



Chronic Pain Ireland

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help is at hand

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Chairperson's Welcome

Dear Members

We have just held our AGM and I am very pleased to report that we now have a strong committee dedicated to the organisation's mission statement. The governing body has elected its officers and their details are on the CPI web-site.



With this the final issue of 2012, I am looking back on the year that has passed and looking forward towards next year, reflecting on the changes which CPI has embraced, but also observing the general trends in healthcare and how the organisation needs to keep up with the changing times. One trend which struck me particularly at the launch of the European Personalised Medicine Alliance was that the term "patients" was being replaced by the term "client" and the idea that people need to become smart consumers of healthcare.

What I took away from the various presentations was that the cost of healthcare delivery in EU states was escalating and new ways had to be developed to deliver cost efficient effective healthcare; some of these innovations would involve advanced technologies but being a smart consumer means being well informed and having choice. That requires at the very least being educated about your condition and the treatment options available to you. I am talking about health literacy; something ironically the government spends very little on and an area CPI intends to address.

I've kept my editorial short because I would like to bring the following Press Release recently issued by the Australian and New Zealand College of Anaesthetists (ANZCA) to your attention. Reading it you can see the benefits of having Pain recognised as a medical specialty.

Wishing you all a Merry Christmas and a Happy New Year.

Best Wishes

Gina Plunkett
Chairperson



Media release

Pain medicine recognition great news for those in pain

Up to one in five New Zealanders estimated to suffer from chronic pain will be the big winners of a Medical Council of New Zealand decision to recognise pain medicine as a specialty in its own right, say pain medicine specialists. The Medical Council has accredited pain medicine as a scope of

practice in New Zealand, giving formal recognition to this medical specialty and its associated qualification. The newscope and qualification come into effect on December 3 this year. The accreditation follows a lengthy application process under taken by the Faculty of Pain Medicine (FPM) of the Australian and New Zealand College of Anaesthetists.

"This keenly awaited decision recognises the importance of pain medicine as a field requiring specialised skills and qualities to address the epidemic of people suffering in pain in our communities," FPM Dean Associate Professor Brendan Moore says. "Pain medicine emphasises a holistic, all-encompassing approach to the management of pain including the physical, psychological and emotional consequences of this common but poorly understood and under-treated medical problem.

This puts the practice of pain medicine in New Zealand on the same footing as in Australia, where it has been recognised as a stand-alone specialist qualification since 2005. There is now a single unified training and accreditation system, and qualification, for recognising pain medicine specialist physicians across Australia and New Zealand.

Australian and New Zealand specialists with backgrounds in anaesthesia, surgery, rehabilitation medicine, psychiatry and general medicine have worked together for 15 years to establish and progress the training, examination and continuing professional development of pain medicine specialists. "The Medical Council's decision recognises these achievements and the expertise of New Zealand specialists who have contributed to the development of this specialty in New Zealand, Australia and internationally. Both our immediate past Dean and current Vice Dean are New Zealanders," Associate Professor Moore says.

FPM Vice Dean, Professor Ted Shipton of Christchurch, says that while New Zealand already has some pain medicine specialists, lack of formal Medical Council accreditation has limited development of the specialty. "We expect this recognition to lead to a growth of interest in the specialty and more training places opening up here in New Zealand, where such specialists are desperately needed." Professor Shipton says pain is the most common reason for patients consulting health care professionals. "Data from the 2006/07 New Zealand Health Survey showed that one in six New Zealanders (16.9%) suffered from chronic pain with other estimates putting the figure at about 20 per cent, an incidence that is even higher among the elderly. This makes chronic pain – which has a profound effect on the sufferer, their family and society as a whole – a critical public health problem in New Zealand.

"The proper management of pain remains one of the most important obligations of a physician. Acute pain has a warning or protective function but, if not managed properly, it becomes chronic pain. "We can now look forward to better care of all New Zealanders who suffer from pain, provided the Ministry of Health and district health boards pick up the challenge to adequately resource and expand acute and chronic pain management services in New Zealand."

HEALTH LITERACY IN PATIENTS WITH CHRONIC PAIN



Dr Brona Fullen is a lecturer in the UCD School of Public Health, Physiotherapy and Population Science. She holds a BSc Physiotherapy (UUJ), H.Dip Healthcare (Acupuncture), UCD and PhD (UCD) degrees. She is an expert in the clinical area of pain management. Her main research interests include the rehabilitation of patients with chronic pain, with emphasis on physical and cognitive function and sleep disturbance. She has obtained funding from the Health Research Board and the Health Service Executive for research in this area. Brona was the first Chartered Physiotherapist elected as President of the Irish Pain Society.

Health Literacy in Patients with Chronic Pain

Chronic pain is now recognised as a disease in its own right and no longer as a symptom of an underlying cause (EFIC). Chronic pain affects 13% of the Irish population and impacts on sleep, exercise, ability to carry-out household chores, walk, maintain relationships with family and friends, and an independent lifestyle (Breivik et al 2006). The cost of chronic pain in Ireland has been estimated as €5.34 billion per year, or 2.86% of Irish GDP in 2008 (Raftery et al 2012). Chronic pain services in Ireland are generally under resourced (Raferty et al 2012) resulting in prolonged waiting times for patients to attend pain clinics (Fullen et al 2006). Improved coordination and better management of patients is essential if the sizeable economic and personal burden of chronic pain is to be reduced.

Patients with chronic pain must learn to manage their chronic condition. This includes being knowledgeable, motivated, having a positive attitude towards their health, and having effective communication skills. However it has been found that these skills can vary greatly in patients based on their level of health literacy. Health literacy is defined as *a patients' ability to understand basic health information so they have the knowledge to understand their options and work with their healthcare professional to take better control of their health* (www.healthliteracy.ie).

Health literacy can be viewed in two distinct ways: as a clinical risk factor or as a personal asset. From the health professional's perspective, it is the notion of clinical risk factor that is relevant. If a patient does not understand the information given to them, it may impact on their compliance with recommended treatments. Ireland is regarded as having a well educated population; however nearly half of the population has low literacy skills and half of these patients having difficulty with the most basic reading tasks (OECD 1997; NALA, 2009). In

terms of personal asset for patients, health literacy is a resource that allows them to understand and engage in the management of their own and their families' illness, particularly in the management of chronic disease. Empowering patients through increasing their health literacy should be an objective of all healthcare professionals.

Health literacy levels in patients with chronic pain are unknown. In a recently published European wide health literacy study preliminary Irish results of 1000 people found that 40.3% had either inadequate or problematic health literacy (Cafferkey et al, Health literacy EU survey, personal communication). In the United States (US) 48% of the adult population lack the reading and numeracy skills required to fully understand and act on health information (Wolf 2005).

Problems with health literacy has been associated with poorer health outcomes in a number of chronic conditions: heart failure (Robinson et al 2011), asthma (Dewalt et al. 2007), and chronic obstructive pulmonary disease (Roberts et al 2008). Factors identified as contributing to inadequate health literacy include older age, chronic diseases, having English as a second language, ethnicity, reduced income, poor mental status and limited education (Robinson 2011, Macabasco 2011). The impact of health literacy in health outcomes in patients with chronic pain is unknown

Health behaviours

Low health literacy has also been linked to undesirable health behaviours and outcomes such as poor self-management, poor communication between healthcare professionals and patients, decreased health-related knowledge, non-adherence to medication, lower reported self-esteem, patient distress and mortality (Briggs et al 2011, Mazor 2012, Ridpath 2012).

In other chronic conditions low health literacy has also been linked to an increased risk of hospital admission (Mazor 2012, Roberts et al 2008). Patients with low health literacy are at a 1.29 times higher risk of hospital admission than their counterparts with adequate health literacy (Baker et al 2002). A study investigating the relationship between asthma patients with low health literacy showed that they were significantly more likely to be hospitalised (Paashe-Orlow 2004). Similarly, patients with chronic conditions such as rheumatoid arthritis and have suboptimal health literacy had 3 times more hospital visits than those with rheumatoid arthritis and adequate health literacy (Gordon et al 2002), demonstrating that patients may have a poor understanding of their condition and how to manage it.

HEALTH LITERACY IN PATIENTS WITH CHRONIC PAIN

In addition, low health literacy is independently associated with decreased use of preventative health care services (Briggs et al 2011, Baker et al 2002) reflecting patients difficulty with self-management.

In patients with chronic pain this may be particularly important as patients need to understand and comply with behavioural change i.e. with exercise and relaxation programmes as well as cognitive restructuring. The impact of health literacy in patients with chronic pain in terms of self-management and skills compliance is currently unknown.

Self management for chronic diseases

Having self-management skills is particularly important for patients with chronic conditions. This includes handling health information and prescriptions, navigating healthcare settings, communicating with various health professionals and making informed decisions. This is of particular importance in patients with chronic pain where motivation and support from clinicians is seen as critical to perseverance with self-management strategies (Briggs et al 2011).

People working in the healthcare sector play an important part in improving health literacy by communicating more clearly and making information more accessible to patients, and is a basic component of most patient-healthcare professional encounters (Briggs et al 2011). However communication is frequently ineffective in patients with low health literacy. It has been found that patients with health literacy problems are unable to recall half or more than half of the information given to them during their visit with a doctor (Ong et al 1995). It has been suggested that this may be due to doctors not providing explanations to patients that are understood by all levels of health literacy (Ziegler et al 2001). If patients are to manage their chronic condition effectively, health professionals must not only ensure they deliver and communicate health information successfully, but also ensure that patients understand the information they are being given (Briggs et al 2011). The National Adult Learning Agency has developed 'top tips' for health professionals to follow when communicating with patients:

- avoid medical jargon – use plain English instead,
- use images
- or visual aids where possible, and
- use the 'teach back method' – ask the patient to repeat what you have told them in their own words to make sure they understand.

From the patients perspective they also recommend that before a visit with a healthcare provider (GP, consultant, Physiotherapist) that the patient:

- makes a plan for the appointment i.e. makes a list of the questions they want answered, talks about their health concerns,
- asks questions during the appointment to help them understand,
- tells the GP or nurse about their day to day life, and
- before they leave, goes over what has been talked about and what they will do.

Conclusion

As low health literacy can have an adverse effect on patient-healthcare provider communications and therefore on treatment compliance, patients' prognosis and healthcare costs, it is imperative that health literacy levels are determined, and if necessary addressed by all healthcare professionals. This will allow information given to patients may be tailored to their needs to enable them to fully participate in the long term management of their condition.

In The Republic of Ireland the prevalence (Breivik et al 2005) and the cost of pain has been estimated (Fullen et al 2006, Raftery et al 2012). We next need to determine health literacy levels in patients with chronic pain to maximise care.

References

- Baker DW, Gazmararian JA, Williams MV, Scott T, Parker RM, Green D, Ren J, Peel J. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. *Am J Public Health*. 2002 92:8:1278-83
- Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. *Eur J Pain*. 2006 10:4:287-333.
- Briggs AM, Jordan JE, O'Sullivan PB, Buchbinder R, Burnett AF, Osborne RH, Straker LM. Individuals with chronic low back pain have greater difficulty in engaging in positive lifestyle behaviours than those without back pain: an assessment of health literacy. *BMC Musculoskelet Disord*. 2011 15:12:161
- DeWalt, D.A., Dilling, M.H., Rosenthal, M.S., Pignone, M.P. (2007) Low parental literacy is associated with worse asthma care measures in children. *Ambul Pediatr*. 7:1: 25–31
- Fullen B, Hurley DA, Power C, Canavan D, O'Keeffe D. The need for a national strategy for chronic pain management in Ireland. *Ir J Med Sci*. 2006 175:2:68-73
- Gordon MM, Hampson R, Capell HA, Madhok R. Illiteracy in rheumatoid arthritis patients as determined by the Rapid Estimate of Adult Literacy in Medicine (REALM) score. *Rheumatology (Oxford)*. 2002, 41:7:750-4
- Health Literacy www.healthliteracy.ie (accessed 15.11.2012)
- Macabasco-O'Connell, A., Fry-Bowers, E, K., (2012). Knowledge and Perceptions of Health Literacy Among Nursing Professionals. *Journal of Health Communication: International Perspectives*, 16: 295-307
- Mazor KM, Roblin DW, Williams AE, Greene SM, Gaglio B, Field TS, Costanza ME, Han PK, Saccoccio L, Calvi J, Cove E, Cowan R. Health literacy and cancer prevention: two new instruments to assess comprehension. *Patient Educ Couns*. 2012 88:1:54-60
- NALA (2009) NALA Policy Brief on Health Literacy in Ireland. Available at <http://www.nala.ie/sites/default/files/documents/cmcnally/NALA%20policy%20on%20health%20literacy.pdf>
- OECD (1997) Literacy, Economy and Society. Results of the First International Adult Literacy Survey OECD. Published : OECD Publishing.
- Ong LM, de Haes JC, Hoos AM, Lammes FB. Doctor-patient communication: a review of the literature. *Soc Sci Med*. 1995 40:7:903-18
- Paasche-Orlow, M, K., Parker, R, M., Gazmararian, J, A., Nielsen-Bohlman, L, T., Rudd, R, R. The prevalence of Limited Health Literacy. *J of General Internal Medicine* 2005, 20: 175-184
- Raftery MN, Ryan P, Normand C, Murphy AW, de la Harpe D, McGuire BE. The economic cost of chronic non-cancer pain in Ireland: results from the PRIME study, part 2. *J Pain*. 2012 13:2:139-45
- Ridpath JR, Larson EB, Greene SM. Can Integrating Health Literacy into the Patient-centered Medical Home Help us Weather the Perfect Storm? *J Gen Intern Med*. 2012 27:5:588-94
- Roberts NJ, Ghiassi R, Partridge MR. Health literacy in COPD. *Int J Chron Obstruct Pulmon Dis*. 2008, 3:4:499-507
- Robinson S, Moser D, Pelter MM, Nesbitt T, Paul SM, Dracup K. Assessing health literacy in heart failure patients. *J Card Fail*. 2011;17:11:887-92
- Wolf MS, Davis TC, Arozullah A, Penn R, Arnold C, Sugar M, Bennett CL. Relation between literacy and HIV treatment knowledge among patients on HAART regimens. *AIDS Care*. 2005 17:7:863-73

A Member's Perspective

- Niall Finn is a member of CPI and lives with Pain

How would you explain to somebody who doesn't have chronic pain what it is like to live with chronic pain?

Sometimes I think the phrase "chronic pain" somehow reduces the experience somewhat. It fails to fully convey the let's face it, the horror of having pain all or most of the time.

Of course you have to call it something and chronic pain is an accurate phrase and probably the best one to use "for pushing on" for recognition and services.

But for people like myself who live with chronic pain, we live in a world that can really only be described in metaphors or symbols. It's a bit like living on a different planet.

Let me have a go at it. I feel like I'm walking a tightrope each day. One sway either side and I could plunge into the abyss of pain. I must conserve my energy and yet I must achieve the tasks of the day, the art of living. I must remain active or my tolerance for activity will get less. However if I am too active this too can lead to disaster: flare up, energy crisis, low mood and low self-esteem. That's right, I will think and feel that I, the real me inside, is useless and a failure. All because of pain.

So, pain is not just pain, however chronic. It is an internal world - difficult to control which can destroy your mind if you are not careful. I'm not saying this to scare people. I'm saying this because this is what I see, because this is how I feel sometimes. First comes the pain and then comes the judgment of myself which is arguably more damaging. I am saying this because it is important to acknowledge the mental anguish that pain creates. After all, it is your mind that ultimately experiences everything that your body perceives and that includes feelings and thoughts. I believe thoughts can be the most damaging if you don't control them. In order to control them it is important to acknowledge them no matter how horrendous it might feel to really hear them. This is the starting point for healing and acceptance.

It doesn't help that pain can be so difficult to describe. I've been to parties and danced enthusiastically and had relatives say that I don't look like somebody with pain. How can I tell them about my internal risk versus reward account that I have going on. The cost of that night socialising could be severely high. A major flare up is highly probable. This is not good social

conversation. Nothing is meant by the comment but when I am struggling with the cost myself it is easy to take offence.

And how do you describe your pain to a physician? For some it may be more straightforward. But for me it might have to include things like burning, cramping, severe fatigue, heaviness like internal chain mail. One of my internal images is of a spiked metal ball like a medieval weapon, spinning at the base of my spine. Or it could be pain that is not quite shooting down my leg but it just appears all down my leg, like a pain switch has just been turned on.

And do I have the courage to go to my Doctor? Is this a new pain I have or just a slightly different expression or perception of the old one? I'm less active so could this be a new complication of having pain or am I just being hypochondriacal? I have the capacity to feel that way and who could blame me? But can I risk the shame of seeing the proof of that? These are real concerns, I doubt if I am the only one with chronic pain who has them.

Then the decisions that remind you of how compromised your life has become. Is it time to organise another nerve block? Do I have the energy to go through with it? The result may be good but the process can be a stream of reminders of how my health has deteriorated, that my vitality is probably that of a seventy year old man instead of a forty year old one.

The history taking, the journey into that internal painful place required to adequately describe my pain to everybody who needs to know. Assuming that the blocks work, will I have the energy to target my fitness again knowing it is almost inevitably going to spiral downwards again when the nerve blocks wear off again in a few months? It takes courage to do that, to hold my head up high and walk through those hospital doors again and do what has to be done. It takes courage but sometimes I forget.

I seem to have got to a certain point with this piece of writing and perhaps that is sufficient for now. Chronic pain is horrible. It is a vast hidden internal burden for those of us who experience it and still do what we have to do. To fully describe how it really feels in our bodies and minds would probably sound overdramatic because of the depth and the scale of influence it has on our lives that is unknowable to another human being without pain. But it is important to acknowledge some portion of it at least to oneself. And to acknowledge the courage that it takes to do what we have to do for our families, our children and for ourselves. We are courageous. Let us not forget it.

ADVANCES IN PAIN RESEARCH & INDIVIDUALISED MEDICINE



Dr Shafaq Sikandar and Professor Tony Dickenson are from the Neuropharmacology of Pain group at University College London. This group researches pain mechanisms and treatments with a major aim of translating basic science to the pain doctor and the patient. Amongst various sources of funding, they are part of the London Pain Consortium and also Europain, a partnership of doctors, scientists and pharmaceutical industry trying to improve the control of pain. In this account, we cover the types of studies that may lead to

understanding why pains can differ between patients in order to better predict responses to therapy, and thereby encourage a more personalized approach to pain control.

Advances in Pain Research & individualised medicine

Progress in pain research and the development of better analgesic treatments faces challenges presented by both clinical and animal studies. Preclinical studies are essential to test the efficacy and safety of new chemicals before they are given to patients, and animal models of painful syndromes can also provide more insight into the mechanisms of pain to reveal new drug targets. On the other hand, studies using patients and healthy subjects can feed our fundamental understanding of biology, but we still need to bridge gaps between the molecules, networks and pathways to the patients.

Pain is more than a sensation – it is an experience that involves affective and emotional effects that can have a major impact on the individual's amount of suffering. Anxiety, sleep disorders and depression are common co-morbidities in chronic pain patients. When special pain receptors, or nociceptors, located in our skin and deep tissue are activated by painful stimuli, these messages are transmitted through the spinal cord to higher brain centres. Some messages are projected to the thalamus and cortex, areas responsible for discriminating the sensory aspects of pain with regards to location, intensity and duration. Messages signaling painful stimulation also project in parallel to limbic areas, primordial midbrain areas that are involved in fear, anxiety, mood and stress responses. These latter pathways underlie the sleep disturbances, depression and anxiety that chronic pain patients can suffer.

Feedback from higher centres of the brain can project onto descending pathways targeting the spinal cord, where further modulation of nociceptive information occurs. Study of these facilitatory and inhibitory pathways has not only improved our understanding of the mechanisms of drugs used to treat pain, such as the antidepressants, but also our knowledge of events underlying the persistence of pain states. Most of the work in this area originally concentrated on the often tonically active inhibitory pathways, but more recently there has been growing interest in facilitatory pathways. Pain from peripheral nerve injury, inflammation and cancer, which is characterized by ongoing pain, hyperalgesia and allodynia, arises from peripheral and then central spinal processes. The final level of

pain perception is determined by the brain. Therefore, it is plausible that fear, anxiety and despair may drive pain facilitatory feedback between the spinal cord and the brain, whereas coping, distraction and positive emotional contexts could reduce pain by activating descending inhibitory pathways. Human brain imaging has shown that this latter system is active when analgesia is produced by placebo. A recent animal study shows that when the descending excitatory systems are turned off and the inhibitory systems turned on, the painful consequences of a damaged peripheral nerve are lost ^[1]. This highlights the importance of these intrinsic descending systems in the overall perception of pain.

Some recent trends in preclinical and clinical research are promising for the improvement of translation and correspondence of findings between human and animal data. One is the development of animal models that accurately depict outcome measures used in humans, including affective components of pain (measures of emotional responses), as well as measurements of ongoing or spontaneous pain.

The use of more cognitive measures in animal models proves crucial to furthering our understanding of central processing where human studies are limited. Asomaesthesia, the inability to identify location and intensity of a noxious stimulus has been reported in human cases of somatosensory traumas, yet inconsistencies in types of lesions and defining adequate control groups among patients renders animal models necessary to evaluate the role of somatosensory processing in response to noxious stimulation. In a recent study using models of asomaesthesia, rats that have impaired transmission of stimulus source, intensity and frequency retain their ability to discern the unpleasantness of pain is intact ^[2]. These findings support the notion that the sensory discriminative and affective components of nociceptive information are conveyed by largely separate central pathways.

Many chronic pain patients report ongoing or paroxysmal spontaneous pain, but this essential symptomatic profile has been largely ignored in both animal and human studies only measures of responses to a stimulus are reported. In the case of animal studies, this may be due to difficulties in isolating and accurately quantifying particular animal behaviours that don't also manifest from other pathophysiological conditions unrelated to pain, i.e. motor impairment. The large majority of clinical trials on drugs simply ask the patient to report their level of pain. This could be pain that is ongoing, evoked or triggered by the touch of clothes or changes in temperature, which may wax and wane and may differ over the course of the day and night. How would one report the level of pain if only one of these components was changed by a drug? Much more detailed studies of how a treatment modulates the different components of the pain experience could be really valuable in defining which individuals in a group of patients under similar disease classifications might respond to a drug.

Animal models of ongoing pain have thus gained popularity given the strong clinical relevance and a recent series of

ADVANCES IN PAIN RESEARCH & INDIVIDUALISED MEDICINE

studies using experimental models of osteoarthritis and neuropathy have teased apart the differential pharmacological sensitivities of ongoing and evoked pain using motivational and behavioural measures ^[3,4]. Technological advancements in animal research including sophisticated video-tracking systems have also proved useful for enabling better research outcomes in this context of ongoing pain ^[5]. The combination measuring these types of responses can effectively distinguish between the evoked, affective and ongoing features of a pain state. Indeed it will be interesting to match the clinical profile of novel drugs with their activity in these assays. As these measures become more popular in research methods, the significance of preclinical research in providing information on the holistic effects of drugs will grow.

The use of parallel investigations with both animal and human subjects is another recent trend to strengthen the correlation of outcome measures in preclinical and clinical studies. This is key to providing an effective translational understanding of nociceptive signaling. One recent study investigated peripheral mediators of hyperalgesia using a model of ultraviolet irradiation, which produce a heightened sensitivity to thermal and mechanical stimuli, which is common with sunburn ^[6]. This study showed a positive correlation of expression profiles of certain inflammatory mediators between rats and humans following ultraviolet irradiation. Neutralising inflammatory cells in UVB-treated rats demonstrated the role of a certain chemokine (CXCL5) underlying rodent behavioural hypersensitivities following skin irradiation, and so it is likely that this could be a main target for human analgesics against ultraviolet irradiated certain pains from the skin.

Another way to investigate targets in pain would be to search the human genome for proteins that relate to pain. Peripheral nerves transmit messages to the central nervous system about painful and nonpainful stimuli by generating electrical events. These electrical events rely on sodium channels to be operative. A number of studies have revealed rare but informative inherited disorders of pain involving one subtype of these channels, and some families that have the inactive version of this have congenital insensitivity to pain ^[7]. Although pain can be unpleasant, it is crucial for our survival to avoid potentially damaging stimuli, and these families lack this protective mechanism.

As a result children often have multiple injuries due to the lack of any pain messages being signaled, which also renders them to shorter lifespans. There can be other versions of the same channel that now do not switch off normally – these families have excessive abnormal pain syndromes where pain is produced in the absence of any painful stimuli. Less dramatic changes in the channel are part of the variability seen in patients after an injury. Similar differences in another sensor, the heat pain channel, TRPV1 have also been observed ^[8]. This channel is activated by painful heat and capsaicin (the key ingredient in chili peppers, hence explaining why too much chili can lead to a burning sensation

in the mouth) and comes in at least two forms. If you have the less active version of the channel, then after a nerve injury, you will have less pain than people with the more active version. Another recent study used a genome-wide association screen to identify a subtle change in the channel of the P2X7 receptor, which is activated by the chemical ATP that is in all cells in the body ^[9]. Thus, damage releases this chemical and pain ensues.

This altered version of the receptor modulates mechanical hypersensitivity following nerve injury in mice, and it affected the amount of pain perceived by two populations of chronic pain patients - another example of a single study that incorporates both clinical and preclinical outcomes. Thus, the genes we possess may have a bearing on pain variability but this is not a simple relationship and many genes are going to be involved.

Animal models of pain are designed to mimic clinical symptoms, yet the latter can vary in severity and sensation to a large extent across patients with the same causes. Among neuropathic pain patients, clinicians encounter combinations of various degrees and anatomical locations of nerve damage and diverse environmental and genetic backgrounds that all contribute to producing a heterogeneous group of pathophysiological conditions that manifest in an individual. Given that only 30% of neuropathic pain patients typically respond to standard treatments, individual patterns of sensory symptoms is likely to determine differential and individual treatment responses.

This need for classification and treatment of patients according to sensory has been proposed by the German Network on Neuropathic Pain (DFNS). Sensory profiling in patients will identify the most relevant components of the pain phenotype that robustly reflects the underlying mechanism or combination of mechanisms of etiology. Pharmacological studies could follow to inform on responses based on sensory profiles so that certain key pain descriptors could lead to a targeted treatment if it turns out that sensory profiles can predict responses to drugs.

The novel techniques and experimental approaches discussed above are likely to prove essential for linking the ties between clinical and preclinical data. This advancement towards more effective translational and stratified research will hopefully verify its success in the coming years as progress in pain research is translated into new and more effective analgesic treatments.

Acknowledgements

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References (See page 9)

UNDERSTANDING POST-SURGICAL STRESS & CHRONIC PAIN



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Understanding Post-Surgical Stress and Chronic Pain

Hearing the news that you require a surgical operation can be stressful, even shocking, and people vary in how they respond to this news. Although you may accept that surgery is the best treatment approach, it is very natural to have some thoughts and fears around the “unknown”. For many people, facing the prospect of invasive surgery can understandably be daunting. Advances in modern surgical techniques and hospital aftercare, however, allow the majority of people to anticipate in confidence that they will be in safe hands. So, after a short period of recuperation, they make a quick a recovery from their operation and return to a full bill of health.

A small percentage of people, however, do not recover so quickly, or enjoy a sense of well-being, and it is these people that I am considering here. Instead, in the months following their operation they feel low, listless or even sad, unable to concentrate or disturbed by anxious feelings. Others, may also experience perplexing and troubling pain, which began soon after their operation, and still continues beyond the post-operative period. For people experiencing pain before their surgery, told that they would be pain-free after the procedure: naturally, it is disappointing to discover that this hoped-for outcome did not come about. Understandably, this might lead to mistrust and resentment.

Such people tend to ask, “How do I regain my joy of life? How do I cope with this anxiety, bring back my usual optimistic approach to things and return to my old self? Feeling trapped inside an unreliable and painful body, whilst dealing with surges of distressing emotions can feel like a feat of endurance. At these times, it is not unusual to have troubled sleep patterns interrupted by vivid and unsettling dreams.

If this describes your situation, you might not want to worry family and friends by revealing the full extent of your difficulties. Inevitably, loved ones want to see signs that you are on the mend and getting better, but if this is not how you are actually feeling, it can be quite difficult to voice your worries to speak openly about your discomfort.

More unsettling is the uncertainty of whether you’ll ever find people to really listen to you. Consequently, you feel you are living in ‘two worlds’ – the world of other people’s normality

and another, separate world, punctuated by the misery of pain and anxiety, which you alone inhabit. Naturally, at times, this is frightening and for some, brings feelings of desperation in its wake, as if, the road between these two worlds is full of hazards and pitfalls, all of which, impacts especially in your relationships with loved ones.

Far too often, people report that their painful symptoms are dismissed, not taken seriously, even by professionals, contributing to their feeling that others do not want to hear. Fear and concern about the future, specifically as a consequence of not being able to share your concerns can easily begin to dominate your life. And, then it can become all too easy to enter into a period of profound silence, believing that no-one at all can bear to listen to you.

Stress and your Body

When we think of those occasions when we’ve been truly afraid or very angry, we can remember some of the more obvious physical symptoms of stress – taut muscles, clenched teeth, pounding heart, rapid breathing, sweating palms and dry mouth. Inevitably, when stress becomes too much and the emotional reaction becomes intense or prolonged, pain can be the result; especially when little opportunity exists to openly speak about these deeply unpleasant experiences.

Tension, your body and the red alert response

Think of your response in situations of potential danger. Your whole body is affected by a ‘red alert’ response, when the sense organs, most frequently those of sight or hearing receive signals of alarm and pass these on to the brain, where their significance is recognized and from where messages are sent along the nerves to the muscles and to other organs. Receiving a diagnosis of a particular health condition, requiring major surgery, can be one of those intensely stressful occasions that sends your body and mind into the red alert response. Of course, a lot depends on each person’s individual pattern of physiological and psychological response to a red alert. Many people face the prospect of surgery easily, and with the help of their surgeon, anaesthetist and hospital staff, manage easily to take their treatment in their stride.

It is quite usual to experience a short period of disorientation in the recovery time following surgery, but when this continues beyond a reasonable period, it is important to pay close attention. For a small minority, when these responses produce tensions reaching uncontrollable levels, certain symptoms can occur, including physical pain.

It should also be kept in mind, that surgical processes can all be stressful and activate fight or flight reactions, which may feed into other processes further aggravating the stress and impact on healing. And, further to this, experiencing physical pain becomes a significant stressor in itself; another cause of emotional distress. Without doubt, it is vitally important to

UNDERSTANDING POST-SURGICAL STRESS & CHRONIC PAIN

manage any stress or pain as effectively as possible, as this will influence recovery positively and in a significant way.

Warning signs that excessive tension is making your body suffer:

- Pain spreading up the neck and over the back of the head
- Throbbing head or headache
- Back ache in general, especially in the lower back
- Aches between the shoulder blades
- Palpitations and chest discomfort
- Release of stress hormones, like cortisol
- Increased heart rate and blood pressure
- Lowered immune system function

And these psychological responses may signal anxiety and distress:

- insomnia or constant sleepiness
- anxiety or lack of confidence
- continual seeking of company or isolation
- lethargy or hyperactivity
- obsessive thoughts and outbursts of aggression
- increased consumption of alcohol or use of recreational substances
- over-eating
- smoking

Types of Surgery

A wide variety of surgical operations have been shown to be associated with chronic pain syndromes, and studies suggest that changes in the nervous system may underlie many of these syndromes.

There are many differing types of surgery: a few are mentioned here. Childbirth for instance, might necessitate a surgical intervention, after which, the early weeks and months of motherhood become complicated by upsetting or even traumatic memories of the birth.

Sudden unexpected surgery performed after a road traffic accident, before which, there was no time to prepare. Afterwards, unaccountable perplexing feelings and thoughts may prevail. Additionally, when burns injuries are present, treatment might be painful, and both physical appearance and self-image may have changed forever.

Another example of a sudden devastating loss of previous appearance is mastectomy. As scar pain is sometimes known to persist for some time after a mastectomy, a small number of women report numbness and sensitivity, together with strange sensations and muscle weakness, as is sometimes also the case after facial surgery, or limb amputation.

Heart operations frequently involve many hours in theatre, followed by several days of aftercare in an Intensive Care Unit. The combined effect of fatigue, confusion, pain, perplexing memories and disturbing dreams can quickly grind down previous levels of self-confidence.

On a very different note, childhood experiences of hospitalisations and operations occasionally carry unhappy memories of being separated from family and abandoned to the care of strangers in frightening and unfamiliar environments. Faith and trust in life can be impeded and scars may endure into adulthood. Such memories might be triggered and revived in much later life, especially at those times when further surgical treatment becomes necessary.

Overcoming Stress after Surgery

Briefly summarised, feeling stressed in the months following surgical treatment is often unexpected, and its significance easily over-looked. These feelings are likely to stem from a combination of many differing factors, depending on each individual. It is worth noting that men and women can react differently. Talking with someone who can assist you to piece together, make sense of your surgical story and discuss the associated feelings at your own pace can make a great deal of difference.

Having your pain sympathetically acknowledged and your story listened to is the most important aspect of pain management and post-surgical recovery. In turn, this may help you to dismantle emotionally painful feelings, ease the stress that these bring about, and pave the way to regaining your enjoyment in life.

References

- Macrae, W.A. (2001) *Chronic Pain After Surgery – British Journal of Anaesthesia* 87 (1): 88-98
- Rossi, E and Cheek, D.B (1994) *Mind Body Therapy, 13: Emotional Factors in Persistent Pain states*, W.H Norton & Company, NY.
- Weingarten, K. (2001) *Making sense of Illness Narratives: Braiding Theory, Practice and the Embodied Life – Working with the Stories of women's Lives*. Dulwich Centre Publications. Australia.

References (from Page 7)

1. De Felice, M., et al., Engagement of descending inhibition from the rostral ventromedial medulla protects against chronic neuropathic pain. *Pain*, 2011. 152(12): p. 2701-9.
2. Uhelski, M.L., M.A. Davis, and P.N. Fuchs, Pain affect in the absence of pain sensation: evidence of asomesthesia after somatosensory cortex lesions in the rat. *Pain*, 2012. 153(4): p. 885-92.
3. King, T., et al., Contribution of PKMzeta-dependent and independent amplification to components of experimental neuropathic pain. *Pain*, 2012.
4. Okun, A., et al., Afferent drive elicits ongoing pain in a model of advanced osteoarthritis. *Pain*, 2012. 153(4): p. 924-33.
5. Roughan, J.V., S.L. Wright-Williams, and P.A. Flecknell, Automated analysis of postoperative behaviour: assessment of HomeCageScan as a novel method to rapidly identify pain and analgesic effects in mice. *Lab Anim*, 2009. 43(1): p. 17-26.
6. Dawes, J.M., et al., CXCL5 mediates UVB irradiation-induced pain. *Sci Transl Med*, 2011. 3(90): p. 90ra60.
7. Dib-Hajj, S.D., et al., From genes to pain: Na v 1.7 and human pain disorders. *Trends Neurosci*, 2007. 30(11): p. 555-63.
8. Binder, A., et al., Transient receptor potential channel polymorphisms are associated with the somatosensory function in neuropathic pain patients. *PLoS One*, 2011. 6(3): p. e17387.
9. Sorge, R.E., et al., Genetically determined P2X7 receptor pore formation regulates variability in chronic pain sensitivity. *Nat Med*, 2012. 18(4): p. 595-9.

HEADACHE MANAGEMENT SURVEY

Update on the NUIG Headache Management Survey

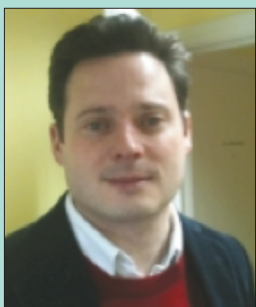


Dr. Brian McGuire
BA, MCLinPsych, DipCrim,
DipHealthSc, PhD, AFPsSI, Reg
Psychol (PsSI), AFBPsS, CPsychol

Dr. Brian McGuire is a Senior Lecturer in Clinical Psychology. A graduate of NUI, Galway, he has completed a Masters Degree in Clinical Psychology (Macquarie University, Sydney), a Diploma in Criminology (University of Sydney), a Diploma in Clinical Teaching (NUI, Galway) and a PhD in clinical psychology (Macquarie University, Sydney).

He worked initially as a research psychologist in brain injury rehabilitation in London. He then moved to Sydney where he spent the next 10 years lecturing in psychology and working as a clinical psychologist. His clinical work was initially in the area of learning disability and challenging behaviour, before he moved into private practice where his work focused on medicolegal assessment and the rehabilitation of chronic pain and acquired brain injury. It was in that context that his interest in symptom magnification and malingering developed and he completed his PhD in that area. After leaving Australia, Brian was Consultant Clinical Psychologist in brain injury rehabilitation in York, England.

After returning to Ireland, Brian worked with the Galway Association learning disability service. He joined NUIG in 2003 and is currently Director of the Doctor of Psychological Science programme in Clinical Psychology and Joint Director of the Centre for Pain Research. His clinical work is primarily in behavioural medicine, such as pain management and diabetes care. His research interests are in pain management, diabetes, and adjustment to chronic physical illness.



Dr. Jonathan Egan, Lecturer above the bar in clinical psychology has worked as a Senior Clinical Psychologist in both child and adult mental services. In 2000, Jonathan became the founding Director of Counselling for the Arches Adult Counselling Service for adult

survivors of childhood abuse and neglect and was a consultant and co-author to the UCD studies on adults psychological adjustment to institutional care in their childhoods. Clinically he is Specialist Principal Clinical Psychologist a half-day a week in the Mater's Cardiac Rehabilitation Programme.



Angeline Traynor MSc, currently studying for a PhD in Psychology and Health, NUIG.

Between March and August of this year Chronic Pain Ireland collaborated with researchers at the National University of Ireland Galway on a study of chronic headache pain management using online methods of treatment delivery.

Dr. Jonathan Egan, Dr. Brian McGuire and Angeline Traynor sought to examine the effectiveness of an online mindfulness based stress reduction (MBSR) programme tailored to support chronic headache pain management in adults with various types of chronic headache. Treatment was delivered via **www.headachemanagement.org** – a specially designed, self-paced forum for participants' convenience.

Participants had unlimited access to the mindfulness based exercises and information designed to support self-management of headache pain. The exercises were specifically designed to help alleviate headache associated barriers including sleep disturbance, anxiety and headache onset. The programme incorporated guided imagery, progressive muscle relaxation, sitting meditation and mindful awareness exercises, and cultivated mindful breathing, peaceful mind states and emotion regulation.

“We know that a combination of psychological and mindfulness techniques are beneficial, particularly for people managing chronic or recurrent pain” says Angeline Traynor, researcher at NUIG. “This type of service was designed to be accessible to all, as being online it is not limited to locality”.

Results

Clinically significant decreases in participant levels of pain severity, anxiety, depression, pain interference in daily functioning, medication intake and the overall impact of chronic headache on daily life were observed in those participants who completed the programme.

“The programme was effective in supporting pain management across chronic headache conditions including migraine and tension type headache” says Ms Traynor. “It appears to have successfully encouraged the development of beliefs consistent with a self-management approach even among individuals who were not pre-disposed to such an approach”.

The study demonstrated that health benefits for chronic headache sufferers followed from just six weeks of online mindfulness based stress reduction practice. Dr. Egan, Dr. McGuire and Ms Traynor would like to thank all who participated in the study or contributed to its development and success. The researchers at NUI Galway are extending their online study in the future, and individuals interested in participating can contact Angeline Traynor at **a.traynor2@nuigalway.ie** for more information.



Dr. Alice Witney, Department of Physiology, School of Medicine, Trinity College Dublin research laboratory works on sensory-motor integration and neuromodulation. Alice's PhD candidate



Tonya Moloney has recently began work in non-invasive neurostimulation with the aim of modulating pain thresholds and providing a future avenue for the treatment of chronic pain.

Modulating Pain Thresholds

Pain is defined by the International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience of actual or potential tissue damage or an experience expressed in those terms”. This statement acknowledges both the physiological and cognitive aspects involved in pain. The sensation is fundamental in protecting the body, as unlike other sensory modalities, pain provokes motivated behavioural responses. These responses facilitate the disengagement of the noxious stimulus, such as extreme temperature or mechanical pressure, and prevent further tissue damage. Hence pain proves a useful defence mechanism for the body.

In a healthy individual, the perception of pain diminishes once the induced tissue injury has healed and storage of these painful experiences in memory occurs allowing us to avoid potentially harmful events in the future. However, difficulties arise when the pain persists, long after the noxious stimulus has been removed (>6months in duration). This is known as chronic pain, where the nociceptive neural networks responsible for pain conduction and processing malfunctions. This type of pain can affect patients suffering from conditions such as rheumatoid arthritis, cancer, Parkinson's disease, multiple sclerosis and can also result from injuries such as limb amputation, stroke or blunt trauma. It is a prevalent, costly and disabling complaint that causes unrelenting agony and disability, with an estimated 13-36% people in Ireland affected (Rafferty et al., 2011).

Chronic pain is a result of a hypersensitive set of neuronal networks with lowered neural thresholds for sensory stimuli, such that noxious stimuli produce an exaggerated and prolonged response to pain and non-noxious stimuli that are not normally painful become more likely to induce pain. There may also be a disturbance in the laying down of memories in relation to harmful situations.

Pain modulation has become a topic of critical importance in recent scientific research due to the increasing numbers seeking treatment to chronic pain. Despite the availability of

multiple approaches to pain management, ranging from spinal cord stimulation to pharmacological options; it is not uncommon that patients fail to experience sufficient pain relief.

Spinal cord stimulation, both costly and invasive have reported complications in 30-40% of cases ranging from altered urinary bladder function to negative gastrointestinal effects with the most common complication arising in the form of lead migration; 13.2-22.6% of cases (McGreevy et al., 2012). Pharmacological interventions are often used as a form of pain management, but they are non-focal and are associated with certain undesirable side-effects which include; drowsiness, impaired memory and decreased capacity to carry out activities that require high executive functioning, which some patients find difficult to tolerate. This may cause an issue in compliance, with patients refusing to take the recommended dosages, or refusing treatment altogether. This dilemma establishes the need for new therapeutic interventions and has prompted a renewed interest in non-invasive, neuromodulatory methods of brain stimulation.

Within the past decade, cortical stimulation has emerged as an effective and promising modality in the development of novel approaches to pain relief. Cortical stimulation is based on the delivery of an electric current to the targeted area of the cortex. It facilitates pain relief in patients by modifying the excitability of the neuronal networks responsible for pain processing and perception. Theoretically, stimulation of the cerebral cortex either inhibits or interrupts and interferes with pain signals that originate from hyperactive areas in the pain networks of the brain.

In particular, the primary motor cortex (M1) was the first cortical target that was proven to be efficacious in chronic pain treatment. Other targets of interest have been the dorsolateral prefrontal cortex; associated with the emotional component of pain and the limbic system and also the somatosensory cortex involved in the sensory-discriminative aspect of pain. Although these targets are useful in modulating different aspects of pain, it is the primary motor cortex which has been proven successful in numerous therapeutic studies to date.

The mechanism of action behind motor cortex stimulation and its pain modulating effects remains hypothetical, but it has been proposed that at least part of the pain relief afforded, is through influencing thalamic activity. The thalamus is a part of the brain that acts as the primary relay centre for passing all sensory information to the cortex, thus playing a key target in pain modulation. Extensive animal literature on motor cortical stimulation demonstrates the involvement of descending inhibitory pathways that travel through the periaqueductal grey matter (PAG), another important location in the perception and processing of pain. Also, there may be the potential that intracortical inhibition may be affected by motor cortex stimulation and this may lead to pain modulation.

MODULATING PAIN THRESHOLDS

Two major neurostimulation techniques; transcranial direct current stimulation (tDCS) and repetitive transcranial magnetic stimulation (rTMS), particularly of primary motor cortex, have been found to be successful in the modulation of chronic pain (O'Connell et al., 2011).

tDCS is a neuromodulatory technique, where a weak electrical current (~1mA) is non-invasively applied to cortical targets using surface electrodes. tDCS functions to influence spontaneous neuronal activity already occurring in the brain in a polarity dependent fashion. Anodal tDCS has been found to induce an increase in cortical excitability via the depolarisation of neuronal membrane potentials and cathodal tDCS has been shown to decrease cortical excitability via the hyperpolarisation of these potentials.

Previous studies using tDCS to modulate pain thresholds have shown effectiveness of both anodal and cathodal stimulation in increasing pain thresholds and producing a form of pain relief. This may be due to tDCS being somewhat non-focal, as the electrodes used to deliver the modulatory current are quite large; different montages of electrodes have been used, and heterogeneous patient groups included in clinical studies. These findings make the optimum polarity for consistent pain threshold modulation difficult to establish.

rTMS is a non-invasive neurostimulatory technique that can be used to modulate cortical excitability to either suppress or facilitate underlying neuronal activity. rTMS is a frequency dependent technique in that low frequency rTMS (1Hz or less) is associated with decreased cortical excitability, whereas higher frequencies (20-50 Hz) have been associated with an increase in excitability.

High frequency rTMS of M1 has proven efficacious in the treatment of chronic pain. Studies have demonstrated that effects of rTMS on pain thresholds can last from several minutes to over eight days after multiple rTMS sessions. Further study of high frequency rTMS for chronic pain has been recommended by a systematic review (O'Connell et al. 2011).

In the past, tDCS and rTMS have been used independently as alternative methods in research regarding modulation of pain thresholds. However, a recent study investigated the regulation of neuronal excitability, and found that a combination of these neuromodulatory approaches may have a greater and long lasting effect in modulating cortical excitability (Siebner et al., 2004).

The combined approach uses tDCS to “prime” or “precondition” the brain before subsequent stimulation via rTMS so that baseline cortical excitability can be standardized. Low frequency (1Hz) rTMS applied on its own, normally results in an inhibition of cortical excitability in relation to the targeted brain area. This study found that preconditioning with cathodal tDCS altered the expected suppressive effect and led to cortical excitation. Similarly,

preconditioning with anodal tDCS resulted in an overall cortical inhibition after subsequent stimulation using 1 Hz rTMS, again altering the expected effects. These findings are thought to be due to cortical homeostatic plasticity.

Our research aims to extrapolate upon these results and apply them to the modulation of pain thresholds. We know from previous work that high frequency rTMS has proven successful in increasing pain thresholds and producing a form of analgesia, but due to risk of dangerous side effects, it is not suitable for clinical use. On the other hand; priming the brain with cathodal tDCS and reversing the suppressive effect of low frequency rTMS on cortical excitability may result in a safer, more consistent and patient friendly approach to the provision of pain relief. There is also the possibility that these techniques may be used in combination with pharmacological interventions, significantly reducing the dosages required whilst still providing adequate pain relief. At the moment these techniques are used solely on an experimental basis; in healthy volunteers or as ‘off label’ interventions in clinical research studies. It is our hope that further development of neurostimulation protocols for pain modulation will pave the way for further research; including patient studies; that, if successful, could lead to these techniques being authorized as part of a treatment plan for chronic pain.

References

- McGreevy, K., Williams, K. A., Christo, P. J. Cephalad lead migration following spinal cord stimulation implantation. *Pain Physician*, 2012; 15(1): 79-87.
- O'Connell N. E., Wand B. M., Marston L., Spencer S., DeSouza L. H. Non invasive brain stimulation techniques for chronic pain- review. *The Cochrane Library*, 2011; 6.
- Rafty, M. N., Sarma, K., Murphy, A. W., De la Harpe, D., Normand, C., McGuire, B. E. Chronic pain in the Republic of Ireland--community prevalence, psychosocial profile and predictors of pain-related disability: results from the Prevalence, Impact and Cost of Chronic Pain (PRIME) study, part 1. *Pain*, 2011; 152(5): 1096-1103.
- Siebner R. H., Lang N., Rizzo V., Nitsche M. A., Paulus W., Lemon R. N., Rothwell J. C. Preconditioning of low frequency repetitive transcranial magnetic stimulation with Transcranial direct current stimulation: evidence for homeostatic plasticity in the human motor cortex. *The Journal of Neuroscience*, 2004; 24(13): 3379-3385.

CHRONIC STRESS AND ITS EFFECT ON PAIN



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Ms. Elaine Jennings, PhD student, Pharmacology & Therapeutics, School of Medicine & Centre for Pain Research, NUI Galway

Dr David Finn's laboratory and research group at the Department of Pharmacology and Therapeutics and the Centre for Pain Research, National University of Ireland (NUI) Galway is one of Ireland's most active research groups investigating the basic science of pain. The research of Dr Finn and his collaborators is investigating diverse areas of pain neurobiology including: the impact of stress and anxiety on pain, the physiology of the body's own in-built pain suppression systems, the potential of cannabis-based medicines for the treatment of pain, new approaches for more effective delivery of analgesic drugs in the body, and the impact of pain on cognitive functioning. In this, the fifth of a series of short articles summarising their research in these areas, Ms. Elaine Jennings, a PhD student jointly supervised by Dr. David Finn and Dr. Michelle Roche, describes her research into the effect of chronic stress on pain. Elaine was recently awarded first prize for her poster presentation and the Pain Research Medal at the Annual Scientific Meeting of the Irish Pain Society 2012.

Chronic Stress and its effect on Pain

Pain is an essential early warning signal to a potentially harmful event. However when pain persists longer than physiologically necessary, it can become pathological and reduce quality of life. Chronic pain is very prevalent, with 35.5% of the adult population in Ireland reporting at least one site of long-term pain (Raftery et al., 2011). Chronic pain is a complex and diverse disease state which can be difficult to treat. In fact, up to 40% of patients with a pain disorder remain unhappy with the drugs available for pain management (Breivik et al., 2006). It is important to remember that pain has both physiological and psychological dimensions, and both aspects of pain processing should be taken into account when treating patients.

Pain can be affected profoundly by stress. The relationship between stress and pain is complex and can be bidirectional, depending on the nature, duration and intensity of the stress. Generally, stressors that are acute and intense in nature result in a short-term suppression of pain known as stress-induced analgesia (Butler and Finn, 2009). Stress-induced analgesia has been widely examined and is part of the body's defensive "fight or flight" response. Thus, when a person is in a potentially dangerous situation, the body temporarily

dampens down pain signalling in order to allow escape or coping, regardless of injury. In contrast, exposure to prolonged/chronic stress generally leads to hyperalgesia or an exacerbation of pain, referred to as stress-induced hyperalgesia (Rhudy and Meagher, 2000).

Increased interest in stress-induced hyperalgesia has developed due to the fact that a high percentage of chronic pain patients have some form of stress-related psychiatric disorder. Common stress-related psychiatric disorders include anxiety and depression; in fact anxiety disorders are among the most prevalent mental health problems, as high as 18-22% in the general population (Kessler et al., 2005, Wittchen, 2002). Interestingly, patients with pain disorders are more likely to develop anxiety compared to the healthy population (35.1% vs. 18.1 %) (McWilliams et al., 2003). In addition, studies with healthy volunteers have shown that exposure to different stressors can alter how a person perceives pain (Rhudy and Meagher, 2000, al Absi and Rokke, 1991).

It has become apparent that pain and stress share common signalling pathways in the brain and can influence one another. Pain patients were shown to display enhanced activation of the hippocampus during anticipation of pain and during the painful experience itself, compared to a healthy control group (Gondo et al., 2012, Ziv et al., 2010). The hippocampus is involved in anxiety, depression, memory and learning deficits. It is also essential in fear conditioning (learning to predict an aversive event). The constant presence or anticipation of pain is a stressor and may lead to dysfunctions in hippocampal neuronal networks. Moreover, a reduction in hippocampal volume of chronic pain patients has been reported, and these abnormalities may underlie learning and emotional deficits commonly observed in such patients (Mutso et al., 2012). The pre-frontal cortex (Elsenbruch et al., 2010) and the amygdala (Ziv et al., 2010) have also displayed altered activity. Both of these regions are heavily involved in the emotionality of pain. Rather than one brain region being implicated in stress-induced hyperalgesia, many areas involved in emotion and pain modulatory systems appear to have alterations compared to the general population (Seminowicz et al., 2010). Animal models have also illuminated our understanding of the receptor and neurochemical mechanisms that may mediate stress-induced hyperalgesia (Imbe et al., 2006). It is clear that multiple receptors and neurotransmitters are involved, including the opioid, GABA and glutamate signalling systems.

The focus of my research is to examine and understand the changes that occur in the spinal cord and specific brain regions that lead to, or are implicated in, stress-induced hyperalgesia. In addition I am examining the influence of genetic background on stress-induced hyperalgesia. Our lab group are particularly interested in the endocannabinoid system, which is a chemical signalling system in the body that plays a key role in both stress and pain (Butler et al., 2008, Finn, 2010, Ford et al., 2011). There is some evidence that dysregulation the endocannabinoid system is involved in stress-induced exacerbation of visceral pain (Hong et al., 2009, Hong et al., 2011).

CHANGE

Exacerbation of pain by stress, and co-morbidity of pain with stress-related psychiatric disorders including anxiety and depression represent significant clinical challenges. A multidisciplinary approach combining psychological interventions such as cognitive behavioural therapy with pharmacological treatment is likely to result in the best treatment outcomes for patients. Our ever-increasing understanding of overlap and interactions that exist between the sites and mechanisms that regulate pain and mood means that it may be possible to develop new drugs which can treat both pain and co-occurring anxiety/depression. Indeed, the current use of drugs such as pregabalin and amitriptyline for the treatment of both pain and anxiety/depression illustrates the close associations that exist between pain and psychiatric disorders and suggests that novel drugs with improved efficacy and fewer adverse effects may eventually emerge from research focused on understanding pain-affect interactions.

Acknowledgements

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References

- AL ABSI, M. & ROKKE, P. D. 1991. Can anxiety help us tolerate pain? *Pain*, 46, 43-51.
- BREIVIK, H., COLLETT, B., VENTAFRIDA, V., COHEN, R. & GALLACHER, D. 2006. Survey of chronic pain in Europe: Prevalence, impact on daily life, and treatment. *European Journal of Pain*, 10, 287-333.
- BUTLER, R. K. & FINN, D. P. 2009. Stress-induced analgesia. *Progress in Neurobiology*, 88, 184-202.
- BUTLER, R. K., REA, K., LANG, Y., GAVIN, A. M. & FINN, D. P. 2008. Endocannabinoid-mediated enhancement of fear-conditioned analgesia in rats: opioid receptor dependency and molecular correlates. *Pain*, 140, 491-500.
- ELSENBRUCH, S., ROSENBERGER, C., BINGEL, U., FORSTING, M., SCHEDLOWSKI, M. & GIZEWSKI, E. R. 2010. Patients with irritable bowel syndrome have altered emotional modulation of neural responses to visceral stimuli. *Gastroenterology*, 139, 1310-9.
- FINN, D. P. 2010. Endocannabinoid-mediated modulation of stress responses: physiological and pathophysiological significance. *Immunobiology*, 215, 629-46.
- FORD, G. K., KIERAN, S., DOLAN, K., HARHEN, B. & FINN, D. P. 2011. A role for the ventral hippocampal endocannabinoid system in fear-conditioned analgesia and fear responding in the presence of nociceptive tone in rats. *Pain*, 152, 2495-504.
- GONDO, M., MORIGUCHI, Y., KODAMA, N., SATO, N., SUDO, N., KUBO, C. & KOMAKI, G. 2012. Daily physical complaints and hippocampal function: An fMRI study of pain modulation by anxiety. *Neuroimage*, 63, 1011-9.
- HONG, S., FAN, J., KEMMERER, E. S., EVANS, S., LI, Y. & WILEY, J. W. 2009. Reciprocal changes in vanilloid (TRPV1) and endocannabinoid (CB1) receptors contribute to visceral hyperalgesia in the water avoidance stressed rat. *Gut*, 58, 202-10.
- HONG, S., ZHENG, G., WU, X., SNIDER, N. T., OWYANG, C. & WILEY, J. W. 2011. Corticosterone mediates reciprocal changes in CB 1 and TRPV1 receptors in primary sensory neurons in the chronically stressed rat. *Gastroenterology*, 140, 627-637 e4.
- IMBE, H., IWAI-LIAO, Y. & SENBA, E. 2006. Stress-induced hyperalgesia: animal models and putative mechanisms. *Front Biosci*, 11, 2179-92.
- KESSLER, R. C., DEMLER, O., FRANK, R. G., OLFSO, M., PINCUS, H. A., WALTERS, E. E., WANG, P., WELLS, K. B. & ZASLAVSKY, A. M. 2005. Prevalence and Treatment of Mental Disorders, 1990 to 2003. *New England Journal of Medicine*, 352, 2515-2523.
- MCWILLIAMS, L. A., COX, B. J. & ENNS, M. W. 2003. Mood and anxiety disorders associated with chronic pain: an examination in a nationally representative sample. *Pain*, 106, 127-33.
- MUTSO, A. A., RADZICKI, D., BALIKI, M. N., HUANG, L., BANISADR, G., CENTENO, M. V., RADULOVIC, J., MARTINA, M., MILLER, R. J. & APKARIAN, A. V. 2012. Abnormalities in hippocampal functioning with persistent pain. *J Neurosci*, 32, 5747-56.
- RAFTERY, M. N., SARMA, K., MURPHY, A. W., DE LA HARPE, D., NORMAND, C. & MCGUIRE, B. E. 2011. Chronic pain in the Republic of Ireland--community prevalence, psychosocial profile and predictors of pain-related disability: results from the Prevalence, Impact and Cost of Chronic Pain (PRIME) study, part 1. *Pain*, 152, 1096-103.
- RHODY, J. L. & MEAGHER, M. W. 2000. Fear and anxiety: divergent effects on human pain thresholds. *Pain*, 84, 65-75.
- SEMINOWICZ, D. A., LABUS, J. S., BUELLER, J. A., TILLISCH, K., NALIBOFF, B. D., BUSHNELL, M. C. & MAYER, E. A. 2010. Regional gray matter density changes in brains of patients with irritable bowel syndrome. *Gastroenterology*, 139, 48-57 e2.
- WITTCHEN, H. U. 2002. Generalized anxiety disorder: prevalence, burden, and cost to society. *Depress Anxiety*, 16, 162-71.
- ZIV, M., TOMER, R., DEFRIN, R. & HENDLER, T. 2010. Individual sensitivity to pain expectancy is related to differential activation of the hippocampus and amygdala. *Hum Brain Mapp*, 31, 326-38.



Mr. Phil Sizer, Specialist & Trainer of Self-Management Techniques, Pain Association Scotland

Change

If you do not change direction, you may end up where you are heading. Lao Tzu

Self-Management helps people to adapt positively to long-term health problems. In theory it should be easy, but in reality it's hard. It's not that there is anything especially technical or tricky involved; the real challenge comes from dealing with change.

Dealing successfully with a change in health often requires questioning standards and expectations that may have become so ingrained that they have become unquestionable. Daring to challenge the 'rules' by which we live, churns up a lot of guilt, awkwardness and resistance.

There are of course other reasons that make Self Management hard to engage with, some of these include:

- A feeling of being let down by Medicine
- Hanging on to Medicine as the only route for help (despite hating it)
- Litigation
- Anger and frustration
- Negative attitudes
- Blame
- The need to fight on regardless
- Perceived lack of permission to make changes
- The doubts of others
- High expectations
- Misunderstandings

Whatever the barrier to adapting, it is important to identify it and start talking about it.

To be straight, if we really want to improve things then Self Management has to be taken seriously. If it were a tablet, everyone would take it, but because it's not, reluctance creeps in. Self-Management is unlike a lot of medicine because it takes effort. So whilst Medicine is done 'to us', Self Management needs to be done by us.

Ironically the people who struggle to engage are not usually the lazy types. Most of the people I work with struggle on and refuse to 'give in'. This may be partly based on misleading ideas like: 'if I don't fight it, it will win, or 'no pain no gain', or that getting the job done is more important than how you feel.

Give

Part of the change process is to realise that we can't have everything our own way and that if something has changed,

we need to change with it. Like an aeroplane wing, if it doesn't have some give in it then it will snap off when it encounters turbulence. Similarly if we don't have some flexibility (give) in the face of life's 'turbulence', then something else 'gives'. That something else could be your health.



Reality

The reality of change is that not everything is the same, quite simply because something has changed and if something has changed, we need to change with it or get stuck. The problem with Chronic Pain is that the longer we're stuck, the worse things get with cycles of pain and stress and boom and bust wearing us out over time and making a condition seem worse. So if health has changed, we need to change with it.

Denial

Sometimes people don't want to make adjustments because they fear that it will mean admitting that there is a change. One lady said as much to me: 'If I start pacing it means that I'm admitting that I have a problem'. To draw parallels with other things in life, if your car breaks down, denying that it has broken down and refusing to go to the garage won't help. Of course people are different to cars, but I hope you get the point.

Acceptance

Usually people stop reading here! Acceptance is a 'dirty word' for many people largely because it is misunderstood.

Acceptance isn't a black and white situation. Often people will never fully accept what has happened, but this doesn't mean that they can't make adjustments. Acceptance doesn't have to be an all or nothing situation.

Acceptance for our purposes is about acknowledging some facts which help you to get unstuck and move forward. If we don't admit that something has changed, then we deny ourselves the opportunity to do something about it.

Deals

It may be useful to do a deal with yourself e.g. 'If I don't do something about this, then I'll get worse'. In this case, accepting certain facts is a better option (a better deal) than getting worse. This is a good deal that makes sense and has benefits, most importantly, we'll be more likely to act on it.

The problem is that people often think that acceptance represents a 'bad deal' where they give up everything. Ironically, accepting something and then actually doing something about it is far better than denying that it happened and not doing anything to improve things.

Time

No-one (who I've met anyway) goes from change to total

acceptance and adaptation in a flash - it takes time. Sometimes it takes more time than other times and some people struggle more than others. A partial explanation for this might be that some people simply have more to deal with than others. However, the main point is that it takes time.

The good news is that we can be helped on this journey. This is important because it is possible to get stuck. This might be a natural sticking point that just needs time, but sometimes we get stuck because we lack something that would help us move forward. A few vital things that can help prevent us getting stuck for too long are:

- The support of others, especially those who have experienced something similar
- Knowing that you're not alone, so that you can feel 'normal'
- Knowing that your problem is real and believed
- Information about your condition so that you know what you can and can't do about it
- Having a background level of 'well-being' so that you are not living on the limit, just surviving from day to day
- Other things to focus on and give life meaning 100 percent

Being realistic, it is rare for someone to completely accept an unwanted change, lock stock and barrel. For our purposes, acceptance just has to be sufficient to free you to manage and cope better. It doesn't have to be 100 percent for example, if someone close dies we may never fully accept that they have, but we do usually get on with life. Similarly with Chronic Pain it is realistic to say that people hate the change and probably will forever, but this doesn't have to mean that they don't change their focus, move on and learn to manage and cope better.

The key thing to remember is that acceptance doesn't have to be 100 percent, it just needs to be sufficient to acknowledge certain facts and realities so that we can be freed up to start doing something about them.

Light at the end of the tunnel

It is quite normal to not want to look at something if we don't have a way forward. Self-Management gives a way forward and a way to re-define hope. It doesn't provide a cure, but it does provide a way to improve things. It takes time to accept this, but this time can be reduced if we find out more and enjoy the support of others in the same boat. In the absence of a cure, it offers a way forward which may seem, given time, a good deal.

As I keep saying, if something has changed, we need to change with it. Even the smallest of adjustments is a step in the right direction and it probably won't be as hard or as bad as you might have feared. A good start would be to focus right now on what you can change rather than what you can't and then actually act on it.

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Annual Membership Form

As a member you are invited to attend and contribute to the Support Meetings, Self Help Workshops, receive updates via quarterly newsletter, avail of telephone support and web-site forum. We are very grateful for your support of CPI and we will continue to lobby Government and increase awareness of Chronic Pain amongst the medical profession and the general public. If you would like to join CPI please complete this form and return to CPI, Carmichael Centre, North Brunswick Street, Dublin 7.

(Please tick as applicable)

Membership Category New ☐ Renewal ☐

Membership Type

Member € 22.00

Health Professional € 22.00

Associate Member * € 22.00

(Voluntary Donation) €

Total Enclosed €

* I do not have Chronic Pain but would like to receive information

Method of Payment

Cheque ☐ Postal Order / Bank Draft ☐

PLEASE USE BLOCK CAPITALS:

Title: _____ First Name: _____

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Chronic Pain Ireland (CPI) requires this information to process your membership, post membership-related material to you, keep you informed of events, issues and opportunities relating to Chronic Pain or to the aims of CPI.

Occasionally, CPI may determine that products/services of appointed agents or third parties might be beneficial to our members and under strict non-disclosure agreements, some of your information may be given to such parties, or may be used by CPI to directly inform you of the product or service. If you do not wish to receive such communication, please tick here. ☐

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Please return this form to us and we will send it on to your bank

Bank Sort No: _____

Bank Account No: _____

Bank Name: _____

Branch: _____

Bank Address: _____

Please pay the sum of _____ to the account of Chronic Pain Ireland, at AIB Bank, Georges Street, Dun Laoghaire, Co Dublin. Sort Code: 93-34-06 Account number 75755027, on this date and on the corresponding date each succeeding year until further notice.

Name: _____

Address: _____

Signed: _____ Date: / /

For Office Use: Receiver: CPI

Sender ☐

Workshop Dates & Events

Members will be notified of all workshops dates and events once scheduled

Fundraising Events

Can you help raise funds for Chronic Pain Ireland? Can you organise an employee fundraising event amongst work colleagues, social club or can you make CPI your employer's charity of the year? Can you organise a social event, coffee morning, cake sale? If so contact CPI for a fundraising pack.

Sporting Events - could a family / friend who is taking part raise much needed funds? If so, please contact us for a sponsorship pack.

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Your Story

If you would like to tell your story and have some positive advice to share with readers please forward to info@chronicpain.ie Please note that publication is at the discretion of the editor.

Your Views

We hope you enjoyed the articles and the updated image of your newsletter. If there are articles or areas of interest that you would like to see covered please let us know by emailing info@chronicpain.ie or writing to CPI, Carmichael Centre, North Brunswick St, Dublin 7.

Book Review

If you have found a book helpful and would like to forward a review to share with other members please forward to info@chronicpain.ie Please note that publication is at the discretion of the editor.

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