensations and emotions in the body (Gard 2005). This therapy tradition developed the Body Awareness Scale (BAS) to evaluate the effect of the BAT in patients with chronic schizophrenia. The scale has been developed to evaluate the physical as well as the psychic functions of the patient (Bunkan 2003). Roxendal also developed the Body Awareness Scale-Health (BAS-H)\(^2\) (Roxendal 1995, Gyllensten et al. 1999, Gyllensten et al. 2004). The purpose of this scale is to assess patients with psychiatric and psychosomatic diseases, and body empathy in healthy individuals (Roxendal 1985, 1995). The scale (BAS-H) has four main domains (grounding/center line index; centring/breathing index; flow index and additional items index) with a total of 26 sub-indices. The test takes about 30-40 minutes to perform. The BAS-H is strongly connected to a specific theory (the psychodynamic tradition), however, with focus on psychiatric dysfunction. According to

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\(^2\) BAS-H should be differentiated from Body Awareness Scale which measures somatic arousal (Stegner et al, 1999) and Body Awareness Questionnaire which is an 18-item questionnaire about sensitivity to normal, nonemotive body processes (Shields et al, 1989).
Gyllensten, “Part of the theories of basic BAT and the body ego, defined by Roxendal, are used to analyse the movement function and behaviour with regard to the relation to the ground and the centre line, centring of movements through the movement centre in the solar plexus, freedom of the breathing and the flow of movements throughout the body by the use of the BAS-H” (Gyllensten et al, 2004).

An observer rating scale scoring system called Body Awareness Rating Scale (BARS) was developed by Skatteboe mainly to assess movement harmony, and the purpose was to evaluate the treatment process of Body Awareness Group Therapy for patients with personality disorders (Friis et al. 1989). Twelve items in this scale refer to postural stability, centring, free respiration and mental presence, and this scale is developed from Roxendal’s BAS-H.

Other body-oriented treatment methods also exist, like Feldenkrais, Alexander technique, yoga body awareness therapy, etc. (Jain et al. 2004, Schlinger 2006), but these traditions do not include instruments of evaluation of body functions.

This review indicates that there could be a need for a new instrument that can be used to assess the quality of movements according to principles derived from functional anatomy and in keeping with a theoretical framework based on the cognitive abilities of the conscious mental domains. Such an instrument should allow therapists thoroughly trained in observation and visual analysis of the quality of movements to rate the different static and dynamic motor patterns including respiration and gait. In a test based on such dynamic principles, items addressing palpation of muscular consistency and passive movement or handling by the therapist can be excluded. The main focus should be related to active wilful movements performed by the patients as performed in the realm of activities of daily life (Haugstad 2000, Wojniusz 2006). By concentrating on the visual analysis of simple movements, the test should be easy to perform in a clinical setting, only requiring a few minutes, and also be easy to video record for the purposes of training of raters and the evaluation of inter-rater reliability. Thus, we have developed a Standardized Mensendieck Test (SMT) to the end of evaluating posture, movement, gait, sitting posture and respiration and the effect of therapy on these parameters (Haugstad, 2006).
GYNECOLOGICAL TREATMENT OF CHRONIC PELVIC PAIN

Gynecological treatment of chronic pelvic pain may include a variety of measures. Prescription of pain relievers is common, but rarely will medication alone be the solution of chronic pain. Even if there are no symptoms or signs of depression it is also rather common to prescribe antidepressants such as amitriptylin due to their analgetic effects. If the pain has a cyclical pattern, hormone treatments such as birth control pills or other hormonal medications may be prescribed. If an infection is suspected as the source of the pain, antibiotics are used. If tender points are localized, a possible treatment option has also been direct injection of a long-acting local anesthetic into the painful spot (trigger point). In more severe cases nerve ablation or even surgery (intra abdominal tissue ablation, hysterectomy and oophorectomy) has been conducted (e.g., Learman et al. 2007). However, such radical surgical procedure in the absence of localizable pathologies may be challenged, in the want of demonstrable effect, especially when performed at an age below 30 years (Rosenbaum & al., 2008). Most gynecologists also offer different kinds of counselling.

There is a paucity of studies showing clinical improvement of CPP due to these types of intervention (Tu et al. 2005). In a review of all studies on the management of chronic prostatitis / chronic pelvic pain syndrome until 2006, Dimitrakov et al. (2006) similarly concluded that “no universally effective treatment is available that can provide significant lasting benefit for chronic pelvic pain syndrome”. Thus women with CPP are often told that no gynecological pathology that may explain their pain has been found (Grace 1995, Duffy 2001) and that no effective treatment is available.

CURRENT TREATMENT STRATEGIES OF CHRONIC PAIN

Since there is an obvious lack of evidence for the effect of traditional gynaecological treatment, it is reasonable to consider treatment studies of chronic pain in general for new treatment options of CPP. There is evidence that cognitive-behavioural therapy applied by interdisciplinary rehabilitation teams may reduce pain in general (Mayou et al. 1997; Lidbeck 1997, 2002; Turk 2003; Baranowski 2009; Wejenborg 2009). Psychological support and cognitive restructuring, explanation of pain mechanism and relaxation techniques often lead to constructive coping and reduced suffering in chronic
pain patients (Sharpe 1995, Mayou et al 1997; Lidbeck 1997, 2002; Gullacksen & Lidbeck 2004; Linton 2006). Results obtained from neurobiological research suggest that cognitive therapy has beneficial biologically demonstrable influences on central pain dysmodulation (Birbaumer et al. 1994, Lidbeck 2002, Gullacksen & Lidbeck 2004). Thus, Mosely (2003) applies the novel insights from functional brain studies of the cerebral neuromatrix of pain in the approach to treatment of patients with chronic pain. Within this model pain is a multiple system output that is activated by an individual-specific pain neuromatrix; activated whenever the brain concludes that body tissue is in danger. The therapeutic aspects of the approach focus on reducing the sensitivity and activity of the pain neuromatrix, via reduction of the perceived threat. The key components are educating the patient in the understanding of pain mechanisms and a systematic approach to desensitizing the pain neuromatrix by gradual increments of the load of motor tasks within the pain limits.

Negative emotional states also contribute to dysfunctional pain modulation mechanisms within the central nervous system (Apkarian et al. 2005, Staud & Domingo 2001), and thus, treatment of these states, like major depression, also could be perceived to improve pain modulation and reduce subjective pain experience. Goldapple et al. (2004) describe how cognitive behavioural therapy alters metabolic rates in the cingulate and frontal cortices. Using imaging techniques, other authors have noticed the effect of distraction on the modulation of pain-evoked activity in the anterior cingulate and insular cortices, as well as in thalamic pain-relaying areas (Apkarian et al. 2005, Hofbauer et al. 2001). Thus, by building both cognitive and motor approaches into the treatment, by changing the focus from pain to other types of sensation from own body, and focusing on coping of simple motor tasks, one would anticipate the activity in pain neuromatrix brain areas become reduced, in parallel with a desensitization to painful stimuli.

Gullacksen and Lidbeck (2004) provided a narrative therapeutic approach. Based on narrative accounts they explained the patient’s experience of chronic pain as an understandable process. The authors stated “the individuals who were diagnosed, found the explanation of pain to be a relief and found themselves at the beginning of a whole new process and a long period of healing” (p 151). Once given an explanation of pain (a “pain diagnosis”) the patient developed new understanding and gradual improvement of coping skills (Gullacksen & Lidbeck 2004). Several other comprehensive treatment programs of pain also include a strong psychoeducational and cognitive dimension (e.g., Borg-Stein 2006; Osborne et al. 2006; Wigers & Finset 2007).

**Physiotherapy as an Integrated Part of Treatment of Chronic Pelvic Pain**

In the rehabilitation of patients with chronic pain, physical therapy is often a key aspect of treatment for the achievement of functional restoration. Skilled physiotherapy relies on principles of behavioural medicine (Turk et al. 2000). The therapists use positive reinforcement to instruct, guide, and encourage the patient to engage in physical activities that improve strength, endurance and flexibility (Loeser & Turk 2001). A systematic review found that physical conditioning programs that include a cognitive-behavioural approach plus intensive physical training, given or supervised by physiotherapist or a multidisciplinary team, was efficient in reducing the number of sick days for workers with chronic back and neck pain (Schonstein et al. 2003 a, Schonstein et al. 2003 b).

Both manual physiotherapy and spinal physiotherapy stabilization programs have been reported to be significantly more effective with respect to pain reduction in chronic low back pain patients compared to an active control group (Goldby et al 2006). In other studies of patients with fibromyalgia, physical therapy has also shown positive impact on the patients’ general well being, and the patients experienced decreased disability and improved function after physical therapy (Havermark & Lanquis 2006, Wennermer et al. 2006). In musculoskeletal pain disorders several RCT studies have shown promising
results in pain and symptom reduction and in self-reported daily functioning improvement (Stuge et al. 2004, Rempel et al. 2006, Maigne et al. 2006, Smeets et al. 2006).

Several studies indicate the effectiveness of similar approaches in other pain conditions as well. In patients with pain related to irritable bowel syndrome (IBS), 12 weeks of basic Body Awareness Therapy (BAT) reduced gastrointestinal and psychological symptoms (Eriksson et al. 2002). Mattson also applied basic BAT as a way of fostering empowerment of women with chronic pelvic pain (CPP), claiming that the women experienced improvement in subjective symptoms after therapy (Mattson et al. 2000). In a non-randomized study of patients with non-specific musculoskeletal disorders, Malmgren-Olsson & Branholm (2002) found larger effect-size in the BAT and Feldenkrais groups compared to regular physiotherapy. However, in a non-randomized study (Kendall et al 2000) of women with fibromyalgia, better results were obtained with a Mensendieck system approach than with BAT. But randomized treatment studies addressing the issue of the most efficient treatment in patients with chronic pain in general or chronic pelvic pain specifically, are lacking.

To summarize, chronic pelvic pain is associated with several non-gynecological symptoms and—as for chronic pain in general—clinical experience and examinations indicate alterations not only in the musculoskeletal system, but also increased psychological symptom load. Furthermore, treatment of chronic pelvic pain is extremely difficult and there is a lack of randomized controlled studies showing long-term efficacy. Comprehensive treatment approaches combining physical and cognitive approaches are lacking despite the fact that such treatments seem promising. This suggests that assessments and treatment based on functional anatomy should be of potential efficacy in the treatment of chronic pelvic pain in women. Mensendieck theory and therapy offers this possibility.

**MENSENDIECK THEORY AND THERAPY**

Two widely different therapeutic traditions developed from the Paris school of neurology in the early 1900s have made their impact on the development of contemporary physical therapy as well as psychotherapy. Within this outstanding academic center at La Salpêtrière, Duchenne made his groundbreaking studies of neurophysiology (Duchenne, 1872), describing the innervations of muscles, and Charcot taught his students basic and clinical
neuropathology. Among their students were Freud, the neurologist who studied hysteric palsies (Freud, 1893) and then went on to formulate his famous theory on the relevance of dreams for understanding the pathology of the subconscious, and Mensendieck, who built explicitly on Duchenne’s theories of innervations of muscles of the body, and the central connections all the way up to the primary motor cortex, thus focusing on the cognitive cortical functions of the conscious human, in contrast to the subconscious realm of dreams (Mensendieck, 1937). The roots of dynamic psychotherapy and the later development of psychomotor therapy, that interpret body signs in dynamic categories, are founded on Freud’s theories, whereas the later development of cognitive psychotherapy is in keeping with Duchenne’s and Mensendieck’s focus on the cognitive capacities of the conscious realms of the mind (Beck, 1979). Mensendieck’s interest for posture and movements was evident even long before she entered into her medical carrier. She was born American (her maiden name was Elizabeth Varel), married a German, and, in the first place went to Paris to study music, singing and sculpturing. While trying to capture and sculpture in stone the appearance of her models, she was struck by their negligent attitude towards own body. She recounts that she asked her teacher why the models had such “floppy bodies”. The teacher, apparently perplexed by this comment, replied that she should leave sculpturing in stone, and start sculpturing in flesh and bone (Mensendieck, 1937). This event spurred Bess Mensendieck’s medical interest, and she went on to Switzerland to study medicine. Thus, when she later entered the fertile academic environment in Paris, her focus was to sculpture the human body, by virtue of human mind, into something beautiful and also healthy (Mensendieck, 1927, Mensendieck, 1954 (“Look better – feel better.”)). Here she found a perfect instrument in Duchenne’s theories.

Mensendieck physiotherapy also contains in germ many of the fundamental principles later developed in theories of motor learning (Fitts et al. 1967; Gentile 1972, 1998; Higgins 1991; Carr et al. 1998; Facchini et al. 2002; Hodges et al. 2002; Flanagan et al. 2003). The focus is on cognitive awareness of experience in own body, and the process of learning new motor patterns in contrast to old habits (Bugge-Rigault 1989, Soukop et al. 1999, Kendall et al. 2000, Haugstad et al. 2000, Kirste et al. 2002, Klemmetsen 2005, Wojnusz 2006). New motor patterns are developed through three phases: 1) the cognitive phase, where the conscious awareness of the patient is directed towards sensory input from visual, tactile and proprioceptive stimuli regarding own body, and compared to ideal mentations with regard to the quality of new patterns sought to be obtained; 2) the associative phase, where
a consciousness gradually develops that integrates the new ideal patterns with new sensory input from the body; and 3) the *automatized* phase, where the new and more efficient or functional motor patterns are utilized without conscious thought, and gradually integrated into behavioral patterns in the activities of daily life. Thus, important basic elements are sensory awareness of own body, conscious cognition of new ideomotor patterns and integrations of the new experience into everyday functions (Mensendieck 1954).

However, it would be a mistake to attribute the application of Mensendieck theory and therapy as it is presented in this study to Bess Mensendieck herself, or to her first line of students. Mensendieck also sought some of her inspiration in the physical fitness program in contemporary Preussian military gymnastics. Thus, even if Mensendieck herself sought to ameliorate the impression of her system of exercises being derived from German military traditions, her later critics have often alluded to this sort of strict upbringing. Mensendieck also never, to our knowledge, herself promoted ideas that would bring her systems of exercises into use within psychiatric care, like Reich, Braatoy and Bülow-Hansen later did with the psychomotor tradition.

The authors were first acquainted with cognitive psychotherapy by Aron Beck’s collaborator, Arthur Freeman (1987), when he visited Modum Bad Psychiatric Hospital (Vikersund, Norway) in 1987 as this form of therapy was first introduced into the treatment of anxiety states, in the first place phobic anxiety. It occurred to us that the rigorous and systematic approach to psychotherapy advocated by Freeman and Beck, had strong similarities with the Mensendieck tradition of physiotherapy, as it had been developed over the year in the Oslo school (Halvorsen, 2009). However, a series of amendments had to be made to bring the two therapy traditions into an amalgament. This work was undertaken together with Ulrik Malt at the University of Oslo, in the Department of Psychosomatic Medicine at Rikshospitalet, in the 1990ies. The aim of our work has been to develop instruments to the end of evaluating and treating patients with longstanding pain states and complex disorders, like gynecologic pain, low back pain, chest pain, headache and widespread pain.

The primary goal of the therapy is to develop a good working alliance with the patient, without which therapy would be futile (Lambert et al. 2004). This can be rapidly achieved in the first encounter with the patient, once the therapist opens to empathic listening to the anamnestic history of the patient. The treatment session then can continue by describing a possible explanation for the reported symptoms and a dialogue thus develops between the therapist and the patient with regards to body experiences (see below). The therapist teaches the patients about the mind/body relations, and explaine pain
mechanism, in line with the principles of essential cognitive pain education that Lidbeck recommends (2002). Again, the therapist’s empathic attitude is of decisive importance to develop the necessary therapeutic alliance with these patients, who often have suffered a lot (Nerdrum 2000 et al., Nerdrum 2002, Hersoug 2002).

Mensendieck therapists are trained to assess motor function both in terms of global quality of movement and in the detailed function of every muscle group in the body (Mensendieck 1937, 1954; Haugstad et al. 2000; Kirste et al. 2002; Klemmetsen 2005). Thus, it can be said that the Mensendieck tradition is founded on the principles of functional anatomy. However, Bess Mensendieck was also deeply aware of the fact that the generation of movements is a mental task, and that this task could be brought to conscious attention by mentally rehearsing the movement ahead of time, before the physical execution of the movement proper. Thus, the training programs start with the “teacher” and “pupil” imagining (“sketching”) the movement to be practiced (Mensendieck, 1927, 1937, 1954). In physiologic terms, this preparation for movement involves several areas frontal to the primary motor cortex (Facchini et al. 2002, Flanagan et al. 2003, Andersen 2003). This form of ideomotor preparation of the movement proper, called “motor templates”, have been shown to enhance motor learning (Fitts 1954, Facchini et al. 2002, Flanagan et al. 2003). The focus on the cognition preceding movement, as well as the focus on practicing new motor patterns in the activities of daily life, can also be said to be more in keeping with cognitive therapy, developed by Ellis, Beck, Freeman and others (Beck 1976, Freeman 1987, Reinecke 1996).

An additional important aspect of Mensendieck therapy is focus on the state of tension of a specific group of muscles or agonist. The patient’s awareness is guided towards increase of tension in the muscle (maximal contraction), and the decrease of tension (maximal relaxation). This awareness of tension and relaxation is also sought to be automatized into the movements of daily living, much in keeping with the principles of “applied relaxation” (Öst 1987).

Similar to patients in cognitive therapy, the patients treated by a Mensendieck therapist are always assigned graded tasks to be practiced several times each day, preferably while performing the activities of a normal life (Mensendieck 1927, 1954). Thus, the new motor programs are sought to be automatized and internalized in the patient including the pattern of tension and relaxation of agonist and antagonist muscle groups. Further, the Mensendieck physiotherapy trainees are taught in a systematic way to be aware of own bodily experience, thus developing a high level of body awareness themselves,

The mental aspects of the effort it takes to change ingrained motor patterns are sometimes underestimated. In the Mensendieck tradition, this focus has been quite clear from the original works of Bess Mensendieck. However, the mental parts of therapy may at some points in time have caught less attention than the biomechanical and anatomical aspects of the tradition. In our opinion, it is the integration of mind and body that are so characteristic of this tradition within physical therapy. And it is this integrative approach that we have sought to bring to attention in our work within the field of psychosomatic medicine. Thus, to underline the cognitive aspect of Mensendieck therapy and remind the reader to keep the mental aspects of the therapeutic approach in conscious attention, we prefer the term “somato-cognitive therapy”\(^3\) as label of the treatment approach that we apply in this study.

**SOMATOCOGNITIVE THERAPY**

Somatocognitive therapy can thus be understood as a hybrid between physiotherapy and psychotherapy. As such, it is a short-term body-oriented therapy, concentrating on the situation here and now—not focusing on the possible historical roots of the symptoms. The goal is to achieve new body awareness through explorative treatment with functional goals linked into the activities of daily living. As sessions evolve, the therapy necessarily leads to the disclosure of repressed emotions. This is not the primary goal of the therapy, but on the other hand, emotions should be given room and be received by the empathic therapist. The therapist and the patients are seen as equally important partners in exploring the experiences of the patient. Like in cognitive therapy, the therapy session is three-phased: 1) The patient recounts from his or her experience since the last session, reports on homework done, and possible new experiences or insights evolved through the new movements

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\(^3\) The concept “somatocognitive” in this setting refers to the therapeutic approach combining a somatic and cognitive approach and should not be confused with the “somatocognitive theory of emotion” proposed by Schachter (Schachter & Singer 1962). This theory is based on attribution research where emotions are interpreted as a result of (unspecific) neurovegetative excitation (arousal) and certain characteristics of the external situation (the so-called cognitions).
that have been practiced in the activities of daily living. 2) Learning new active movements in a graded task assignment—again to be practiced several times each day, not as separate exercise sessions, but well integrated in the activities of the day, like while walking to the bus, sitting in the office, lying down in bed, watching the television, while eating, performing house chores, etc. This may influence muscle relaxation, respiration, the flexibility of joints, muscles and ligaments, straining work loads on muscles and joints, extero- and proprioception, awareness of own body, and reduced fear for movements (kinesophobia). It is of utmost importance that the training is started in a gentle manner, and that exercise is not exceeding the patient’s capacities in any way. These patients have often a long story of suffering from aches and pains, which involve them in a passive lifestyle with fear for movement. An abrupt change to vigorous physical activity may result in physiological responses characterized by increased pain, due to mechanisms like long term potentiation (LTP) and wind-up (Staud, 2005). Often manual release of the tensed muscles may be given, with a dual purpose: First, it improves the circulation of the relevant muscle and leads to new tactile experiences, and secondly, it leads to release of endogenic substances like oxytocin (Meyer-Lidenberg, 2008), that are known to promote relaxation and foster bonding between therapist and patient. The second part of the therapy session is always concluded with a brief session of applied relaxation. 3) New assignments are given for the homework of the patient, again underscoring that the most important part of therapy takes place during the intervals between therapy sessions. The therapist constantly assures that the patient understands the significance of each step, and that the working alliance is upheld.

**APPLICATION OF SOMATOCOGNITIVE THERAPY IN A CLINICAL SETTING: A RANDOMIZED, CONTROLLED INTERVENTION STUDY**

In a recent study, we sought to apply the principles described above in an intervention study with women with CPP. The main aims of this study were to study the complex motor patterns of posture, movement and coordination, gait, sitting posture and respiration, and to study the effect of somatocognitive therapy on these and other outcome variables. As part of this effort, the aim was also to develop and evaluation instrument specifically designed to assess these complex motor functions.
MATERIALS AND METHODS

CPP Patients, Inclusion and Exclusion Criteria

During the period 1998–2003 women between 20 and 50 years with pelvic pain duration between 1 and 10 years referred to the outpatient department of gynecology in a tertiary care university hospital (Rikshospitalet, The National Hospital, Oslo, Norway), were consecutively considered suitable for inclusion in our study. A full medical record and clinical examination was obtained, including a gynecological examination and palpation of the pelvic muscles, and a thorough history of pain. Patients were excluded from the study if there was evidence of somatic diseases such as multiple sclerosis, stenosis of the lumbar spinal canal or traumatic damage of the spinal cord/cone/spinal roots or nerves, lumbar disc herniation, pelvic instability, cancer, Mb. Crohn, ulcerating colitis, trapped ovary syndrome or pain localized to the vulvae only.

Table 2. Inclusion and exclusion criteria for the selection of patients to the randomized, controlled intervention study involving women with chronic pelvic pain

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>Somatic disease</td>
</tr>
<tr>
<td>20-50 years</td>
<td>Pain in vulva only</td>
</tr>
<tr>
<td>Chronic pelvic pain</td>
<td>Psychiatric exclusion criteria;</td>
</tr>
<tr>
<td></td>
<td>serious personality disorder</td>
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<tr>
<td></td>
<td>lifetime psychosis</td>
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<tr>
<td></td>
<td>organic brain disease</td>
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<tr>
<td></td>
<td>major depression</td>
</tr>
<tr>
<td></td>
<td>serious anorexia or bulimia</td>
</tr>
<tr>
<td>Pain duration 1-10 y</td>
<td>Pelvic instability</td>
</tr>
<tr>
<td></td>
<td>Lumbar root affection</td>
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</tbody>
</table>

Secondly the patients were examined by a clinical psychologist at the Department of Neuropsychiatry and Psychosomatic Medicine at Rikshospitalet that performed a standard psychological interview and examination, including psychometric evaluation. The psychiatric exclusion criteria were the following: serious personality disorder, lifetime psychosis, bipolar disorder, organic brain disease, major depression, drug or alcohol dependency, and serious anorexia or bulimia.
Finally, the patients were examined by a Mensendieck physical therapist with a full standard clinical examination, including Lasegue’s test to exclude lumbar nerve root affection, and pelvic examination to exclude pelvic instability (see table 2).

<table>
<thead>
<tr>
<th>Key functions assessed by the Standardized Mensendieck Test</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal score 7, poorest score 0</td>
<td></td>
</tr>
<tr>
<td>Posture</td>
<td></td>
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<tr>
<td>Global/line of gravity</td>
<td></td>
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<tr>
<td>Ankle</td>
<td></td>
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<tr>
<td>Knee</td>
<td></td>
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<tr>
<td>Pelvis</td>
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<tr>
<td>Back</td>
<td></td>
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<tr>
<td>Shoulder</td>
<td></td>
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<tr>
<td>Neck</td>
<td></td>
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<tr>
<td>Average</td>
<td></td>
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<tr>
<td>Gait</td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>Foot roll</td>
<td></td>
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<tr>
<td>Propulsion</td>
<td></td>
</tr>
<tr>
<td>Rotation</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>Movement</td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>Frontal armlift</td>
<td></td>
</tr>
<tr>
<td>Vertical armlift</td>
<td></td>
</tr>
<tr>
<td>Sagital armswing</td>
<td></td>
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<tr>
<td>Diagonal armswing</td>
<td></td>
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<tr>
<td>Balance/hip flexion</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>Sitting posture</td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td></td>
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<tr>
<td>Pelvis</td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>Respiration</td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td></td>
</tr>
<tr>
<td>Armlift</td>
<td></td>
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<tr>
<td>Pelvic lift</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. The women included in the study were scored for motor patterns with regards to posture, movement, gait, sitting posture and respiration. See Methods for explanation. For further details, see Haugstad et al., (2006 a, appendix).
DEVELOPMENT OF A STANDARDIZED MENSENDIECK TEST (SMT)

A standardized Mensendieck Test (SMT) was developed to evaluate posture, movement, gait, sitting posture, and respiration of patients with chronic pelvic pain, based on the Mensendieck principles of observation and analysis of motor function (Figure 1). To validate the test and to make a comprehensive body examination of a defined group of patients, it was applied in this study of women with chronic pelvic pain (Haugstad 2000).

The first 15 patients who fulfilled the inclusion criteria (women averaged 32.3 years (SEM 1.43) were compared with 15 matched healthy controls using the SMT test for examination of motor function. These 15 healthy women were almost in the same age range (mean age 30 y, range 22–50 y), and educational background, randomly recruited from students and employees at the Oslo College and The National Hospital. All the 30 women were videotaped when they performed the Standardized Mensendieck Test, and three Mensendieck physiotherapists examined the video to validate the test. Raters had no information about the status of the subjects. Each element of the test was assigned a score from 0 to 7, where 0 is the least functional movement, and 7 the score for an optimal performance.

THE CHARACTERISTICS OF PATIENTS WITH CPP

To describe the body characteristics of the patients with CPP we included 40 + another 20 women having fulfilled the above-mentioned criteria. The additional 20 patients were recruited in the same way as described above. All were clinical interviewed by the physiotherapist. The 15 healthy female matched controls are described above. All the patients and the healthy control women were examined by The Standardized Mensendieck test (SMT). The examination was video recorded. For the 60 chronic pelvic pain patients a visual analogue score of pain (VAS) was obtained. In order to obtain a more thorough evaluation of muscle function, we also examined several muscle groups for elasticity and density and for subjective experience of pain, in addition to the SMT and the VAS score. The muscle was said to have normal, high, or very high density and elastic stiffness, scored as 0 for normal, 1 for high and 2 for very high. The subjective experience of pain in the muscles under the palpation was also marked with 1 for painful and 2 for very painful.
The muscles that were systematically examined were femoral adductor muscles, the iliopsoas muscles, the abdominal muscles, the muscles in the gluteal region and outward rotators of the hip.

**THE RANDOMIZED CONTROLLED INTERVENTION STUDY AND THE 1 YEAR FOLLOW-UP STUDY**

Having fulfilled the inclusion criteria, the patients were recruited to the intervention study, and the standardized Mensendieck test performed and recorded on video tapes (v.i.). 40 patients with chronic pelvic pain were randomized into the two treatment groups: 1) Standard gynecological treatment (STGT) and 2) STGT + Mensendieck somatocognitive therapy (MCST). The treatment period was 3 months (90 days). Group 1 received standard gynecological advice at inclusion and one more time during the treatment period. Group 2 received 10 treatments sessions with the Mensendieck therapist of 1 hour’s duration over 90 days. The randomization occurred by drawing a folded piece of paper with the patient’s name from a jar, thus allocating the name to a previously chosen treatment group. The randomization was performed by a person external to the study. At the time when the patients were randomized into the treatment groups, a visual analogue score of pain (VAS) (Jensen et al. 1986, Strong et al. 2002) was obtained. They were asked to assess, each day during the first week of the study, their subjective experience of pain on a scale from 0 to 10, and mark the score on a straight line, 0 to the left and 10 to the right, with 0 denoting no pain, and 10 a maximum of pain experience. The average of the daily scores for this week was taken as baseline value.

After the treatment period was completed, a new gynecological, psychological/psychometric and Mensendieck examination was conducted, including a second video recording of the patients performing the Standardized Mensendieck Test (SMT). These video tests were blinded so that the evaluator did not know whether the patients on the video were in the control group or in the treatment group. The same VAS scores procedures was also performed. One year after inclusion the same examinations were done for the third time for all the patients.
PSYCHOLOGICAL ASSESSMENTS

Visual analogue scales are frequently used ways of measuring an individual’s perception of specific phenomena or symptoms such as pain or distress. However, VAS scales do not have predefined severity steps. Thus each individual uses the VAS with their own internal reference for severity in mind. This procedure explains why VASs are valid and sensitive assessments tools from an individual perspective. The drawback, however, is limited validity when comparing group data. For this purpose, rating scales, symptom checklists or questionnaires are more suitable. They provide the patient with pre-defined categories (e.g. a little bit, some; much; very much or less than usual; as usual; more than usual). For example: a VAS score of 70 (0-100) on a distress scale may by one person be labelled “much”, by another “very much”. This difference in evaluation of the severity of the symptom will be detected by the questionnaire, but not by the VAS score. This well-known fact indicates that when evaluating treatment outcome both VASs and questionnaires with predefined severity or frequency steps should be employed for optimal description.

During the last thirty years, a large amount of self-rating scales, checklists and questionnaires have been published addressing phenomena such as quality of life, distress, psychosomatic symptoms, social and occupational function. In our study we decided that besides pain, two major classes of phenomena were crucial targets for treatment: inability to continue to carry out one’s normal “healthy” functions, and the appearance of new phenomena of a distressing nature. Thus we wanted a questionnaire that addressed these two phenomena and which was sensitive to change. Secondly, we wanted to use a scale that was well-validated and widely used in different medical and psychosomatic populations including pain and gynaecology. The General Health Questionnaire (GHQ) meets all these requirements (Goldberg & Williams 1988).

Huppert and co-workers (1989) factor analyzed the GHQ-30 and found five factors: (1) anxiety and insomnia; (2) depression; (3) general well-being; (4) social function and (5) coping. The anxiety sub-scale (8 items) includes symptoms of worrying, inner tension, self confidence and general distress. The focus is on cognitive aspects of anxiety. The depression sub-scale (5 items) addresses a more clinical dimension of depression with questions on guilt, pessimistic thoughts, lassitude and suicidal ideation. The well-being sub-scale (4 items) addresses issues such as vitality, well-being and life satisfaction. The coping subscale (5 items) covers adaptation and self-assertiveness. The social
Therapies and Motor Function Assessments…

dysfunction scale only has 3 items dealing with relation to and content with relationships to other persons.

**RESULTS**

**Intraclass Correlation among the Raters in Evaluation of the SMT**

The ICC\(_{1,1}\) values ranged between 0.83 (subscore for the position of the back) to 0.97 (several subscores for movement; gait and sitting posture). The SMT showed good discriminative ability when examining these two groups. Patients with CPP scored significantly lower than the controls on every subtest. In particular, scores were low for movement (coordination), gait (rotation of the pelvis relative to the spinal column) and for respiration (respiratory response on pelvic lift). The values ranged between 0.83 (posture, subscores for position of the back, 95 % C.I. between 0.63 and 0.92) and 0.97 (respiration) in the evaluation among the raters. The power of the Mensendieck assessment technique to discriminate between patients with CPP and the controls was calculated and the sensitivity and specificity of the test was good to excellent. Despite the fact that the testing was blinded with regard to the test subjects status, we found that the agreement among the testers was generally better when assessing patients than when assessing the healthy controls.

**Clinical Characteristics of CPP Patients**

The average score for the subjective pain (VAS) for all 60 patients was 6.01 (SD ± 1.51; SEM ± 0.21; range 3-8), on a scale from 0 to 10.75% of the patients had moderate or severe pain during or after intercourse. 50% of the patients described this as aching in one or both inguinal regions and also in the sub umbilical region. 25% reported that pain started after infection in the bladder or kidney region, and 25% told that the pain developed after an abortion or after a hard labour. 15–20% had a recount of sexual abuse. They experienced their whole body as painful, with no pleasurable sensations left. They also reported lack of contact and control with whole regions of their bodies.
Posture and Movement Patterns Assessed with the SMT

All subscores found in the patients were significantly lower (p levels < 0.01) than those of the healthy controls. The largest difference in scores between the two groups was found for gait, movement and respiration. The subscores were 54% lower for pelvic rotation in the gait group of scores and 52% lower for pelvic lift in the respiration group and diagonal arm swing in the movement group, respectively, compare with the healthy controls. The least difference between the patients and the controls were found in the subscores for posture. The greatest deviation from normal pattern was found for tests that posed a demand on balance and coordination. In the test for hip flexion, the patients had great difficulties when trying to stand on one leg for 10 seconds, scoring 38% below the healthy controls. Further, their ability to coordinate the movements of both arms and both legs in the sagittal (33%) and diagonal arm swing tests (39%) were well below the healthy controls. The ability to give in to gravity was found to be reduced for the patients compared to controls, when testing their ability to lift extended arms to shoulder height, and let them fall down. When examining gait we observed a careful gait with short steps and almost no foot propulsion, and a markedly reduced hip extension in the propulsion phase. The typical findings in respiration are high costal respiration with almost no movement in the thorax or in the abdominal area (Haugstad, 2006a, appendix). In the evaluation of respiration the scores differed 52% from the healthy women. The movement pattern may be ascribed to what we call a typical pelvic- pain- protection pattern (ppp). The patients protect their pelvic in gait, movement and in the respiration.

Findings in Muscle Palpation

Highest density and highest degree of elastic stiffness were found in the following muscles: iliopsoas in density and 1.59 ± 0.09 in elastic stiffness. Iliopsoas was also most painful 1.60 ± 0.09. Almost the same scores were found in the straight abdominal muscles with 1.52 ± 0.10 in density, 1.53 ± 0.10 in elastic stiffness and 1.53 ± 0.10 in tenderness. The femoral adductors also had high scores; 1.41 ± 0.11 (density) and 1.38 ± 0.11 (elastic stiffness and tenderness).
THE EFFECT OF THE MENSENDIECK SOMATOCOGNITIVE THERAPY

The Effect of Treatment after Three Months

After 90 days of treatment the CPP patients in the Mensendieck somato-cognitive therapy group (MSCT) had significantly improved scores in all subtests of the SMT. The patients receiving standard gynecological treatment only (STGT) for the most part did not show any significant changes of scores. The best treatment response in the STGT + MSCT group was found in the case of scores for respiration. The second group of functions that improved considerably was in the subtests for movement. The patients demonstrated the largest improvement in the movement tests functions designed to demonstrate coordination, and the ability to relax. The average SMT score values after treatment were 4.37 ± 0.38 (up 19.3%) for posture, 4.13 ± 0.38 (up 26.1%) for movement, 4.13 ± 0.39 (up 24.8%) for gait, 4.67 ± 0.36 (up 27.9%) for sitting posture, and a considerable increase to 4.72 ± 0.37 (up 58.4%) in the scores for respiration.

The patients’ subjective experience of pain was assessed by means of a visual analogue (VAS) pain scale. Before treatment, the patients were randomized into the group receiving standard gynecological treatment scored an average of 6.68 ± 0.29 (average ± standard error). After the treatment period of 90 days, the average VAS score was 6.16 ± 0.50, a reduction by 7.8 % (non-significant). The patients in the Mensendieck somatocognitive therapy group scored an average of 5.60 ± 0.40 at baseline. After the 90 days’ treatment program, the average score was 2.89 ± 0.40, down by 48.4 %. This corresponds to an effect size of 1.5 and a number needed to treat (NNT) of 1.9, both based on the VAS scores.

Effect after One Year Follow Up

When the patients were evaluated with a new SMT and VAS nine months after end of treatment, the patients in the group receiving standard gynecological treatment showed no significant change in motor performance. At one year follow up, the tendencies for the performance of the motor functions on a general level was an increased deterioration, even significantly for some of the subtests in the STGT group.
By contrast, the patients receiving Mensendieck somatocognitive therapy demonstrated improved scores after treatment. Moreover the effect of therapy lasted for the 9 months follow-up period and for most functions even improved further after end of therapy. The scores nine months after treatment were 4.66 ± 0.30 (up 4.0%, non significant change from end of treatment) for posture, 4.85 ± 0.33 (up 13.0%, p < 0.02) for movement, 4.54 ± 0.39 (up 10.0%, p < 0.001) for gait, 5.01 ± 0.36 (up 7.2%, non-significant change from end of treatment) for sitting posture, and a considerable increase to 5.36 ± 0.35 (up 13.5%, p < 0.05) in the scores for respiration.

The largest change nine months after treatment was seen in the respiratory response to the lifting and lowering the arms from the supine position (“armlift” see the test manual, appendix of Haugstad et al., 2006a). Score for this function increased from 4.68 ± 0.31 to 5.50 ± 0.39 (up 20.2%, p < 0.01). Further, the improvement was greatest for the subscales for rotation in gait, and diagonal arm swing and hip flexion in movement.

The patients’ subjective experience of pain was assessed by means of a visual analogue (VAS) pain scale. Nine months after treatment the average pain was 6.13 ± 0.39, a reduction by 0.5 % from 90 days (non-significant). In contrast the patients in the Mensendieck treatment group scored an average of 2.21 (± 0.44) at nine months compared to 5.60 ± 0.40 at baseline and 2.89 ± 0.40 after 90 days of treatment. Thus there is a further significant reduction from 3 to 9 months in the treatment group (p < 0.003). NNT was 2.9, and effect size 1.0.

The mean case and likert scores were relatively low at inclusion for the STGT and MSCT groups respectively (5.19 and 28.19 versus 7.61 and 31.33). Nevertheless there was a statistical significant decrease in sub-scale scores for coping and anxiety-insomnia-distress in the MSCT-group, but not in the STGT group only. The reduction in the subscale for depressive symptoms (from 3.39 to 2.62) was almost statistical significant in the MSCT-group (p=0.06), but not for the STGT group where an increase occurred (2.13 to 2.92; p=0.17). However, when only looking at the GHQ-30 likert total score the reduced in the MSCT-group from 31.33 to 26.54 was not statistical significant (p=0.12). There was a non-significant increase in total likert score in the STGT-group (from 28.19 tol 30.15; p=0.28).

The NNT and effect size based on GHQ-total likert scores were 4.3 and 0.7, respectively. The coping and anxiety-insomnia subscales showed NNT and effect size scores of 3.2/1.2 and 3.2/0.6, respectively. The NNT values are calculated from a treatment effect of at least 50 %.
The main aim of this study was a) to develop a better understanding and more knowledge of women with chronic pelvic pain, including a body oriented treatment approach, and to apply this treatment in a randomized controlled treatment study, including the mental elements of recognizing body function, concentrating on motor expressions and learning of new patterns (somatocognitive therapy). As part of this aim, we wanted to b) develop an evaluation instrument specifically designed to describe complex motor patterns of posture, movements and coordination, gait, sitting posture and respiration (the SMT test).

The Standardized Mensendieck Test

The test discriminated well between women with chronic pelvic pain and matched healthy women.

With respect to the overall validity of the test, it should be noted that there are three principal ways of establishing validity (American Psychological Association, 1974): 1) content validity (demonstrating that the test samples the proper domain of items), 2) criterion-related validity (demonstrating that scores of the test correlate with other independent measures that are called criteria) and 3) construct validity (showing that hypotheses derived from theory are confirmed when tested by empirical research; Schontz 1986). We have demonstrated that the SMT test samples relevant data (i.e., it shows content validity), that the test demonstrates significant differences between groups defined by different criteria like healthy women and women with CPP (i.e., it shows criterion-related validity), and that it demonstrates that the hypothesized deviation from normal motor patterns of the CPP patients are indeed found to be deviant when applying the test (i.e., it shows construct validity).

We have concluded that the SMT showed good discriminative validity. Thus it should be understood that we hereby refer to the finding that the test discriminated well between CPP patients and healthy controls.

Several explanations can be proposed. One may question whether the evaluating physical therapist was really “blinded”, i.e., whether some bias could still come into play. CPP patients have a characteristic pain behaviour that easily can be spotted by the evaluator. For example, some of the patients could not walk without a stick, others could not lift their arms because of the
stretch in the abdomen, and some could not stand on one leg without holding on to something. This problem would generally apply to any study of patients that have altered behaviour or motor patterns, and is thus not a specific problem of this particular study. Still, it cannot be excluded that a bias stemming from these differences in patients’ appearance could have influenced the rating of patients, thus providing less variance of scores. However, the greater variability in the scoring of the controls may reflect difference in the opinion among the therapists as to what pattern of movement is perceived to be optimal or “normal”. On the other hand, when patients were assessed by the SMT, the agreement among the evaluators was generally good, with excellent agreement in evaluating the pattern of movement, gait and respiration. This may indicate that the patients with CPP display a stereotypical pattern of movement dysfunction that is clearly perceived to deviate from normal variation. The deviations from normal patterns were most clearly demonstrated in the tests for movement, gait and respiration.

This corresponds to others studies using different assessments. The GPE-52 domains Respiration and Movement also showed higher ICC scores in patient groups in the Kvåle study (2003). Thus it is likely that experienced physiotherapists observe deviations from normal patterns in patients with chronic muscle pain, and most clearly so in the tests for movement and respiration.

Based on SMT alone, it would be possible to discriminate between women with CPP and asymptomatic women. However, this does not imply that the SMT would suffice as tool to categorize a woman as having pelvic pain, because no comparison has been made with patients with other psychosomatic or psychiatric symptoms. In the future we have to use the SMT to validate the test on different patient groups other than CPP.

**The Effect of Somatocognitive Treatment**

**Methodological Considerations**

In our randomized material, the women of the two treatment groups are similar with regard to average age, number of labors, depression scores and the frequency of dyspareunia, irritable bowel syndrome and muscle and joint pains (Haugstad et al., 2006c). However, in spite of the blinded randomization procedure there were slight differences with regard to educational level and
the subjective pain level in the two groups. In the STGT group none of the women had college education; in the MSCT group 7 of the patients had education from college. Still, when college and high school education were seen together, 12 women in the each group had higher level education. Thus, overall the educational level may be said to be reasonably equal in the two groups.

In the two treatment groups the baseline VAS scores were also a bit different. The VAS average score in the STGT group was 6.68 (± 0.29), one point higher than in the MSCT group (5.60 ± 0.40). After 3 months treatment the VAS score reduction in the MSCT group was great almost 50% down (2.89 ± 0.40) compare to the STGT group reduction after 3 months that was only 7.8 % (non significant). We have no good explanation for this differences in baseline VAS score in the two groups, other than that they are probably within the range that could be explained by random variation in two groups of 20 CPP patients.

**Possible Mechanisms behind the Improvement in SMT and VAS Scores after Somatocognitive Treatment**

In the very beginning of the somatocognitive therapy the patients and the therapist have to establish a good therapeutic alliance. The empathic therapeutical attitude is of great importance for the outcome of the treatment in all types of therapies (Gyllensten et al. 1999, Hersoug 2001, Hoffart et al. 2002, Nerdrum & Rønnestad 2003, Ekerholt & Bergland 2004, Ryum & Stiles 2005). In the past decade, the working alliance has emerged as possibly the most important conceptualization of the common elements in diverse therapy modalities. The working alliance is the product of the patient's and the therapist's conscious determination and ability to work together. No successful therapy can take place without a working alliance which is equivalent to a working relationship in any team effort outside the therapeutic setting (Hersoug 2001, Nerdrum & Rønnestad 2003).

A good working alliance requires that the patient is able to look at himself objectively together with the therapist. It is seen as a prerequisite that the patient perceives the therapist to have a supportive attitude. Thus trust and belief the therapist’s abilities and genuine motivation to help are invaluable assets in the therapeutic setting. The therapeutic working alliance has been shown to be of importance for the outcome of the therapy, and Hersoug
concludes that patients prefer therapists that are actively involved in treatment and treatment planning.

It is necessary to have achievable functional goals for the treatment. Examples of such goals from our study could be “to learn breathing more deeply”, ”learn walking without a stick”, ”sleep in the prone position”, ”sit on both tuber ischii”, “touch the abdomen” and “try to have sex again”. In line with cognitive therapy the somatocognitive therapy formulate an agenda for every session. Typical agenda items might include a review of the week (brief, and focused on items of relevance), review of the homework, particular items to be worked on within the session and how to practice the learned techniques (Freeman et al. 1987, Beck et al. 1979). The final few minutes of the session can be used to evaluate the session, go over homework for the next session, and have the patient encapsulate what she has learned during the session and will be taking home with her. An aspect of great significance in both somatocognitive and cognitive therapy is the idea that the therapy does not happen 1 or 2 hours a week in the therapist’s office, but needs to be a process that is constantly lived. An important part of the collaboration is for the patient to do the self-help work at home, in daily life. Clinical experience has indicated that the patients who do more self-help work make progress more quickly in therapy and are able to meet their stated therapy goals more rapidly (Freeman et al. 1986).

A word of caution should be added when discussing the different outcomes of the two treatment groups. The frequency of therapeutic sessions was clearly different in the two groups. Where as the women in the STGT group had all together 7 visits to the therapists during the 10 weeks’ intervention period, the women in the MSCT group had all together 7 + 10, i.e. 17 visits to the therapists, a considerably larger number of consultations. 10 of these sessions were with one of the therapists, the Mensendieck therapist. Thus, the possibility that the empathic alliance formed by this latter therapist in itself, or the positive expectations formed by the knowledge that this intervention was perceived to be a new and exciting procedure by the whole team could explain the favorable outcome in these women, independent of the specific therapeutic procedures, can not be entirely ruled out. The strength of evidence that MSCT itself works, would be increased if future studies can be performed with equal numbers of consultations in the STGT and STGT + MSCT groups.
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Figure 2. The figure shows change in scores, in % of baseline before therapy, for motor pattern after therapy and at one years follow-up (for posture, movement, gait, sitting posture and respiration, for standard gynaecological treatment black and densely hatched bars, for somatocognitive therapy, lightly hatched and open bars.

• GHQ-30 (1 y):
  - reduced scores in the treatment group
    - Anxiety \( p < 0.05 \)
    - Coping \( p < 0.05 \)
    - Depression \( p = 0.06 \)

• No change in the treatment as usual group

Figure 3. To the left, the light bars show the VAS pain scores for control patients (B = baseline, 90 day = after therapy and 1 year = at follow-up), whereas the dark bars show the VAS score for the patients subjected to somatocognitive therapy at the same points in time. To the right, the level of statistical significance for change in mental distress after therapy as measured by the general health questionnaire (GHQ-30) instrument.

Respiration

In this study the pattern of respiration is the subtest in the SMT where the patients improve the most during the 90 days of Mensendieck somatocognitive therapy. In Mensendieck therapy there is always a focus on a functional respiration (Mensendieck 1954, Haugstad 1999, 2000). The patients are taught
how to fill the lung so the thoracic rib cage and abdomen move. In the initial sessions the patients should register their breathing pattern and how they could change the breathing to more functional and freer respiration. They learnt this through new movements and cognition, (Mensendieck Exercises, Klemmetsen 2004), through pedagogical instructions and through careful manual release (“sykegrep”) of tender musculature around the abdomen and in the pelvic area (Lingsten & Halvorsen 2001). The patients were assigned homework between sessions, i.e. breathing lessons to be performed during daily activities; when they sit watching TV, relax on the sofa, or work on the PC. It was found typical for the patients in the study to state that they “had not dared to breathe down in the abdomen because of the pain”. In somatocognitive therapy we start changing the focus, from pain experiences in the body to experiences of new movements in daily life. It was seldom for the patients to experience these new movements as scaring or unpleasant. This strategy of “changing the focus” is an important element in the patient’s path out of the vicious circle of negative thoughts and actions. This can be seen to be in line with a theory of “desensitization” (Mosely 2003).

**Movement**

The second group of functions that improved considerably after somatocognitive therapy was the subtests for movements. The patients demonstrated the largest improvement in the tests functions designed to demonstrate coordination and the ability to relax. Other authors have also demonstrated that there seem to be a relationship between the experience of pain and the ability to relax as well as other aspects of motor functions (Kvåle 2003, Kvåle et al. 2005). In this study we found an altered pattern of movements and “no touching” of hypersensitive and swollen abdominal area. We have ascribed the term a “pelvic pain protecting pattern” this particular cluster of behaviours. The typical pattern described (Haugstad et al., 2006b) correlates to the well-known “guarded behaviour” in patients with low back pain, which may either be due to the pain itself or to the fear of pain (Hamaoui et al. 2002, Lamoth et al 2003, Vlayen et al. 2007). The Mensendieck somatocognitive therapy starts the therapy with the simplest forms of movements that may be used in daily life, moving to the more complex exercises when the simple ones are automatized. New baselines are created (Moseley 2003). This learning of movement is well known from neuropsychology and from sport sciences (Fitts et al. 1964, Gentile 1998, Hodges & Franks 2002). The new movements will
focus on normal use of the muscles, and focus on the movement itself, without paying attention to the pain. Mensendieck somatocognitive therapy also include the element of manual release of tender muscles in the pelvic region, in keeping with the approach physical therapy traditions in general, as demonstrated in other studies (Fitzgerald et al. 2003, 2005, Kotarinos et al. 2003, Anderson et al. 2005, 2006, Cornel et al. 2005). The various manual techniques and modalities could open up for more free movements and more functional use of the muscles both in gait and in coordination of movements.

**Pain**

Mensendieck somatocognitive treatment changed the level of experienced pain for the CPP patients with an average of almost 50 \% in VAS score. Seven of the 20 patients in the treatment group were quite pain free after treatment (VAS 0-2), they respond very well to the MSCT. Two of the patients in the MSCT group had not responded specifically to the treatment and the pain was almost same in intensity after treatment (VAS 6-7). These two patients were not responding well enough to this treatment (Haugstad et al., 2006c). The others had significantly reduction in pain after three months with MSCT. With regard to possible mechanisms involved in the pain reduction, we suggest that the reasons might be more functional movement, changes in gait, improved posture with more relaxed pattern, reduction in fear for movements etc. All of these changes would imply a change of focus from pain experience to positive body experiences and coping of daily activities. According to the pain neuromatrix theory, these changes would occur simultaneously with reduced brain activity in the correspondeing areas, i.e. anterior cingulate and insular cortices. In addition, we have observed less swelling of the lower abdomen and inguinal areas, implying improved lymphatic drainage through better circulation. With respect to the positive development in body awareness in these women, we would like to emphasize the importance of the ideomotor preparation for the movement proper. Mensendieck training is focusing on the mental ideation of movements, thus increasing the patient’s conscious awareness of both proprioceptive and exteroceptive sensory input. We tend to believe that this carefully developed method of patient instruction is a prerequisite for the relatively rapid improvement in the patient’s acquaintance with her own body. With regards to the effect of this treatment modality on pain perception, we would like to point to the studies that indicate that central sensitization of pain perception and defects in pain inhibition play important
roles in the development and maintenance of chronic pain states (Ursin 1997, 2005, Lidbeck 2002, Eriksen & Ursin 2002, 2004, Banic et al. 2004). The treatment approaches that have demonstrated clinical effect would refer to elements like 1) lateral inhibition brought about by alternative stimuli, as touching, manual release of muscles in the painful area, move the painful area, or 2) changes in mental focus from focus on pain experience to focus on other and more pleasurable body sensations, and likewise 3) focus on coping and mastery rather than on regressive behaviour and being a passive recipient of treatment and pain killers, may be important factors.

**Effect of Treatment on Level of Psychological Distress**

Assessing the level of psychological distress by means of the GHQ-30 questionnaire at the time of inclusion and again at the time of one year follow-up, the main finding was that the levels of distress were reduced in the treatment (STGT+MSCT) group, but not for the STGT group, where there was a tendency towards increased distress. Specifically, the reduction in scores for anxiety-insomnia-distress and coping in the treatment group were highly significant, and the sub-scores for depression were reduced almost to the level of significance. The exception from this general trend, were the scores social function, where both groups experienced higher level of distress at follow-up than at inclusion. To comment on this latter result, that at first hand might seem somewhat surprising, one should bear in mind that the therapy has been limited to out patient, one-to-one encounters between the patient and the therapist, and has not included group sessions, exposure to a wider social setting or focus on social functioning in the therapy sessions. We are now starting a modified therapeutic approach, where chronic pain patients are treated in a day care program that includes a wide variety of exposures to groups and other social interaction programs.

However, the main result is the improvement with respect to anxiety, distress and coping. Although the therapy has not focused mainly on psychological symptoms such as anxiety and depressed mood states, rather on improved motor skills and reduced fear for movements. With respect to coping, the therapy has focused on dealing with the challenges related to the movements of daily living, and they have been challenged to explore the territories of new patterns of motor behaviour.
Possible Reasons for the Long-Term Positive Effect of Somatocognitive Therapy

In addition to the short term outcome of therapy after the treatment period of three months, we have demonstrated that the motor patterns and pain experience of the patients continue to improve after end of therapy, and are found to be significantly better at one year follow-up than at the immediate post-therapy assessment.

One explanation for this, that we find plausible, is that the therapy and constant practice of the cognitive and motor elements of behaviours that are so intensely rehearsed in the activities of daily living during the treatment period continue to be of use to the patient. These “toolkits” of novel approaches that the patients acquire during treatment, is now owned by the patient, who, by the success of these “tools” during active therapy, is, to a greater or lesser degree, motivated to continue the utilization of these tools is the post-treatment period. By changing the focus from pain experience towards coping of functions in activity of daily life and new motor patterns, the patient will be less fearful that movements elicit pain, conceivably by means of reduced activation of the cerebral pain neuromatrix circuits. This implies that new strategies have been learnt, both with respect to motor skills, and with respect to the reduction of anxiety levels. When people understand how and why they are doing well, they can continue doing what they are doing to make themselves better. The patients will after a while in this form for treatment be their own therapists, they have learnt how to cope with respect to the challenges of daily living, and they have their own tools to use (Mensendieck 1937, Haugstad 2000, 2007).

We suggest that this pattern of further improvement of function during the follow-up period is due to a learning effect. The patients have learnt to move in a more natural and relaxed manner. The pelvic protection pattern is thus changed to a more functional and flexible use of the pelvis that promotes blood circulation and lymphatic drainage. Perhaps most importantly the pattern of respiration is changed, with an active use of the diaphragm, and thoracic and low abdominal expansion during the inspirium. The aim is that these new patterns will be automatized and integrated in the patient’s new image of own body. Thus, these new motor skills are, in term, utilized without the patient conscious awareness, and they are gradually interwoven as natural parts of their new daily performance.
Somatocognitive Therapy as Contrasted to Cognitive Therapy with Chronic Pain Patients

We have, time and again, underscored the close relationship between somatocognitive therapy and cognitive psychotherapy as developed by Beck and collaborators since the 1960s. However, a word of caution is warranted: these are two approaches that are also very different. Cognitive therapy is developed as psychotherapy (Winterowd et al. 2003). As such, it only deals with the mental components of pain – the part of pain that finds itself “above the collar”. It does not relate to the body, in a strict sense of the word. Even when the therapist promotes relaxation techniques, the patient only relates, in a passive way, to a restricted array of sensory input from the body. In no way is the therapist active in promoting specific use of the body, or specific strategies for experiencing alternative movement patterns, and how this leads to alternative sensations from the body. Somatocognitive therapy, again, should be understood as a hybrid of physiotherapy and psychotherapy. A wide array of sensory input from and about the body is encouraged – visual, tactile and proprioceptive among them. Even slight alterations in the postural tone or use of the extremities and shoulder and limb girdle may lead to profound alterations of, say, the respiration pattern, the free movement of abdominal and pelvic muscle groups, the position of the head in relation to the spine, the normal curvatures of the spinal column, etc. This close relation to functional anatomy is totally wanting from cognitive psychotherapy, and the theories of motor learning are also distant from the theory of cognitive therapy. On the other hand, somatocognitive therapy makes use of the proprium of cognitive therapy, in that it incorporates the understanding of dysfunctional cognitive schemata that prepares the way for negative emotional load, which again results in repressed body language. In the realm of psychiatry and therapy, somatocognitive therapy also can be said to break certain taboo areas, in that physical contact between the therapist and the patient not only is encouraged, but is seen as an absolute prerequisite in therapy.

CONCLUSION

Mensendieck physiotherapists evaluate posture, movement, gait, sitting posture and respiration with a high level of agreement when using the Standardized Mensendieck Test (SMT). The reliability is better when examining those with CPP than those with no symptoms.
The performance in all of these subtests is significantly lower in the symptomatic women’s group than for the healthy controls. Thus the SMT discriminated well between patients with CPP and healthy women. These results indicate that the SMT may be useful in the evaluation of patients with CPP and other somatoform disorders.

We found a specific pattern of pain, posture, movements, muscle elasticity and reduced awareness of one’s own body in women with CPP. These findings may increase our understanding of this disease.

Our study demonstrates effect of Mensendieck somatocognitive therapy on the symptom load of patients with CPP. Mensendieck somatocognitive therapy combined with standard gynecological care improved pain experience and motor functions specially the respiration and the movement of women with chronic pelvic pain better than gynecological treatment alone.

We have shown that the effect of Mensendieck somatocognitive therapy in combination with standard gynecological treatment in a group of women with CPP prevails, in that improved motor functions are lasting, and that even further progress takes place nine months after end of therapy. We suggest that this further improvement is due to a learning effect.

**Suggestions for Further Research**

As comments to the outcomes of this study described above, we would like to indicate that our approach might be of significance in several different areas that we have made an effort to juxtapose: Mensendieck therapy has been operationalized and developed by means of the SMT and somatocognitive therapy. This approach has been applied to the field of psychosomatic medicine in order to develop a deeper understanding of the relationship between psychological and somatic pathology, and a new approach to treating disorders like chronic pelvic pain, vulvodynia, chronic chest pain, neck and shoulder pain, low back pain and irritable bowel disease. By applying this knowledge to the field of clinical gynecology, some light may have been shed on the pathophysiology of, and treatment approach to, the chronic pelvic pain disorder. In the area of psychotherapy, application of cognitive techniques to specific somatic problems has generated new insights, and the term “somatocognitive therapy” has been coined. In terms of diagnostic classification, the possible relationships among somatoform disorders (like CPP) and disorders that involve myogenic pain (like chronic headaches) may be implicated.
In future studies we would like to clarify whether psychotherapy in addition to Mensendieck somatocognitive therapy is of importance for the treatment outcomes. This can be done by adding a third intervention group to the design, and subjecting the patients to CBT in addition to MSCT as well as STGT.

We have already initiated studies where we apply the SMT to other groups of patients (i.e., irritable bowel disorder, shoulder and neck pain), and it will be of interest if the SMT is sensitive for other patient groups.

In this study the follow up period is one year. Longer follow-up, for example five years after treatment, would clarify whether the learning effect persists.

It will also be of special interest to look at the psychometric evaluation and to the other examination to identify predictive factors with regard to degree of treatment response.

In this study, patients with major psychopathology, both with respect to symptom load (axis I) and personality traits (axis II) have been excluded. In future studies, we would like to examine whether patients displaying such symptoms respond to Mensendieck somatocognitive therapy.

Subsequent Developments and Comments

Since our study on the application of somatocognitive therapy to this particular group of gynecological patients, other authors have commented on our approach. We find the editorial comments to our last paper (Haugstad et al., 2008) in the American Journal of Obstetrics and Gynecology (AJOG) most interesting. Here it is stated that “the somatocognitive approach should be applied to patients with chronic urogenital and musculoskeletal pain”, that “Gynecology departments should develop treatment programs for patients with chronic pelvic pain that incorporate a somatocognitive approach to motor analysis and therapy”, and that “when no such program is available at the patient’s treatment facility, she should be referred to one elsewhere”. In our opinion, we may need some additional research in order to have a strong base for such wide-ranging conclusions. The research is still at its inception, and further studies, involving other centers and other target groups, should be performed. However, preliminary results from a pilot study where the current approach is applied in women with vulvodynia are promising. We have also been encouraged by several authors that have commented on and enquired into our results, that seem to find different aspects of our approach interesting,
ranging from interest in the posture’s effect on the tilt, position and motion of the pelvis, to the effect of a full abdominal respiration on the hemodynamics and lymphatic drainage of the pelvis minor, the concept of alexisomia and its relation to somatic dissociation, and the overall focus on showing empathy and establishing a good working alliance with the patient.

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