

# Neuroscientific painmodulation

## Important references used in the two-day course.

*"Pain is a **subjective experience dependent on complex interactions of neurobiological, cognitive, affective, contextual and environmental factors.** Thus, pain management depends on identifying contributory factors from biological, psychosocial and contextual domains and addressing them through various evidence-based techniques."*

Ref.: Hainline et al. 2017

*"We need to move beyond a longing for the way things were and to see things as they might yet be. We need the courage to do what our founders did before us and to look to a new day—a day when our profession will be fundamentally different because we will be accountable and our practice will be based on research rather than whim. We need to make certain that, as we move to a better form of practice, we continue to put patients first. Nothing could be more humanistic than using evidence to find the best possible approaches to care. We can have science and accountability while retaining all the humanistic principles and behaviors that are our legacy."*

Ref.: Rothstein JM. Thirty-Second Mary McMillan Lecture: journeys beyond the horizon. Phys Ther. 2001 Nov;81(11):1817-29.

*"Unfortunately, **many health care providers lack a comprehensive perspective on pain and not infrequently interpret the suffering of others through their own personal lens. Misjudgment or failure to understand the nature and depths of pain can be associated with serious consequences—more pain and more suffering—for individuals and our society.**"*

Relieving Pain in America, Institute of Medicine, Committee on Advancing Pain Research, Care, and Education. National Academies Press, 2011

*"Problems with pain education identified by surveys of multiple health science courses in higher education institutions across the United States, Canada, and Europe include a lack of dedicated curriculum time, and that pedagogic approaches are not always thought to be effective in improving students' pain knowledge and skills. Pedagogic approaches tend to be didactic and biomedically focussed, which may not be optimal for developing knowledge and skills relevant to a pain practitioner."*

Ref.: Thompson K, Johnson MI, Milligan J, Briggs M. Twenty-five years of pain education research—what have we learned? Findings from a comprehensive scoping review of research into pre-registration pain education for health professionals. Pain. 2018 Nov;159(11):2146-2158.

*"Science is **"the process of understanding the world through experimentation and observation,"** whereas beliefs are **"feelings that something is true."** Thus, the former*

represents an ideal of discovering truth that exists separate from the knower, whereas beliefs are internally held understandings filtered through one's world view. By "unscientific belief," we indicate that something is held as generalizable fact without substantial scientific supporting evidence"

Ref.: Brown et al. 2014

### What is science?

"There is **nothing magical about science. It is simply a systematic way for carefully and thoroughly observing nature and using consistent logic to evaluate results**" Dr. Steven Novella, MD

"If you base medicine on science, **you cure people. If you base the design of planes on science, they fly. If you base the design of rockets on science, they reach the moon. It works**" Richard Dawkins

"The **real purpose of the scientific method is to make sure nature hasn't misled you into thinking you know something** you actually don't know" Robert M. Pirsig

"Individual practitioners therefore need to be able to find and use evidence themselves — **a 21st century clinician who cannot critically read a study is as unprepared as one who cannot take a blood pressure or examine the cardiovascular system.**"

Ref.: Evidence based medicine and the medical curriculum. BMJ 2008;337:a1253

"Plausibility is essentially an **application of existing basic and clinical science to a new hypothesis, to give us an idea of how likely it is to be true.** We are not starting from scratch with each new question – which would foolishly ignore over a century of hard-won biological and medical knowledge." Prof. Steven Novella, MD

### What is EBM?

"Evidence-based medicine can be seen as a combination of three skills by which practitioners **become aware of, critically analyze, and then apply the best available evidence from the medical research** literature for the care of individual patients."

Ref.: Essential Evidence-based Medicine, 2nd Edition, November 2009.

"Evidence-based physiotherapy is **physiotherapy informed by relevant, high-quality clinical research.** The practice of evidence-based physiotherapy should involve integration of evidence (high-quality clinical research) with patient preferences and practice knowledge."

Ref.: Herbert, Jamtvedt, Hagen, Mead. Practical Evidence-Based Physiotherapy, 2nd Edition, 16th August 2011

"The World Confederation for Physical Therapy (European region) has defined EBP as **"a commitment to use the best available evidence to inform decision-making about the care of individuals that involves integrating physiotherapist practitioners and individual professional**

**judgement with evidence** gained through systematic research.” World Confederation for Physical Therapy—European Region

“The practice of evidence-based medicine mean **integrating individual clinical expertise with the best available external clinical evidence** from systematic research”

Ref.: Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ. 1996 Jan 13;312(7023):71-2.

“Regardless of your thoughts on EBP, there are at least 3 reasons why physical therapists should engage with research evidence: **1. The public expects medical care to be based in science. 2. If physical therapy wants to call itself a scientific profession, then relevant evidence must be generated and used in clinical practice. 3. Agencies that pay for services, such as insurers and government bodies, are increasingly making reimbursement contingent on providing evidence-based care.** Sometimes research results differ substantially from your own experience of the effectiveness of a particular treatment. This presents a challenge and begs the very reasonable question of why a physical therapist should be expected to prioritize evidence from a study over his or her own clinical experience. **Information recalled from clinical experience should be appraised and assessed for bias, just as information from research should be.** So, it is important to understand the potential limitations and relevant biases.”

“People tend to **appraise and interpret information such that it reinforces their own beliefs. We overvalue information that supports our beliefs, ignore or forget information that contradicts them,** and interpret ambiguous information in a way that favors our views.”

“People have a **tendency to better remember substantial or impressive events, as opposed to average or more common occurrences. In the context of clinical practice, this could lead to clearly remembering the patients who did spectacularly well (or spectacularly badly) and less clearly remembering those with an average outcome.** So, when it comes time to apply previous experience to the next patient, the most likely outcome may be the one least likely to be recalled.”

Ref.: J Orthop Sports Phys Ther. 2018 Jun;48(6):512-513. Engaging With Research: Linking Evidence With Practice. Kamper SJ

“Perhaps it is unfortunate that the physiotherapy profession has responded to the perception that physiotherapists must justify what they do by routinely measuring clinical outcomes. **The implication is that measures of outcome can provide justification for intervention. Arguably that is not the case.** Outcome measures measure outcomes. They do not measure the effects of intervention. Outcomes of interventions and effects of interventions are very different things.”

“**Clinical outcomes are influenced by many factors other than intervention, including the natural course of the condition, statistical regression, placebo effects, and so on.** (Tuttle (2005) makes this point clearly in his article, in this issue, on the predictive value of clinical outcome measures.) **The implication is that a good outcome does not necessarily indicate that intervention was effective; the good outcome may have occurred even without**

**intervention.** And a poor outcome does not necessarily indicate that intervention was ineffective; the outcome may have been worse still without intervention. This is why proponents of evidence-based physiotherapy, including ourselves (Herbert et al 2005), argue **it is necessary to look to randomised trials to determine, with any degree of certainty, the effects of intervention.**"

Ref.: Aust J Physiother. 2005;51(1):3-4. Outcome measures measure outcomes, not effects of intervention. Herbert R, Jamtvedt G, Mead J, Hagen KB.

**"Nothing could be more humanistic than using evidence to find the best possible approach to care"** Prof. Jules Rothstein, PT, PhD

*"After first being proposed by Engel in 1977, and subsequently being applied to pain, **the biopsychosocial model of pain is considered to be the most comprehensive theoretical perspective of pain 15 as it accounts for contributions of psychological, biological, cognitive, affective, behavioural, and social factors in the variability in the conscious experience, and clinical presentation of pain between individuals.**"*

Ref.: Tracy 2017

*"The neuromatrix theory **guides us away from the Cartesian concept of pain as a sensation produced by injury, inflammation, or other tissue pathology** and toward the concept of **pain as a multidimensional experience produced by multiple influences**". "Pain is **not injury, the quality of pain experiences must not be confused with the physical event of breaking skin or bone.** Warmth and cold are not 'out there', temperature changes occur 'out there', but the **qualities of experience must be generated by structures in the brain.**"*

Ref.: Melzack R, Katz J. Pain. Wiley Interdiscip Rev Cogn Sci. 2013 Jan;4(1):1-15.

*"Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage"*

*"This **definition avoids tying pain to the stimulus. Activity induced in the nociceptor and nociceptive pathways by a noxious stimulus is not pain,** which is always a psychological state, even though we may well appreciate that pain most often has a proximate physical cause."*

Ref.: IASP Task Force on Taxonomy, 1994

*"Exercise can improve symptoms, decrease disability and improve function and wellbeing in a range of CMP conditions. **No one exercise modality has proven superior with considerable uncertainty regarding exercise modality and dosage.** The weight of evidence is for aerobic and resistance exercise modalities. However, if patients prefer, non-traditional forms such as pilates, yoga and tai chi should not be excluded."*

Ref.: Musculoskeletal Care. 2017 Mar 30. Exercise for chronic musculoskeletal pain: A biopsychosocial approach. Booth J, Moseley GL, Schiltenswolf M, Cashin A, Davies M, Hübscher M.

**"The physiotherapy, manual therapy and medical professions have long focused on trying to find the magic 'technique', 'muscle', 'injection' or 'surgical technique' required to solve the problem of NSCLBP and PGP disorders. This reductionist approach to dealing with complex disorders in a simplistic manner clearly hasn't delivered for our patients and contradicts current knowledge that NSCLBP should be considered within a multidimensional bio-psycho-social framework."**

Ref.: O'Sullivan P. It's time for change with the management of non-specific chronic low back pain. Br J Sports Med. 2012 Mar;46(4):224-7. Epub 2011 Aug 4.