Prevalence and Characteristics of Chronic Sensory Problems
in Burn Patients

Annie Malenfant\textsuperscript{a,b}, Robert Forget\textsuperscript{c}, Jacques Papillon\textsuperscript{a,d},
Rhonda Amsel\textsuperscript{f} Jean-Yves Frigon\textsuperscript{b} and Manon Choinière\textsuperscript{a,d,e,*}

\textsuperscript{a}Burn Centre, Hotel-Dieu Hospital of Montreal, Montreal, H2W 1T8 (Canada),
Departments of \textsuperscript{b}Psychology, \textsuperscript{c}School of Rehabilitation, \textsuperscript{d}Surgery and \textsuperscript{e}Anesthesia, Faculty of Medicine, University of Montreal, Montreal, H3C 3J7 (Canada) and \textsuperscript{f}Department of Psychology, McGill University, Montreal, H3A 1B1 (Canada)

Summary

Problems of pain and paresthesia in the healed wounds of burn patients are an understudied and poorly documented phenomenon. This descriptive study was designed to examine the prevalence and characteristics of these chronic sensory problems one year or more postburn. Four hundred and thirty patients were sent questionnaires which assessed the frequency and intensity of the problems, influencing factors and impact on patients' lives. These problems were assessed by rating scales (visual analogue and categorical scales) and the McGill Pain Questionnaire (MPQ). The response rate was 67%. Over one-third of the participants (36.4%) complained of pain while the prevalence of paresthetic sensations was 71.2%. More than half of the symptomatic patients experienced
sensory problems every week sufficient to interfere with daily living. No relationships were found between these sensory problems and the patients' age or sex, burn etiology, or length of time elapsed since injury. Burn severity was related to the frequency of the problems. Discussion emphasizes the need for adequate treatment of these problems and suggests further research issues.

**Key words:** Chronic pain, Paresthesia; Burns; Prevalence.

**Introduction**

Burn injuries are common, affecting more than two million people in the USA annually. Approximately, 3 to 5% of burn injuries require hospitalization (Demling and Lalonde 1989; Deitch 1990). Of the 200,000 burn injuries occurring in Canada each year, about 7000 people require hospitalization (Snelling and Germann 1992; Waitzman and Neligan 1993). Often hospitalized for weeks or months, burn victims face pain on a daily basis. After they are discharged from the hospital, burn patients may continue to feel pain or paresthetic1 sensations in their healed burns and these problems may persist for years (Choinière et al 1991; Choinière 1994). However, the prevalence of this type of problem is not clear and the characteristics remain understudied and poorly documented.

The existing literature on chronic sensory problems in burn patients consists of a few papers dealing with rehabilitation issues (Ahrenholz and Solem 1987; Blalock et al. 1992), anecdotal reports (McBride 1979; Ton 1984) and a case study (Lane and Hogan 1985). When investigating

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1 The term « paresthesia » is used to refer to a nonpainful abnormal sensation (Subcommittee on Taxonomy of the International Association for the Study of Pain - IASP, 1986)
cutaneous sensitivity after grafting, Ward et al. (1989) found that 25% of the examined patients in their study (N = 60) complained of pain in the grafted areas, 25% had chronic pruritus and 50% reported an increased sensitivity to ambient temperature. However, these results may have been influenced by the fact that the patients were seeking impairment ratings for compensation. In another study, Choinière et al. (1991) attempted to determine the prevalence of pain and paresthesia in burn patients and found that 35% of the patients in their sample (N=104) complained of chronic pain one year or more following the burn injury while 82% reported various paresthetic sensations in healed areas. However, this exploratory study was based on a low response rate (35%).

The present study was designed to 1) examine the prevalence of pain and paresthesia in a large sample of patients with healed burns, and 2) to describe the characteristics of these problems in terms of intensity, frequency, influencing factors and impact on patients' lives.

**Methods**

**Subjects**

The participants of the present study were recruited among adult burn patients who had been hospitalized at the Burn Center of Hotel-Dieu Hospital of Montreal between June 1985 and December 1992 (one to seven years before the start of the study). The subjects were recruited from a computerized list of consecutive admissions during this period. Excluding the patients who were deceased or had a diagnosis of psychiatric illness clearly documented in their medical file, the initial population included 638 patients. Each of them was contacted by phone by a staff member of the Burn Center assigned to patient recruitment for the present study. Four hundred and thirty patients
were located and sent questionnaires. Patients who did not send back the forms were contacted within six months and encouraged to return the material.

A total of 290 patients sent back the questionnaires for a response rate of 67% (290/430). Fifty-four patients were excluded from the analysis for various reasons including inability to answer the questionnaires because of language difficulty or mental instability or the presence of a disorder affecting sensory function (see assessment material), leaving 236 subjects.

*Procedure*

Since many patients lived outside of the Montreal area, data were collected using mailed questionnaires. Each patient was mailed the assessment material (patient questionnaire and McGill Pain Questionnaire) along with a stamped return envelope and a letter which explained the study requirements and provided detailed instructions for completing the questionnaires. Upon return of the questionnaires, each form was reviewed by the principal investigator (A.M.) to ensure that the patient had followed the instructions and answered all questions. Patients who returned an incomplete questionnaire or provided ambiguous answers were contacted by phone to collect missing information.

A medical review form was completed for each patient by an experienced research nurse who also had clinical experience in the care of burn patients. She reviewed the patients' medical files to collect information about the characteristics of the burn injuries (etiology, size, location, skin graft areas). Burn size was calculated by using the Rule of Nines (Knaysi and Crikelair 1968) and was expressed as the percentage of total body surface area burned. Demographic and medical data (age,
sex, type and size of the burns, length of time elapsed since injury) for the patients who did not return the questionnaire (N = 140) or ineligible patients (N = 54) were retrieved from the computerized data base at the Burn Center.

Assessment material

Material used in this study consisted of a medical review form, the patient questionnaire and the McGill Pain Questionnaire.

Medical review form. This form contained the medical information regarding total body surface area burned (TBSA), etiology and location of the burns, grafted areas, and length of time elapsed since injury. Because it was often difficult to obtain accurate information about the location of skin grafts in areas other than the hands, only hands were considered for the analysis of the relationship between painful or paresthetic sensations and skin grafts.

Patient questionnaire. The first section of the questionnaire consisted of descriptive items about demographic and medical history. Patients whose pre-existing medical condition might alter sensory functions were excluded from the study. To preserve confidentiality, the patients were provided with a series of statements and asked whether their actual condition corresponded to any of the following: diabetes, chronic pain not originating from burns, (e.g. arthritis), skin disease, amputation, daily alcohol intake, regular consumption of street drugs (e.g. cocaine) or psychiatric disorder requiring medication. When patients answered positively, they were asked to return the questionnaire without completing it. Otherwise, the patients were included in the study and requested to complete the rest of the questionnaire.
The second part of the patient questionnaire examined the prevalence and characteristics of painful and paresthetic sensations in burn sites. This questionnaire was a modified version of the structured interview protocol used in Choinière et al's study (1991). The revised version included additional items and was designed to be completed in writing by the patients. It was composed of closed questions (multiple-choice and yes/no questions), rating scales (visual analogue and categorical scales) and single-phrase answers. A first version of the questionnaire was revised by two psychologists and a research nurse. The instrument was modified and pre-tested with five burn patients. Copies of the questionnaire can be obtained from the authors.

The first set of questions were about paresthetic sensations felt at the sites of the burns while the second set concerned painful sensations. Various parameters were assessed including the location, frequency, intensity of the sensations, influencing factors and impact on patient's functioning. Intensity measures were obtained using a 10-cm long visual analogue scales (VAS: "no pain" or "no sensation", "unbearable pain" or "unbearable sensation") (Huskisson 1983) and adjective scales (1 = mild, 2 = moderate, 3 = severe, 4 = unbearable). Special care was taken to provide the patients with clear instructions regarding the use of the VAS as a certain number of studies have shown that some patients may have difficulties in understanding the VAS (Carlsson 1983; Kremer et al. 1981). Detailed instructions were provided using an analogy where the VAS was compared to a thermometer for measuring body temperature (Taenzer 1983). Verification for patients' comprehension of the VAS was made by comparing the intensity ratings at its worse and usual level. If a subject rated his pain and/or paresthesia at its usual level as being more intense than the pain at its worse, using a maximum allowable difference of 0.5 cm between the two ratings, it was...
assumed that he did not understand and/or use the scale properly. Questionable ratings were noticed in less than 1% of the participants (6/169) and were excluded from the data analysis.

Participants were also asked to rate the extent to which pain and/or paresthesia interfered with their sleep, work, social activities, and concentration using a 0 to 4 scale where 0 = not at all, 1 = a little, 2 = moderately, 3 = a lot, and 4 = extremely. Additional questions were aimed at assessing factors which exacerbate or decrease the sensations. A final series of questions asked about pharmacological and nonpharmacological methods patients used to relieve pain at the site of their healed burns.

*McGill Pain Questionnaire.* Patients who reported pain in their healed wounds were asked to complete the McGill Pain Questionnaire (MPQ) (Melzack 1975). Unlike other pain scales which measure only pain intensity, the MPQ allows the assessment of several dimensions of the pain experience. It consists of 20 categories of adjectives from which the patient selects those that best describe his or her pain. The adjectives are scaled according to relative intensity within each category and the categories are grouped into three major classes which measure the sensory, affective, and evaluative dimensions of pain experience. Data collected from the MPQ can be analyzed from a qualitative or quantitative point of view. A qualitative profile can be derived from the words the patients select to describe their pain and can be used to characterize the pain properties. Quantitative scores for each of the sensory, affective, and evaluative classes as well as a total pain score can also be calculated for the adjectives selected (Melzack 1975). The validity and reliability of the MPQ have been demonstrated in numerous studies (Reading 1989; Chapman and Syrjala 1990; Katz and Melzack 1992). In the present study, the French translation of the MPQ
developed by F. Viguier of the Pain Clinic of the Hotel-Dieu Hospital of Montreal was used. This French version has shown satisfactory results in terms of its psychometric properties (Boureau and Paquette 1988).

Data analysis

Parametric and non-parametric statistics were used to compare the demographic and medical characteristics of the participants and non-participants. T-tests were used for continuous variables and chi-square analyses for discrete variables. The same type of statistical tests were used to compare the characteristics of the patients reporting sensory abnormalities (pain and/or paresthesia) and those who were asymptomatic. Statistical significance was evaluated using two-tailed probability levels. Correlations between the intensity ratings on the VAS and verbal-numerical scale were assessed using Pearson coefficients (one tailed-test). All analyses were performed using the SPSS/PC program (version 4.0) and alpha was set at p < .05 for statistical significance.

Results

Participants' characteristics

Demographic and medical characteristics of the participants (N = 236) and non-participants (N = 194) are shown in Table I. Statistical analyses revealed no significant differences between the two groups with respect to sex, age, total body surface area burned, burn etiology, and time elapsed since injury.
Prevalence of pain and paresthesia in healed burns

Figure I shows the prevalence of chronic postburn sensory problems in the study sample. Eighty-six of the 236 participants (i.e 36.4% of the sample) felt pain while 71.2% of the patients (168/236) reported paresthetic sensations. About one-quarter (28.4%) of the patients did not report any painful or abnormal sensations. The various types of paresthetic sensations the patients reported in their healed burns are listed in Table II.

All patients filled out the questionnaire one year or more after the injury. Table III shows the prevalence of the sensory problems according to the number of years elapsed since the burn injury. The prevalence of pain or paresthesia in healed burns did not vary significantly as a function of the number of years postburn ($\chi^2(3) = 4.72, P > .05$). The presence of chronic sensory problems was also not related to patients' age, sex or burn etiology. However, a significant association was found with the size of the burn injuries. The patients who reported pain in their healed wounds had larger burns on the average (mean: $24.1\% \pm 17.1\%$) than patients who did not complain of pain (mean: $17.5\% \pm 15.6\%$) ($t(164) = 2.97, P < .003$). The same was true for patients who experienced paresthetic sensations (mean: $22.4\% \pm 17.4\%$) as opposed to those who were asymptomatic (mean: $13.8\% \pm 11.8\%$) ($t(181) = 4.39, P < .0001$). The relationship between the depth of burns and presence of sensory problems was explored in a subgroup of patients who had burns to their hands.
(see methods). Painful sensations were significantly more frequent in more deeply burned hands which required skin grafts than in superficial burns which healed spontaneously ($\chi^2(1) = 23.9, P < .05$). The same was true for the paresthetic sensations which were reported more frequent in grafted hands than in hands without grafts ($\chi^2(1) = 23.4, P < .05$).

- Insert Table III about here -

**Characteristics of the painful sensations**

For questions about the characteristics of the painful sensations, patients with pain in more than one area were asked to refer to the most painful sensation.

More than 75% (65/86) of patients who reported pain felt it either every day or more than one day a week. Other patients reported experiencing pain on a more intermittent basis (7.6%) or as a function of the weather (10.1%).

Eighty-four patients described their pain using the MPQ. The qualitative aspects of burn pain were explored by retaining words that were chosen by 30% or more of the patients. The most often selected sensory words were itchy (34/84: 40.5%), tight (31/84: 36.9%), cool (28/84: 33.3%), tingling (26/84: 31%), and taut (25/84: 30%) while tiring was the only affective descriptor chosen by more than 30% of the patients (37/84: 44%). Mean pain ratings index (PRI) for each MPQ subscale are shown in Table IV along with those recorded in other pain syndromes (Melzack 1975). Although there are obvious limitations to comparing pains of widely different origin, it can be seen that the pain scores are relatively low on the average, and especially on the affective subscale of the
When using Kremer et al's (1982) method of calculation where the sum of the obtained ranks within each MPQ dimension is divided by the total possible score for a particular dimension, the sensory component (mean: $0.24 \pm 0.18$) predominates slightly over some dimensions (affective: mean: $0.14 \pm 0.19$; evaluative: mean: $0.28 \pm 0.34$; miscellaneous: mean: $0.19 \pm 0.17$). Further examination of the total PRI scores revealed a wide range of variation. Seventy-two percent of the patients who reported pain had scores between 2-20 (mild pain), 8.4% had scores in the moderate pain range (21-30) while almost one-fifth of the patients (19%) had scores above 30 which, according to Melzack (1984), are associated with intensity descriptors of severe to unbearable pain. On the visual analogue scale (VAS), the mean rating of the patients was $6.1 \pm 2.4$ for pain at its worse intensity and $3.4 \pm 2.5$ at its usual level. About two-thirds (64%) of the patients stated that the intensity of their pain stayed the same or had increased with time. As strong correlations ($r=0.65$ to $0.82$, $P < .001$) were found between the ratings obtained on the VAS and verbal rating scales, only the VAS results were presented here. The size of the correlations is similar to those found in previous studies (Scott and Huskisson 1976; Kremer et al. 1981; Choinière et al. 1994).

As reported by the patients, the pain was often sufficiently intense to interfere with daily functioning. Considering only the scores $\geq 2$ (moderately to extremely) on the 0-4 scale (see methods section), more than one-third (36%) of the 86 patients with pain reported sleep difficulties because of their pain, 67% stated that the pain affected their work, 47% indicated that their social activities were disturbed while 39% reported concentration difficulties because of their pain.
Factors which were commonly mentioned to increase pain were weather-related. Sixty percent of the patients reported that the weather conditions such as heat, cold or humidity exacerbated their pain. Other factors which increased pain included physical effort (63.3%), fatigue (58.8%), movement (46.2%), and stress (42.5%). Heat application (e.g. heating pad) was reported to decrease the painful sensations for 22% of the patients. Only 16% of the patients with pain (14/86) reported taking analgesic medication regularly (e.g. morphine, acetaminophene, etc) which produced only mild to moderate relief in the majority of the cases (65%). Forty-two percent of the patients (36/86) reported using other pain controlling methods such as bath, ointment or massage. Sixty-seven percent of the patients using non-pharmalogical methods reported moderate to complete relief from pain.

**Characteristics of the paresthetic sensations**

Of the patients who had paresthetic sensations in their healed burns (N = 168), 70% reported experiencing these sensations either daily or more than one day a week. Twenty patients (12.2%) experienced these problems on an intermittent basis and 29 (17.7%) stated that it varied with the weather conditions. In terms of intensity, the mean VAS scores were 5.2 ± 2.6 (worse level) and 3.1 ± 2.4 (usual level). Sixty-two percent of these patients stated that the intensity of their paresthetic sensations had remained the same or had increased with time.

Paresthetic sensations were also reported to affect daily activities. About one-third (29%) of the patients stated that these sensations affected their sleep and social activities moderately to extremely (score ≥ 2). The same was true for the effects on work (45.7%) and concentration (27.3%)
Like pain problems, paresthetic sensations were reported to vary in intensity as a function of the weather conditions, the temperature making the sensations worse (whether it is hot, cold or humid). Fatigue, physical effort, and stress were mentioned as exacerbating factors respectively for 50.6%, 43.3%, and 37.4% of the patients experiencing unusual sensations in their healed burns. For 20.8%, heat application was used to decrease the sensations.

**Discussion**

The prevalence and characteristics of post-burn chronic sensory problems are poorly documented in the literature. As shown in this study, these problems are common several years after a burn injury. More than one third of the patients in this study (36%) reported pain in their healed burns while 71% had paresthetic sensations (e.g., itching, tingling, cold sensations, etc). These prevalence rates confirm those observed in an exploratory study (Choinière et al. 1991) and are based on a much larger sample size and a higher participation rate.

In terms of frequency, the vast majority of the patients reported experiencing pain or paresthesia every week in their healed wounds. The problems can stay for many years post-burn--i.e. long after the scar maturation is known to be complete (Ketchum 1977; Larson et al 1979). In a large proportion of patients, the sensations persisted with no significant decrease in intensity. Moreover, the majority of the patients (60% of those with pain and 56% of those with paresthesia) reported that the sensations stayed the same with time which shows the persistence or chronicity of these sensory problems. Pain or paresthetic sensations were most commonly exacerbated by weather conditions,
fatigue, physical effort, movement and stress. Many patients reported that the sensations in their healed wounds had moderate to extreme disabling effects on their work, social life, concentration and/or sleep.

Limitations of the present study need to be taken into account. The first concerns the sampling method. Random selection of the patients was not feasible so a convenience sample was used. It is possible that the non-participants (those who were not located or who did not return the questionnaires) differed from the respondents. Exclusion of these patients may perhaps have inflated the prevalence rates observed in the present study. However, some generalizations from the present sample can be viewed as possible considering that more than two-thirds of the patients contacted took part in the study and that the respondents were comparable with the non-participants on several important medical and demographic variables.

Other study limitations have to do with the data collection method. Results obtained in the present study were based upon patients' self reports and a review of their medical files. No physical examination data or functional scales to measure disability were included. However, adequate assessment from the patients' point of view provides essential information for subjective phenomena such as pain (Chapman and Syrjala 1990, Jensen and Karoly 1992; Melzack and Katz 1994, Stevens et al 1995). Patients' self-reports were collected via mailed questionnaires. Contrary to telephone or face-to-face interviews, this technique limits the control over question misinterpretation. However, all precautions were taken to assure proper comprehension of the questions (see Method section). A more important drawback of mailed questionnaires is the relatively small number of items that can be investigated. Although the present study included more items than Choinière et al's study (1991),
variables such as the psychological characteristics of the patients were not investigated so as not to overwhelm the patients and thereby decrease the participation rate. The only instrument which assessed dimensions other than pain intensity was the McGill Pain Questionnaire which provides some information about the affective dimension of the pain experience. Interestingly, the patients' pain did not appear to have a strong affective component. Few words describing the affective or emotional qualities of the pain were selected compared to those describing its sensory aspects. This issue, however, merits further investigation. Considering that pain and other subjective phenomena can influence and be influenced by psychological variables such as anxiety and depression (Melzack and Wall 1988; Craig 1994), a closer examination of these factors should be performed as they may have affected some of the results obtained in the present study. We are currently carrying out an extensive study on the long-term effects of burn injuries where we investigate more closely the interrelationships between the subjective sensory complaints in the healed wounds, objective signs of sensory deficits in cutaneous sensitivity, psycho-social factors and impact on the patients' quality of life.

Despite the study limitations, the present findings are believed to have important implications. Acknowledging that burn patients commonly experience persistent sensory problems in their healed wounds is important from both a clinical and a research point of view. Clinically, patients and physicians often face difficulties when the time comes to have these incapacities acknowledged by compensation agencies. For example, burn patients who work outdoors may be limited by the pain or paresthetic sensations that humidity or cold temperatures trigger in the healed wounds. In their study, Ward et al. (1989) also described patients who experienced difficulty in returning to outdoor work because of intolerance to extreme temperatures. These results along with those of the present
study should encourage compensation agencies in the USA (American Medical Association 1988) or in Quebec (Commission de la Santé et de la Sécurité au Travail, 1987) to revise their guidelines for evaluation of permanent impairment in burn patients so as to include a specific category for chronic sensory problems in healed wounds.

The presence of this type of problem in burn patients is not surprising when one considers the nature of injury, which damages underlying nerve structures, the kind of surgery carried out (skin grafting) and the possible problems of the scarring process. The exact pathophysiological mechanisms responsible for chronic pain and paresthesia after a burn injury are not, however, well understood. Abnormalities of neural excitability and ectopic impulses originating from damaged or regenerated nociceptive endings and fibers may give rise to abnormal inputs and produce pain or paresthetic sensations (Asbury and Fields 1984; Devor 1991, 1994; Adams and Victor 1993). A deficient reinnervation of the scar tissue may also be involved (Hermanson et al. 1986; Ochs et al. 1989; Levitt 1990). Skin grafts and wound healing processes, which can affect the quality of reinnervation, along with the formation of hypertrophic scars may also account for a diminished sensory function or appearance of some abnormal sensations (Terzis 1976; Hermanson et al. 1986; Hermanson and Dalsgaard 1987). Explanation of sensory abnormalities must consider the central processing changes induced by peripheral nerve trauma (Wall 1991; Devor 1994). Some studies with several types of injuries (Devor and Wall 1981; Wall and Cusick 1984; Katz et al. 1991) suggest that peripheral nerve lesions trigger changes in spinal, subcortical and cortical pathways that may alter sensory transmission.
Factors that may contribute or predispose to the development of pain and paresthesia in healed burns are unknown. The results of the present study revealed no predictable patterns related to patient age, sex, burn etiology, or length of time since burn injury. However, the symptomatic patients tended to have undergone more severe injuries, on the average, than patients who did not have any sensory problems, confirming some earlier observations (Choinière et al. 1991). More studies are needed to explore influencing variables. The results of the present study need to be replicated in populations of patients treated in various burn facilities. As suggested by Choinière et al. (1991), the prevalence of sensory complaints in burn patients may vary in different climates and this issue needs to be examined more closely. Another aspect to investigate is the type of nursing and surgical techniques used to treat the burn wounds, as these procedures may vary from one burn centre to the other. For example, burn wounds can be treated with a closed method (coverage with dressings), an open method (exposure to dry, warm air), or a combination of both (Demling 1985, Hurt and Ericksson 1986). In our burn centre, a combined method is used depending on the body area involved and the treatment phase. The time taken for complete wound closure after the injury (surgical wound excision and skin grafting) may also be an important variable to consider since some observations (Folkerts et al. 1959) suggest that graft timing may be a determinant for optimal reinnervation and sensory recovery. Vitale et al. (1991) also provides some evidence that severity of itching problems in burn patients may vary according to the duration of time to wound closure. Well-designed, prospective studies are needed to examine the long-term differential effects of burn wound management techniques.

The results of the current study indicate that burn patients often must rely on their own resources for treatment of pain and paresthesia in the healed wounds. Few patients were prescribed pain
medication and pain relief was generally reported as being inadequate. A larger proportion of patients reported using non-pharmacological approaches such as heat application, bath, etc. Data relating to the severity of the problems (VAS and MPQ scores) usually revealed pain and paresthetic sensations in healed burns of a relatively mild intensity but with a certain proportion of patients experiencing persistent, severe discomfort. Effects on daily functioning, another index of the severity of these problems, also showed elevated scores indicative of patient distress.

Deficient treatment of pain and paresthesia in healed burns is probably due to the clinicians' lack of familiarity with this symptomatology and its potential treatment, and to the absence of research on ways to prevent and control these problems. Further research is clearly needed to provide burn patients with pharmacological and/or non-pharmacological methods for relieving discomfort in healed wounds.

The idea of a resemblance to neuropathic pain disorders put forward by several authors (Atchison et al. 1991, Jonsson et al. 1991, Choinière 1994, Latarjet and Choinière 1995) merits further investigation when one considers the similarities with the nature and pathophysiological consequences of a burn injury. A vast literature exists on the management of neuropathic pain disorders (see review by Fields 1994; Hegarty and Portenoy, 1994) and the treatment of painful and paresthetic sensations in healed burns may involve experimenting with the variety of drugs that are employed for neuropathic pain, including antidepressants, anticonvulsivants and anesthetic agents. The use of opioids for treating neuropathic-like pain is still a controversial issue which merits further investigation. Topical medications such as capsaicin may also be beneficial (Zhang and Li Wan Po 1994). No study exists however on the use of these various agents for treating pain and
paresthesia in healed burns. The only exception is a trial performed by Choinière and Papillon (1994) on the use of capsaicin for treating chronic itching in healed burns. The results of this study were not conclusive and the authors suggest that other treatment approaches with greater efficacy and minimal adverse effects need to be explored.

Most of the literature on burns is devoted to the problems encountered during the hospitalization phase and numerous efforts have been made in recent years to improve the management of burn pain during this phase. Recognition and understanding of the pain which many burn patients continue to experience in their healed burns deserves further attention. The same is true for chronic paresthetic sensations, which can be as unpleasant and disabling as pain as shown by the similarity in percentages of patients who where affected by pain or paresthesia in their daily living activities. Not only do clinicians need to be aware of these problems but strategies for prevention and alleviation need to be explored.

Acknowledgements

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Table I
Subjects' characteristics

<table>
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<th></th>
<th>Participants (N = 236)</th>
<th>Non-participants (N = 194)</th>
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<tr>
<td><strong>Demographic variables</strong></td>
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<tr>
<td>Sex (% male/female)</td>
<td>76/24</td>
<td>73/27</td>
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<tr>
<td>Age (years): mean ± SD (range)</td>
<td>41.3 ± 14.3 (18-97)</td>
<td>42.3 ± 16.1 (18-83)</td>
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<tr>
<td><strong>Medical variables</strong></td>
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<tr>
<td>Burn extent (%): mean ± SD (range)</td>
<td>19.9 ± 16.4 (1-80)</td>
<td>17.6 ± 16.2 (1-80)</td>
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<tr>
<td>Time since injury (mths): mean ± SD (range)</td>
<td>47.3 ± 22.9 (12-102)</td>
<td>51.8 ± 25.2 (13-100)</td>
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<td>Burn etiology: N (%)</td>
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<tr>
<td>Thermal</td>
<td>187 (79)</td>
<td>158 (81)</td>
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<tr>
<td>Electrical</td>
<td>40 (17)</td>
<td>29 (15)</td>
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<tr>
<td>Chemical</td>
<td>9 (4)</td>
<td>7 (4)</td>
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Table II  
Type and prevalence of paresthetic sensations ($N = 236$)

<table>
<thead>
<tr>
<th>Type of sensation</th>
<th>Prevalence</th>
<th>%</th>
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<tr>
<td>N</td>
<td>N</td>
<td></td>
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<tr>
<td>Itching</td>
<td>105</td>
<td>44.5</td>
</tr>
<tr>
<td>Tingling</td>
<td>91</td>
<td>38.6</td>
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<tr>
<td>Coldness/freezing sensation</td>
<td>76</td>
<td>32.2</td>
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<tr>
<td>Numbness</td>
<td>58</td>
<td>24.6</td>
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<tr>
<td>Pins and needles</td>
<td>49</td>
<td>20.7</td>
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<tr>
<td>Warm sensation</td>
<td>40</td>
<td>16.9</td>
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<tr>
<td>Electric shock sensation</td>
<td>29</td>
<td>12.3</td>
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Table III
Prevalence of chronic sensory problems according to the length of time elapsed since injury

<table>
<thead>
<tr>
<th>Number of years postburn</th>
<th>Distribution of patients with pain complaints</th>
<th>Distribution of patients with paresthetic complaints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>proportion</td>
<td>%</td>
</tr>
<tr>
<td>1-2 years</td>
<td>17/42</td>
<td>40.5</td>
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<tr>
<td>2-3 years</td>
<td>16/42</td>
<td>38.1</td>
</tr>
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<td>3-4 years</td>
<td>22/49</td>
<td>44.9</td>
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<tr>
<td>&gt; 4 years</td>
<td>31/103</td>
<td>30.1</td>
</tr>
<tr>
<td>Total</td>
<td>86/236</td>
<td>36.4</td>
</tr>
</tbody>
</table>
Table IV
Mean intensity scores for each subscale of the MPQ and scores for various pain syndromes (Melzack 1975)

<table>
<thead>
<tr>
<th>Pain syndromes scores</th>
<th>Sensory</th>
<th>Affective</th>
<th>Evaluative</th>
<th>Miscellaneous</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual</td>
<td>12.6</td>
<td>2.4</td>
<td>2.5</td>
<td>*</td>
<td>17.5</td>
</tr>
<tr>
<td>Arthritis</td>
<td>10.3</td>
<td>2.5</td>
<td>1.9</td>
<td>4.1</td>
<td>18.8</td>
</tr>
<tr>
<td>Cancer</td>
<td>17.3</td>
<td>2.3</td>
<td>4.1</td>
<td>2.3</td>
<td>26.0</td>
</tr>
<tr>
<td>Dental</td>
<td>11.8</td>
<td>1.7</td>
<td>2.2</td>
<td>3.8</td>
<td>19.5</td>
</tr>
<tr>
<td>Back pain</td>
<td>14.0</td>
<td>3.5</td>
<td>3.3</td>
<td>5.5</td>
<td>26.3</td>
</tr>
<tr>
<td>Phantom limb</td>
<td>17.2</td>
<td>3.2</td>
<td>3.3</td>
<td>1.3</td>
<td>25.0</td>
</tr>
<tr>
<td>Post-herpetic</td>
<td>14.4</td>
<td>2.4</td>
<td>2.4</td>
<td>3.4</td>
<td>22.6</td>
</tr>
<tr>
<td>Pain in healed burns</td>
<td>9.7</td>
<td>2.0</td>
<td>1.4</td>
<td>3.2</td>
<td>16.3</td>
</tr>
</tbody>
</table>

* Category not used.
PREVALENCE OF CHRONIC SENSORY PROBLEMS

<table>
<thead>
<tr>
<th></th>
<th>Percentage (%) of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>36.4</td>
</tr>
<tr>
<td>Paresthesia</td>
<td>71.2</td>
</tr>
<tr>
<td>No sensory problems</td>
<td>28.4</td>
</tr>
</tbody>
</table>
References


Commission de la Santé et de la Sécurité au Travail, Réglement annoté sur le barème des dommages corporels, Québec, Canada, 1987.


Lane, P.R. and Hogan, D.J., Chronic Pain and Scarring From Cement Burns, Arch. Dermatol., 121 (1985) 368-369.


