

# Evidence-Based Massage Therapy



# EVIDENCE-BASED MASSAGE THERAPY

A Guide For Clinical Practice

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# CONTENTS

Introduction	1
Aims and Structure of The Book	5
About The Author	7

## Part I. Setting the Groundwork for Evidence-Based Massage

1. Critical Thinking and Evaluating Sources	13
2. The Hierarchy of Scientific Evidence	16
3. Systematic Reviews of Massage Therapy	18

## Part II. Theories and Treatment Strategies

4. Massage Therapy: An Evidence-Based Framework	33
5. Pain Education	41
6. Neural Mobilization	48
7. Myofascial Release	55
8. Myofascial Triggerpoints	61
9. Joint Mobilization	67

## Part III. Complementary Therapies

10. Instrument Assisted Soft Tissue Mobilization	77
11. Self Massage and Foam Rolling	81
12. Cupping Therapy	84
13. Elastic Therapeutic Tape	87
14. Medical Acupuncture	90
15. Transcutaneous electrical nerve stimulation (TENS)	99

16. Thermal Applications: Heat & Cold	103
---------------------------------------	-----

## Part IV. Clinical Examination

17. Interpersonal Communication Skills	115
18. Screening for Red and Yellow Flags	118
19. Orthopedic Physical Examination	123
20. Neurological Examination	128

## Part V. Massage Therapy for Musculoskeletal Pain

21. Temporomandibular Disorders	141
22. Migraines and Tension-Type Headaches	146
23. Post-Concussion Syndrome	153
24. Neck Pain	159
25. Shoulder Pain	165
26. Elbow Pain	173
27. Thoracic Outlet Syndrome	178
28. Carpal Tunnel Syndrome	186
29. Dupuytren's Disease	193
30. Back Pain	199
31. Sciatica	210
32. Hip Pain	217
33. Knee Pain	225
34. Achilles Tendinopathy	233
35. Ankle Pain	239
36. Plantar Heel Pain	245
37. Rehabilitation for Strains and Sprains	250
38. Fibromyalgia	257
39. Chronic Pain	261
40. Osteoarthritis	267
41. Delayed Onset Muscle Soreness	274

42. Tendinopathy	281
Supplementary Resources	289
<i>Supplementary Resources</i>	
Glossary	296
<i>Glossary</i>	



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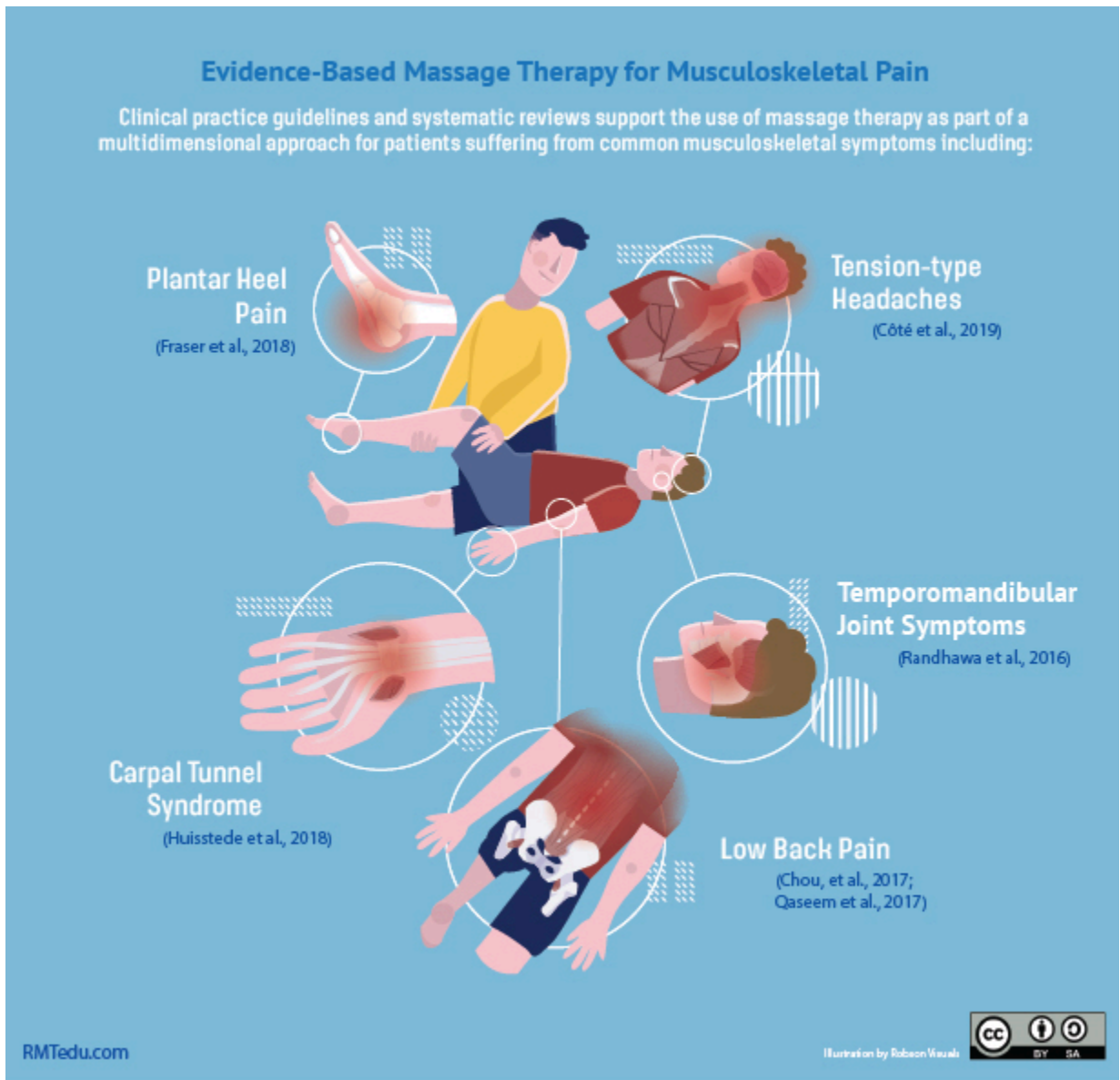
## Introduction

Chronic musculoskeletal pain is associated with significant social and economic costs (Blyth et al., 2019, Shupler et al., 2019). What's more is that conventional treatment options such as opioid-based analgesics, corticosteroid injections, and surgical interventions are associated with small improvements versus placebo for pain and function and an increased risk of harm (Busse et al., 2017, Chou et al., 2020). This has prompted stakeholders to re-evaluate how treatment is provided for people living with chronic musculoskeletal pain (Lewis et al., 2020; Lin et al., 2020).

Musculoskeletal pain is a complex and multifactorial phenomenon and treatment requires an individualized multidisciplinary approach that addresses biopsychosocial influences and empowers people with shared decision-making. Increasingly evidence-based non-pharmacological treatments options are being integrated with standard care as part of a person-centered approach (Lin et al., 2020; Manchikanti et al., 2020).

The paradigm shift to an evidence-based multidisciplinary approach presents an opportunity for massage therapists to collaborate with other healthcare professionals to improve a patient's health and treatment outcome. With respect to the multidisciplinary treatment of pain, massage therapy has a desirable safety profile and it is a health care option that has been shown to be effective for many persistent pain syndromes (Skelly et al., 2020). What is often not appreciated is that a number of clinical practice guidelines and systematic reviews support the use of massage therapy for patients suffering from a whole host of conditions including but not limited to back pain, tension-type headaches, temporomandibular joint disorder, carpal tunnel syndrome, and plantar heel pain.

Specific examples would be the endorsement from the American College of Physicians who now recognizes massage therapy as a treatment option for patients with acute and chronic low back pain (Chou et al., 2017; Qaseem et al., 2017). Another example is the Canadian Guideline for Opioid and Chronic Non-Cancer Pain now recommends a trial of massage therapy rather than a trial of opioids for a number of conditions including: back and neck pain, osteoarthritis of the knee and headaches (Busse et al., 2017). Internationally – The Global Spine Care Initiative also recognizes the value of non-pharmacological treatment options such as exercise, yoga, and massage therapy (Chou et al., 2018).



### Key Takeaways

Based on updated clinical practice guidelines, as a profession Massage Therapists will see an increase in direct physician referrals as we are now recognized as front line treatments for acute and chronic pain. This is a change that did not happen overnight, for years massage therapy has been shown to be a safe, effective non-pharmacological therapeutic intervention that is simple to carry out, economical, and has very few side effects.

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# AIMS AND STRUCTURE OF THE BOOK

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## Aims and Structure of The Book

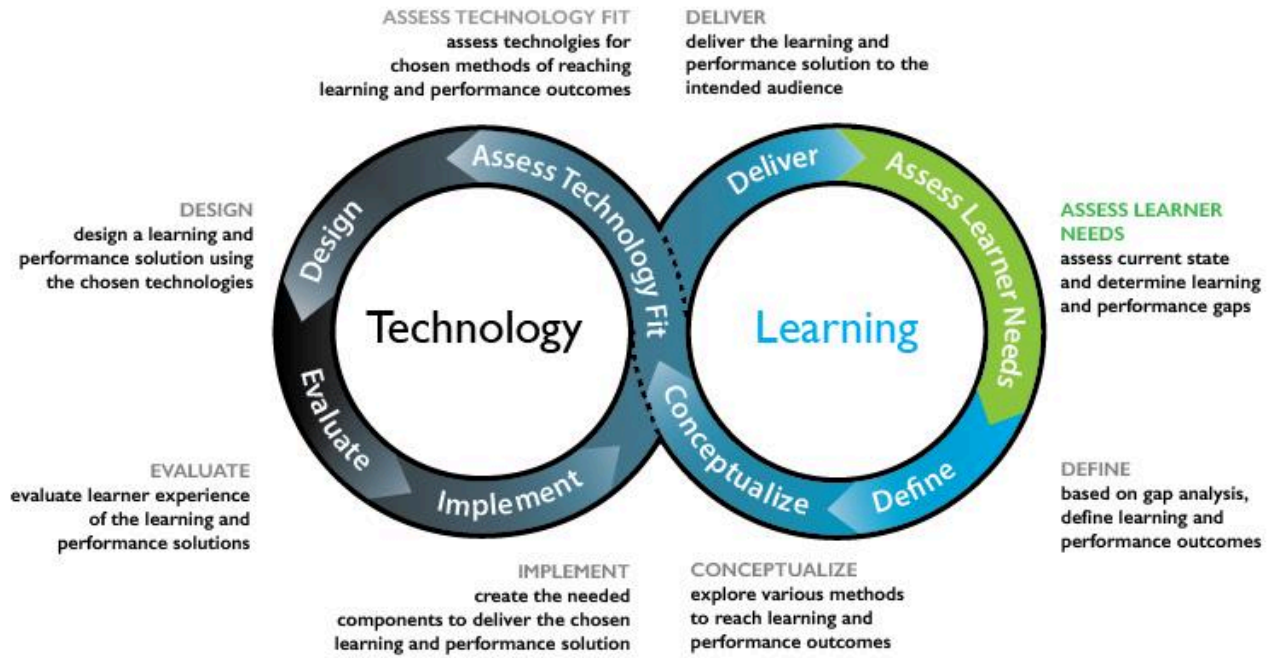
This book exists to facilitate interprofessional education and collaboration between massage therapists and health care teams. As the practice of massage therapy moves into mainstream medical care for a number of physical ailments, students and practicing massage therapists have an urgent need for a clinical resource that will be continuously updated as new research becomes available. The primary goal of this resource is to turn recent policy changes into actionable gains for the advancement of our profession globally, by:

1. Identifying and describing key postulates and applications of an evidence-based framework.
  2. Providing an overview of current research findings and their practical implications for massage therapists.
  3. Fostering a culture of evidence-based practice by incorporating new scientific findings and methods into clinical practice.
- 

## Note On The Format Of The Book

This is a project utilizing Open Educational Resources (OERs) to set the groundwork for research literacy and evidence based practice. This resource is a living document that is constantly being updated and systematically edited for clarity and flow. It will be monitored and updated throughout the life-cycle, based off Paul Hibbits Learning & Technology Development Process Model.

# Learning + Technology Development Process Model



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# ABOUT THE AUTHOR

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## About The Author: Richard Lebert

Richard Lebert is an educator, researcher, and health care professional with a focus on digital literacy, interprofessional collaboration and person-centred care. He is Associate Faculty in The School of Health Science, Community Services and Creative Design at Lambton College and a Registered Massage Therapist with over ten years of experience. In addition to his training as a massage therapist, Richard has certification in Medical Acupuncture from McMaster University and a Certificate of Online and Open Learning from The University of Windsor.

An active advocate for interdisciplinary collaboration, Richard is involved in a number of committees and ongoing projects. This has led to him being recognized by the Registered Massage Therapists' Association of Ontario (RMTAO) for his contribution to the profession.



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## Note to Educators Using this Resources

This resource can support learners knowledge and skill related to clinical practice with a client with musculoskeletal pain. If you would like to share your experience using this open educational resource or provide feedback, please contact Richard Lebert.

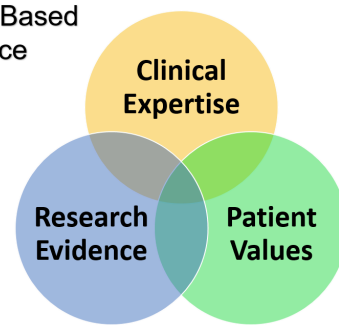
## PART I

# SETTING THE GROUNDWORK FOR EVIDENCE-BASED MASSAGE

## Setting the Groundwork for Evidence-Based Massage Therapy

Being a recognized treatment option for people in pain means the profession of massage therapy is moving into new formal settings. As this shift occurs, it is important that therapists adhere to evidence-based medicine and utilize critical thinking and research literacy skills. David Sackett and Gordon Guyatt first introduced evidence-based medicine (EBM) in 1996 as the conscientious use of current best evidence in making decisions about patient care. It is a process intended to reduce the risk of harm and optimize decision-making by emphasizing the use of evidence from well designed research. This includes the use of logical reasoning and the gathering of ideas and knowledge from many overlapping disciplines.

Evidence-Based Practice



- **Patient Values** – The needs and requests of your patient will influence your decision making. Therapists need to be able to hear the patient’s values and create a working relationship with the patient. Shared-decision making will include developing a plan of care based on individualized goals and needs of the patient.
- **Research Evidence** – Research’s main role is to help guide clinical decisions and to warn of known harm, the higher the quality of the evidence the more confident we can be as a therapist making an informed decision.
- **Clinical Expertise** – Clinical experience is used to create individualized treatment plans as patient presentation will vary on a case by case basis. Making sound decisions requires the clinician to expertly assess the patient’s personal, social, and clinical context and integrate this information with the values and preferences of the informed patient. The therapist will use his/her clinical expertise and allow the evidence to guide this process, rather than dictate it.

Key Takeaways

Evidence-based medicine systematically integrates **research evidence** with **clinical expertise** and **patient values** to achieve the best possible patient management, while minimizing the potential for harm. This section features a number of resources that help to bridge the gap between research and clinical practice.

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1.

# CRITICAL THINKING AND EVALUATING SOURCES

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## Critical Thinking and Evaluating Sources

Bias has the potential to influence perceptions and decision-making. To help mitigate flaws in thinking there are a number of different filters you can use to process information and evaluate resources. In this text we use the CRAAP method of evaluating information, but there are a number of other tools that are just as useful.

### The CRAAP Method of Evaluating Sources

In the age of 'new media' and 'fake news' it is important to be able to critically evaluate information. If you are unsure of the validity of what you are reading, **The CRAAP Method** is a simple acronym that will simplify the way you evaluate information.

# Research Literacy – Think CRAAP

<b>Currency</b>	Is the information current?
<b>Relevance</b>	Does the information answer your question?
<b>Accuracy</b>	Is the information supported by evidence?
<b>Authority</b>	Who is the author & what are their qualifications?
<b>Purpose</b>	Are the authors intentions clear?

The CRAAP test is a test to check the reliability of sources across academic disciplines.

## Key Takeaways

If you are unsure of the validity of what you are reading, **The CRAAP Method** is a simple acronym that will simplify the way you evaluate information.

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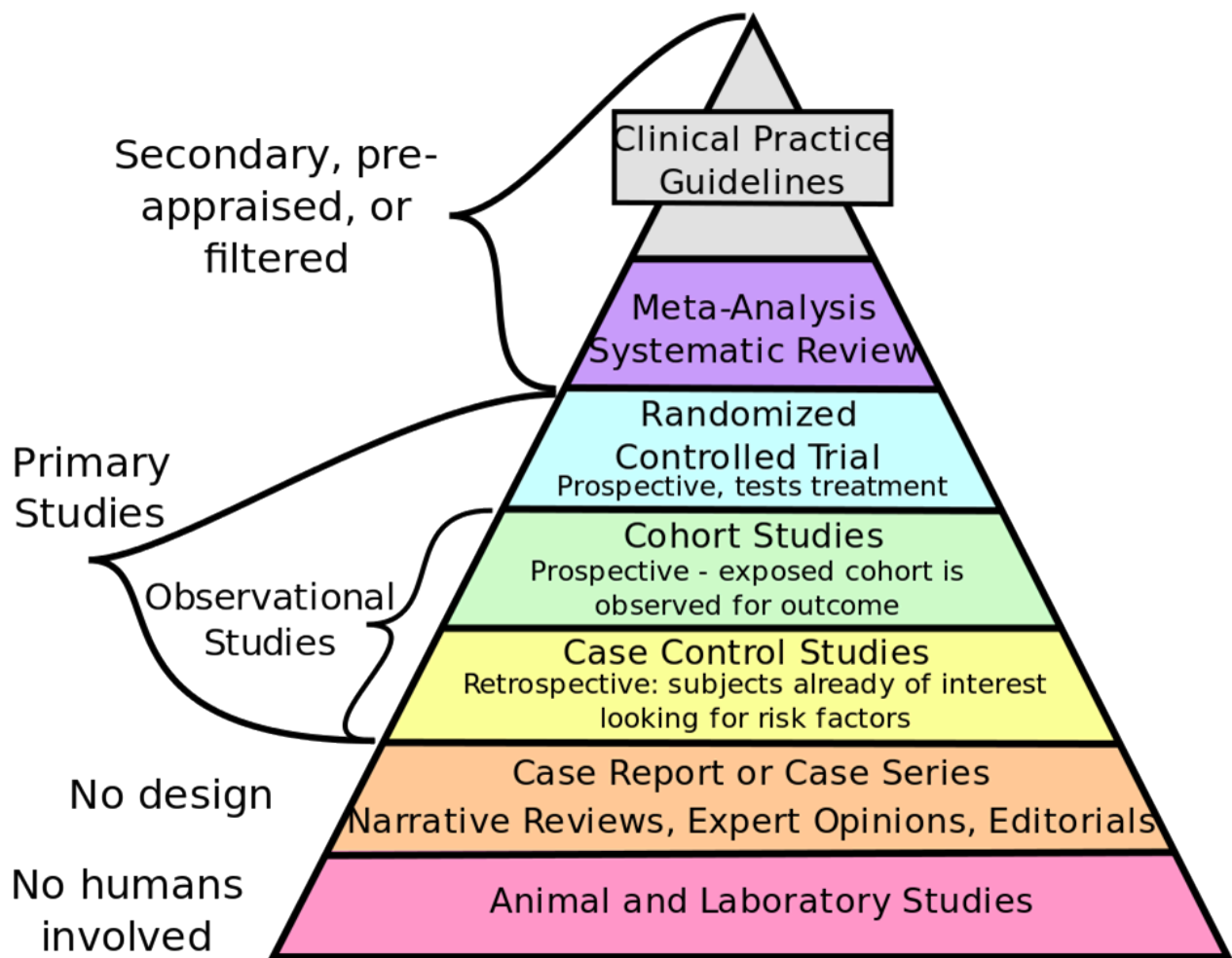
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## THE HIERARCHY OF SCIENTIFIC EVIDENCE

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### The Hierarchy of Scientific Evidence

Evaluating research involves ranking studies based on their methods. **The Hierarchy of Evidence Pyramid** provides an overview of various types and levels of scientific research.



The hierarchy of research evidence

## Key Takeaways

The hierarchy of evidence pyramid provides an overview of various types and levels of scientific research, systematic reviews sit at the top of the pyramid, followed by randomized control trials and observational studies. Expert opinion and anecdotal experience are ranked at the bottom.

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## SYSTEMATIC REVIEWS OF MASSAGE THERAPY

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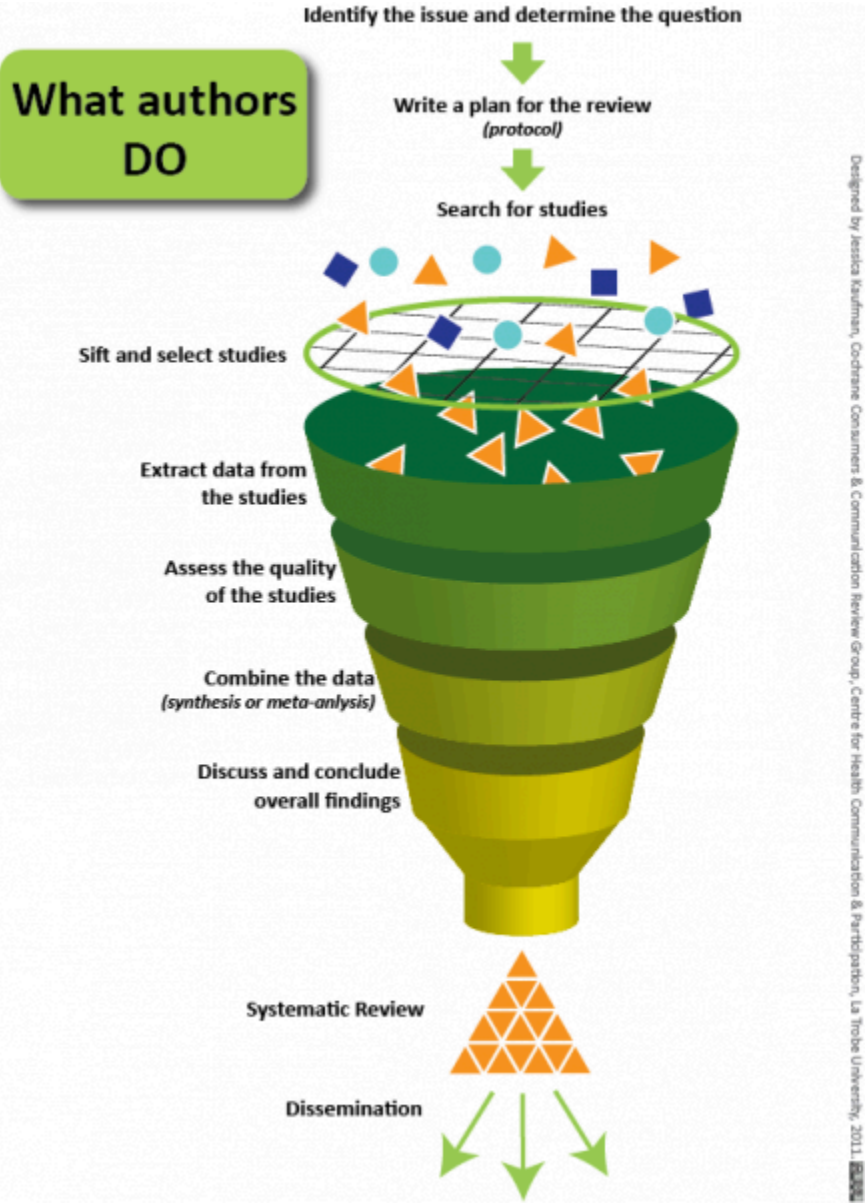
### Systematic Reviews of Massage Therapy

#### Massage Therapy – The Science is Emerging

Systematic reviews are used as part of an evidence-based model of care to help identify and evaluate existing research for a specific topic. Conducting a systematic review is a complex process. This specific type of research, requires multiple research experts each with their own specialized background to collaborate and analyze all the existing research available for one specific topic.

First researchers will pick a particular topic – for example we could say, ‘the use of massage therapy for low back pain’. Then the researchers comb through research databases to find studies from around the world carried out on that specific topic. After the search is completed the articles are evaluated based on a predefined inclusion criteria. Then articles are separated by those that meet the pre-defined criteria and those that do not meet the predefined criteria.

The research articles that meet the pre-defined criteria are then individually screened for potential biases. There are a number of ways that biases sneak into research, for massage therapy one of the primary sources of bias is due to therapist and patient blinding (this is hard to control for). In addition to evaluating studies for potential biases, researchers are looking for potential harms, and treatment effect size. Essentially, does this treatment work, and how does it compare to a placebo/sham intervention.



## Healthcare Triage: Systematic Review and Evidence-based Medicine



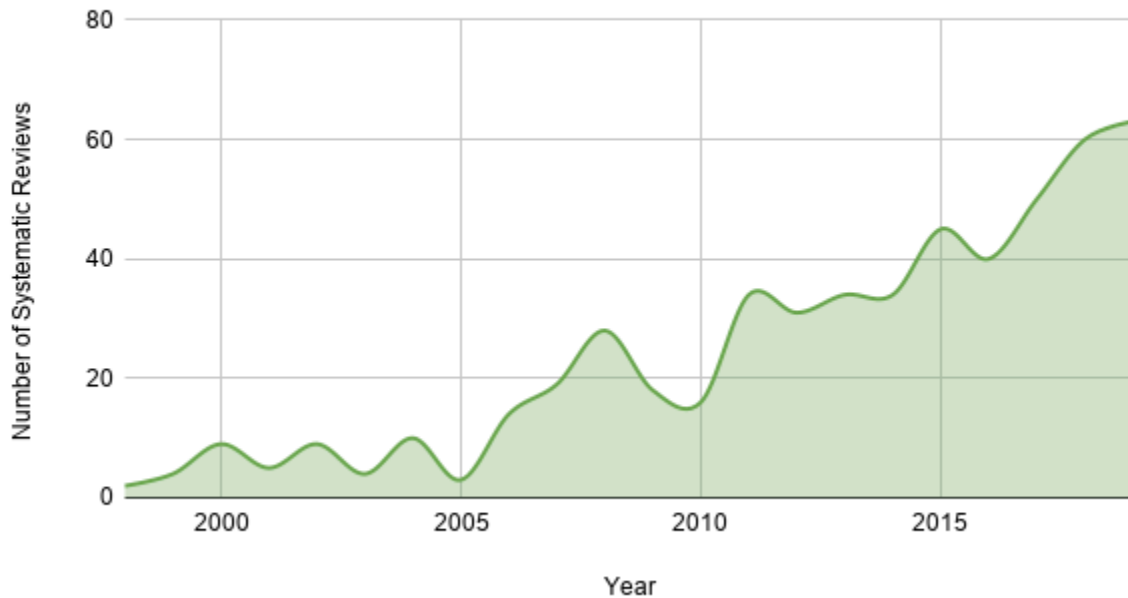
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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=604>*

### **A List of Systematic Reviews of Massage Therapy**

Twenty years ago there was a limited number of systematic reviews of massage therapy, since 2005 there has been a steady increase in the quality and number of systematic reviews of massage therapy.



## Systematic Reviews of Massage Therapy (1998-2019)



Graphical representation of the steady increase in number of systematic reviews

## Improvement in Quality & Quantity

Based on these systematic reviews massage therapy has a growing body of evidence supporting its effectiveness in reducing pain and improving health-related quality of life in a variety of health conditions and rehabilitation, including but not limited to:

- Chronic Pain (Busse et al., 2017; Crawford et al., 2016; Skelly et al., 2020)
- Low Back Pain (Chou et al., 2017; Qaseem et al., 2017; Brasure et al., 2019; Skelly et al., 2020)
- Neck Pain (Chou et al., 2018; Côté et al., 2016; Skelly et al., 2020)
- Headaches and Migraines (Busse et al., 2017; Côté et al., 2019)
- Temporomandibular Disorder (Martins et al., 2016; Randhawa et al., 2016)
- Shoulder Pain (Hawk et al., 2017; Steuri, et al., 2017; Pieters et al., 2020)
- Carpal Tunnel Syndrome (Huisstede et al., 2018)
- Lateral Epicondylitis (Sutton et al., 2016)
- Arthritis (Nelson et al., 2017)
- Hip Osteoarthritis (Cibulka et al., 2017; Skelly et al., 2018)
- Knee Osteoarthritis (Busse et al., 2017; Newberry et al., 2017)
- Plantar Fasciitis (Fraser et al., 2018)
- Chronic Ankle Instability (Powden et al., 2017)
- Surgical Pain Population (Boitor et al., 2017; Boyd et al., 2016; Kukimoto et al., 2017)
- Symptom Burden of Critically Ill Adults (Thrane et al., 2019)

- Cancer-Related Fatigue (Hilfiker et al., 2018)
- Cancer Pain Population (Boyd et al., 2016; Calcagni et al., 2019)
- Fibromyalgia (Busse et al., 2017; Skelly et al., 2020; Yuan et al., 2015)
- Delayed Onset Muscle Soreness (Dupuy et al., 2018; Guo et al., 2017)
- Postpartum Maternal Sleep (Owais et al., 2018)
- Pain Management in Labour (Smith et al., 2018)
- Antenatal Depression (Smith et al., 2019)
- Hypertrophic Scarring (Ault et al., 2018)
- Palliative Care (Armstrong et al., 2019; Zeng et al., 2018)
- Dementia (behavioural & psychological symptoms) (Leng et al., 2020; Margenfeld et al., 2019; Watt et al., 2019)
- Parkinson's Disease (motor and non-motor symptoms) (Angelopoulou et al., 2020)

### Key Takeaways

Massage therapy is a clinically-oriented healthcare option, that is increasingly being used alongside standard medical care to help manage a number of symptoms. This chapter highlights a number of systematic reviews that support the use of massage therapy.

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## PART II

# THEORIES AND TREATMENT STRATEGIES



A wall painting found in the tomb of the highest official after the Pharaoh – Ankhmahor. This wall painting is dated back to 2330 B.C

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## Theories and Treatment Strategies

For thousands of years, people with illnesses and disabilities were treated with various methods of massage, the history of which varies from country to country. Ancient Babylonia, Assyria, China, India, Greece and Rome all practiced some form of massage. One of the oldest accounts is in Egypt in the tomb of Akmanthor, in this tomb there is a painting dating back to 2330 BC that depicts two men having work done on their feet and hands.

Another historical account is in Homer's Iliad and the Odyssey where "massage with oils and aromatic substances is mentioned as a means to relax the tired limbs of warriors and a way to help the treatment of wounds". The use of massage for therapeutic purposes originated in a pre-scientific era and some of the reasoning once used to explain the effects do not make sense in the light of what we know today. As such we should aim to update some of our explanations and align it with current medical practice.

The contemporary practice of massage therapy is often practiced as a multi-modal approach that includes, but is not limited to classical massage, swedish massage, myofascial mobilization, instrument-assisted soft tissue mobilization (IASTM), cupping, joint mobilization, strain-counterstrain, neuromuscular therapy, muscle energy techniques, neural mobilizations, manual lymphatic drainage, and education. Treatment approaches in massage therapy may vary and



despite being called different names, most of these techniques have similar effects and outcomes outlined in the chart below.



Overview of Massage Therapy Techniques



<p><b>Commonly Used Techniques</b></p>	<p>Swedish massage (effleurage, petrissage, percussion, vibration, friction),</p> <p>Joint mobilization (grades 1-4)</p> <p>Neural mobilization (nerve gliding, nerve flossing, sliders and tensioners)</p> <p>Neuromuscular therapy and muscle energy techniques</p> <p>Strain counterstrain and positional release</p> <p>Lymphatic drainage techniques</p> <p>Golgi tendon organ techniques</p> <p>Rocking and shaking</p> <p>Triggerpoint techniques</p> <p>Myofascial mobilization (muscle stripping, skin rolling)</p>
<p><b>Safety Considerations</b></p>	<p><b>Patient comfort:</b> Always treat client within the agreed upon pain tolerance</p> <p><b>Treatment related adverse effects:</b> discomfort, increase of pain aching muscles, headache, and tenderness; reports of increased pain</p> <p><b>Underlying pathologies:</b> Varicosities, uncovered opening or recent incision, contagious skin lesion, hemophilia or anticoagulant medication, deep vein thrombosis, congestive heart failure, etc.</p> <p><b>Red flags:</b> A referral will be given if a serious underlying pathology is suspected (e.g. cauda equina syndrome, spinal fracture, malignancy, and spinal infection).</p>

**Effects & Outcomes**

Decrease pain perception

Increase range of motion

Decrease muscle spasm

Increase local circulation

Sensory motor integration (Wholebody integration)

Stimulate the parasympathetic nervous system to promote relaxation &amp; wellness

Enhanced body and postural awareness

## Key Takeaways

As the body of knowledge to support the use of massage therapy to help alleviate the musculoskeletal disorders associated with everyday stress, physical manifestation of mental distress, muscular overuse and many persistent pain syndromes continues to grow, understanding the basic science behind what we do enable us to apply this work to a number of conditions. Treatment approaches in Massage Therapy may vary, but each therapeutic encounter involves some overlapping principles. This book will conceptualize the main domains of an evidence-based framework for Massage Therapy using recent scientific research.

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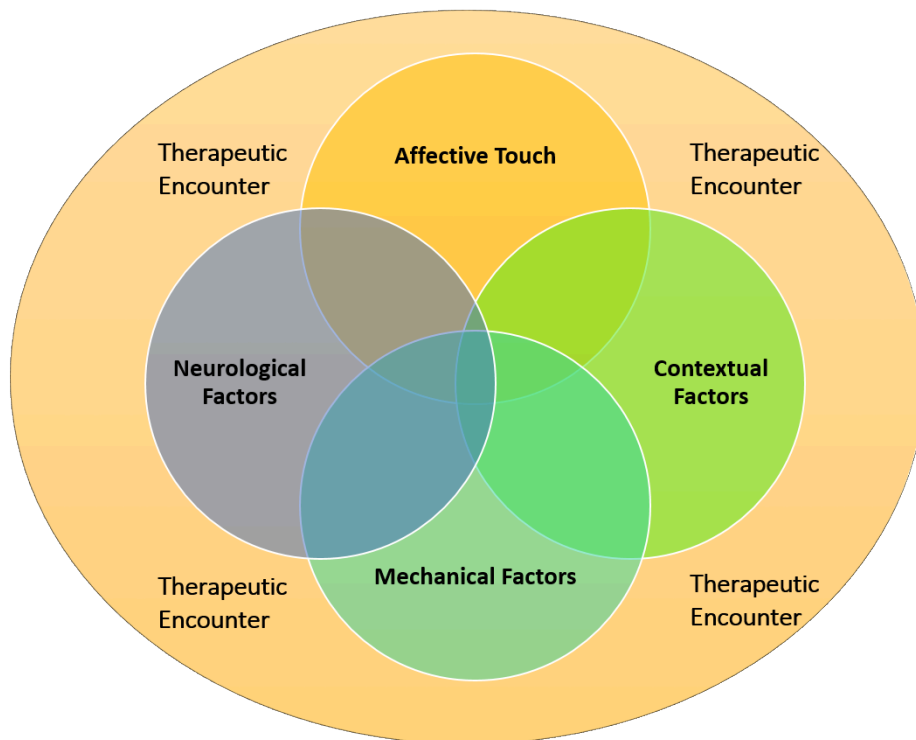
# MASSAGE THERAPY: AN EVIDENCE-BASED FRAMEWORK

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## Massage Therapy: An Evidence-Based Framework

Massage therapists want to help patients, and part of our approach requires having a clear message of who we are and the value we offer. Adopting an evidence-based framework offers a solution, as it can provide a cohesive message of our nature and value. An evidence-based framework is an interdisciplinary approach to clinical practice used throughout healthcare. By adopting this approach, massage therapists will ensure that healthcare professionals consider the complex interplay between physiological and psychological factors that massage therapy affects.

Treatment approaches in massage therapy may vary, but each therapeutic encounter involves some overlapping principles. This book highlights the main principles of an evidence-based framework for massage therapy using recent scientific research.



### Massage Therapy: An Evidence-based Framework

Schematic representation how physiological and psychological factors interplay in a complex manner.



## Affective Touch: Therapeutic massage is a source of safety, comfort and relief

Socially appropriate interpersonal touch has been shown to stimulate the release of neurochemicals (endogenous opioids and oxytocin) associated with relaxation and pain relief (Rapaport et al., 2012; Vigotsky et al., 2015; Walker et al., 2017). Massage therapy has been shown to have an effect on cortisol levels, but the effect is generally small and, in most cases not clinically significant (Moyer et al., 2004; Moyer et al., 2011). In general a reassuring therapeutic encounter, in which a patient is provided with compassionate touch, provides the patient with a safety message. This can result in reduced physiological and behavioural reactivity to stressors and improved mood/affect.

“We will experience pain when our credible evidence of danger related to our body is greater than our credible evidence of safety related to our body. Equally we won’t have pain when our credible evidence of safety is greater than our credible evidence of danger”- Lorimer Moseley

## Contextual Factors: A person-centered clinical experience enhances the natural healing capacity of the body

It has long been known that the way a clinician presents both themselves and their treatment, is tied to health-related outcomes – this is known as the contextual factors of a therapeutic encounter (Rossettini et al., 2018). In the book *How Healing Works: Get well and stay well* using your hidden power to heal, Wayne Jonas talks about creating an optimal healing environment. This involves providing a person-centered clinical experience that embraces the placebo response and the natural healing capacity of the body (Ongaro et al., 2019).

In essence, behaviours and interactions with patients facilitate a relaxation response that will help to influence health-related outcomes; the magnitude of a response is influenced by mood, expectation, and conditioning.

“By definition, CFs (Contextual Factors) are physical, psychological and social elements that characterize the therapeutic encounter with the patient. CFs are actively interpreted by the patient and are capable of eliciting expectations, memories and emotions that in turn can influence the health-related outcome, producing placebo or nocebo effects.” – Rossettini et al., 2018

## Mechanical Factors: Therapeutic massage influences tissue and cell physiology

Researchers have investigated the effect of soft-tissue massage on cellular signalling and tissue remodelling; this is referred to as mechanotherapy. Geoffrey Bove a researcher at the University of New England has conducted research examining the effect of modelled manual therapy on repetitive motion disorders and the development of fibrosis. One study published in *The Journal of Neurological Sciences* showed soft-tissue massage prevented the deposition of collagen and transforming growth factor beta-1 (TGF beta 1) in the nerves and connective tissues of the forearm (Bove et al., 2016). This was recently followed up by a study published in the prestigious journal *Pain* showing that by attenuating

the inflammatory response (with modelled massage) in the early stages of an injury, they were able to prevent the development of neural fibrosis (Bove et al., 2019).

Research demonstrated that massage therapy (effleurage in particular) has a modest effect on local circulation and perfusion both in the massaged limb and also in the contralateral limb (Monteiro Rodrigues et al., 2020). Furthermore, a recent joint research effort between Timothy Butterfield of the University of Kentucky and researchers at Colorado State University demonstrated that modelled massage enhanced satellite cell numbers (Miller et al., 2018; Hunt et al., 2019). This was in addition to earlier research from Butterfield and his collaborators at the University of Kentucky, which proposes the idea that mechanical stimulation prompts a phenotype change of pro-inflammatory M<sup>1</sup> macrophages into anti-inflammatory M<sup>2</sup> macrophages (Waters-Banker et al., 2014). Taken together the increase in satellite cell numbers and reduction in inflammatory signaling may improve the body's ability to respond to subsequent rehabilitation.

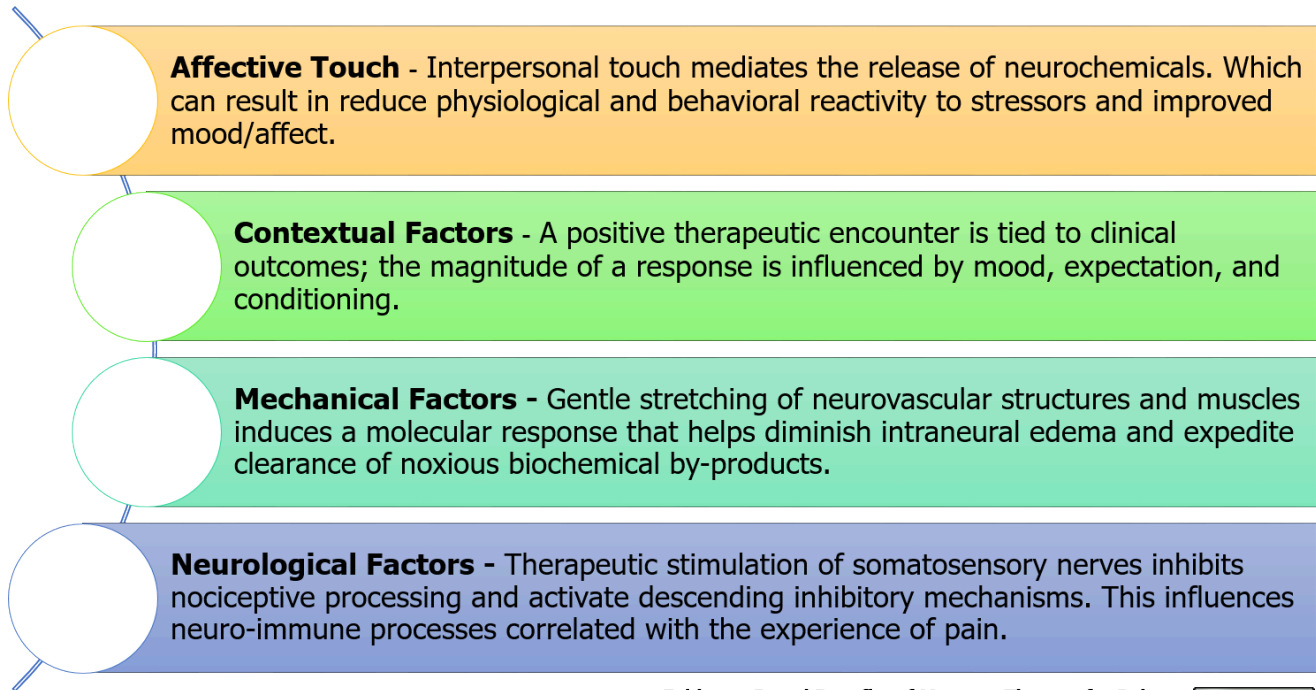
## Neurological Factors: Therapeutic massage stimulates specialized sensory receptors

Therapeutic massage is processed by specialized sensory receptors located in cutaneous and subcutaneous structures. Specialized mechanoreceptors located cutaneous and subcutaneous structures are what informs the body about the type of touch they are receiving, there are five major types of mechanoreceptors that massage therapists should be aware of:

- Two of these are located in the superficial layers of the skin: Merkel cells and Meissner corpuscles.
- Two receptors, the Pacinian corpuscle and the Ruffini endings, are found in the subcutaneous and deeper tissue layers.
- The fifth type of mechanoreceptor are the recently discovered C-tactile fibers that play a specific role in transmitting the pleasurable properties of touch (They also play a role in affective touch mentioned prior.).

Massage therapy is a form of peripheral somatosensory stimulation that can modulate the activity of neuro-immune (peripheral, cortical, subcortical) processes correlated with the experience of pain. Through a process of gently stretching muscles, neurovascular structures and investing fascia nociceptive processing associated with tissue damage (actual or perceived) is modifiable in such a way that the pain subsides. Preferential sites for stimulation are associated with areas rich in specialized sensory receptors such as Merkel cells, Meissner corpuscles (superficial layers of the skin), Pacinian and Ruffini's corpuscles (joint capsules & subcutaneous tissue) and C-tactile fibers which play a role in the singling of affective aspects of human touch.

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Evidence-Based Benefits of Massage Therapy for Pain  
and Health-related Quality of Life



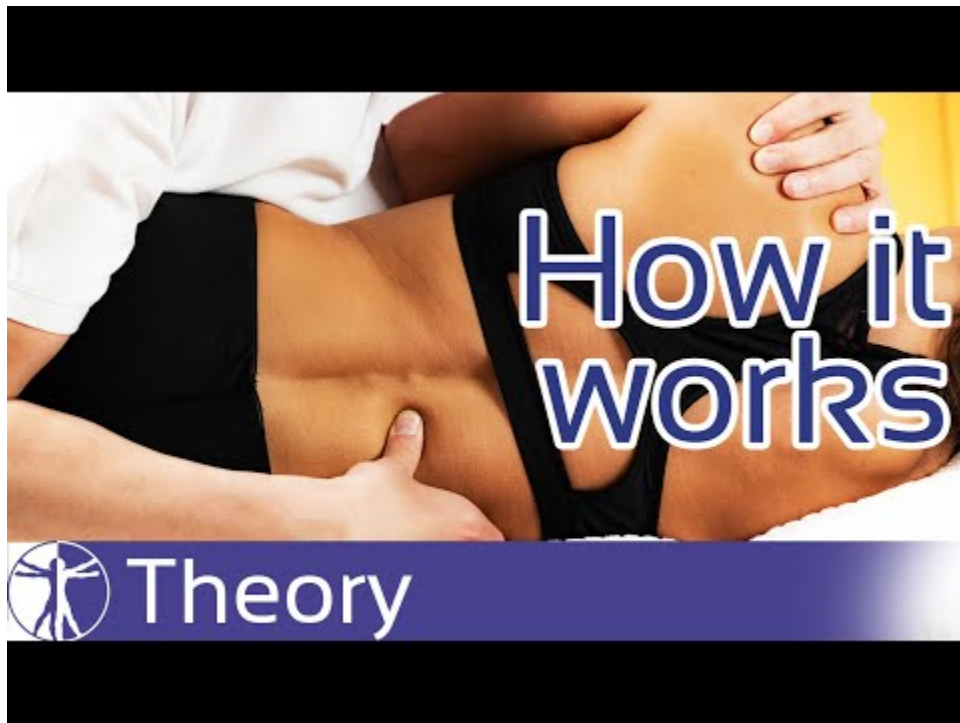
## Building of Effective Patient-Provider Relationships in the Context of Chronic Pain

Massage therapy is a form of peripheral somatosensory stimulation that can modulate the activity of neuro-immune (peripheral, cortical, subcortical) processes correlated with the experience of pain (Bialosky et al., 2018). By activating ascending and descending inhibitory systems, massage therapy may be able to mitigate the transition, amplification and development of chronic pain.

Massage therapy is a clinically-oriented healthcare option that can improve quality of life for patients with a variety of conditions. The responses to massage therapy are multifactorial, even if the mechanisms of action have not yet been fully elucidated. There is evidence that in terms of clinical responses to massage therapy affective touch, contextual factors, mechanical factors, and neurological factors are likely to play a role.



## How Manual Therapy Works – From Physiotutors



*A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=58>*

### Key Takeaways

#### **The Body is Adaptable**

With respect to the multidisciplinary treatment of chronic pain massage therapy has a desirable safety profile and it is a health care option that is effective, economical and accessible. Understanding the basic science behind massage therapy and the guiding principles of adaptability enables massage therapists to think flexibly about what's going on, both in terms of specific and nonspecific effects. Based on available evidence the best way to describe the effects of massage therapy, is not in a single unified response, but as a collection of interconnected adaptive responses within the nervous system and soft tissue structures. A biopsychosocial framework of health and wellness helps put into context the interconnected and multidirectional interaction between: physiology, thoughts, emotions, behaviours, culture, and beliefs. In terms of clinical responses to

massage therapy there are a couple of proposed mechanisms of action, including but not limited to: affective touch, contextual factors, mechanical factors, neurological factors.

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5.

## PAIN EDUCATION

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### Pain Education

#### The Human Body is Complex and Adaptable

The human body is not a simple structure, but rather a complex and adaptable network of overlapping systems. We must move from the myth of a simple biomechanical framework, or pathoanatomical model of trying to fix the structure, to understanding the complexity of a biopsychosocial framework and how all of the systems within the body interact to experience all types of pain. The “no pain, no gain” mindset is being changed.

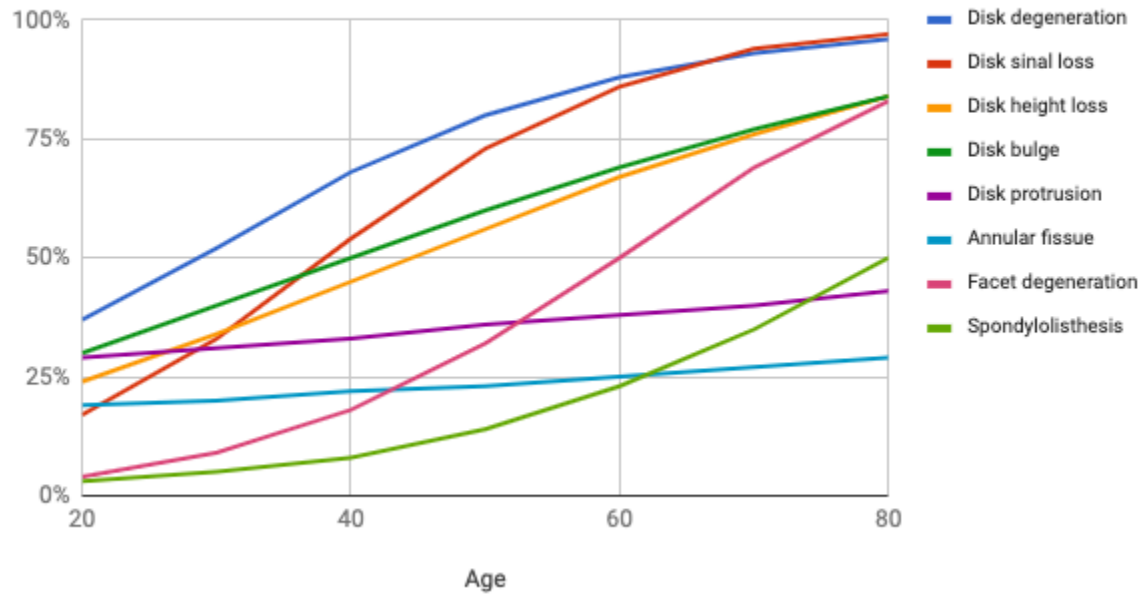
Increasingly, research shows that attributing the experience of pain solely to poor posture, minor leg length discrepancies, vertebral misalignment and other structural abnormalities is an oversimplification of a complex process (Green et al., 2018). Even in the case of degenerative changes in the knee, shoulder, and spine several landmark studies have shown that tissue tears revealed on imaging are a part of normal aging (Culvenor et al., 2019; Girish et al., 2011; Sihvonen et al., 2018). This disconnect between tissue damage seen on imaging and clinical presentation often creates confusion for both patients and clinicians. As a result, the medical community has moved on from a traditional biomechanical framework into a biopsychosocial framework.

The shift from a biomechanical framework to a biopsychosocial framework helps put into context the interconnected and multi-directional interaction between: physiology, thoughts, emotions, behaviors, culture, and beliefs. Humans are complex and are composed of many overlapping systems, knowing how they interact is important for any therapist. The general consensus is that structural abnormalities alone do not explain or necessarily predict pain. The reason people experience pain differently is in part due to differences in genetics, depression, emotional stress, history of physical trauma and sensitization of the nervous system (Green et al., 2018).

#### Correlation Doesn't Prove Causation

There is often a weak correlation between radiographic findings and symptoms – Several landmark studies have shown tissue tears revealed on imaging are a common finding in patients who are asymptomatic. This disconnect between tissue damage seen on clinical imaging and clinical presentation is part of normal aging and unassociated with pain. One study that illustrates this concept well is a systematic review published in 2015, it provides important data demonstrating that degenerative changes can exist on a spinal magnetic resonance imaging and people can have no pain.

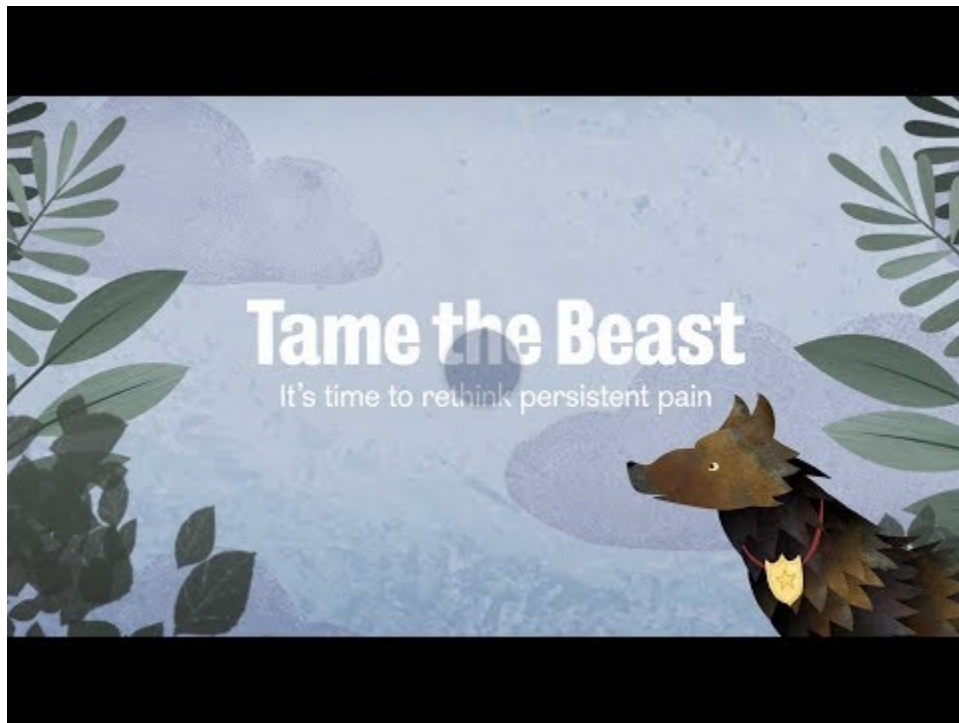
### Age-specific degenerative spine imaging findings in asymptomatic patients - Brinjikji et al. 2015



“Imaging findings of spine degeneration are present in high proportions of asymptomatic individuals, increasing with age. Many imaging-based degenerative features are likely part of normal aging and unassociated with pain. These imaging findings must be interpreted in the context of the patient’s clinical condition.” (Brinjikji et al., 2015).

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## Tame the Beast – It's time to rethink persistent pain



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### IASP Terminology Activity

This activity will help familiarize learners with terminology used by The International Association for the Study of Pain (IASP).



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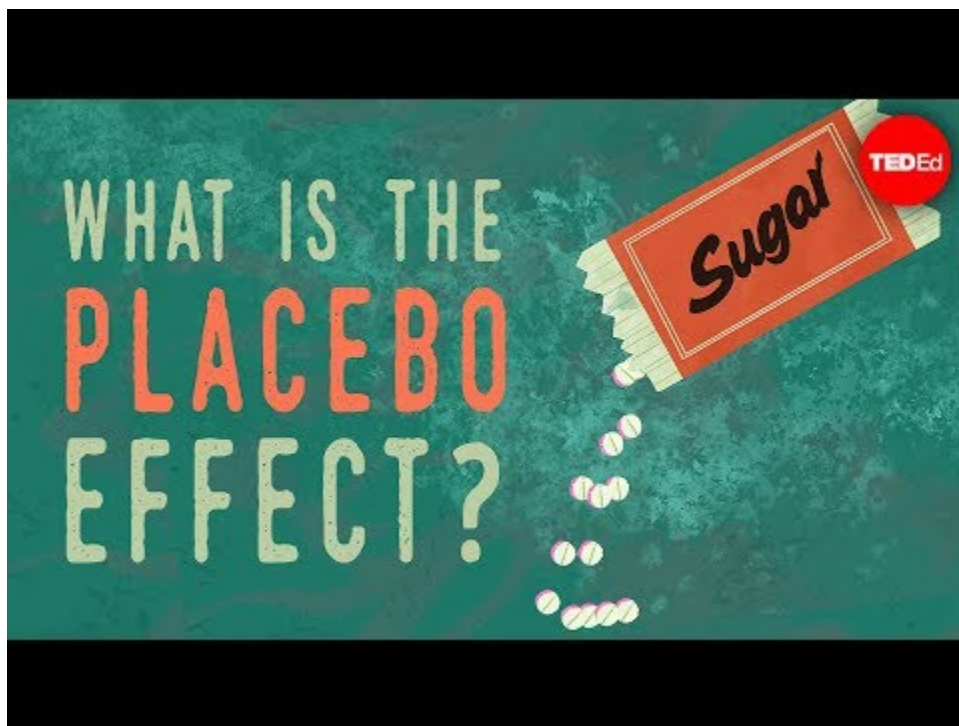
## The Placebo Response and The Therapeutic Encounter

The way a clinician presents themselves and their treatment has influence on therapeutic outcomes. The magnitude of a response may be influenced by mood, expectation, and conditioning, this is often referred to as the placebo response. The placebo effect isn't a single phenomenon but a number of responses involving cortical, subcortical and emotional responses. Any therapeutic encounter can trigger significant biological changes that ease symptoms.

The existence of placebo-induced effects do not negate treatment-induced results, patients feel better after a therapeutic encounter because of a complex physiological response to the treatment that INCLUDES, but is not LIMITED to placebo.

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Learn more about the placebo response in this 5 min TED-Ed video.



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## Key Takeaways

**Employing An Individualized Biopsychosocial Approach to Pain Management**

Ascribing a patient's pain solely to a tissue-driven pain problem is often an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. Over time the supportive theories behind techniques evolve or change completely. It is becoming increasingly evident that a biomechanical model as a basis for treatment is outdated based on the latest research into pain science. A shift to a biopsychosocial model of massage therapy helps put into context the interconnected and multidirectional interaction between: physiology, thoughts, emotions, behaviours, culture, and beliefs.

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## NEURAL MOBILIZATION

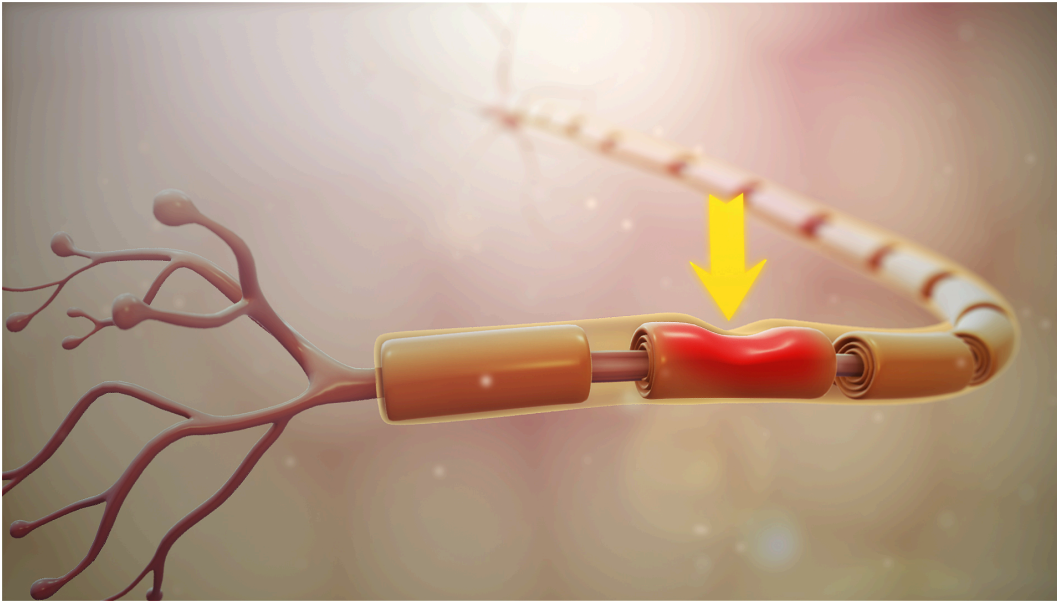
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### Neural Mobilization: A Conceptual Framework

Neural mobilization is a multidimensional treatment approach that has gained popularity because it is effective, and easy to implement. These maneuvers can be performed in a passive manner where a therapist guides the client through a movement pattern, it can also be carried out as part of a self-care program that clients perform on their own. Clinicians may be familiar with terms such as nerve gliding, nerve flossing, sliders and tensioners. These names describe similar approaches and all these techniques fall under the umbrella of neural mobilization – a gentle form of manual therapy that aims to assess and address irritated peripheral nerves.

### Pathophysiology: Sensitivities of Axons Exposed to a Pathological Environment

As peripheral nerves pass through the body they may be exposed to mechanical or chemical irritation at different anatomical points. Prolonged compression or fixation of a nerve may result in a reduction of intraneural blood flow (Bove et al., 2019). This then triggers the release of pro-inflammatory substances (calcitonin gene-related peptide and substance P) from the nerve. This by product is referred to as neurogenic inflammation and it can disrupt the normal function of nerves even without overt nerve damage, it can also contribute to the initiation and propagation of chronic pain (Matsuda et al., 2019).



Prolonged compression or fixation of a nerve may result in a reduction of intraneural blood flow.

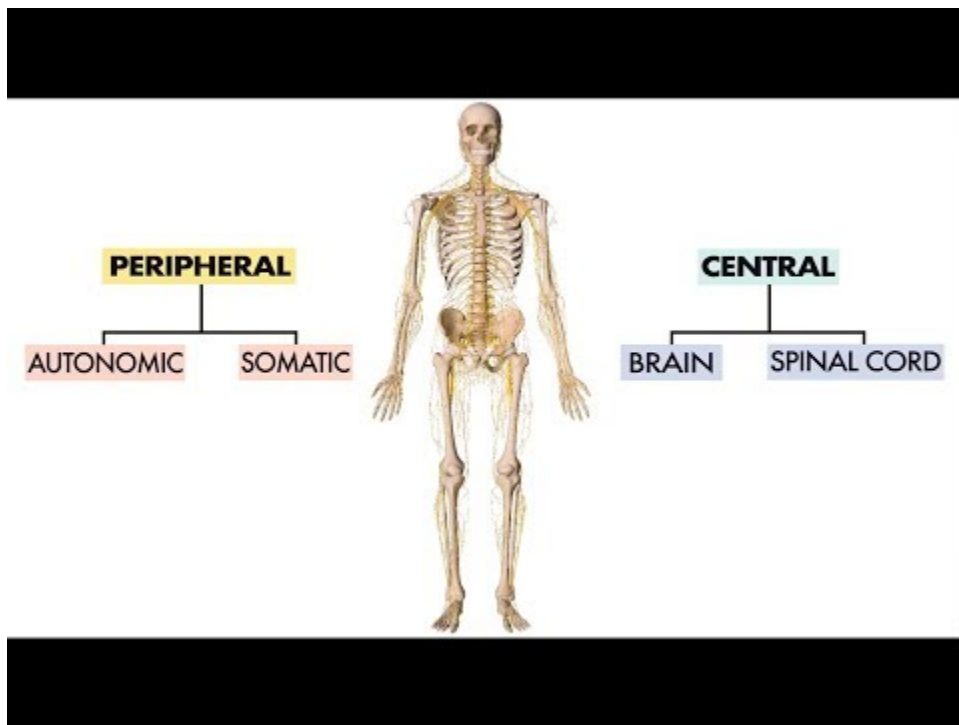
## Examination: Clinical Sensory Testing Can Be Used to Assess for Increased Sensitivity of the Nervous System

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors (eg, coping style) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

If there is an irritated peripheral nerve, clinical sensory testing can be used to assess for areas of hypersensitivity. In addition to orthopedic testing this could involve palpation (neural and non-neural structures). If a hypersensitive peripheral nerve has been identified, a treatment plan is then implemented based on patient-specific assessment findings and patient tolerance.

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## FXNL: How Do Nerves Become Hypersensitive?



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## Treatment Considerations

### Education

Provide patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

The responses to neural mobilization are complex and multifactorial – physiological and psychological factors interplay in a complex manner. Systematic reviews have shown that neural mobilization combined with multimodal care can improve symptoms, decrease disability and improve function for patients who suffer from peripheral nerve entrapment (Basson et al., 2017).

The biopsychosocial model provides a practical framework for investigating the complex interplay between manual

therapy and clinical outcomes. Based on this, the investigation into mechanisms of action should extend beyond local tissue changes and include peripheral and central endogenous pain modulation (Bialosky et al., 2018).

### Central Response

Neural mobilization has a modulatory effect on peripheral and central processes via input from large sensory neurons that prevents the spinal cord from amplifying the nociceptive signal. This anti-nociceptive effect of massage therapy can help ease discomfort in patients who suffer from peripheral nerve entrapments.

### Peripheral Response

Neural mobilization may also involve specific soft tissue treatment to optimize the ability of mechanical interfaces to glide relative to the neural structure. The application of appropriate shear force and pressure impart a mechanical stimulus that may attenuate tissue levels of fibrosis and TGF- $\beta$ 1 (Bove et al., 2016; Bove et al., 2019). Furthermore, passive stretching may help diminish intraneural edema and/or pressure by mobilizing the peripheral nerve as well as associated vascular structures (Boudier-Rev  ret et al., 2017; Gilbert et al., 2015).

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## Nerves, Knowledge and Theratube With David Butler



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## Prognosis

In terms of research evidence neural mobilization has been shown to be particularly helpful for common forms of back, neck, leg and foot pain (Basson et al., 2017). An observed favorable outcome may be explained by a number of overlapping mechanisms in the periphery, spinal cord, and brain, including but not limited to affective touch, contextual factors, neurological factors, and mechanical factors.

### Key Takeaways

Nerves can be exposed to mechanical or chemical irritants at different anatomical points. Gently stretching the muscles, neurovascular structures, and investing fascia activates endogenous pain modulating systems that help to mitigate the transition, amplification and development of peripheral neuropathies and chronic pain.

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7.

# MYOFASCIAL RELEASE

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## Myofascial Release

### A Look at Fascial Anatomy

Andreas Vesalius (1514-1564) is often considered to be the first anatomist and is best remembered for publishing the famous anatomy text, *De humani corporis fabrica* in 1543. If you look at these early illustrations they present the fascia and muscles as one continuous soft tissue structure. Fast forward to the 20th century (texts we study) most omit fascial tissue in order to depict muscles in a cleaner fashion. Some recent anatomy textbooks have made an effort to include this ‘forgotten tissue’ in their depictions and descriptions.

An example of this is the *Functional Atlas of the Human Fascial System* by Carla Stecco, an Orthopedic surgeon and a professor of human anatomy at the University of Padua in Italy, the same University that once employed Andreas Vesalius in the early 1500’s. Another example is *Anatomy Trains* by Thomas Myers, in this book Myers presents conceptual ‘myofascial meridians’, recent systematic review confirmed a number of these continuous soft tissue structures (Wilke et al., 2016; Wilke et al., 2019).

To better understand myofascial release, there is a need to clarify the definition of fascia and how it interacts with various other structures: muscles, nerves, vessels.

### Fascia has Been Used as an Ambiguous Term

Inconsistent definitions in the literature has led to confusion for researchers and therapists. A definition put forth by the Fascial Research Society hopes to provide some guidance. These researchers suggest making the distinction between A Fascia and The Fascial System (Schleip et al., 2019).

**A Fascia** – ” A fascia is a sheath, a sheet, or any other dissectible aggregations of connective tissue that forms beneath the skin to attach, enclose, and separate muscles and other internal organs.”

**The Fascial System** – “The fascial system consists of the three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissues that permeate the body. It incorporates elements such as adipose tissue, adventitia and neurovascular sheaths, aponeuroses, deep and superficial fasciae, epineurium, joint capsules, ligaments, membranes,

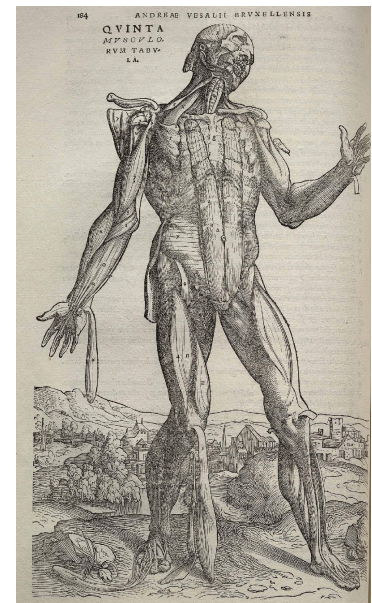


Image from *De humani corporis fabrica* circa 1543

meninges, myofascial expansions, periosteal, retinacula, septa, tendons, visceral fasciae, and all the intramuscular and intermuscular connective tissues including endo-/peri-/epimysium.”

## Myofascial Release in Various Forms Stimulates Mechanoreceptors

Ascribing a patient's pain solely to a tissue-driven pain problem is often an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. When it comes to myofascial release a biopsychosocial framework helps put into context the interconnected and multidirectional interaction between a number of proposed mechanisms of action, including but not limited to: affective touch, contextual factors, neurological factors, and mechanical factors.

Neurologically myofascial release may be used to stimulate mechanoreceptors, which in turn, trigger tonus changes in skeletal muscle fibers. Furthermore, input from sensory neurons may prevent the spinal cord from amplifying nociceptive signalling.

## Myofascial Release in Various Forms Influences Tissue and Cell Physiology

Researchers have investigated the effect of soft-tissue massage on cellular signalling and tissue remodelling; this is referred to as mechanotherapy. Geoffrey Bove a researcher at the University of New England has conducted research examining the effect of modelled manual therapy on repetitive motion disorders and the development of fibrosis. One study published in the *Journal of Neurological Sciences* showed soft-tissue massage prevented the deposition of collagen and transforming growth factor beta 1 (TGF beta 1) in the nerves and connective tissues of the forearm (Bove et al., 2016). This was recently followed up by a study published in the prestigious journal *Pain* showing that by attenuating the inflammatory response (with modelled massage) in the early stages of an injury, they were able to prevent the development of neural fibrosis (Bove et al., 2019). This is potentially impactful in postoperative rehabilitation because TGF- $\beta$ 1 plays a key role in tissue remodelling and fibrosis.

Furthermore, a recent joint research effort between Timothy Butterfield of the University of Kentucky and researchers at Colorado State University demonstrated that modelled massage enhanced satellite cell numbers (Miller et al., 2018; Hunt et al., 2019). This was in addition to earlier research from Butterfield and his collaborators at the University of Kentucky, which proposes the idea that mechanical stimulation prompts a phenotype change of pro-inflammatory M1 macrophages into anti-inflammatory M2 macrophages (Waters-Banker et al., 2014). Another group of researchers at The University of Arizona propose that mechanical stimulation can trigger fibroblasts to express anti-inflammatory cytokines (Zein-Hammoud & Standley, 2015; Zein-Hammoud & Standley, 2019). Taken together the increase in satellite cell numbers and reduction in inflammatory signalling may play a role in tissue remodelling and improve the body's ability to respond to subsequent rehabilitation.

## Does Myofascial Release Break Adhesions?

Following trauma there are often a number of pathological adaptations which may impair the body's ability to respond to subsequent rehabilitation. Traditionally when soft tissue structures have a reduced ability to glide adhesions are blamed. Currently there is a paucity of research to support the claim that manual therapy can break mature adhesions. However, in the developmental phase manual therapy may be able to attenuate the development of post-surgical adhesions (Bove et al., 2017). In the remodelling phase the mechanisms by which myofascial release interrupts the sequelae of pathological healing is most likely not in a single unified response.

## Michael Hamm: An Ecological Approach To Nerves and Fascia



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=52>

Myofascial Release is a treatment approach that stimulates mechanoreceptors and influences tissue and cell physiology. Clinically this translates into improved proprioception, increased range of motion and pain management.

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8.

## MYOFASCIAL TRIGGERPOINTS

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### Myofascial Triggerpoints

#### Convergent Thinking and Myofascial Triggerpoints

The concept of sore spots that can be leveraged for therapeutic purposes have been independently discovered by a number of different cultures in Europe, Africa and Asia. One of the oldest examples on record is a 5,300 year old naturally preserved human body discovered in the Tyrolean Alps of Austria called Otzi “The Iceman”. This frozen body has 61 tattoos that correspond to myofascial triggerpoints and traditional acupuncture points that are commonly utilized to treat musculoskeletal pain. This 5300 year old preserved body gives insight into ancient medical practices, as it is believed that these tattoos represent an early form of therapeutic treatment similar to acupuncture used to treat low back and knee pain (Kean et al., 2013; Zink et al., 2019).

It is well documented in asian cultures that traditional healers would therapeutically treat sore spots with manual therapy or acupuncture needles, one example is ASHI (ah yes!) points, a central tenant in acupuncture for over two thousand years. Many years later in the 1930’s Jonas Henrik Kellgren started the scientific investigation into these sore spots or what he called Referred Pain from Muscle (Kellgren, 1938). This was then followed up by years of research and documentation by Janet Travell and David Simons, the result of their cumulative work was the textbook – Travell, Simons and Simons’ Myofascial Pain and Dysfunction (now in its 3rd edition).

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## What Are Muscle Knots? SciShow



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### Myofascial Triggerpoint Pathophysiology: Sore Spots Exist, But Their Etiology is Still Not Well Understood.

Early research into myofascial triggerpoints often focused on a physiological dysfunction involving local soft tissue, but recently clinicians have spoken out against these traditional narratives to say that the explanations used in the past of this observable phenomenon are flawed in reasoning. They posit that what we call a myofascial triggerpoint may represent a form of nociplastic pain where there are neuroplastic changes of the peripheral or central nervous system (Quintner et al., 2015).

Moving forward as a profession we ought to acknowledge that there is uncertainty on the subject of myofascial triggerpoints and update the way we communicate with patients and other healthcare providers. One issue is that ascribing a patient's pain solely to MTrPs or other tissue-driven pain problem is often an oversimplification of a complex process. When it comes to MTrPs there are a number of competing hypothesis, including, but not limited to:

- **Cinderella Hypothesis** – low-level, continuous muscle contractions overload tissues and makes “Cinderella” fibers susceptible to calcium dysregulation and subsequently sarcomere contracture (Bron et al., 2012).

- **Integrated Hypothesis** – the zone around a MTrP seems to be in an ischemic state resulting in a shortage of glucose and oxygen for metabolism and subsequent contracted sarcomeres in skeletal muscle (Gerwin et al., 2004; Gerwin et al., 2020).
- **Neurogenic Inflammation** – the release of inflammatory substances from the nerve axon, results in a lower threshold for depolarization and hyperalgesia in innervated tissue (Quintner et al., 2015).
- **Central Sensitization** – several studies support the hypothesis that persistent nociceptive input from MTrP contributes to the development of central sensitization and/or changes in the dorsal horn. In contrast, preliminary evidence suggests that central sensitization can also promote MTrP activity (Fernández-de-las-Peñas et al., 2014).

## International Consensus on Diagnostic Criteria and Clinical Considerations of Myofascial Trigger Points

In an effort to establish standard terminology an international panel of 60 clinicians and researchers was recently consulted to establish a consensus for identification of a myofascial trigger point. The panel agreed on two palpatory and one symptom criteria: a taut band, a hypersensitive spot, and referred pain (Fernández-de-Las-Peñas & Dommerholt, 2018).

## Myofascial Trigger Points: Examination and Treatment Considerations

It has been demonstrated in a number of studies that patients benefit from hands on work aimed at MTrPs, but this may not always be due to reasons we once were taught. Even if some of the traditional narratives around myofascial triggerpoints may be flawed, from a clinical perspective, myofascial triggerpoints describe an observable phenomenon that may be help clinicians investigate common pain patterns, such as:

- Neck Pain (Morikawa et al., 2017; Castaldo et al., 2019)
- Migraine Headaches (Landgraf et al., 2018)
- Tension-Type Headache (Fernández-De-Las-Peñas & Arendt-Nielsen, 2017; Palacios-Ceña et al., 2018)
- Carpal Tunnel Syndrome (Meder et al., 2017)
- Low Back Pain (Takamoto et al., 2015; Kodama et al., 2019)
- Chronic Pelvic Pain (Fuentes-Márquez et al., 2019)

Key Takeaways

**Myofascial Trigger Points: What Are They, Really?**

From a clinical perspective, myofascial triggerpoints describe an observable phenomenon that may help clinicians investigate common pain patterns. There is still no consensus on the etiology of these sore spots and what role they play in the generation and propagation of myofascial pain syndrome.

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9.

## JOINT MOBILIZATION

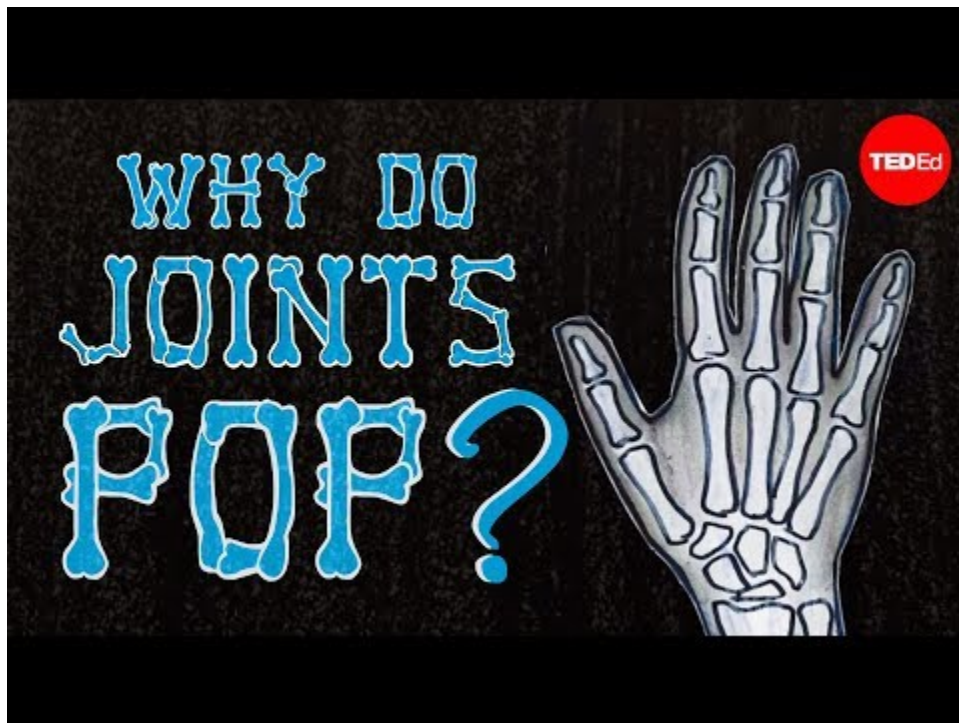
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### Joint Mobilization

Joint mobilization is a type of passive movement of a skeletal joint with the aim of achieving a therapeutic effect such as decreasing pain or increasing range of motion.

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TedEd: Why do joints pop?



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=520>*



## Classification and Mechanisms of Joint Mobilization

Joint mobilization is classified by five 'grades' of motion (grade 1 through grade 5), each of which describes the range of motion of the target joint during the procedure. Joint mobilization stimulates joint mechanoreceptors which may stimulate a number of reflex effects including reduction of pain. The different grades of mobilization are believed to produce selective activation of different mechanoreceptors in the joint, but in terms of outcomes studies have demonstrated that general approach to joint mobilization is as effective as a specific one (McCarthy et al., 2019).

### Movements are classified as

- Anterior to Posterior (AP)
- Medial to Lateral
- Oscillations (which stimulate dynamic, rapidly adapting receptors, i.e., Meissner's and Pacinian Corpuscles)
- Translation
- Distraction is the separation of joint surfaces without rupture of their binding ligaments and without displacement

### The Goals of Joint Mobilization are

- Decrease pain in joint/periarticular structures
- Induce reflex muscle relaxation

### Grade 1

- Small amplitude movement at the beginning range of joint play
- Used when pain and spasm limit movement early in ROM

### Grade 2

- Large amplitude movement at the mid range of joint play
- Used for pain control, spasm reduction which inhibit movement

### Grade 3

- Large amplitude movement at the end range of joint play
- Reduce pain, and increase periarticular extensibility

### Grade 4

- Small-amplitude movement at the end of the range of joint play
- Reduce pain, and increase periarticular extensibility



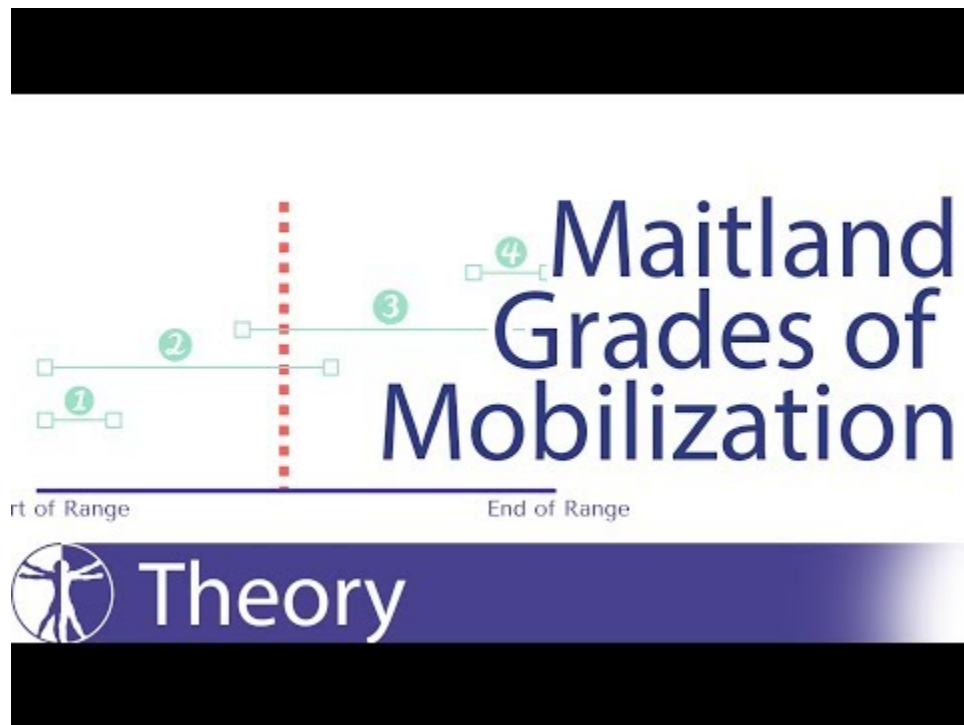
## Grade 5 (also referred to as a manipulation)

- Manipulation of high velocity and low amplitude to the anatomical end point of a joint
- Usually accompanied by a popping sound called a cavitation.

## Precautions

- Joint ankylosis
  - Joint hypermobility
  - Rheumatoid arthritis
  - Malignancy
  - Fracture
  - Osteoporosis
  - Tuberculosis
  - Paget's disease
  - Joint effusion
  - Severe scoliosis
  - Spondylolisthesis
  - Pregnancy
-

## PhysioTutors: Maitland Mobilization Grades



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### Key Takeaways

Joint mobilization is a type of passive movement of a skeletal joint with the aim of achieving a therapeutic effect. The different grades of mobilization are believed to produce selective activation of different mechanoreceptors in the joint, but in terms of outcomes studies have demonstrated that a general approach to joint mobilization is as effective as a specific one.

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## PART III

# COMPLEMENTARY THERAPIES

## Complementary Therapies

There are a number of modalities that may be taught in recognized massage educational institutions that could be integrated into a multi-modal massage treatment approach if the therapist has recognized training in the specific modality. Massage Therapists who provide complementary modalities must be accountable to ensure that the modality is integrated into a treatment plan that consists of modalities with the scope of practice and understand that they are responsible for:

- Following
  - Code of Ethics
  - Standards of Practice & Regulations
- Determining the appropriateness of the complementary modality
- Ensuring that they have the knowledge, skill, and judgment to perform the modality competently
- Performing an assessment of clients before providing the treatment
- Explaining to the client the anticipated effects, the potential benefits, and the potential risks of the proposed modality so the client can make an informed choice
- Obtaining informed consent before beginning treatment
- Evaluating the ongoing status of the client and the effects of the modality on the client's condition and overall health

## Informed Consent

Informed consent is based upon a clear appreciation and understanding of all relevant facts, this includes a knowledge of possible risks and benefits. If a patient requests to see the literature, as part of our professional relationship with our patients we should do all we can do to provide them with links and resources. Essentially what information does the patient require to make an educated decision, this involves the disclosure of evidence on both sides of the issue and will vary on a case by case basis.

## Instrument Hygiene and Sanitation

Just like any other therapy, IASTM and Cupping should be subject to universal precautions for infection control and prevention. It is recommended to use a disinfectant cloth to clean and sanitize tools after each session. Stainless steel tools are preferred because of their non-porous structure for hygiene reasons.

## Precautions

Screening for risk factors and other underlying conditions and asking for feedback from the patient during treatment ensure a safe and positive outcome for the patient.

- Be aware of the patient's overall health, high fever, cramps, spasms, skin allergies, open or recently healing wounds, unknown skin rashes, swelling and edema are all cautions
- Use caution over bony prominences and areas where the skin is thin.
- Be aware that some clients may have less fatty tissue as well as less elasticity in the skin (elderly & congenital conditions).
- Like all musculoskeletal therapies, cupping should be done within the client's tolerance; it may feel tight but not painful. If a patient finds the process painful, modify to accommodate their comfort levels.
- Recognize conditions requiring urgent medical attention and respond accordingly.
- Apply standard hygiene and infection control precautions.
- Inform patients of the possibility of a petechiae response – Cupping will often leave circular marks from the suction drawing blood to the skin's surface. To the best of your abilities avoid swelling, hematomas, petechiae and ecchymoses.

## Soft Tissue injuries that can be caused by cupping and IASTM

- Bruise- an injury appearing as an area of discolored skin on the body, caused by a blow or impact rupturing underlying blood vessels.
- Hematoma- a solid swelling of clotted blood within the tissues.
- Ecchymosis- a discoloration of the skin resulting from bleeding underneath, typically caused by bruising.
- Purpura- a rash of purple spots on the skin caused by internal bleeding from small blood vessels.

\*Consult your regulatory body in regards to your ability to practice this technique. Health professionals often will require training and certification to be covered within liability insurance.

### Key Takeaways

There are a number of modalities that can be integrated into a treatment plan by a massage therapist, the massage therapist must be accountable to ensure that the modality is integrated into a treatment plan that consists of modalities with the scope of practice.

- Make sure you're doing it safely

- Make sure what you're doing is supported by the evidence
- Make sure you're explaining your intervention correctly





10.

# INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION

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## What is Instrument Assisted Soft Tissue Mobilization?

Instrument Assisted Soft Tissue Mobilization (IASTM) is a soft tissue technique that uses hand held tools to impart a mechanical stimulus to local mechanoreceptors. IASTM devices may be made from different materials (e.g. wood, stone, jade, steel, ceramic, resin).

## How can Massage Therapists Incorporate IASTM into Treatments?

IASTM has been shown to improve short term range of motion and improve function for athletes (Cheatham et al., 2016). IASTM is closely related to transverse friction massage which has long been used for tendon pain and sports injuries. The depth of application varies from simple massage based techniques aiming at stimulating mechanoreceptors and improving range of motion to a complex soft-tissue treatment system encompassing the latest research on mechanotherapy.

There are many nuances to using these techniques, with the possibility of bruising and petechiae if treatments are not done with care. Not fully understanding the different aspects and approaches to IASTM is leading to a great deal of confusion about what exactly IASTM is, when it's appropriate and how to use these techniques.

## IASTM Protocols

IASTM techniques are frequently combined with other techniques, exercises, positions or different types of stretching. First, the treatment area is lubricated with massage lotion, then short sweeping movements are applied using multi-directional assessment and treatment strokes. IASTM techniques are frequently combined with active and passive stretching. Around 2-3 minutes of light scraping per area should be enough to stimulate local mechanoreceptors.

## Post-Operative Care

Treatments depend on the underlying pathology, but IASTM may have a role in post-surgical care. A recent study published in *The Journal of Knee Surgery* looked at the effect that soft-tissue treatments with hand-held instruments have on post-surgical knee stiffness (Chunghtai et al., 2016). In the study soft-tissue treatments were shown to improve knee

flexion deficits by 35° and knee flexion contractures by 12° in a small cohort of individuals who had failed to respond to traditional rehabilitation and manipulation under anesthesia. Hypothetically it may be used to impart a mechanical stimulus that contributes to the breakdown of immature scar tissue and developmental fibrosis. Fibrosis is a potential complication of surgery or trauma characterized by the production of excessive fibrous scar tissue, which may result in decreased movement. Understanding the cellular effectors and signaling pathways that drives the accumulation of fibrotic deposition, helps therapists optimize treatment protocols.

In the normal wound healing response, the cascade of biological responses is tightly regulated. Fibrotic development is characterized by a lack of apoptosis in the proinflammatory phase, resulting in an imbalance between synthesis and degradation. Persistent transforming growth factor- $\beta$  (TGF- $\beta$ ) secretion and downstream responses are thought to contribute to a sustained inflammatory response (Cheuy et al., 2017). One study published in *The Journal of Neurological Sciences* showed soft-tissue massage prevented the deposition of collagen and transforming growth factor beta 1 (TGF beta 1) in the nerves and connective tissues of the forearm (Bove et al., 2016). This was recently followed up by a study published in the prestigious journal *Pain* showing that by attenuating the inflammatory response (with modelled massage) in the early stages of an injury, they were able to prevent the development of neural fibrosis (Bove et al., 2019). This is potentially impactful in postoperative rehabilitation because TGF- $\beta$ 1 plays a key role in tissue remodelling and fibrosis.

### Key Takeaways

The responses to IASTM are complex and multifactorial – biopsychosocial factors interplay in a complex manner. The use of prophylactic IASTM may help patients manage postoperative pain. It may also affect the development of fibrosis by mediating differential cytokine production. The next step for researchers is to look into what sort of dosage and duration would be needed to optimize the effects of this non-pharmacological approach.

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11.

# SELF MASSAGE AND FOAM ROLLING

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## Self Massage and Foam Rolling

The goal of performance support is ensuring that athletes possess the health, physical and mental capacities necessary to compete at the top level. Which can be a challenge, due to the number of variables can affect athletic performance (eg. fatigue, recovery, training status, health and well-being).

Increasingly athletes have taken soft tissue work into their own hands, using foam rollers to ease the pain of overexertion and support athletic performance.

## Can Foam Rolling Ease The Pain of Overexertion?

There is conflicting evidence for the use of foam rolling for reducing pain perception after delayed onset muscle soreness (DOMS), but evidence seems to justify the use of foam rolling as a warm-up activity rather than a recovery tool (Wiewelhove et al., 2019). Other studies have demonstrated that the addition of self-massage significantly improved stretch tolerance and flexibility compared with isolated static stretching (Capobianco et al., 2018). As well decrease muscle excitability through central mechanisms, which may account for the post-treatment increase in range of motion and pain pressure threshold (Young et al., 2018, Wilke et al., 2020).



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### Key Takeaways

The addition of self-massage may decrease muscle excitability and improve stretch tolerance, which may account for the post-treatment increase in range of motion and pain pressure threshold.

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12.

## CUPPING THERAPY

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### The Use of Cupping Massage in Musculoskeletal Medicine

Cupping has been practiced in most cultures in one form or another throughout history but the true origin of cupping therapy remains uncertain (Qureshi et al., 2017). The practice of cupping is a technique where a vacuum is created in a cup, drawing the skin up and decompressing the layers of the epidermis and subcutaneous superficial fascia.

Cupping massage is a modern version of a traditional therapy, frequently carried out using plastic cups and a manual hand-pump to create the vacuum. The vacuum draws the soft tissue perpendicular to the skin, providing a tensile force, which can be left in one site or moved along the tissue. The practitioner can control the intensity of the desired suction from 80 mmHg to 250 mmHg.

The most common sites of application are the back, chest, abdomen and hips. The cups are typically left in place for 5-15 minutes depending on the client's reaction and sensitivity. To cover a wider area, cupping massage can also be used with varying amounts of suction.

### Why Does Cupping Work?

The responses to cupping are multifactorial – physiological and psychological factors interplay in a complex manner. The biopsychosocial provides a practical framework for investigating the complex interplay between cupping therapy and clinical outcomes. Based on the biopsychosocial model, investigation into mechanisms of action should extend beyond local tissue changes and include peripheral and central endogenous pain modulation. An observed favorable outcome may be explained by a number of overlapping mechanism in the periphery, spinal cord, and brain including, but not limited to:

- Affective Touch – Interpersonal touch and therapeutic stimulation of somatosensory nerves (C-tactile afferent) mediates the release of oxytocin. Which can result in reduced reactivity to stressors and improved mood/affect.
- Contextual Factors – A positive therapeutic encounter is tied to clinical outcomes, the magnitude of a response may be influenced by mood, expectation, and conditioning.
- Mechanical Factors – Gentle stretching of neurovascular structures and muscles induces a molecular response that helps diminish edema and expedite clearance of noxious biochemical by-products of inflammation (cytokines, prostaglandins, and creatine kinase).
- Neurological Factors – The skin, subcutaneous tissue and fascia are all embedded with mechanosensitive nerve



fibers, so the application of cupping invokes a number of neurophysiological responses. One being, input from low-threshold A $\beta$  fibers inhibits nociceptive processing and contributes to the activation of endogenous pain inhibitory mechanisms.

## Is Cupping Safe?

Cupping is generally considered a safe therapy with minor side effects such as erythema, edema, and ecchymosis in a characteristic circular arrangement. The longer a cup is left on the skin and the higher tensile stress inside of the cup, the more of a circular mark is created this is due to capillary dilation. Cupping encourages blood flow to the cupped region (hyperemia), often the patient may feel warmer and/or hotter as a result of vasodilatation taking place, slight sweating may occur.

### Key Takeaways

Cupping is a technique where a vacuum is created in a cup, drawing the skin and subcutaneous superficial fascia up into the cup. The use of cupping originated as early as 3000 B.C.E in a pre-scientific era and much of the reasoning once used to explain the effects do not make sense in the light of what we know today. Anecdotally cupping is used to alleviate pain, whether cupping works via contextual factors, neurophysiological responses or mechanical factors are all up for discussion.

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13.

## ELASTIC THERAPEUTIC TAPE

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### Elastic Therapeutic Tape

Elastic therapeutic tape is an elastic cotton strip with an acrylic adhesive that is used with the intent of treating pain and disability from athletic injuries and a variety of other physical disorders. Unlike conventional athletic taping it is applied in a manner that allows the body to move freely without restriction. Research suggests that elastic taping may help relieve pain, but not more than other treatment approaches.

### What is The Role of Taping?

The tape lifts the skin (decompression technique), increasing the space below it, and increasing blood flow and circulation of lymphatic fluids (swelling). This increase in the interstitial space is said to lead to less pressure on the body's nociceptors, which detect pain, and to stimulate mechanoreceptors, to improve overall joint proprioception. Performance Taping works by affecting the specialized nerve receptors of the skin and the underlying fascia through the gentle tugging action the tape offers during movement. The intention is to optimize motor recruitment in order to improve the quality of movement of a specific region, and to reduce pain.

### Therapeutic Taping for Pain Management

There are many brands of elastic therapeutic tape, the most well known brand being Kinesio tape. This brand of therapeutic tape was developed by Kenzo Kase in 1970 as an adjunct treatment for athletic injuries and a variety of musculoskeletal disorders. Despite being around for nearly forty years, taping remained relatively unknown until a surge in popularity after the product was donated to Olympic athletes in the 2008 Beijing Summer Olympics and the 2012 London Summer Olympics. After being featured on this global stage it became common practice to add therapeutic taping to treatments in an effort to accelerate the return to activity, specifically for cases of low back pain. Evidence of efficacy is mostly anecdotal, but there are recent randomized controlled clinical trials showing clinically significant improvements in pain and disability.

The application of taping stays on the skin for 3-7 days, during this time the tape stimulates large diameter mechanosensitive nerve fibers. This novel sensory input helps to alleviate pain by preventing or reducing nociceptive traffic into the central nervous system. Essentially, this involves the gate control theory of pain, insofar as nociceptive signals are often modifiable in such a way that the pain experience greatly subsides or disappears altogether. Another proposed mechanism of action is that the application of tape facilitates tissue perfusion and lymphatic flow through a

sympathetic vascular reflex and by mechanically increasing the interstitial space where the exchange of gases, nutrients, and metabolites between the blood and tissues occurs (Cimino et al., 2018).

In acute cases of low back pain, there are studies that show therapeutic taping provided clinically significant improvements in pain and disability (Kelle et al., 2016). In chronic cases of low back pain the literature on therapeutic taping is mixed. However there is a recent randomized controlled trial published in the journal *Spine*, that showed simple application of Kinesio tape over the erector muscle group reduces pain and disability in people who suffer from chronic non-specific low back pain (Al-Shareef et al., 2016).

### Key Takeaways

For those who suffer from low back pain, taping has been shown to be a safe non-pharmacological therapeutic intervention that is simple to carry out, economical, and has very few and relatively minor side effects. Existing evidence suggests that therapeutic taping decreases the frequency, intensity and duration of non-specific low back pain, giving people confidence in their recovery and may lead to a reduced need for additional medication. However, it does not establish the superiority of taping to most sham interventions and other treatment approaches in terms of pain reduction. Additional rigorous study into the mechanisms behind and therapeutic values of taping would be of value.

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# MEDICAL ACUPUNCTURE

## Medical Acupuncture

The earliest detailed report on Chinese and Japanese medicine to be written by a European was by Willem ten Rhyne, a Dutch physician who published *Dissertatio de arthritide* in 1683 (Bivins, 2001). In this book Willem ten Rhyne documented the practice of acupuncture in detail, this was the first time that Europeans were introduced to the practice of acupuncture. Since then there have been specific branches of acupuncture that have developed in Europe and North America independent of Traditional narratives. The practices are often referred to as medical acupuncture or western acupuncture. Regardless of its theoretical basis and based on the traditional definition, the term acupuncture refers to the actual insertion of a needle (usually a solid needle) into the body.

“The term ‘acupuncture’ is a translation of 针刺术 (zhen ci shu in Chinese pin yin) or in short 针 (zhen), and is literally equivalent to the term ‘needling’ or ‘needling technique’. Based on the traditional and official definition, the term acupuncture refers to the actual insertion of a needle (usually a solid needle) into the body, which describes a family of procedures involving the stimulation of points on the body using a variety of techniques” — (Fan et al., 2016).



Sites for the application of acupuncture documented by Willem ten Rhyne.

Following the European lineage, the concept of medical acupuncture was pioneered by Felix Mann who began to view acupuncture as a form of peripheral nerve stimulation technique. Fast forward to contemporary practice and Medical Acupuncture is a precise peripheral nerve stimulation technique, in which acupuncture needles are inserted into anatomically defined sites, and stimulated manually or with electricity. Needle insertion is based on an understanding of anatomy and neurophysiology and acknowledges the fact that, regardless of where the needle is inserted (skin, fascia, muscles, tendons, periosteum, joint capsules, etc.), there will be a number of physiological responses.

## A Neurological Model: Many clinicians explain the mechanism of action in neurophysiological terms.

Acknowledging that traditional narratives outdated, medical acupuncture is an approach that is based upon a theory that is inline current scientific understanding of how the body works (Robinson, 2016; White, 2009). Acupuncture originated in a pre-scientific era – Meridians and the concepts of Qi ought to be replaced by systems biology and an understanding of neurophysiology (endogenous opioids, endocannabinoid, and purinergic signalling).

The insertion of an acupuncture needle provides mechanical stimulation of specialized sensory receptors located in the cutaneous and subcutaneous structures. Preferential sites for acupuncture stimulation are associated with areas rich in specialized sensory receptors such as muscle spindles, Golgi tendon organs, ligament receptors, Paciniform and Ruffini's receptors (joint capsules), deep pressure endings (within muscle belly), and free nerve endings (muscle and fascia). Based on the neurological model, all of these areas are highly innervated and as a result there are a number of physiological responses that help modulate the experience of pain. An observed favorable outcome may be explained by a number of overlapping mechanisms in the periphery, spinal cord, and brain (Yin et al., 2017; Zhang et al., 2014).

## Acupuncture Research Has Matured

The most comprehensive overview of acupuncture is published in *The Journal of Pain*, it is a meta-analysis using data from 39 trials and 20 827 patients showing that acupuncture helps with pain and effects exist beyond placebo. In this paper researchers looked at all accumulated randomized controlled trials and examined how acupuncture fared in treating people with chronic pain, what it found was acupuncture often worked better than sham acupuncture and other control groups (Vickers et al., 2018).

As research into acupuncture continues to mature, more clinical practice guidelines, randomized controlled trials and systematic reviews now support the use of acupuncture as part of a multidimensional approach for patients suffering from common musculoskeletal symptoms including:

- Chronic pain (Vickers et al., 2018)
- Acute pain (Cohen et al., 2017; Jan et al., 2017; Murakami et al., 2017; Sakamoto et al., 2018)
- Low back pain (Chou et al., 2017; Foster et al., 2018; Qaseem et al., 2017)
- Neck pain (Blanpied et al., 2017; Chou et al., 2018; Kjaer et al., 2017)
- Pelvic pain (Franco et al., 2018)
- Tension-type headaches (Busse et al., 2017; Linde et al., 2016)
- Migraines (Busse et al., 2017; Linde et al., 2016; Xu et al., 2020; Yang et al. 2016; Zhang et al., 2020)
- Osteoarthritis (Busse et al. 2017; Lin et al. 2016)
- Postoperative Pain (Tedesco et al., 2017)
- Cancer Pain (He et al., 2019; Hershman et al., 2018)

## Auricular Acupuncture for Pain

A specific branch of acupuncture is auricular acupuncture, which has been shown to be an easy to carry out non-pharmacological pain management method that may be of use for patients as a part of a larger multidisciplinary pain management pain strategy (Jan et al., 2017; Murakami et al., 2017; Ushinohama et al., 2016). Acknowledging that traditional narratives outdated auricular acupuncture is being reframed as a form of peripheral nerve stimulation technique in which acupuncture needles are inserted into anatomically defined sites, and stimulated manually or with electricity. Auricular acupuncture is interesting because it can be used to stimulate the auricular branch of the vagus nerve (the inner conch of the ear) which may have therapeutic benefits (Butt et al., 2020; Usichenko et al., 2017).

## Michigan Medicine: Deconstructing the Legitimization of Acupuncture: How Science Helped Move Acupuncture to Mainstream



*A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=869>*

### The responses to acupuncture are multifactorial – physiological and psychological factors interplay in a complex manner.

The existence of placebo-induced effects do not negate treatment-induced results, the meaning response, therapeutic alliance, ritual and context all play into the effects, the magnitude of a response may be influenced by mood, expectation, and conditioning (Kong et al., 2018).

The placebo response is real and it is effective, which is why some may overlook other subtle physiological responses such as sensory gating. In addition to the placebo response the insertion of an acupuncture needle provides mechanical stimulation of specialized sensory receptors located in the cutaneous and subcutaneous structures. This can have an analgesic & anti-inflammatory effect via the inflammatory reflex, endogenous opioids, endogenous cannabinoids and purinergic signalling (Yin et al., 2017; Zhang et al., 2014).



Adopting a neurophysiological explanation can lead to a wider acceptance in both research and clinical settings. Primary mechanism of action is likely through inhibition of nociceptive processing (bottom-up) and stimulation of endogenous pain inhibitory mechanisms (top-down) (Yu et al., 2020).

### Key Takeaways

Acknowledging that traditional narratives outdated, medical acupuncture is an approach that is based upon a theory that is inline current scientific understanding of how the body works. For those who are unfamiliar with the literature, it may be easy to assume that acupuncture is just a placebo. It is clear that the placebo response is a big part of why patients feel better, but it is also within the realm of reasons that patients have a complex biopsychosocial response to acupuncture that INCLUDES but is not LIMITED to placebo.

Acupuncture needles stimulate afferent nerves (A-beta, A-delta and C fibers), which triggers mechanical, contextual and neurological responses that help modulate the experience of pain.

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## TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)

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### Transcutaneous electrical nerve stimulation (TENS)

Transcutaneous Electrical Nerve Stimulation (TENS) involves the delivery of electrical stimuli with the aim of relieving acute and chronic pain. Primary mechanism of action is likely through inhibition of nociceptive processing (bottom-up) and stimulation of endogenous pain inhibitory mechanisms (top-down) (de Oliveira et al., 2019; Peng et al., 2019).

Based on randomized controlled trials and systematic reviews TENS therapy does not have a large body of evidence, but there is still some research that supports the use of TENS as part of a multidimensional approach for patients suffering from fibromyalgia (Dailey et al., 2020).

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## The University of Vermont: How to Use a TENS Unit



A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=875>

### Key Takeaways

Transcutaneous Electrical Nerve Stimulation (TENS) involves the delivery of electrical stimuli that stimulates afferent nerve (A-beta, A-delta and C fibers), which triggers neurological responses in the periphery, spinal cord, and brain that may help modulate the experience of pain.

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# THERMAL APPLICATIONS: HEAT & COLD

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## Thermal Applications: Heat & Cold

### Heat Therapy

Heat therapy in the form of deep moist heat or a heating pad is a mild analgesic that has a number of effects on the human body including increases in blood flow, increases in the expression of heat shock proteins and pain relief (McGorm et al. 2018). A number of clinical practice guidelines recommend the use of heat to manage acute and chronic low back pain (Chou et al., 2018; Qaseem et al., 2017).

### Cold Therapy

Cold therapy in the form of cold compress, ice pack or ice massage is also a mild analgesic, the physiological effects of cold therapy include reduced blood flow, reduced metabolic demand, and pain relief. There is limited evidence from randomized clinical trials (RCTs) supporting the use of cold therapy following acute musculoskeletal injury and delayed-onset muscle soreness (DOMS), also a mounting body of research has shown that ice can delay healing, increase swelling, and possibly cause additional damage to injured tissues (Duchesne et al., 2017; Fuchs et al., 2020; Peake et al., 2017).

#### **PEACE & LOVE: New acronym for the treatment of traumatic injuries**

One of the primary changes surrounding the management of acute injuries is that most guidelines recommend against the use of ice to control inflammation. It is now recognized that ice can delay healing, increase swelling, and possibly cause additional damage to injured tissues. Traditionally treatment of an acute sprain or strain consists of RICE (Rest, Ice, Compression, Elevation), the most recent recommendation has been to provide soft tissue injuries with the PEACE & LOVE protocol to encourage optimal loading of the joint and tissue around the affected injury to can impact the amount swelling leading to a faster recovery (Dubois & Esculier, 2020).

- **PEACE** makes up the first steps you would take after an injury. Immediately after the injury you would want to protect (P) the injured structure, followed by elevating (E) the limb higher than the heart, avoid anti-inflammatory (A) both over-the-counter or prescriptions and ice, as they slow down tissue healing. Compress (C) the injured area to decrease swelling. Ensure patient education (E) on the risks of overtreatment.
- **LOVE** makes up the progressive return to activities a few days after the injury. Gradual load (L) will facilitate healing, optimistic (O) influences the perception of pain and recovery speed. Loading and progressive return to activity will facilitate vascularization (V) of the injured tissues. The last step involves activity exercises (E) can help

recover range of motion, strength and proprioception.

## Ice baths (also known as cold-water immersion or whole body cryotherapy)

Even though ice baths may delay healing, that does not mean that there is no use for the techniques. Controlled stress is a way to promote adaptation in the body, this may include, but it is not limited to: training, fasting, cold immersions, breathing exercises. One prominent figure in the world of body experimentation is Wim Hof a Dutch adventurer, known by the name “The Iceman” who has popularized the Wim Hof Method and cold-water immersion. Research on this method of cold exposure suggest that people can learn to modulate their immune responses — a finding that has raised hopes for patients who have chronic inflammatory disorders such as rheumatoid arthritis and inflammatory bowel disease (Kox et al., 2014).

### Thermal Applications: Summary

Technique	Application	Application notes (e.g. anatomical location, conditions)
<b>Application of cold</b>	Local application of cold/ice (e.g. compress, ice pack, ice massage) often for 15 minutes or less.	Used over areas of acute inflammation or pain. Generally not used over areas of chronic inflammation.
<b>Application of heat</b>	Local application of heat (e.g. compress, magic bag) often for 10 – 5 minutes.	Used for chronic pain. Not used over areas of acute inflammation.
<b>Contrast application</b>	Alternating application of cold (e.g., 3 minutes) with application of heat (e.g., 1 minute).	Used for subacute pain

### Key Takeaways

For those who suffer from musculoskeletal pain, thermal applications have been shown to be a safe non-pharmacological therapeutic intervention that is simple to carry out, economical, and has relatively minor side effects.

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## PART IV

# CLINICAL EXAMINATION

## A Person-Centered Approach to Clinical Examination

Increasingly, research has shown that attributing the experience pain solely to poor posture, minor leg length discrepancies, vertebral misalignment and other structural abnormalities is an oversimplification of a complex process (Green et al., 2018; Lewis et al., 2020; Swain et al., 2020). Even in the case of osteoarthritis wear and tear on the joints may not be the primary cause of pain (Culvenor et al., 2019; Girish et al., 2011; Sihvonen et al., 2018). This may sound counter-intuitive but it is part of our ever changing understanding of the experience of pain and disability.

Contemporary pain management is shifting away from a pathoanatomical model to a person-centered model of care that is responsive to the individual context of each patient. Clinical examination and decision-making ought to reflect this change by understanding that structural abnormalities alone do not explain or necessarily predict pain.

### Postural Assessment

The idea that poor posture is a contributor to spinal pain is being called into question as this long-held belief is not supported by strong evidence (Swain et al., 2020). When assessing posture there is a low inter and intra-rater reliability as patient presentation may vary greatly based on a number of factors. Secondly static posture has limited validity in predicting the cause of pain and long-term research trials have demonstrated that posture during sitting, standing and lifting does not predict low back pain or its persistence (O'Sullivan et al., 2020).

For most of the population structural asymmetries and poor posture is not the primary cause of chronic pain. The human body is a complex and adaptable network of overlapping systems. Minor biomechanical variation is considered normal and is not considered a pathological abnormality. The reason people experience pain differently is in part due to differences in genetics, emotional stress, history of physical trauma and sensitization of the nervous system (Rethorn et al., 2019; Swain et al., 2020). A person-centered care model acknowledges that patient presentation may vary based on biopsychosocial factors (Engel, 1980).

### Orthopedic Special Testing

Traditionally the role of orthopedic testing is to define a treatable pathology, which does have a role in the management of acute injuries. However, in the chronic pain population orthopedic special tests involve a degree of subjectivity and few are sensitive or specific enough to have clinical value on their own (Cook, 2010; Hegedus et al., 2017; Salamh & Lewis, 2020). Even when orthopedic special tests are clustered there are issues with testing validity, this is because these tests are often good at reproducing pain but not great at telling us what structures the symptoms are coming from (Salamh & Lewis, 2020).

Orthopedic special testing is focused on the biomechanical aspects of pain which can overlook important underlying

processes such as sensitization of the nervous system or underlying psychological factors. Traditional orthopedic special testing can help identify potential red flags but may often give limited information about the experience of pain. A modern understanding is that chronic pain patients often suffer from multiple ongoing issues compounded by peripheral and central sensitization, which may lead to inconclusive testing (Wideman et al., 2019).

### Clinical Tests: Sensitivity & Specificity

- Sensitivity refers to the percentage of people who test positive for a specific disease among a group of people who have the disease.
- Specificity refers to the percentage of people who test negative for a specific disease among a group of people who do not have the disease.

## Musculoskeletal Imaging

The current use of musculoskeletal imaging is focused on a black and white pathoanatomical diagnosis; this often does not determine the source of pain. One of the big revelations of widespread imaging has been that if tested a majority of the population will have degenerative changes in the knee, hip, shoulder, and spine. These are age-related changes that are part of normal aging and often unassociated with pain (Horga et al., 2020; Hunter & Bierma-Zeinstra, 2019; Lewis et al., 2020; Maher et al., 2019).

Incidental findings such as tissue degeneration are so common that even after ‘diagnostic imaging’ we may still have limited information as to how we should proceed and formulate a meaningful treatment plan. Since a large portion of people with no pain show abnormalities or degenerative tissue (e.g. degenerative disk disease, rotator cuff tear, degenerative torn meniscus, femoroacetabular impingement, etc.) most clinical practice guidelines now recommend against widespread musculoskeletal imaging (Foster et al., 2018; Kamper et al., 2020; Lin et al., 2020).

## A Person-Centered Approach to Pain & Disability

This disconnect between structural abnormalities and clinical presentation can create confusion for both patients and clinicians. This does not mean we should give up performing a thorough health history and physical examination of our patients. What it does mean is that we ought to adopt a person-centered model of care and interpret these findings in the context of individual patient presentation. A person-centered model of care is a multidimensional approach that gives therapists a better understanding of an individual’s symptoms.

A skilled clinical examination helps to orientate, and aid clinical decision-making based on patients’ limitations, goals,



and course of pain. By capturing the patient’s narrative, it can also help to identify meaningful goals and direct the most appropriate intervention based on pain presentation, functional limitations, and psychosocial factors.

The added value of a person-centered assessment is that even when underlying mechanisms are unclear, by understanding the patient’s functional limitations and how pain is affecting their activities of daily life we can still formulate a meaningful treatment plan. A skilled clinical examination and a comprehensive health history taking has even been shown to have a therapeutic effect related to pain, fear-avoidance, pain catastrophization, and functional measures of mobility and sensitivity (Louw et al., 2020).

#### Foundations of a Person-Centered Approach

<b>Evidence-Based Healthcare</b>	A clinically-oriented approach based on the three pillars of evidence-based practice (best available evidence, clinical expertise and patient values)
<b>Biopsychosocial Model of Health &amp; Disease</b>	A holistic approach that addresses biomechanical, psychological, and social factors while using a shared decision-making process
<b>Shared-Decision Making</b>	Employs effective communication and is responsive to the individual context of the patient.

## The Multidimensional Clinical Examination

Massage therapists often are already taking a person-centered approach to the assessment of pain. An example of this would be the use of SOAP notes to combine quantitative measurements (questionnaires, scales and tests), with qualitative reporting (patient’s narratives).

In practice a thorough health history is done to gather information about patients’ limitations, course of pain, and prognostic factors (e.g. coping style) and answers to health-related questions. This information is then blended with the patient narrative and information gathered from a traditional physical examination including orthopedic special testing, neurological screening tests, mobility and/or muscle strength assessment. For assessing and monitoring patient progress validated outcome measurements (e.g. patient-specific functional scale, brief pain inventory, visual analog scale, McGill pain questionnaire, global impression of change, patient-centered outcomes questionnaire) can be used to capture quantitative measurements.

A person-centered clinical examination is one that seeks to better understand the complex web of interactions in the

patient's history, physiology and lifestyle. This information is then used to formulate a clinical hypothesis that does not seek a single source of pain. If adopted widely a person-centered model of care helps to reconceptualize pain leading to improved patient-clinician relationships, improved self-efficacy, and better health outcomes for patients with pain.

## Summary

Contemporary best-practices for pain supports a multidimensional approach that addresses biopsychosocial influences and empowers people with shared decision-making. Adopting a person-centered model of care does not discount the use of a traditional orthopedic assessments, it helps to put into context the interconnected and multi-directional interaction between physiology, thoughts, emotions, behaviors, culture, and beliefs.

If adopted a person-centered model of care could help reduce suffering and costs associated with musculoskeletal pain in our society. By helping patients avoid unnecessary procedures, minimize unnecessary harms and decrease economic burden associated with low-value care.

### Key Takeaways

Contemporary pain management is shifting away from a pathoanatomical model to a person-centered model of care that is responsive to the individual context of each patient. Clinical examination and decision-making ought to reflect this change by understanding that structural abnormalities alone do not explain or necessarily predict pain. This section of the textbook will explore treatment options and best-practice recommendations for evidence-based assessment strategies.

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17.

# INTERPERSONAL COMMUNICATION SKILLS

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## Interpersonal Communication Skills

### A Person-Centered Approach to The Clinical Encounter

Adopting a person-centered model of care gives therapists a better understanding of an individual's symptoms by capturing the patient's narrative. It can also help identify meaningful goals and direct the most appropriate intervention based on pain presentation, functional limitations, and psychosocial factors. The added value of a person-centered model is that even when underlying mechanisms are unclear, by understanding the patient's functional limitations and how pain is affecting their activities of daily life we can still formulate a meaningful treatment plan.

#### 5 Practices to Help Establish a Meaningful Connection with Patients in The Clinical Encounter

1. Prepare with intention (take a moment to prepare and focus before greeting a patient);
2. Listen intently and completely (sit down, lean forward, avoid interruptions);
3. Agree on what matters most (find out what the patient cares about and incorporate these priorities into the visit agenda);
4. Connect with the patient's story (consider life circumstances that influence the patient's health; acknowledge positive efforts; celebrate successes);
5. Explore emotional cues (notice, name, and validate the patient's emotions)

(Zulman et al., 2020)

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## Practical Application: How I Interview New Massage Clients – From Massage Sloth



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### Key Takeaways

A person-centered clinical examination is one that seeks to better understand the complex web of interactions in the patient's history, physiology and lifestyle. If adopted widely a person-centered model of care helps to reconceptualize pain leading to improved patient-clinician relationships, improved self-efficacy, and better health outcomes for patients with pain.



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18.

## SCREENING FOR RED AND YELLOW FLAGS

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### Screening for Red and Yellow Flags

**Red flags** are signs and symptoms that raise suspicion of serious underlying pathology, if a serious pathology is suspected a clinical decision should be made to refer the patient to an appropriate healthcare practitioner.

- **Red Flags for Back Pain** – For patients with low back pain there are a number of serious spinal pathologies to be aware of, these are cauda equina syndrome, spinal fracture, malignancy, and spinal infection (Finucane et al., 2020).

**Yellow flags** are psychosocial and occupational factors that may affect patient presentation and treatment approaches and outcomes.

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## PhysioTutors: Screening for Red Flags



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## PhysioTutors: What are Yellow Flags and Why are They Important?



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# ORTHOPEDIC PHYSICAL EXAMINATION

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## Orthopedic Physical Examination

Most orthopedic special tests involve a degree of subjectivity and few are sensitive or specific enough to have clinical value on their own. Even when these tests are clustered there are issues with testing validity, this is because these tests are often good at reproducing pain but not great at telling us what structures the symptoms are coming from (Docking et al., 2016; Hegedus et al., 2017; Salamh & Lewis, 2020).

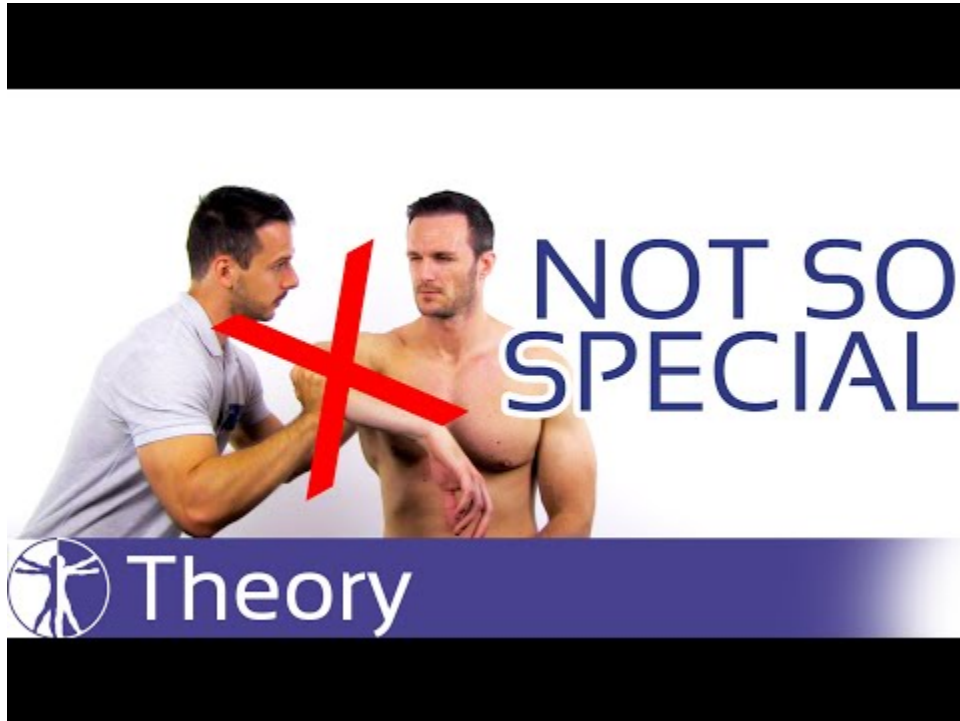
The current use of clinical tests is focused on a black and white pathoanatomical diagnosis, this often does not determine the source of pain. Increasingly, research shows that attributing the experience of pain solely to poor posture, minor leg length discrepancies, vertebral misalignment and other structural abnormalities is an oversimplification of a complex process (Green et al., 2018).

In some cases degenerative changes in the knee, shoulder, and spine are a normal part of normal aging and not associated with symptom presentation (Brinjikji et al., 2015; Culvenor et al., 2019; Farrell et al., 2019; Girish et al., 2011; Sihvonen et al., 2018). This disconnect between tissue damage seen on imaging and clinical presentation often creates confusion for both patients and clinicians. As a result, the medical community has moved on from a traditional biomechanical framework into a biopsychosocial framework (Lewis et al., 2020; Lin et al., 2020).

All this does not mean we should give up on performing a physical examination of our patients, what it means is that we ought to gather information about patients' limitations, course of pain, and prognostic factors (eg, coping style). This information is then blended with information gathered from a traditional clinical examination including special testing, neurological examination, mobility and/or muscle strength assessment.

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**PhysioTutors: Special Tests Are Not So Special... and when to use them**



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### Key Takeaways

Increasingly, research shows that attributing the experience of pain solely to poor posture, minor leg length discrepancies, vertebral misalignment and other structural abnormalities is an oversimplification of a complex process. The human body is not a simple structure, but rather a complex and adaptable network of overlapping systems. We must move from the myth of a simple biomechanical framework, or pathoanatomical model of trying to fix the structure, to understanding the complexity of a biopsychosocial framework and how all of the systems within the body interact to experience all types of pain.



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## NEUROLOGICAL EXAMINATION

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### The Nervous System Becomes Sensitive When it is Exposed to a Pathological Environment

As peripheral nerves pass through the body they may be exposed to mechanical or chemical irritation at different anatomical points. Prolonged compression or fixation of a nerve may result in a reduction of intraneural blood flow. This then triggers the release of pro-inflammatory substances (calcitonin gene-related peptide and substance P) from the nerve. This by product is referred to as neurogenic inflammation and it can disrupt the normal function of nerves even without overt nerve damage, it can also contribute to the initiation and propagation of chronic pain (Barbe et al., 2019; Bove et al., 2019; Matsuda et al., 2019).

### Examination: Clinical Sensory Testing Can Be Used to Assess for Increased Sensitivity of the Nervous System

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors (e.g. coping style) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

If there is an irritated peripheral nerve, clinical sensory testing can be used to assess for areas of hypersensitivity. In addition to orthopedic testing this could involve palpation (neural and non-neural structures). If a hypersensitive peripheral nerve has been identified, a treatment plan is then implemented based on patient-specific assessment findings and patient tolerance.

## Upper Limb Neurodynamic Tests

	1	2	3	4	5	6
<b>ULNT – Median (1)</b>	Shoulder girdle stabilization	Shoulder abduction	Wrist/finger extension	Forearm supination	Shoulder external rotation	Elbow extension
<b>ULNT – Median (2)</b>	Shoulder girdle depression	Elbow extension	Shoulder external rotation	Forearm supination	Wrist/finger extension	Shoulder abduction
<b>ULNT – Radial (3)</b>	Shoulder girdle depression	Elbow extension	Shoulder internal rotation	Forearm pronation	Wrist/finger flexion	Shoulder abduction
<b>ULNT – Ulnar (4)</b>	Wrist/finger extension	Forearm pronation	Elbow flexion	Shoulder external rotation	Shoulder girdle depression	Shoulder abduction

## Lower Limb Neurodynamic Tests

	1	2	3	4	5	
<b>Slump</b>	Hands behind back	Thoracic flexion	Extend one knee	Dorsiflex foot	Cervical flexion	
<b>Straight Leg Raise</b>	Supine position	Raise the leg with the knee extended	If pain radiates when the angle of the leg is between 30 and 70 degrees (positive)	Increased pain on dorsiflexion of the patient's foot increases sensitivity of the test		
<b>Femoral Nerve Test</b>	Prone or side lying	Knee flexion	Extension at the hip			
<b>Dorsiflexion-Eversion</b>	Supine	Place foot into full dorsiflexion & eversion	Hold for 5-10 sec.			

## Synopsis of Common Peripheral Nerve Complaints

Affected Nerve	Symptoms	Peripheral Nerve Palpation Point
<b>Head, Neck &amp; Upper Limb</b>		
Occipital nerve	Pain, numbness or tingling at the base of the occiput	Base of the occiput
Suprascapular n.	Shoulder pain, weakness in shoulder abduction and external rotation	Suprascapular notch
Dorsal scapular nerve	Upper and mid-thoracic pain, stiffness	Medial border of rhomboids
Long thoracic nerve	Pain, numbness or tingling over lateral flank. Winging of the scapula is possible	In-between scapula and chest wall
Median nerve	Pain, numbness or tingling in the thumb, index, middle, and ring fingers.	Upper arm, pronator teres and carpal tunnel
Ulnar nerve	Pain, numbness or tingling in ring and little finger	Upper arm, cubital tunnel
Radial nerve	Pain, numbness or tingling over common extensor tendon	Triangle interval, spiral groove, epimysial groove – extensor, snuff box
<b>Back &amp; Hip</b>		
Spinal nerve (dorsal cutaneous ramus)	Dysesthesia on the upper back between the vertebra and scapula (T2-T6)	Deep to back muscles
Intercostal nerve	sharp or shooting thoracic pain	Anterior cutaneous branches of the thoracoabdominal (T7 –11) and subcostal (T12) nerves – lateral border of the rectus muscle
Cluneal nerve	Pain, numbness or tingling along iliac crest or into gluteus muscles	Superior rim of the iliac crest

Sciatic nerve	Pain, numbness or tingling felt in the buttock, back of the thigh down to the calf, into the toes	Popliteal fossa
Lateral femoral cutaneous nerve	Paresthesia of the lateral upper thigh	Distal to inguinal ligament
<b>Lower Limb</b>		
Saphenous nerve	Knee pain or paresthesia medial thigh	Adductor canal
Tibial nerve	Pain, numbness or tingling over medial ankle and arch of the foot	Tarsal tunnel, posterior to the medial malleolus
Medial & lateral plantar n.	Sharp or stabbing heel pain	Deep to plantar muscle – running under the calcaneus
Peroneal nerve	Pain, numbness or tingling over lateral ankle and dorsum of foot	Over peroneal muscle belly & dorsum of foot
Sural nerve	Pain, numbness or tingling over entrapment site and lateral calf	Mid-belly of the gastrocnemius, lateral ankle

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## UBC Medicine Neurology Clinical Skills – Motor, Sensory, and Reflex Examination



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=538>*

### Key Takeaways

As peripheral nerves pass through the body they may be exposed to mechanical or chemical irritation at different anatomical points. Prolonged compression or fixation of neurovascular structures may result in reduced intraneural blood flow and ischemia, this then triggers the release of pro-inflammatory substances from the nerve. This by product is referred to as neurogenic inflammation and it can contribute to the propagation of acute and chronic pain.

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## PART V

# MASSAGE THERAPY FOR MUSCULOSKELETAL PAIN

## Massage Therapy for Musculoskeletal Pain

Now that massage therapy is recognized for being an evidence-based treatment option for the management of pain means the profession is moving into new formal settings. As part of this shift, it is important that therapists learn to think critically and evaluate research. This section aims to outline best-practice recommendations and connect readers with resources to help bridge the gap between research and clinical practice.

Contemporary massage therapists are uniquely suited to incorporate multi-modal management strategies based on patient-specific assessment findings. The Canadian Massage Therapists Alliance (CMTA) defines Massage Therapy as “The practice of massage therapy is the assessment of the Musculoskeletal system of the body and the treatment and prevention of physical dysfunction, injury and pain by manipulation, mobilization and other manual methods to develop, maintain, rehabilitate or augment physical function, relieve pain or promote health. Massage therapy is a clinically-oriented healthcare option that helps alleviate the Musculoskeletal disorders associated with everyday stress, physical manifestation of mental distress, muscular overuse and many persistent pain syndromes.”

The definition used in this book, defines massage therapy as a multi-modal approach that includes, but is not limited to classical swedish massage, myofascial mobilization, instrument-assisted soft tissue mobilization (IASTM), cupping, non-thrust mobilization, strain-counterstrain, muscle energy techniques, neural mobilizations and education. Despite being called different names, most of these techniques use a combination of – loading, stretching, compression and shearing.

## Best Practice Recommendations for Musculoskeletal Pain

The medical community is acutely aware of the economic and social burden of musculoskeletal disorders and the overuse of radiological imaging and invasive interventions and opioids. Contemporary best-practices for musculoskeletal pain supports a multidisciplinary approach that addresses biopsychosocial influences and empowers patients to actively self-manage.

If a best practice approach for musculoskeletal pain was adopted, it would massively reduce suffering and costs associated with musculoskeletal pain in our society. A systematic review and narrative synthesis published in the *British Journal of Sports Medicine* identified eleven consistent best-practice recommendations for musculoskeletal pain (Lin et al., 2020):

1. Care should be patient centred. This includes care that responds to the individual context of the patient, employs effective communication and uses shared decision-making processes.
2. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions.

3. Assess psychosocial factors.
4. Radiological imaging is discouraged unless:
  1. Serious pathology is suspected.
  2. There has been an unsatisfactory response to conservative care or unexplained progression of signs and symptoms.
  3. It is likely to change management.
5. Undertake a physical examination, which could include neurological screening tests, assessment of mobility and/or muscle strength.
6. Patient progress should be evaluated including the use of outcome measures.
7. Provide patients with education/information about their condition and management options.
8. Provide management addressing physical activity and/or exercise.
9. Apply manual therapy only as an adjunct to other evidence-based treatments.
10. Unless specifically indicated (e.g. red flag condition), offer evidence-informed non-surgical care prior to surgery
11. Facilitate continuation or resumption of work.

If Massage Therapists adopt these best-practice recommendations, we could be part of the solution as we can reduce the suffering and costs of musculoskeletal pain in our society.

### Key Takeaways

Evidence-Based Massage therapy is a clinically-oriented multi-modal approach (manual therapy, remedial exercise and patient education) based on a biopsychosocial model and on the three pillars of evidence based practice (best available evidence, clinical expertise and patient values). This section of the textbook will explore treatment options and best-practice recommendations for common clinical issues.

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# TEMPOROMANDIBULAR DISORDERS

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## Temporomandibular Disorders

Temporomandibular disorders (TMDs) affect up to 15% of adults and 7% of adolescents, this umbrella term may include jaw pain, movement limitations, and clicking of the jaw (List et al., 2017).

### Pathophysiology

Many factors may play a role in the progression of TMD, this may include soft-tissue dysfunction, joint disorders and central sensitization. On its own TMD can have a significant impact on quality of life and there are other comorbidities associated with TMD, as it may be a contributing factor to cervicogenic headache (von Piekartz & Hall, 2013).

### Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors (eg, coping style) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Numeric Pain Rating Scale (NRS)
- Jaw Functional Limitation (JFL-8)
- Mandibular Function Impairment Questionnaire (MFIQ)

- Tampa Scale for Kinesiophobia for Temporomandibular disorders (TSK/TMD)
- Neck Disability Index (NDI)

## Treatment

### Education

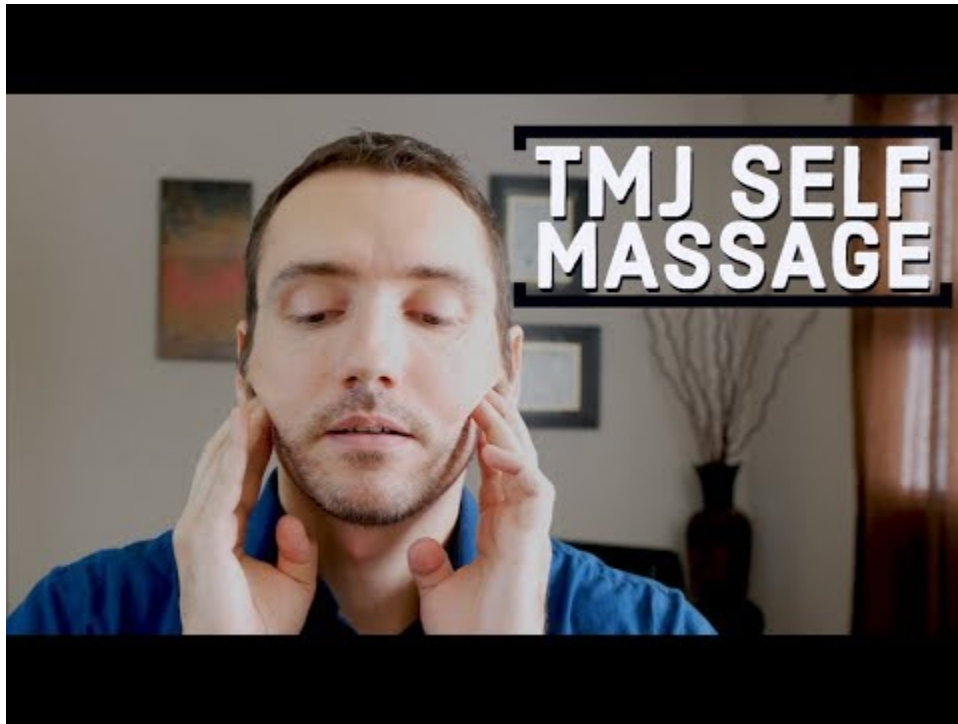
Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Intra-oral and extra-oral massage can be performed in the clinic or as self care. In its simplest form it could include working on:

- Medial Pterygoid
  - Temporalis
  - Masseter
  - Sternocleidomastoid
  - Suprahyoid Muscle Group (digastric, stylohyoid, geniohyoid, and mylohyoid)
  - Infrahyoids Muscle Group (sternohyoid, sternothyroid, thyrohyoid, and omohyoid)
  - Scalene Muscle Group (anterior scalene, middle scalene, and posterior scalene)
  - Upper Cervical Spine (suboccipitals, upper trapezius, splenius cervicis, splenius capitis)
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## Massage Sloth: Self-Massage for TMJ Pain



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=42>*

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## Prognosis

The therapeutic effects of intra-oral, extra-oral massage, and self-care management of temporomandibular dysfunction has been demonstrated in a number of randomized control trials and systematic reviews (Martins et al., 2016; Randhawa et al., 2016).

### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation

strategies for temporomandibular disorder based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (intra-oral and extra-oral massage)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# MIGRAINES AND TENSION-TYPE HEADACHES

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## Migraines and Tension-Type Headaches

With an estimated three billion individuals world-wide living with migraine or tension-type headache *The Global Burden of Diseases, Injuries, and Risk Factors* list migraine and tension-type headaches as one of the leading causes of disability worldwide (GBD 2016 Headache Collaborators).

### Pathophysiology

Migraine has two major types.

1. Migraine without aura is a clinical syndrome characterized by headache with specific features and associated symptoms.
2. Migraine with aura is primarily characterized by the transient focal neurological symptoms that usually precede or sometimes accompany the headache. Some patients also experience a prodromal phase, occurring hours or days before the headache, and/or a postdromal phase following headache resolution. Prodromal and postdromal symptoms include hyperactivity, hypoactivity, depression, cravings for particular foods, repetitive yawning, fatigue and neck stiffness and/or pain.

Tension-type headache is very common, with a lifetime prevalence in the general population ranging in different studies between 30% and 78%. Tension-type headaches are divided into two categories: episodic and chronic.

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## TED-ED: What Causes Headaches



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## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

### Red Flag Screen

- Thunderclap Headache – a severe headache reaching at least 7 (out of 10) in intensity within 1 min of onset
- Fever and Meningismus
- New headache with cognitive change in an elderly patient

### Outcome Measurements

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Headache Impact Test 6-item (HIT-6)
- Migraine-Specific Quality of Life Questionnaire (MSQ v2.1)
- Patient Perception of Migraine Questionnaire (PPMQ-R)
- The Migraine Disability Assessment (MIDAS)
- Headache Disability Index

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. For patients with persisting headaches it is important to work with the patient and their physician to develop strategies to manage symptoms. For people who suffer from migraine and tension-type headaches soft tissue irritation and nerve sensitization may be a major contributor to symptoms (Do et al., 2018). Gentle manual therapy of the upper cervical spine may help avoid ongoing nociceptive input into the trigeminocervical complex (Luedtke et al., 2017). Structures to keep in mind while assessing and treating patients suffering from headaches may include neurovascular structures and investing fascia of:

- Upper Cervical Spine (suboccipitals, upper trapezius, splenius cervicis, splenius capitis)
- Levator Scapula
- Longus Colli & Capitis
- Rhomboid Minor and Major
- Occipitofrontalis
- Corrugator Supercilii
- Sternocleidomastoid
- Scalene Muscle Group (anterior scalene, middle scalene, and posterior scalene)
- Temporomandibular Joint
  - Medial Pterygoid
  - Temporalis
  - Masseter
  - Suprahyoid Muscle Group (digastric, stylohyoid, geniohyoid, and mylohyoid)
  - Infrahyoids Muscle Group (sternohyoid, sternothyroid, thyrohyoid, and omohyoid)



## Self-Care

Mindfulness based stress reduction has been shown to be safe and effective for reducing headaches, with little to no side effects. It can be used a part of a multidimensional treatment approach (Seminowicz et al., 2020)

## Prognosis

Globally physicians, now more than ever are recommending complementary treatment options (ie. manual therapy, acupuncture, mindfulness based stress reduction, pain neuroscience education, and exercise) as part of a multi-modal approach to decrease the individual's headache frequency, intensity, duration and acute medication requirements. Massage therapy specifically is included in a number of practice guidelines for the treatment of headaches (Busse et al., 2017; Côté et al., 2019)

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## Massage Sloth: Myofascial Release for Headache



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## Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for tension-type headaches and migraines based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# POST-CONCUSSION SYNDROME

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## Post Concussion Syndrome

A concussion is a brain injury caused by a complex physical process affecting the brain, induced by biomechanical forces. The most commonly reported symptoms are occipital headache, blurry vision, nausea, dizziness, balance problems, a “foggy feeling,” difficulty with concentration, difficulty with memory, fatigue, confusion, drowsiness, and irritability. Clinically these symptoms fall into four major categories:

1. Somatic: Headaches, nausea, vomiting, balance and or visual problems, and sensitivity to light and noise
2. Emotional: Sadness to the point of depression, nervousness, and irritability
3. Sleep disturbance: Sleeping more or less than usual and having trouble falling asleep
4. Cognitive: Difficulty concentrating, troubles with memory, feeling mentally slow or as if in a fog that will not lift

## Pathophysiology

Persistent symptoms’ does not reflect a single pathophysiological entity, but describes a constellation of non-specific post-traumatic symptoms that may be linked to coexisting and/or confounding factors, which do not necessarily reflect ongoing physiological injury to the brain (McCroory et al., 2017).

Concussion is an injury that typically resolves relatively quickly in most people (symptoms generally disappear for 80-90% of patients within 7 to 10 days), however whiplash symptoms can linger for up to a year or more. Persistent symptoms after concussive injuries often include headaches and neck pain. Post-traumatic headache (PTH) is a highly disabling secondary headache disorder and one of the most common symptoms after a concussion (Ashina et al., 2019). In these demographics soft tissue irritation and subsequent nerve sensitization may be a major contributor to symptoms. With the high impact nature of most concussive injuries, the assessment and rehabilitation of cervical spine may decrease the likelihood that an individual will develop persistent headaches and neck pain (Kennedy et al., 2019).

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## Ted Ed: What Happens When You Have A Concussion?



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=337>*

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## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Sport Concussion Assessment Tool 5th Edition (SCAT5)
- Headache Impact Test 6-item (HIT-6)

- The Migraine Disability Assessment (MIDAS)
- Post Concussion Symptom Scale

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms. After an initial short rest period lasting 24-48 hours, the early introduction of light cognitive and physical activity can be initiated as long as the activity does not exacerbate symptoms (sub-threshold activities).

### Manual Therapy

Post-concussion headaches are multifactorial with evidence for the contributions of muscles and other structures surrounding the cervical spine. A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from cervicogenic headaches may include neurovascular structures and investing fascia of:

- Upper Cervical Spine (suboccipitals, upper trapezius, splenius cervicis, splenius capitis)
- Levator Scapula
- Longus Colli & Capitis
- Rhomboid Minor and Major
- Occipitofrontalis
- Corrugator Supercilii
- Sternocleidomastoid
- Scalene Muscle Group (anterior scalene, middle scalene, and posterior scalene)
- Temporomandibular Joint
  - Medial Pterygoid
  - Temporalis
  - Masseter
  - Suprahyoid Muscle Group (digastric, stylohyoid, geniohyoid, and mylohyoid)
  - Infrahyoids Muscle Group (sternohyoid, sternothyroid, thyrohyoid, and omohyoid)

## Prognosis

Persistent symptoms often reflect a constellation of symptoms that may be linked to coexisting and/or confounding factors. Early intervention reduces the risk of cervicogenic headaches developing into chronic post concussion headaches, but, do not attempt to treat the concussion directly, instead treat the impairments that may be related to or irritating, based on patient-specific assessment findings and patient tolerance.

## Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for post-concussion syndrome based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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24.

## NECK PAIN

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### Neck Pain

#### Pathophysiology

Recent clinical guidelines published in the *Journal of Orthopaedic & Sports Physical Therapy (JOSPT)* suggest a pragmatic approach to the management of neck pain. These guidelines describe four subcategories of neck pain: neck pain with limited motion, neck pain associated with whiplash, headaches related to neck pain, neck and nerve-related pain into the arm (also known as radicular pain) (Blandpied et al., 2017).

#### Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-specific Functional Scale
- Neck Pain and Disability Scale
- Neck Disability Index

### Treatment

#### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

Randomized controlled trials have demonstrated that compression at myofascial triggerpoints (MTrPs) significantly improved subjective pain scores compared with compression at Non-MTrPs and the control treatments for patients suffering from neck pain (Morikawa et al., 2017).

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating people suffering from neck pain may include neurovascular structures and investing fascia of:

- Upper Cervical Spine (suboccipitals, upper trapezius, splenius cervicis, splenius capitis)
- Levator Scapula
- Longus Colli & Capitis
- Rhomboid Minor and Major
- Occipitofrontalis
- Corrugator Supercilii
- Sternocleidomastoid
- Scalene Muscle Group (anterior scalene, middle scalene, and posterior scalene)
- Temporomandibular Joint
  - Medial Pterygoid
  - Temporalis
  - Masseter
  - Suprahyoid Muscle Group (digastric, stylohyoid, geniohyoid, and mylohyoid)
  - Infrahyoids Muscle Group (sternohyoid, sternothyroid, thyrohyoid, and omohyoid)

## Rehabilitation

With simple home-care recommendations, people can often self-manage this condition and follow up with massage therapy as needed.

## Prognosis

Clinical practice guidelines for neck pain support the need for a multidimensional therapeutic approach with consistent recommendations including universal provision of information and advice to remain active, discouraging routine referral for imaging, and limited prescription of opioids (Chou et al., 2018). A multidimensional treatment approach can involve a number of management strategies that include but is not limited to education, reassurance, analgesic medicines and a number of non-pharmacological therapies (Blandpied et al., 2017; Chou et al., 2018).

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## Massage Sloth: Neck Massage Tutorial



*A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=40>*

### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for neck pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)

- Self-Care Strategies

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# SHOULDER PAIN

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## Shoulder Pain

The rotator cuff is a group of tendons that holds the shoulder joint in place allowing people to lift their arm and reach overhead. Rotator cuff related shoulder pain is a term that encompasses a spectrum of conditions including subacromial pain syndrome, rotator cuff tendinopathy, and symptomatic partial and full thickness rotator cuff tears (Lewis, 2016).

## Pathophysiology

### **Rotator Cuff Related Shoulder Pain**

In some cases of rotator cuff disorders pathoanatomical explanations do not account for why pain persists, which is why it is important to take into account patient-specific assessment findings and psychosocial factors (Wylie et al., 2016; Wong et al., 2020). In other cases pathological changes (eg. fibrosis, interstitial collagen deposition, and inflammatory cells) may be associated with sensorimotor declines, and symptomatic rotator cuff disorders (Fouda et al., 2017).

### **Frozen Shoulder**

Frozen shoulder also known as “Adhesive Capsulitis” is classified as idiopathic (primary) or following shoulder surgery or trauma (secondary). Traditionally it has been taught that regardless of therapeutic intervention the affected shoulder will eventually improve or “thaw out”. This long held idea of complete resolution without treatment for frozen shoulder is unfounded. In most cases an understanding of the pathophysiology of frozen shoulder will lead to improved treatment outcomes, reduced pain and suffering associated with the condition (Wong et al., 2017).

The progression of the frozen shoulder is a complicated process, involving a cascade of molecular and cellular events. Connective tissue fibrosis and storage of leukocytes and chronic inflammatory cells is thought to play a fundamental role. Ongoing inflammation feeds into a cycle and upregulation of pro-inflammatory cytokine production, namely transforming growth factor beta (TGF- $\beta$ ). This may be further perpetuated by sympathetic dominance of autonomic balance, and neuro-immune activation (Pietrzak, 2016).

## Clinical Examination

A thorough health history intake can be done to gather information about patients’ limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher

likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-specific Functional Scale
- DASH Outcome Measure
- Upper Extremity Functional Index
- Western Ontario Rotator Cuff (WORC) Index

### Neurovascular Assessment

**Medial axillary space** – The Axillary space is bounded by teres major muscle, teres minor muscle and humerus. The long head of triceps brachii splits this area into medial and lateral groups. Scapular circumflex artery and scapular circumflex vein pass through it.

**Lateral axillary space** – The axillary nerve and posterior circumflex humeral artery can be irritated by soft tissue structures. Symptoms include axillary nerve related weakness of the deltoid muscle, resulting in a reduction in shoulder abduction. The pain from axillary neuropathy is usually dull and aching rather than sharp, and increases with increasing range of motion. Many people notice only mild pain but considerable weakness when they try to use the affected shoulder.

**Triangular interval** – The radial nerve and profunda brachii artery pass through the triangular interval, on route to the posterior compartment of the arm. The triceps brachii has potential to irritate the radial nerve in the triangular interval.

## Drag and Drop: Anatomy Review



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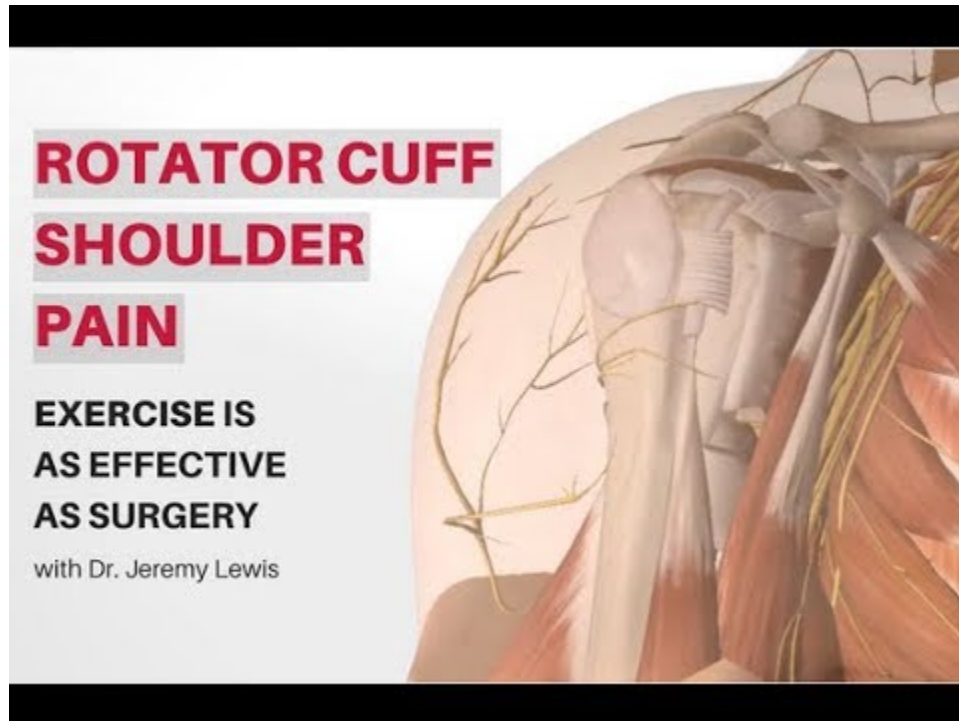
### Special Testing

- Subacromial impingement – Neer test, Hawkins-Kennedy test, and painful arc
- Superior labral anterior to posterior (SLAP) tears – relocation test, Yergason’s test, compression-rotation test
- Stiffness-related disorders (osteoarthritis and adhesive capsulitis) – shoulder shrug sign

- Subscapularis tendinopathy – The belly-off and modified belly press tests

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## Jeremy Lewis: Rotator Cuff Shoulder Pain – Exercise is as effective as surgery



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## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from shoulder pain may include neurovascular structures and investing fascia of:

- Rotator Cuff (subscapularis, infraspinatus, teres minor, supraspinatus)
- Pectoral Region (pectoralis major, pectoralis minor, serratus anterior and subclavius)
- The Upper Arm (biceps brachii, brachialis, coracobrachialis, triceps brachii)
- Deltoid Muscle Group (anterior, middle, posterior)
- Erector Spinae (iliocostalis, longissimus, spinalis) & Multifidus
- External Obliques, Internal Obliques, and Transverse Abdominal
- Thoracolumbar Fascia, Latissimus Dorsi and Teres Major
- Quadratus Lumborum

## Prognosis

Prognosis is favorable when therapists use a multidisciplinary approach to treatments. Exercise is the mainstay of treatment, a strong recommendation may be made regarding the effectiveness of manual therapy when combined with exercise for subacromial shoulder pain (Pieters et al., 2020). A number of additional systematic reviews support the use of manual therapy for the treatment of shoulder pain (Hawk et al., 2017; Steuri et al., 2017).

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## Massage Therapeutics: How to treat frozen shoulder: Massage video with Maria Natera



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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for acute and chronic shoulder pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization, IASTM)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)

- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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## ELBOW PAIN

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### Elbow Pain

Lateral elbow tendinopathy (LET), also known as Tennis elbow is described as pain at the outside of the elbow and in the upper forearm where the muscle tendon attaches to the bone. Medial elbow tendinopathy (MET), also known as Golfer's elbow is described as pain at the inside of the elbow and in the upper forearm where the muscle tendon attaches to the bone.



Tennis elbow is described as pain at the outside of the elbow and Golfer's elbow is described as pain at the inside of the elbow.

### Pathophysiology

The presentation of pain in a tendon, does not always mean that the tendon itself is the primary contributor to pain. There is research that suggests a majority of nerves are found in peritendinous tissue, which is likely contributes to the

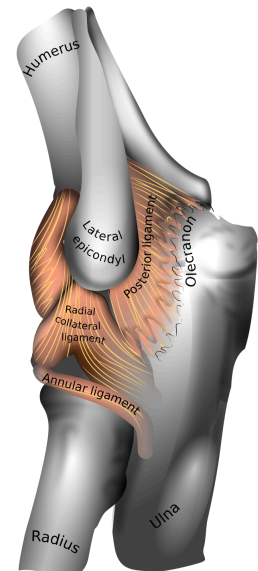
complex clinical picture of tendon pain. There may be times that focal irritability (ie. nerve irritation, triggerpoints, nervous system sensitization) co-exists with lateral elbow tendinopathy.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Patient-Rated Elbow Evaluation (PREE)
- Patient-Rated Tennis Elbow Evaluation (PRTEE)
- DASH Outcome Measure
- Upper Extremity Functional Index



Elbow Joint From Gray's Anatomy (1918)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

A massage therapy treatment plan for elbow pain should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from elbow pain may include neurovascular structures and investing fascia of:

- Scalene Muscle Group (anterior scalene, middle scalene, and posterior scalene)
- Pectoral Region (pectoralis major, pectoralis minor, serratus anterior and subclavius)
- Rotator Cuff (subscapularis, infraspinatus, teres minor, supraspinatus)
- The Upper Arm (biceps brachii, brachialis, coracobrachialis, triceps brachii)
- Anterior Interosseous Membrane

- Common Extensor Tendon (extensor carpi radialis brevis, extensor digitorum, extensor digiti minimi, extensor carpi ulnaris)
- Common Flexor Tendon (pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis, flexor carpi ulnaris)
- Carpal Bones (trapezium, trapezoid, capitate, hamate, scaphoid, lunate, triquetrum, pisiform)

## Prognosis

Prognosis is good for the conservative management of elbow pain (Piper et al., 2016). Massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for patients with elbow pain including soft tissue massage, simple home-care recommendations and remedial exercise.

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## Massage Sloth: Massage for Elbow Pain



*A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=34>*

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## Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for elbow pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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27.

# THORACIC OUTLET SYNDROME

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## Thoracic Outlet Syndrome

Thoracic outlet syndrome is a neurovascular compression injury characterized by tingling, numbness and pain in the shoulder and upper extremity, hand and fingers.

### Pathophysiology

Symptoms are often the result of irritation or compression at the thoracic outlet (three structures are at risk: the brachial plexus, the subclavian vein, and the subclavian artery). Compression of these structures is classified as neurogenic (NTOS), venous (VTOS), and arterial (ATOS) thoracic outlet syndromes. Although each of these three are separate entities, multiple sites of compression can coexist and have overlapping symptoms.

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### Osmosis: Klumpke's palsy and thoracic outlet syndrome



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=722>*

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

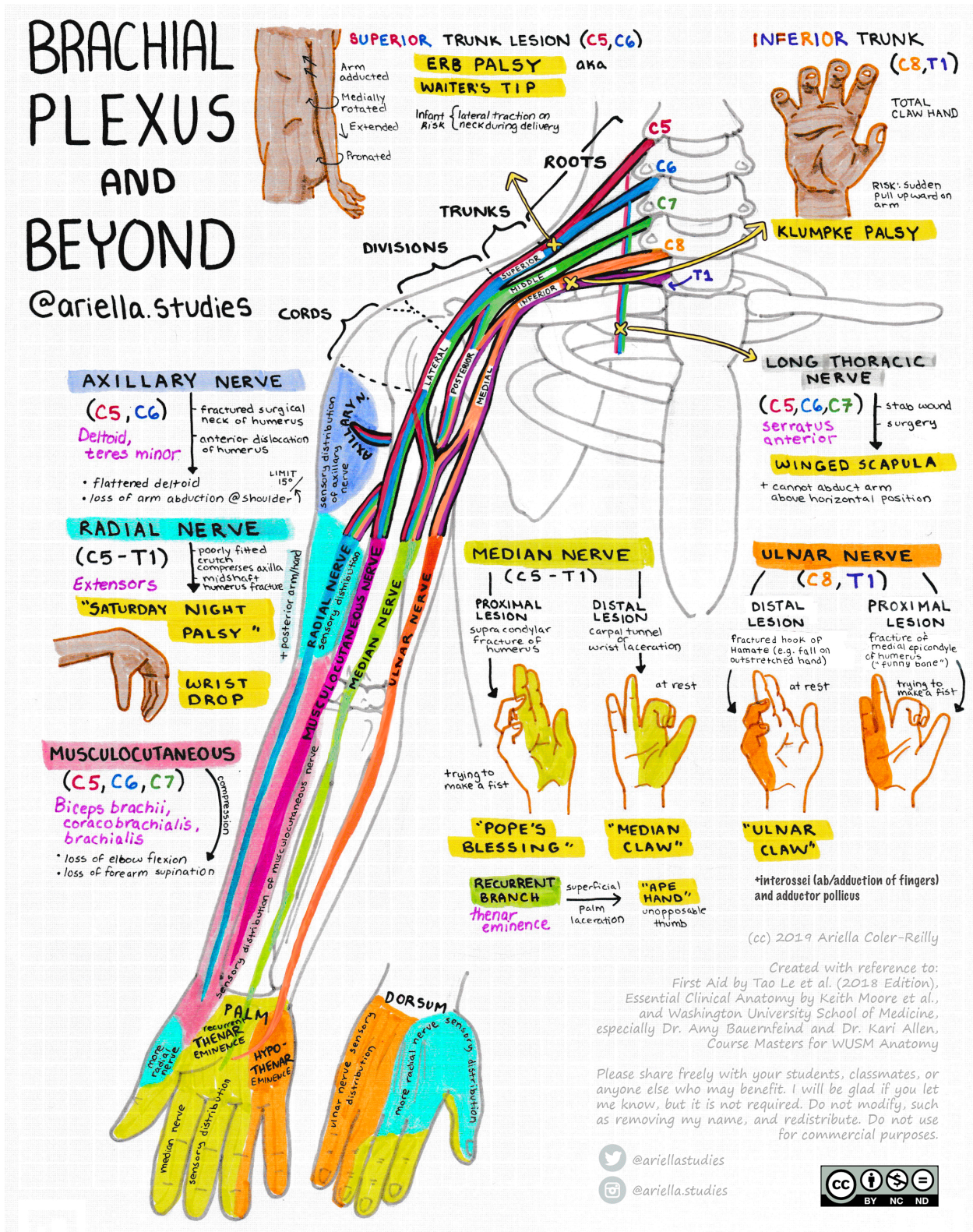
Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- DASH Outcome Measure

- Upper Extremity Functional Index
-



# Ariella.Studies – Injuries Associated with The Brachial Plexus



Injuries associated with the brachial plexus.

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

The responses to massage therapy are complex and multifactorial – physiological and psychological factors interplay in a complex manner. Massage therapy combined with multimodal care may improve symptoms, decrease disability and improve function for patients who suffer from mild forms of thoracic outlet syndrome. Massage has a modulating effect on peripheral and central processes via input from large sensory neurons that prevents the spinal cord from amplifying the nociceptive signal. This anti-nociceptive effect of massage therapy can help ease discomfort in patients who suffer from peripheral nerve entrapment.

#### **Structures to be Aware of When Treating Thoracic Outlet Syndrome**

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from thoracic outlet syndrome may include neurovascular structures and investing fascia of:

- Interscalene Triangle (anterior scalene muscle, middle scalene muscle, and first rib)
- Costoclavicular Space (subclavius muscle, clavicle, the first rib, and anterior scalene muscle)
- Subcoracoid Space (pectoralis minor muscle, and the ribs)
- The Upper Arm (biceps brachii, brachialis, coracobrachialis, triceps brachii)
- Common Extensor Tendon (extensor carpi radialis brevis, extensor digitorum, extensor digiti minimi, extensor carpi ulnaris)
- Common Flexor Tendon (pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis, flexor carpi ulnaris)
- Carpal Bones (trapezium, trapezoid, capitate, hamate, scaphoid, lunate, triquetrum, pisiform)

## Prognosis

Prognosis for the conservative management of thoracic outlet syndrome is mixed. Massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for patients with thoracic outlet syndrome including soft tissue massage, simple home-care recommendations and remedial exercise. It is not suggested that massage therapy alone can control symptoms but be can used to help relieve pain & reduce anxiety when integrated with standard care.

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## Massage Tutorial: Thoracic outlet syndrome, tingling fingers, myofascial release



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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for thoracic outlet syndrome based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)



- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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28.

# CARPAL TUNNEL SYNDROME

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## Carpal Tunnel Syndrome

Carpal tunnel syndrome is a condition characterized by tingling, numbness and pain in the hand and fingers (particularly the thumb, index, middle and ring fingers). These symptoms are often the result of median nerve irritation in the wrist or forearm.



Carpal tunnel syndrome is a condition characterized by tingling, numbness and pain in the hand and fingers (particularly the thumb, index, middle and ring fingers).

## Pathophysiology

The median nerve passes through a number of anatomical structures and it may be exposed to mechanical irritation at many different points. Prolonged irritation may result in a reduction of intraneural blood flow. In turn, local hypoxia of a peripheral nerve leads to a drop in tissue pH that triggers the release of inflammatory mediators, known as “inflammatory

soup”; this noxious substance can disrupt the normal function of nerves. Ongoing tissue hypoxia or inflammatory responses lead to molecular signaling that promote the development of fibrosis, this may contribute to further peripheral nerve dysfunction (Barbe et al., 2019; Bove et al., 2019).

## Examination

A thorough health history intake can be done to gather information about patients’ limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- DASH Outcome Measure
- Upper Extremity Functional Index
- Brigham and Women’s Carpal Tunnel Questionnaire
- Boston Carpal Tunnel Questionnaire (BCTQ)
- Patient-Rated Wrist Evaluation (PRWE)
- Patient-Rated Wrist/Hand Evaluation (PRWHE)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

The responses to massage therapy are complex and multifactorial – physiological and psychological factors interplay in a complex manner. Systematic reviews have also shown that manual therapy combined with multimodal care can improve symptoms, decrease disability and improve function for patients who suffer from carpal tunnel syndrome (Huisstede et al., 2018). Research has looked at both peripheral and central responses elicited by massage therapy treatments.

#### Central Response

Massage has a modulatory effect on peripheral and central processes via input from large sensory neurons that prevents

the spinal cord from amplifying the nociceptive signal. This anti-nociceptive effect of massage therapy can help ease discomfort in patients who suffer from carpal tunnel syndrome.

### Peripheral Response

Carpal tunnel specific work may also involve specific soft tissue treatment to optimize the ability of mechanical interfaces to glide relative to the median nerve. The application of appropriate shear force and pressure impart a mechanical stimulus that may attenuate tissue levels of fibrosis and TGF- $\beta$ 1 (Bove et al., 2016; Bove et al., 2019). Furthermore, passive stretching may help diminish intraneural edema and/or pressure by mobilizing the median nerve as well as associated vascular structures (Boudier-Revéret et al., 2017).

**Myofascial Triggerpoint: Infraspinus** – The etiology of myofascial triggerpoints are still not well understood, but that does not deny the existence of the clinical phenomenon. From a clinical perspective, myofascial triggerpoints describe an observable phenomenon that may help clinicians investigate common pain patterns. An international panel of 60 clinicians and researchers was recently consulted to establish a consensus for identification of a myofascial trigger point. The panel agreed on two palpatory and one symptom criteria: a taut band, a hypersensitive spot, and referred pain (Fernández-de-Las-Peñas & Dommerholt, 2018). For patients with carpal tunnel syndrome studies have demonstrated that assessing and treating the infraspinus muscle may be an effective treatment option for a sub-group of patients (Meder et al., 2017).

### Structures to be Aware of When Treating Carpal Tunnel Syndrome

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from carpal tunnel syndrome may include neurovascular structures and investing fascia of:

- Costo-Clavicle Space
- Scalene Muscle Group (anterior scalene, middle scalene, and posterior scalene)
- Pectoral Region (pectoralis major, pectoralis minor, serratus anterior and subclavius)
- Rotator Cuff (subscapularis, infraspinus, teres minor, supraspinatus)
- The Upper Arm (biceps brachii, brachialis, coracobrachialis, triceps brachii)
- Superficial Anterior Compartment of the Forearm (pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis, flexor carpi ulnaris)
- Deep Anterior Compartment of the Forearm (flexor digitorum profundus, flexor pollicis longus, and pronator quadratus)
- Anterior Interosseous Membrane
- Carpal Bones (trapezium, trapezoid, capitate, hamate, scaphoid, lunate, triquetrum, pisiform)
- Palmar Aponeurosis & Transverse Carpal Ligament
- Lumbricals

## Prognosis

Massage therapy as a therapeutic intervention is being embraced by the medical community, it is simple to carry out,



economical, and has very few side effects. Randomized clinical trials have demonstrated that for some patients who suffer from carpal tunnel syndrome there is no significant differences in pain and functional outcomes at six and twelve months when surgical and conservative care are tested (Fernández-de-Las Peñas et al., 2017; Fernández-de-Las-Peñas et al., 2019).

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## Massage Sloth: Massage Tutorial: Carpal Tunnel Syndrome



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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation

strategies for carpal tunnel syndrome based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

## References and Sources

Barbe, M. F., Hilliard, B. A., Fisher, P. W., White, A. R., Delany, S. P., Iannarone, V. J., ... Popoff, S. N. (2019). Blocking substance P signaling reduces musculotendinous and dermal fibrosis and sensorimotor declines in a rat model of overuse injury. *Connective tissue research*, 1–16. Advance online publication. doi:10.1080/03008207.2019.1653289

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# DUPUYTREN'S DISEASE

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## Dupuytren's Disease

Dupuytren's disease (also known as Dupuytren's contracture) is a progressive fibroproliferative disorder of the hand that eventually can cause contractures of the affected fingers. Typical presentation is a gradual onset in males over 50 years of age. At first people may not notice the development of changes in their palms, the condition may even go dormant, but if the palmar fascia begins to thicken and contractions develop, the condition is recognizable – this is the ideal time to seek help from massage therapy.

## Pathophysiology

The progression of the disease is a complicated process, involving a cascade of molecular and cellular events, in which the cytokines transforming growth factor beta (TGF- $\beta$ ) and tumour necrosis factor (TNF) play a fundamental role during the course of Dupuytren disease. High levels of TGF- $\beta$  & TNF contribute to the contractile activity of myofibroblasts, which drives disease development, in Dupuytren's patients (Hinz & Lagares, 2020). This leads to a thickening of the tendons of the forearm and the palmar fascia.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-Specific Functional Scale (PSFS)
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- DASH Outcome Measure
- Upper Extremity Functional Index
- Patient-Rated Wrist Evaluation (PRWE)

- Patient-Rated Wrist/Hand Evaluation (PRWHE)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

Studies have demonstrated that non-operative treatments such as massage therapy combined with active and passive stretching may affect progression (Christie et al., 2012). As a therapeutic intervention massage therapy has the potential to attenuate TGF- $\beta$ 1 induced fibroblast to myofibroblast transformation. Recent studies have looked at the effect of modeled massage therapy and mechanical stretching on tissue levels of TGF- $\beta$ 1. In these studies, it was demonstrated that manual therapy has the potential to attenuate tissue levels of TGF- $\beta$ 1 and the development of fibrosis (Bove et al., 2016; Bove et al., 2019). This is potentially impactful in the treatment of Dupuytren's disease because TGF- $\beta$ 1 plays a key role in tissue remodeling and fibrosis. ,

Treatment focus is on the intrinsic hand muscles and carpal bones of the wrist, while also addressing areas of compensation, such as the flexors and extensors of the forearm. Massage therapy may delay the progression of contractures and decrease recurrence in post-operative patients. Massage therapy treatment for dupuytren's disease should not be vigorous and stretching should be a gentle exploration of range of motion. A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from dupuytren's may include neurovascular structures and investing fascia of:

- Biceps Brachii (bicipital aponeurosis)
- Triceps Brachii
- Common Extensor Tendon (extensor carpi radialis brevis, extensor digitorum, extensor digiti minimi, extensor carpi ulnaris)
- Common Flexor Tendon (pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis, flexor carpi ulnaris)
- Anterior Interosseous Membrane
- Palmar Aponeurosis
- Carpal Bones (trapezium, trapezoid, capitate, hamate, scaphoid, lunate, triquetrum, pisiform)
- Lumbricals

## Rehabilitation Program

Tension and compression orthotic devices and splinting is often used after surgery in the short term. This has been shown

to reduce the chances of recurrence in some people. Long term use of orthotic devices and splinting has mixed evidence. There have been modeled experiments to demonstrate the impact of stretching on inflammation-regulation mechanisms within connective tissue. Patients should be educated on the benefits of gentle stretching routines. Stretching should not be vigorous, it should be a gentle exploration of range of motion.

## Prognosis

There is a high rate of recurrence in the post-operative population. In the early stages a trial of conservative care is the preferred treatment approach, this often includes physical therapy, night splinting, and home hand exercises. Persistent inflammation has the potential to interfere with the tissue remodelling, early conservative interventions may serve to interrupt the sequelae of pathological healing.

The ideal treatment for patients with progressive dupuytren disease would be at the early stage to prevent or delay the development of flexion deformities and loss of manual dexterity. Prophylactic massage therapy treatments may inhibit inflammatory processes and affect the development of fibrosis by mediating differential cytokine production. Consequently, this may stabilize the progression of contractures and in some cases ameliorate the degree of deformity.

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## Niel Asher Education: Detailed Palm Massage – Dupuytren's Contracture



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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for Dupuytren's disease based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization, IASTM)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)



- Hydrotherapy (hot & cold)
- Self-Care Strategies

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30.

## BACK PAIN

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### Back Pain

Back pain affects 540 million people worldwide and is often classified by duration of injury, such as acute (pain lasting less than 6 weeks), sub-chronic (6 to 12 weeks), or chronic (more than 12 weeks). Symptoms may vary from a dull ache to a sudden sharp shooting pain.

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### DocMikeEvans: Low Back Pain



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## Pathophysiology

Increasingly, research shows that attributing the experience of back pain solely to poor posture, minor leg length discrepancies, vertebral misalignment and other structural abnormalities is an oversimplification of a complex process (Green et al., 2018; Swain et al., 2020). So-called abnormalities are often normal variations or adaptations, in some cases they may even be advantageous. Even in the case of degenerative changes in the spine, landmark studies have shown that tissue tears revealed on imaging are a part of normal aging (Brinjikji et al., 2015). What's more is that in the case of herniated discs 60-80% have been shown to spontaneously resorb (Zhong et al., 2017). This disconnect between tissue damage seen on imaging and clinical presentation often creates confusion for both patients and clinicians.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

### **Red Flags for Serious Spinal Pathology**

Red flags are signs and symptoms that raise suspicion of serious underlying pathology, for patients with low back pain there are a number of serious spinal pathologies to be aware of, these are cauda equina syndrome (0.08% of low back pain patients presenting to primary care), spinal fracture, malignancy, and spinal infection (Finucane et al., 2020; Hoeritzauer et al., 2020).

### **Outcome Measurements**

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient-specific Functional Scale
- Oswestry Disability Index
- Roland-Morris Disability Questionnaire
- STarT Back Screening Tool (SBST)

## Treatment

Most clinical practice guidelines for low back pain are moving towards an interdisciplinary approach with an emphasis on self-management, physical and psychological therapies and less emphasis on pharmacological and surgical treatments (Foster et al., 2018). Pharmacological treatments options such as opioid analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) have small effects on low back pain (Chou et al., 2020; Kamper et al., 2020; Tucker et al., 2020; van

der Gaag et al., 2020). Embracing an interprofessional strategy for pain management can include the use of education, exercise, acupuncture, massage therapy and spinal manipulation as part of a multi-dimensional approach for the management of back pain.

Recommendations	Acute low back pain (less than six weeks duration)	Chronic low back pain (more than 12 weeks duration)
<b>First line treatments</b>	Advice to stay active; patient education	Advice to stay active; patient education; exercise therapy; cognitive behavioral therapy
<b>Second line treatments</b>	Spinal manipulation; massage; acupuncture	Spinal manipulation; massage; acupuncture; yoga; mindfulness-based stress reduction; interdisciplinary rehabilitation
<b>If the above treatments fail</b>	Non-steroidal anti-inflammatory drugs	Non-steroidal anti-inflammatory drugs; selective norepinephrine reuptake inhibitors; surgery
*Reference – Foster et al., (2018). Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet.		

## Education

When consulting with someone living with low back pain provide reassurance and educational resources on condition and management options and encourage the use of active approaches (e.g. lifestyle, physical activity) to help manage symptoms. As an example of an educational resource a recent review published in the *British Journal of Sports Medicine* provided a list of ten sensible evidence-based recommendations for the management of low back pain (O’Sullivan et al., 2020).

### Back to basics: 10 facts every person should know about back pain

Once red flags and serious pathology are excluded, evidence supports that:

1. Low back pain (LBP) is not a serious life-threatening medical condition.
2. Most episodes of low back pain improve and LBP does not get worse as we age.
3. A negative mindset, fear-avoidance behaviour, negative recovery expectations, and poor pain coping behaviours are more strongly associated with persistent pain than is tissue damage.
4. Scans do not determine prognosis of the current episode of LBP, the likelihood of future LBP disability, and do not improve LBP clinical outcomes.
5. Graduated exercise and movement in all directions is safe and healthy for the spine.
6. Spine posture during sitting, standing and lifting does not predict LBP or its persistence.
7. A weak core does not cause LBP, and some people with LBP tend to tense their ‘core’ muscles. While it is good to keep the trunk muscles strong, it is also helpful to relax them when they aren’t needed.

8. Spine movement and loading is safe and builds structural resilience when it is graded.
9. Pain flare-ups are more related to changes in activity, stress and mood rather than structural damage.
10. Effective care for LBP is relatively cheap and safe. This includes: education that is patient-centred and fosters a positive mindset, and coaching people to optimise their physical and mental health (such as engaging in physical activity and exercise, social activities, healthy sleep habits and body weight, and remaining in employment).



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## Manual Therapy

There have been a number of studies looking at the use of massage therapy for patients with low back. One study published in the *Annals of Internal Medicine* randomized 401 people with nonspecific chronic low back pain. The control group in the study received usual care and the other two groups received two different types of massage, what this study found was that massage therapy was beneficial for this patient population and there did not appear to be a meaningful difference between the two types of massage that patients received (Cherkin et al., 2011).

Two additional randomized controlled trials demonstrated that a treatment approach focused on the compression at myofascial triggerpoints (MTrPs) significantly improved subjective pain scores compared with compression at non-MTrPs for patients suffering for back pain (Takamoto et al., 2015; Kodama et al., 2019).

### Structures to be Aware of When Treating Back Pain

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance, back pain may be caused by disc herniation, spondylolisthesis or soft tissue irritation. Structures to keep in mind while assessing and treating patients suffering from sciatica may include neurovascular structures and investing fascia of:

- Erector Spinae (iliocostalis, longissimus, spinalis)
- Quadratus Lumborum
- Multifidus
- Thoracolumbar Fascia and Latissimus Dorsi
- External Obliques, Internal Obliques, and Transverse Abdominis
- Iliopsoas (iliacus and psoas major)
- External Rotators of The Hip (piriformis, gemellus superior, externus and internus obturators, gemellus inferior, and quadratus femoris)
- Gluteal Muscles (gluteus maximus, gluteus medius, gluteus minimus, and tensor fasciae latae)
- Quadriceps Muscles (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)
- Hamstring Muscles (semimembranosus, semitendinosus and biceps femoris)

## Rehabilitation Program

Massage therapists not only provide massage treatments to help symptoms, they can also help develop movement based self-care strategies and insight into the nature of pain. Evidence supports the use of pilates, stabilisation/motor control, resistance training and aerobic exercise training for the management of low back pain (Owen et al., 2019).

## Prognosis

International clinical practice guidelines for low back pain contain consistent recommendations including the need for a multi-modal therapeutic approach, advice to remain active, discouraging routine referral for imaging, and limited prescription of opioids (Kamper et al., 2020). A multi-modal approach can involve a number of management strategies that include but is not limited to education, reassurance, analgesic medicines and a number of non-pharmacological therapies (Chou et al., 2018).

Recommendations from The American College of Physicians and The Canadian Medical Association represent a monumental shift in pain management. Physicians now more than ever are recommending conservative treatment options including massage, spinal manipulation, acupuncture and exercise as part of a multi-modal approach for patients suffering from low back pain (Chou et al., 2017; Qaseem et al., 2017; Traeger et al., 2017)

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## Massage Sloth: Massage Tutorial – Full Back Massage Routine



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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for back pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)



- Self-Care Strategies

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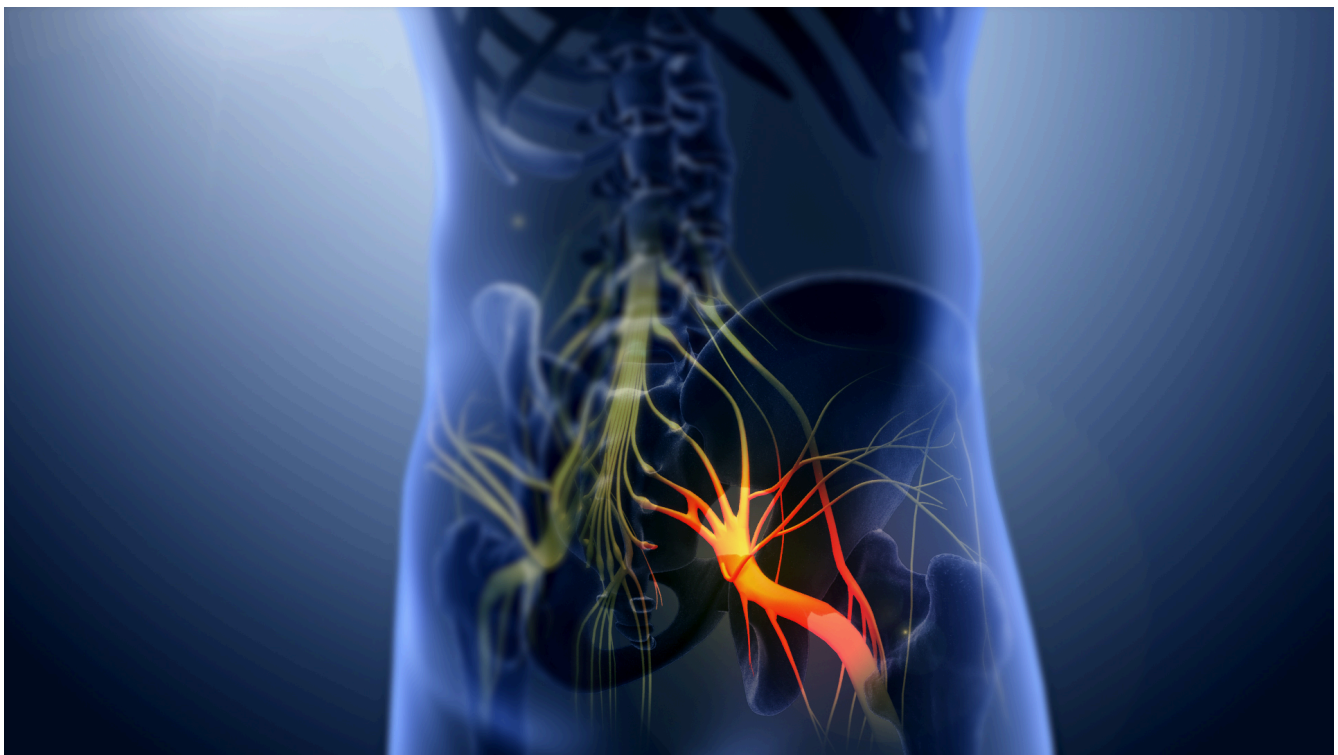
31.

# SCIATICA

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## Sciatica

Sciatica is a condition characterized by symptoms of radiating pain in one leg with or without associated neurological deficits on examination. Lumbar disk herniations are a frequent cause of sciatica, for a majority of the population (70 to 90% of patients) symptoms are generally self-limited and often resolve within 3 months (Schoenfeld & Weiner, 2010).



Sciatica is a condition characterized by symptoms of radiating pain in one leg.

## Pathophysiology

Symptoms of sciatica radiates along the path of the sciatic nerve, which branches from your lower back through your hips and buttocks and down the leg. Neurovascular bundles may be exposed to mechanical irritation or a noxious biochemical environment at many different points. Prolonged irritation may result in a reduction of intraneural blood flow. In turn, local hypoxia of a peripheral nerve leads to a drop in tissue pH that triggers the release of inflammatory mediators, known as “inflammatory soup”. This noxious substance may contribute to ongoing nociception without overt nerve damage.



The application of specific soft tissue treatments and neural mobilization may help to decrease sciatic nerve stiffness and diminish intraneural edema and/or pressure by mobilizing neural tubes (Gilbert et al., 2015; Neto et al., 2020).

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

### Red Flags for Serious Spinal Pathology

Red flags are signs and symptoms that raise suspicion of serious underlying pathology, for patients with low back pain there are a number of serious spinal pathologies to be aware of, these are cauda equina syndrome (0.08% of low back pain patients presenting to primary care), spinal fracture, malignancy, and spinal infection (Finucane et al., 2020; Hoeritzauer et al., 2020).

### Orthopaedic Physical Examination

A straight leg raise or slump test can be used to assess for sensitization and may give valuable information about the clinical presentation. Sometimes patients may test negative, but this does still not rule out nerve irritation, in these cases a more refined neurological assessment approach may be needed (Schmid et al., 2013).

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Oswestry Disability Index
- Roland-Morris Disability Questionnaire
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Lower Extremity Functional Scale (LEFS)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

A treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from sciatica may include neurovascular structures and investing fascia of:

- Gluteal Muscles (gluteus maximus, gluteus medius, gluteus minimus, and tensor fasciae latae)
- Hamstring Muscle Group (biceps femoris, semitendinosus, and semimembranosus)
- External Rotators of The Hip (piriformis, gemellus superior, externus and internus obturators, gemellus inferior, and quadratus femoris)
- Erector Spinae (iliocostalis, longissimus, spinalis) & Multifidus
- Quadratus Lumborum
- Thoracolumbar Fascia & Latissimus Dorsi

## Prognosis

Most patients improve over time with conservative treatment including exercise, manual therapy, and pain management (Stochkendahl et al., 2018; Jensen et al., 2019).

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## Sciatic Nerve Mobilization Technique with Erik Dalton



A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=341>

### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for sciatica based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)

- Self-Care Strategies

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32.

## HIP PAIN

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### Hip Pain

Hip-related pain is common in young to middle aged active adults (usually aged 18–50 years) and has a significant impact on physical activity and quality of life (Kemp et al., 2020).

### Pathophysiology

The presentation of hip pain does not always mean that the joint is the primary contributor to pain. Another peripheral generator that is often overlooked is peripheral nerve irritation, namely, sciatic, pudendal, obturator, femoral, and lateral femoral cutaneous (Martin et al., 2017). There are also twenty one muscles that cross the hip providing both movement and stability between the femur and acetabulum, all of this contributes to the complex clinical picture of hip pain.

### Classification of hip-related pain

**Osteoarthritis Related Hip Pain** – Osteoarthritis of the hip is a common finding in the general population, and in a majority of cases these degenerative changes are asymptomatic. However in some cases this condition involves sensitization of nociceptive pathways, which may result in patients with osteoarthritis perceiving relatively low level stimuli as being overtly painful (Hunter & Bierma-Zeinstra, 2019).

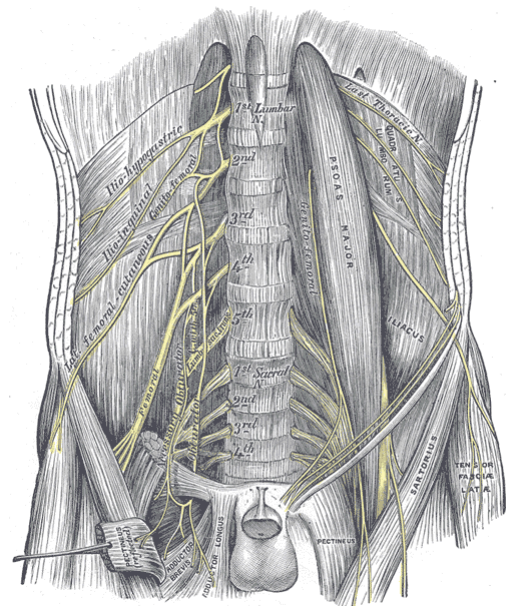
**Gluteal Tendinopathy** – Tendinopathy of the gluteus medius and gluteus minimus tendons is now recognized as a primary local source of lateral hip pain. Many cases of hip “bursitis”, should be more correctly classified as a non-inflammatory insertional tendinopathy of the gluteus medius or gluteus minimus tendons, that attach just deep to the greater trochanteric bursa. This condition interferes with sleep (side lying) and common weight-bearing tasks. The cardinal sign for this diagnosis is pain on palpation of the soft tissues over the greater trochanter.

**Greater Trochanteric Pain Syndrome** – An umbrella term used to encompass trochanteric bursitis, snapping hip syndrome, and abductor tendinopathy.

**Femoroacetabular Impingement (FAI) Syndrome** – The diagnosis of FAI syndrome currently includes bony morphological changes in the hip which may cause aberrant joint forces during hip movements and possible damage to the intra-articular structures of the joint.

**Ischiofemoral Impingement** – Refers to the painful entrapment of the quadratus femoris muscle between the lesser trochanter and the ischial tuberosity. The quadratus femoris acts synergistically with the other short external rotators but also serves as a secondary adductor of the hip.

**Snapping Hip Syndrome** – (iliopsoas tendinitis, or dancer’s hip) is characterized by a snapping sensation felt when the hip is flexed and extended. This may be accompanied by an audible snapping or popping noise and pain or discomfort. Pain often decreases with rest and diminished activity. Snapping hip syndrome is classified by location of the snapping, either extra-articular or intra-articular.



- **Intra-articular** Because the iliopsoas or hip flexor crosses directly over the anterior superior labrum of the hip, an intra-articular hip derangement (i.e. labral tears, hip impingement, loose bodies) can lead to an effusion that subsequently produces internal snapping hip symptoms.
- **Extra-articular**
  - **Lateral extra-articular (More common)** Occurs when the iliotibial band, tensor fasciae latae, or gluteus medius tendon slides back and forth across the greater trochanter. This normal action becomes a snapping hip syndrome when one of these connective tissue bands thickens and catches with motion. The underlying bursa may also become inflamed, causing a painful external snapping hip syndrome.
  - **Medial extra-articular (Less common)** The iliopsoas tendon catches on the anterior inferior iliac spine, the lesser trochanter, or the iliopectineal ridge during hip extension, as the tendon moves from an anterolateral to a posterior medial position. With overuse, the resultant friction may eventually cause painful symptoms, resulting in muscle trauma, bursitis, or inflammation in the area.

## Examination

A thorough health history intake can be done to gather information about patients’ limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

### Physical Examination

According to a recent systematic review the most useful clinical finding to identify patients most likely to have osteoarthritis of the hip are (Metcalf et al., 2019):

- Posterior Pain with squatting
- Groin pain with passive abduction or adduction
- Hip abductor weakness
- Decreased passive hip adduction or internal rotation as measured by a goniometer or compared with the contralateral leg.

### **Outcome Measurements**

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- The Western Ontario and McMaster Universities Arthritis Index (WOMAC)
- Lower Extremity Functional Scale (LEFS)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

The use of massage therapy has been shown to improve outcomes in post-operative hip patients. One recent randomized controlled trial published in the journal *PM&R*, looked at the use of manual therapy following total hip arthroplasty (Busato et al., 2016). In this study two treatment sessions were able to significantly improve functional outcomes in patients when used in addition to usual treatment.

### **Structures to be Aware of When Treating Hip Pain**

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from hip pain may include neurovascular structures and investing fascia of:

- Iliopsoas (iliacus and psoas major)
- Hip Adductors (adductor brevis, adductor longus, adductor magnus, pectineus, gracilis)
- External Rotators of The Hip (piriformis, gemellus superior, externus and internus obturators, gemellus inferior,

and quadratus femoris)

- Quadricep Muscles (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)
- Hamstring Muscles (semimembranosus, semitendinosus and biceps femoris)
- Gluteal Muscles (gluteus maximus, gluteus medius, gluteus minimus, and tensor fasciae latae)
- Erector Spinae (iliocostalis, longissimus, spinalis) & Multifidus
- Quadratus Lumborum
- Thoracolumbar Fascia & Latissimus Dorsi

## Rehabilitation Program

Patient education to remove or reduce loads that exacerbate symptoms, this may be sitting or standing with crossed legs, standing out onto one hip, and side lying (without pillows between the knees).

## Prognosis

Prognosis is good, manual therapy is supported by clinical practice guidelines for the management of hip pain and mobility deficits (Ceballos-Laita et al. 2019; Cibulka et al., 2017).

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## Massage Tutorial: Hip Pain



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=28>*

### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for acute and chronic hip pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)

- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# KNEE PAIN

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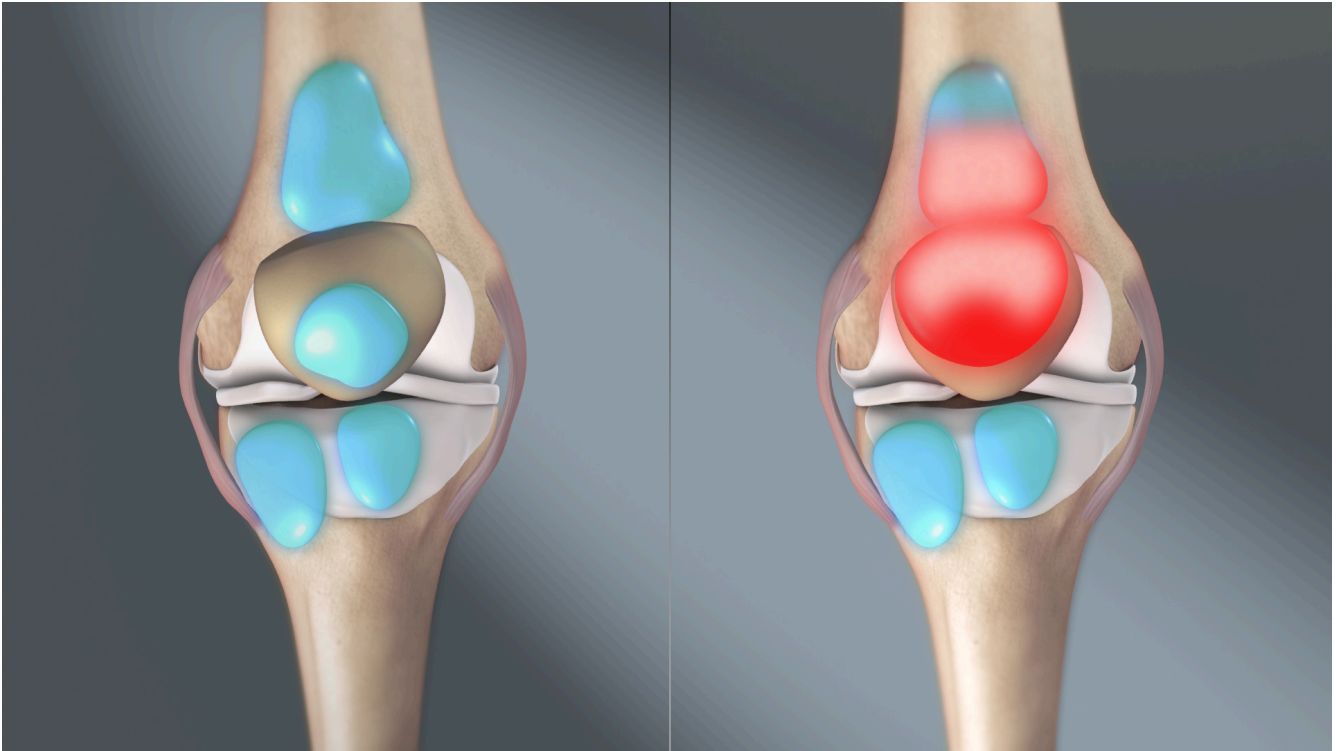
## Knee Pain

Physicians now more than ever are recommending conservative treatment including but not limited to: low-impact exercise, acupuncture, and manual therapy as part of a multi-modal approach for patients suffering from knee pain.

## Pathophysiology

**Degenerative meniscus and osteoarthritis** of the knee is a common finding in the general population, and in a majority of cases these degenerative knee changes are asymptomatic (Hortga et al., 2020). However in some cases this condition involves sensitization of nociceptive pathways, which may result in patients with osteoarthritis perceiving relatively low level stimuli as being overtly painful (Hunter & Bierma-Zeinstra, 2019).

**Patellar tendinopathy** is the preferred term for persistent patellar tendon pain and loss of function related to mechanical loading.



Physicians, now more than ever are recommending conservative treatment options for patients suffering from knee pain.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- The Western Ontario and McMaster Universities Arthritis Index (WOMAC)
- Lower Extremity Functional Scale (LEFS)

# Treatment

## Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from hip pain may include neurovascular structures and investing fascia of:

- Erector Spinae (iliocostalis, longissimus, spinalis) & Multifidus
  - Quadratus Lumborum
  - Thoracolumbar Fascia & Latissimus Dorsi
  - Hip Adductors (adductor brevis, adductor longus, adductor magnus, pectineus, gracilis)
  - Quadriceps Muscles (rectus femoris, vastus lateralis, vastus medialis, vastus intermedius)
  - Gluteal Muscles (gluteus maximus, gluteus medius, gluteus minimus, and tensor fasciae latae)
  - Hamstring Muscles (semimembranosus, semitendinosus and biceps femoris)
  - Anterior Compartment of the Leg (tibialis anterior, extensor hallucis longus, extensor digitorum longus, peroneus tertius)
  - Superficial Posterior Compartment of the Leg (gastrocnemius, soleus, plantaris)
  - Deep Posterior Compartment of the Leg (flexor hallucis longus, flexor digitorum longus, tibialis posterior, popliteus)
  - Proximal Tibiofibular Joint
  - Ankle Joint (talocrural joint, subtalar joint and inferior tibiofibular joint)
-

## Massage Sloth: Massage Tutorial – Knee Pain



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## Prognosis

Physicians now more than ever are recommending conservative treatment options for patients suffering from knee pain. Two recent randomized clinical trials have highlighted the effect of conservative treatment options for patients suffering from osteoarthritis related knee pain. In one randomized clinical trial published in the *Journal of General Internal Medicine* massage therapy was shown to improve function in patients who suffer from osteoarthritis related knee pain (Perlman et al., 2019). In addition a randomized trial published in *The New England journal of medicine* demonstrated the benefits of a conservative multimodal approach (manual therapy + exercise) for patients with symptomatic osteoarthritis of the knee (Deyle et al., 2020).

Key Takeaways



Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for knee pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# ACHILLES TENDINOPATHY

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## Achilles Tendinopathy

Tendinopathy is the preferred term for persistent tendon pain and loss of function related to mechanical loading. Achilles tendinopathy is the preferred term for persistent achilles tendon pain and loss of function related to mechanical loading, this injury is commonly categorized into two types:

- Insertional (affects 20–25%)
- Non-insertional (affects 75–80%)

## Pathophysiology

The presentation of pain in a tendon, does not always mean that the tendon is the primary contributor to pain. The multifactorial model of tendinopathy suggests that an impaired motor system, local tendon pathology, and changes in the pain/nociceptive system contributes to the complex clinical picture of tendon pain (Eckenrode et al., 2019).

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Lower Extremity Functional Scale (LEFS)
- Foot and Ankle Ability Measure
- Foot and Ankle Disability Index

# Treatment

## Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. There may be times that focal irritability (ie. nerve irritation, triggerpoints, nervous system sensitization) co-exists with achilles tendinopathy. Structures to keep in mind while assessing and treating patients suffering from achilles tendon pain may include neurovascular structures and investing fascia of:

- Plantar Fascia
- Lumbricals
- Adductor Hallucis
- Flexor Hallucis Brevis
- Metatarsals & Interossei
- Peroneals (peroneus longus, peroneus brevis)
- Hamstring Muscles ( semimembranosus, semitendinosus and biceps femoris)
- Anterior Compartment of the Leg (tibialis anterior, extensor hallucis longus, extensor digitorum longus, peroneus tertius)
- Superficial Posterior Compartment of the Leg (gastrocnemius, soleus, plantaris)
- Deep Posterior Compartment of the Leg (flexor hallucis longus, flexor digitorum longus, tibialis posterior, popliteus)
- Ankle Joint (the talocrural joint, subtalar joint and the inferior tibiofibular joint)

## Rehabilitation Considerations

Massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for patients with achilles pain including manual therapy, simple home-care recommendations and remedial exercise, such as slow eccentric heel-drops. Remedial loading programs such as eccentric heel drops do-as-tolerated repetition and specific Alfredson achilles tendinopathy rehabilitation protocol have both been shown to be useful for achilles tendon pain (Head et al., 2019).

## Prognosis

Multimodality options self-care techniques such as exercise therapy, relative rest, activity modifications should be considered as the first line treatment of tendon pain (van der Vlist et al., 2020). Clinicians should be thoughtful and skilled in managing the load on the tendons and supporting structures through a number of rehabilitation

considerations including, but are not limited to manual therapy, education on psychosocial factors such as fear avoidance, and remedial loading programs.

Manual joint mobilization and soft tissue techniques for the calf muscles may modify a contributing factor in the experience of pain. In cases that involve nerve entrapment, a massage therapist may use a specialized technique called neural mobilization. The goal of neural mobilization is to free the entrapped nerve by mobilization of the nerve itself or muscles that surround the nerve. There is a fair-bit of research to support the use of neural mobilization. A 2017 meta-analysis published in the *Journal of Orthopaedic & Sports Physical Therapy* showed that nerve mobilizations are an effective treatment approach for patients with back, neck and foot pain (Basson et al., 2017).

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## PhysioTutors: Alfredson Achilles Tendinopathy Rehab Protocol



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<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=720>

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## Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for achilles tendon pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization, IASTM)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# ANKLE PAIN

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## Ankle Pain

There are a number of different things to take into consideration when assessing a patient with ankle pain.

- One cause of ankle pain can be peroneal tendinopathy, which is described as persistent peroneal tendon pain and loss of function related to mechanical loading (Scott et al., 2020).
- Another causes of ankle pain is a sprained ankle, there are three different types of ankle sprain all with varying severity:
  - Inversion (lateral) ankle sprain – The most common type of ankle sprain involving tearing of the ligaments on the outside of the ankle (anterior talofibular ligament).
  - Eversion (medial) ankle sprain – Involving a tear of the deltoid ligaments, on the inside of the ankle.
  - High (syndesmotic) ankle sprain – Injury to the tibiofibular ligament above the ankle.

## Pathophysiology

The structure of the foot consists of 26 bones, 33 joints (20 of which are actively articulated), 4 layers of arch muscles, and 100+ muscles, tendons, and ligaments. Following an initial ankle injury there is a risk of re-injury dependent on a combination of factors including, but not limited to: sensorimotor deficits and changes in ankle biomechanics.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)

- Lower Extremity Functional Scale (LEFS)
- Foot and Ankle Ability Measure
- Foot and Ankle Disability Index

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

Massage therapists are uniquely suited to incorporate a number sensory-targeted rehabilitation strategies for patients with chronic ankle instability (Mckeon et al., 2016). This may include superficial peroneal nerve mobilization – the superficial peroneal nerve passes between peroneal muscles and the extensor digitorum longus. It then pierces the deep fascia and is divided in cutaneous nerves that enter the foot to innervate the dorsal surface (Plaza-Manzano et al., 2016). The specific movement to mobilize the superficial peroneal nerve involves plantar flexion with inversion combined with straight leg raise. Branches of the saphenous nerve also innervate the talocrural capsule.

### Structures to be Aware of When Treating Ankle Sprains

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from ankle pain may include neurovascular structures and investing fascia of:

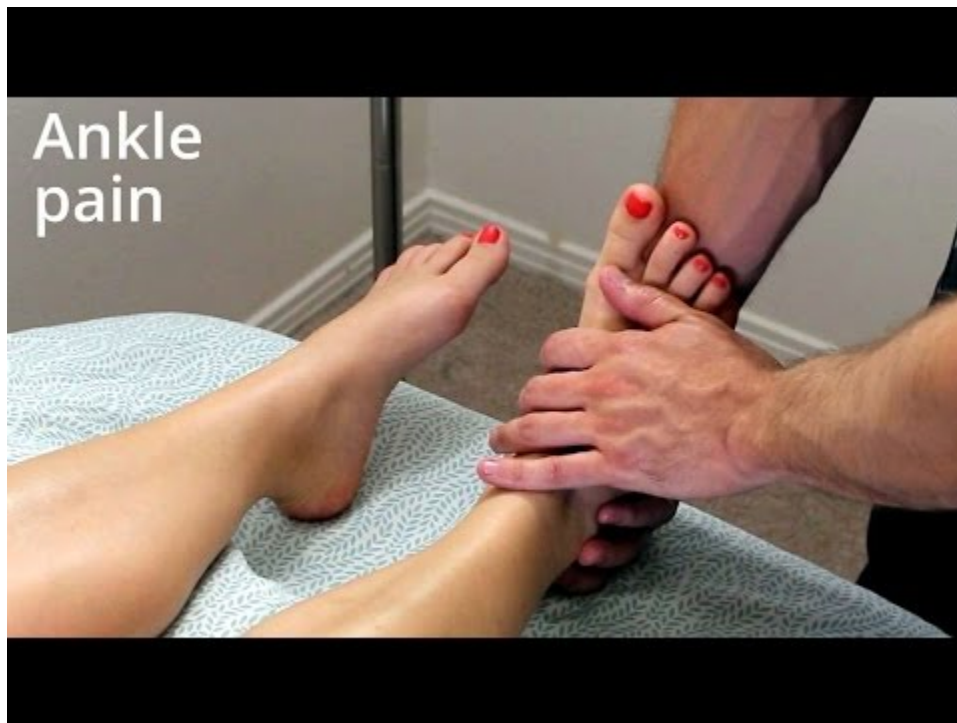
- Plantar Fascia
- Lumbricals
- Adductor Hallucis
- Flexor Hallucis Brevis
- Metatarsals & Interossei
- Peroneals (peroneus longus, peroneus brevis)
- Anterior Compartment of the Leg (tibialis anterior, extensor hallucis longus, extensor digitorum longus, peroneus tertius)
- Superficial Posterior Compartment of the Leg (gastrocnemius, soleus, plantaris)
- Deep Posterior Compartment of the Leg (flexor hallucis longus, flexor digitorum longus, tibialis posterior, popliteus)
- Ankle Joint (talocrural joint, subtalar joint and the inferior tibiofibular joint)

## Prognosis

Prognosis is favorable, a multi-modal rehabilitation approach utilizing exercise (proprioceptive and strengthening) and manual therapy (plantar massage, joint mobilizations and nerve mobilization) can be used to enhance motor control in patients (Doherty et al., 2017; Plaza-Manzano et al., 2016).

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## Massage Sloth: Massage Tutorial – Ankle Pain Techniques and Strategy



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Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for ankle pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# PLANTAR HEEL PAIN

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## Plantar Heel Pain

Plantar heel pain, also known as plantar fasciitis is generally described as sharp or stabbing, and worse in the morning. The pain can decrease with activity but can return after long periods of standing or after getting up from a seated position.

## Pathophysiology

Just because this condition is referred to as plantar fasciitis, does not mean that the plantar fascia is the primary contributor to symptoms. Entrapment of the tibial nerve and its branches in the tarsal tunnel (along the inner leg behind the ankle) may mimic symptoms of plantar fasciitis. Inside the tunnel, the nerve splits into three different segments – one nerve continues to the heel, the other two continue to the bottom of the foot. Entrapment of any of these nerves may contribute to the complex clinical picture of plantar fasciitis (Plaza-Manzano et al., 2019).

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Lower Extremity Functional Scale (LEFS)
- Foot and Ankle Ability Measure
- Foot and Ankle Disability Index

# Treatment

## Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. Structures to keep in mind while assessing and treating patients suffering from plantar heel pain may include neurovascular structures and investing fascia of:

- Plantar Fascia
- Lumbricals
- Adductor Hallucis
- Flexor Hallucis Brevis
- Metatarsals & Interossei
- Peroneals (peroneus longus, peroneus brevis)
- Hamstring Muscles (semimembranosus, semitendinosus and biceps femoris)
- Anterior Compartment of the Leg (tibialis anterior, extensor hallucis longus, extensor digitorum longus, peroneus tertius)
- Superficial Posterior Compartment of the Leg (gastrocnemius, soleus, plantaris)
- Deep Posterior Compartment of the Leg (flexor hallucis longus, flexor digitorum longus, tibialis posterior, popliteus)
- Ankle Joint (the talocrural joint, subtalar joint and the inferior tibiofibular joint)

## Rehabilitation Considerations

**Foot Core Exercise** – Intrinsic foot muscles play a crucial role in supporting the medial longitudinal arch, providing the foot stability and flexibility for shock absorption. There are a number of foot core exercises that will help recondition foot muscles (McKeon et al., 2015).

- Toe Adduction & Abduction
- Doming & Arching
- Toe Splaying
- Big Toe Press
- Reverse Tandem Gait
- Vele's Forward Lean

## Prognosis

Massage therapy as a therapeutic intervention is being embraced by the medical community. This is in part because it is a non-pharmacological therapeutic intervention that is simple to carry out, economical, and has very few side effects. Existing evidence suggests that massage therapy (joint mobilization and soft tissue massage) is helpful in improving function and reducing plantar heel pain (Fraser et al., 2018).

In cases that involve nerve entrapment, a massage therapist may use a specialized technique called neural mobilization. The goal of neural mobilization is to free the entrapped nerve by mobilization of the nerve itself or muscles that surround the nerve. There is a fair-bit of research to support the use of neural mobilization. A 2017 meta-analysis published in the *Journal of Orthopaedic & Sports Physical Therapy* showed that nerve mobilizations are an effective treatment approach for patients with back, neck and foot pain (Basson et al., 2017).

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## Massage Sloth: Massage Tutorial – Myofascial Release for Plantar Fasciitis and Heel Pain



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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for plantar heel pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization, IASTM)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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37.

# REHABILITATION FOR STRAINS AND SPRAINS

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## Rehabilitation for Strains and Sprains

### Pathophysiology

Many of the current clinical practice guidelines for acute care of sprains and strains run counter to some long held beliefs. One of the primary changes surrounding the management of acute injuries is that most guidelines recommend against the use of ice to control inflammation. It is now recognized that ice can delay healing, increase swelling, and possibly cause additional damage to injured tissues (Duchesne et al., 2017).

### Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)

### Treatment

#### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

Ascribing a patient's pain solely to a tissue-driven pain problem is often an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. Gently stretching the muscles, neurovascular structures, and investing fascia activates endogenous pain modulating systems that help to modulate neuro-immune responses. There is initial evidence indicating that conservative methods (exercise or manual therapy) may be able to mitigate the development of fibrosis and other similar pathologies by attenuating tissue levels of fibrosis and TGF- $\beta$ 1 (Bove et al., 2016; Bove et al., 2019).

## Rehabilitation Considerations

By following the principles of load and exercise progression early movement and rehabilitation for acute muscle strains may accelerate return to sport. A recent article published in the *New England Journal of Medicine* highlights the role of early movement and rehabilitation for acute muscle strains (Bayer et al., 2017), this study used a combination of loads to accelerate return to sport including:

- Static stretching (Three times a day 30 seconds)
- Isometric exercises
- Dynamic resistance exercises
- Heavy slow resistance exercises

## PEACE & LOVE: New acronym for the treatment of traumatic injuries

One of the primary changes surrounding the management of acute injuries is that most guidelines recommend against the use of ice to control inflammation. It is now recognized that ice can delay healing, increase swelling, and possibly cause additional damage to injured tissues. Traditionally treatment of an acute sprain or strain consists of RICE (Rest, Ice, Compression, Elevation), the most recent recommendation has been to provide soft tissue injuries with the PEACE & LOVE protocol to encourage optimal loading of the joint and tissue around the affected injury to can impact the amount swelling leading to a faster recovery (Dubois & Esculier, 2020).

- **PEACE** makes up the first steps you would take after an injury. Immediately after the injury you would want to protect (P) the injured structure, followed by elevating (E) the limb higher than the heart, avoid anti-inflammatory (A) both over-the-counter or prescriptions and ice, as they slow down tissue healing. Compress (C) the injured area to decrease swelling. Ensure patient education (E) on the risks of overtreatment.
- **LOVE** makes up the progressive return to activities a few days after the injury. Gradual load (L) will facilitate healing, optimistic (O) influences the perception of pain and recovery speed. Loading and progressive return to activity will facilitate vascularization (V) of the injured tissues. The last step involves activity exercises (E) can help recover range of motion, strength and proprioception.



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## Prognosis

Massage therapy as a therapeutic intervention is being embraced by the medical community. This is in part because it is a non-pharmacological therapeutic intervention that is simple to carry out, economical, and has very few side effects. Existing evidence suggests that massage therapy (soft tissue massage, neural mobilization, joint mobilization) can be utilized to help relieve pain, improve function, and reduce anxiety when integrated with standard care (Brasure et al., 2019). However, massage therapists should not overlook the importance of educating patients and addressing psychosocial factors to enhance recovery, which is the backbone of rehabilitation of acute injuries.

Key Takeaways



Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for acute sprains and strains based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (e.g. biopsychosocial framework of pain, fear avoidance, and pain-related coping)
- Stretching & Loading Programs (e.g. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# FIBROMYALGIA

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## Fibromyalgia

Fibromyalgia is used to describe a ‘constellation of symptoms’ characterized by widespread pain in the muscles and joints, fatigue, sleep problems and cognitive difficulties (Arnold et al., 2019).

## Pathophysiology

The current scientific consensus is that symptoms are caused by ongoing neuro-inflammation and hyper-vigilance of the central nervous system. More specifically sustained glial cell activation and elevated levels of certain inflammatory substances (Albrecht et al., 2019). Symptoms are then exacerbated as the body struggles to dampen neuro-immune responses associated with pain, fatigue and cognitive difficulties.

## Examination

A thorough health history intake can be done to gather information about patients’ limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Fatigue Severity Scale
- Fibromyalgia Impact Questionnaire (FIQ)
- Michigan Body Map
- Perceived Stress Questionnaire (PSQ)
- McGill Pain Questionnaire (MPQ)
- Pain Self Efficacy Scale
- Multidimensional Pain Inventory

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

Ascribing a patient's pain solely to a tissue-driven pain problem is often an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. Gently stretching the muscles, neurovascular structures, and investing fascia activates endogenous pain modulating systems that help to modulate neuro-immune responses (Espejo et al., 2018).

### Prognosis

A number of clinical practice guidelines now recommend the use of massage therapy as part of a multi-modal approach for patients with Fibromyalgia (Busse et al., 2017; Skelly et al., 2020). It is not suggested that massage therapy alone can control symptoms but can be utilized to help relieve pain & reduce anxiety when integrated with standard care.

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## Massage Sloth: Massage for Fibromyalgia

[https://www.youtube.com/watch?v=O5UhECAwOHs\[/embed\]](https://www.youtube.com/watch?v=O5UhECAwOHs[/embed])

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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for fibromyalgia based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (e.g. biopsychosocial framework of pain, fear avoidance, and pain-related coping)

- Stretching & Loading Programs (e.g. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# CHRONIC PAIN

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## Chronic Pain

Chronic pain is defined as pain that persists or recurs for longer than three months. Such pain often becomes the sole or predominant clinical problem in some patients.

- **Chronic primary pain** is characterized by disability or emotional distress and not better accounted for by another diagnosis of chronic pain. Here, you will find chronic widespread pain, chronic musculoskeletal pain previously termed “non-specific” as well as the primary headaches and conditions such as chronic pelvic pain and irritable bowel syndrome.
- **Chronic secondary pain** is organized into the following six categories:
  1. **Chronic cancer-related pain** is chronic pain that is due to cancer or its treatment, such as chemotherapy.
  2. **Chronic postsurgical or post-traumatic pain** is chronic pain that develops or increases in intensity after a tissue trauma (surgical or accidental) and persists beyond three months.
  3. **Chronic neuropathic pain** is chronic pain caused by a lesion or disease of the somatosensory nervous system. Peripheral and central neuropathic pain are classified here.
  4. **Chronic secondary headache or orofacial pain** contains the chronic forms of symptomatic headaches and follows closely the ICHD-3 classification.
  5. **Chronic secondary visceral pain** is chronic pain secondary to an underlying condition originating from internal organs of the head or neck region or of the thoracic, abdominal or pelvic regions. It can be caused by persistent inflammation, vascular mechanisms or mechanical factors.
  6. **Chronic secondary musculoskeletal pain** is chronic pain in bones, joints and tendons arising from an underlying disease classified elsewhere. It can be due to persistent inflammation, associated with structural changes or caused by altered biomechanical function due to diseases of the nervous system.

## Pathophysiology

Chronic pain is a condition, affecting an estimated 20% of people worldwide. The current scientific consensus is that symptoms are caused by ongoing neuro-inflammation and hyper-vigilance of the central nervous system. More specifically sustained glial cell activation and elevated levels of certain inflammatory substances.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following chronic pain outcome measurements when assessing and monitoring patient progress:

- Patient Global Impression Change
- Pain Self Efficacy Scale
- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Numeric Pain Rating Scale (NPRS)
- Visual Analogue Scale (VAS)
- Michigan Body Map
- Perceived Stress Questionnaire (PSQ)
- McGill Pain Questionnaire (MPQ) or The Revised Short McGill Pain Questionnaire Version-2 (SF-MPQ-2)
- Multidimensional Pain Inventory
- Short Musculoskeletal Function Assessment (SMFA)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

Ascribing a patient's pain solely to a tissue-driven pain problem is an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. Gently stretching the muscles, neurovascular structures, and investing fascia activates endogenous pain modulating systems that help to modulate neuro-immune responses.

## Prognosis

A number of clinical practice guidelines now recommend the use of massage therapy as part of a multi-modal approach

for patients with chronic pain (Busse et al., 2017; Skelly et al., 2018). It is not suggested that massage therapy alone can control symptoms but can be utilized to help relieve pain & reduce anxiety when integrated with standard care.

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## The Mysterious Science of Pain – Joshua W. Pate

[https://www.youtube.com/watch?v=eakyDiXX6Uc\[/embed\]](https://www.youtube.com/watch?v=eakyDiXX6Uc[/embed])

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### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for chronic pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (e.g. biopsychosocial framework of pain, fear avoidance, and pain-related coping)
- Stretching & Loading Programs (e.g. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# OSTEOARTHRITIS

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## Massage Therapy for People with Osteoarthritis

Osteoarthritis (OA) is the most common form of arthritis, affecting an estimated 302 million people worldwide, this is a condition characterized by cartilage degradation and bone remodeling which in some cases can lead to pain, stiffness, swelling, and loss of normal joint function (Kolasinski et al., 2020).

### Pathophysiology

Osteoarthritis is a common finding in the general population, and most commonly will affect knees, hips, hands, and the spine. In addition to tissue degeneration this condition involves sensitization of the nervous system, which may result in patients with osteoarthritis perceiving relatively low level stimuli as being overtly painful (Hunter & Bierma-Zeinstra, 2019).

### Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Patient Global Impression Change
- Pain Self Efficacy Scale
- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)
- Numeric Pain Rating Scale (NPRS)
- Visual Analogue Scale (VAS)
- McGill Pain Questionnaire (MPQ) or The Revised Short McGill Pain Questionnaire Version-2 (SF-MPQ-2)
- Multidimensional Pain Inventory
- Short Musculoskeletal Function Assessment (SMFA)

- Knee Injury and Osteoarthritis Outcome Score (KOOS)
- The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

## Treatment

### Skills-based capability framework for health professionals providing care for people with osteoarthritis

There are a number of rehabilitation strategies for osteoarthritis based on patient-specific assessment findings including, but not limited to self-management and education, exercise, and manual therapy. A skills-based capability framework helps to facilitate individualized treatment decisions regarding the management of osteoarthritis (Hinman et al., 2020), this includes but is not limited to:

1. communication
2. person-centred care;
3. history-taking;
4. physical assessment;
5. investigations and diagnosis;
6. interventions and care planning;
7. prevention and lifestyle interventions;
8. self-management and behaviour change;
9. rehabilitative interventions;
10. pharmacotherapy;
11. surgical interventions;
12. referrals and collaborative working;
13. evidence-based practice and service development

## Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

A number of clinical practice guidelines and randomized controlled trials recommend the use of manual therapy as part of a multi-modal approach for patients with osteoarthritis related pain (Busse et al., 2017; Kolasinski et al., 2020; Skelly et al., 2020). Two recent randomized clinical trials have highlighted the effect of conservative treatment options for patients suffering from osteoarthritis related knee pain. In one randomized clinical trial published in the *Journal of General Internal Medicine* massage therapy was shown to improve function in patients who suffer from osteoarthritis related knee pain (Perlman et al., 2019). In addition a randomized trial published in *The New England journal of medicine* demonstrated the benefits of a conservative multimodal approach (manual therapy + exercise) for patients with symptomatic osteoarthritis of the knee (Deyle et al., 2020).



It is not suggested that massage therapy alone can control symptoms but can be utilized to help relieve pain & reduce anxiety when integrated with standard care. Ascribing a patient's pain solely to a tissue-driven pain problem is often an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. Massage therapy is a form of peripheral somatosensory stimulation that can modulate the activity of neuro-immune (peripheral, cortical, subcortical) processes correlated with the experience of pain (Bialosky et al., 2018). By activating ascending and descending inhibitory systems, massage therapy may be able to mitigate the transition, amplification and development of chronic pain.

## Exercise

People with lower-extremity osteoarthritis should be encouraged to engage in physical activity, irrespective of duration. There is good evidence that even modest volumes of exercise will benefit people with arthritis-related pain (Kraus et al., 2019).

## Prognosis

Clinical practice guidelines for osteoarthritis are moving towards an interdisciplinary approach with an emphasis on self-management, physical and psychological therapies and less emphasis on pharmacological and surgical treatments (Bannuru et al., 2019; Kolasinski et al., 2020). Pharmacological treatments options such as opioid analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) have small effects on osteoarthritis related pain and are associated with adverse effects (Chou et al., 2020; Fuggle et al., 2019; Gregori et al., 2018; Machado et al., 2015; Zeng et al., 2019). Research also has demonstrated that corticosteroid injections can harm the joint resulting in cartilage loss, accelerated progression of osteoarthritis, and increase the risk of requiring arthroplasty (Kompel et al., 2019; Wijn et al., 2020).

Embracing an interprofessional strategy for pain treatment can include the use of conservative pain management strategies including but not limited to: low-impact exercise, acupuncture, hydrotherapy, manual therapy, and psychological therapies as part of a multidimensional treatment approach for patients suffering from osteoarthritis related pain (Bannuru et al., 2019; Busse et al., 2017; Kolasinski et al., 2020; Lin et al., 2020; Skelly et al., 2020).

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## Canadian Chiropractic Guideline Initiative (CCGI): Osteoarthritis Recommendations

[https://www.youtube.com/watch?v=2WfcWMq8bVk\[/embed\]](https://www.youtube.com/watch?v=2WfcWMq8bVk[/embed])

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## Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for osteoarthritis based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (e.g. biopsychosocial framework of pain, fear avoidance)
- Stretching & Loading Programs (e.g. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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41.

# DELAYED ONSET MUSCLE SORENESS

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## Delayed Onset Muscle Soreness

Delayed onset muscle soreness (DOMS) is the distinct feeling of discomfort after strenuous physical activity, symptoms typically peak at 24-72 hours.

## Pathophysiology

There are different theories of what accounts for this delayed discomfort 24-48 hours post exercise. The inflammation theory proposes that delayed onset muscle soreness is due to the accumulation of histamines, cytokines, and prostaglandins (Vadasz et al., 2020). Another theory is that delayed onset muscle soreness is caused by an acute axonopathy, where increased fluid pressure mechanically irritates nerve endings in the muscle spindle (Sonkodi et al., 2020). Current evidence suggests that lactic acid does not play a role in this condition.

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## SciShow: Does Lactic Acid Really Cause Muscle Pain?



*A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=1139>*

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Brief Pain Inventory (BPI)
- Visual Analog Scale (VAS)
- Patient Global Impression of Change (PGIC)



## Treatment

Massage therapists are professionally trained to treat active individuals from grassroots sports to professional athletes. They specialize in specific techniques for pre-event, post event and restorative/ training massage. There are important considerations to be made around dosage and timing of massage, but most treatment lengths vary between five and twenty minutes. Therapists use many different techniques, Swedish massage, sports massage, myofascial release and cupping massage, most often patients will feel a difference once they get off the table.

## Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

## Manual Therapy

Researchers have investigated the effect of soft-tissue massage on cellular signalling and tissue remodelling; this is referred to as mechanotherapy. Research has demonstrated that massage therapy (effleurage in particular) has a modest effect on local circulation and perfusion both in the massaged limb and also in the contralateral limb (Monteiro Rodrigues et al., 2020). Furthermore, a recent joint research effort between Timothy Butterfield of the University of Kentucky and researchers at Colorado State University demonstrated that modelled massage enhanced satellite cell numbers (Miller et al., 2018; Hunt et al., 2019). This was in addition to earlier research from Butterfield and his collaborators at the University of Kentucky, which proposes the idea that mechanical stimulation prompts a phenotype change of pro-inflammatory M<sup>1</sup> macrophages into anti-inflammatory M<sup>2</sup> macrophages (Waters-Banker et al., 2014). Taken together the increase in satellite cell numbers and reduction in inflammatory signaling may improve the body's ability to respond to subsequent rehabilitation.

Also worth noting is that ascribing a patient's pain solely a tissue-driven pain problem is often an oversimplification of a complex process. This insight provides us with an opportunity to re-frame our clinical models. Gently stretching the skin, muscles, neurovascular structures, and investing fascia activates endogenous pain modulating systems that help to modulate neuro-immune responses. There is initial evidence indicating that conservative methods (exercise or manual therapy) can help to ease pain and muscle soreness (Davis et al., 2020; Dupuy et al., 2018; Guo et al., 2017).

## Rehabilitation Considerations

When massage therapy is combined with a healthy diet, active recovery and sleep it can be part of an effective post-exercise recovery strategy (Van Hooren & Peake, 2018). The goal of post-exercise recovery is to ensure that athletes possess the physical & mental capacities to compete at their highest level. Which can be a challenge, due to the number of variables can affect athletic performance (eg. fatigue, recovery, training status, health and well-being). However short-term gains in recovery may be balanced out by longer-term costs, ice baths and massage that may artificially accelerate recovery from exercise may carry a hidden cost, since post-exercise inflammation signals your body to adapt and get stronger.



## Prognosis

The growing body of literature supports the use of massage therapy to help alleviate the musculoskeletal disorders associated with everyday stress, physical manifestation of mental distress, muscular overuse and many persistent pain syndromes (Skelley et al., 2020). Massage therapy may be an effective recovery tool considering it provides both physical and psychological benefits, examining the basic science behind massage therapy enables us to speculate how specific and nonspecific effects of massage can help to ease pain and muscle soreness (Best, & Crawford, 2017). Existing evidence suggests that massage therapy (soft tissue massage, neural mobilization, joint mobilization) can be utilized to help relieve pain, improve function, and reduce anxiety when integrated with standard care (Davis et al., 2020; Dupuy et al., 2018; Guo et al., 2017).

### Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for delayed onset muscle soreness based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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42.

# TENDINOPATHY

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## Rehabilitation for Tendon Pain

Tendinopathy is the preferred term for persistent tendon pain and loss of function related to mechanical loading (Scott et al., 2020).

- Patellar tendinopathy is the preferred term for persistent patellar tendon pain and loss of function related to mechanical loading.
- Achilles tendinopathy is the preferred term for persistent Achilles tendon pain and loss of function related to mechanical loading.
- Peroneal (fibularis) tendinopathy is the preferred term for persistent peroneal (fibularis) tendon pain and loss of function related to mechanical loading.
- Persistent tendon pain and loss of function related to mechanical loading of the medial or lateral elbow tendons should be referred to as medial or lateral elbow tendinopathy.

## Pathophysiology

The presentation of pain in a tendon, does not always mean that the tendon is the primary contributor to pain. The multifactorial model of tendinopathy suggests that an impaired motor system, local tendon pathology, and changes in the pain/nociceptive system contributes to the complex clinical picture of tendon pain.

## Examination

A thorough health history intake can be done to gather information about patients' limitations, course of pain, and prognostic factors for delayed recovery (e.g. low self-efficacy, fear of movement, ineffective coping strategies, fear-avoidance, pain catastrophizing) and answers to health-related questions. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions. Then undertake a physical examination: neurological screening test, assess mobility and/or muscle strength.

Incorporate one or more of the following outcome measurements when assessing and monitoring patient progress:

- Self-Rated Recovery Question
- Patient Specific Functional Scale
- Brief Pain Inventory (BPI)

- Visual Analog Scale (VAS)

## Treatment

### Education

Provide reassurance and patient education on condition and management options and encourage the use of active approaches (lifestyle, physical activity) to help manage symptoms.

### Manual Therapy

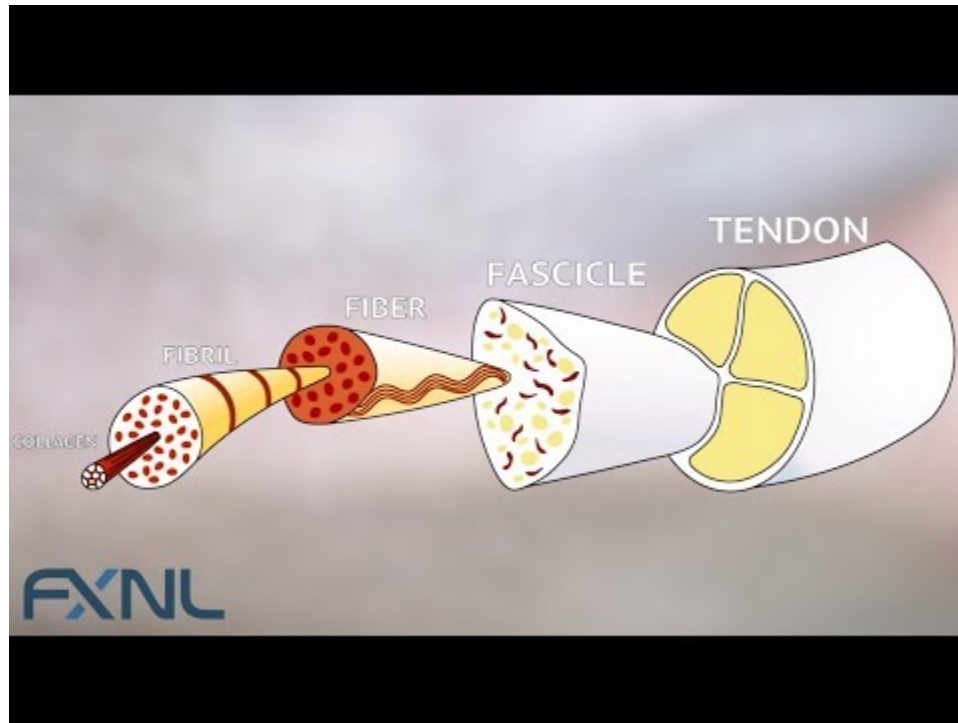
A massage therapy treatment plan should be implemented based on patient-specific assessment findings and patient tolerance. There may be times that focal irritability (ie. nerve irritation, triggerpoints, nervous system sensitization) co-exists with tendon pain. Gently stretching the muscles, neurovascular structures, and investing fascia activates endogenous pain modulating systems that help to modulate neuro-immune responses.

### Rehabilitation Considerations

Massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for patients with tendon pain including simple home-care recommendations and remedial loading programs.

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## Tendinitis, Tendinosis, Tendinopathy? Exercise is the best medicine for tendon pain.



A YouTube element has been excluded from this version of the text. You can view it online here:  
<https://ecampusontario.pressbooks.pub/handbookformassagetherapists/?p=1316>

## Prognosis

Multimodality options self-care techniques such as exercise therapy, relative rest, activity modifications should be considered as the first line treatment of tendon pain (Irby et al., 2020). Clinicians managing tendon pain should be thoughtful and skilled in managing the load on the tendons and supporting structures through a number of rehabilitation considerations including, but are not limited to manual therapy, education on psychosocial factors such as fear avoidance, and remedial loading programs.

## Key Takeaways

Contemporary multimodal massage therapists are uniquely suited to incorporate a number of rehabilitation strategies for tendon pain based on patient-specific assessment findings including, but not limited to:

- Manual Therapy (soft tissue massage, neural mobilization, joint mobilization)
- Education on psychosocial factors (eg. BPS framework of pain, fear avoidance)
- Stretching & Loading Programs (eg. concentric, eccentric, isometric)
- Hydrotherapy (hot & cold)
- Self-Care Strategies

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# SUPPLEMENTARY RESOURCES

## Supplementary Resources

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## Supplementary Resources

**Setting The Groundwork For Evidence-Based Massage Therapy:** A selection of books and research articles that might be of interest if readers want to explore the topics introduced here in more depth.

### General Reference Books

Brassett, C. (2018). *The Secret Language of Anatomy: An Illustrated Guide to the Origins of Anatomical Terms*. North Atlantic Books.

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# GLOSSARY

## Glossary

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### A Fascia

a fascia is a sheath, a sheet, or any other dissectible aggregations of connective tissue that forms beneath the skin to attach, enclose, and separate muscles and other internal organs

### Acupuncture

Acupuncture interventions are defined in accordance with the World Health Organization as body needling (traditional, medical, modern, dryneedling, trigger point needling, etc.), moxibustion (burning of herbs), electroacupuncture, laser acupuncture, microsystem acupuncture (such as ear acupuncture), and acupressure (application of pressure at acupuncture points).

### Adhesion

a fibrous band of connective tissue that develops in response to inflammation, trauma, or surgery, resulting in the union of two adjacent structures.

### Allodynia

pain due to a stimulus that would not normally cause pain, such as light touch or mild changes in temperature.

### Clinical massage

Soft tissue therapies intended to target muscles with specific goals such as relieving pain, releasing muscle spasms or improving restricted motion, performed by a practitioner.

### Clinical practice guideline

A systematically developed statement that aims to assist clinicians in providing quality care to patients.

### Cognitive behavioural therapy

A therapy that is used to help people think in a healthy way with a focus on thought (cognitive) and action (behavioral).

### Cryotherapy

The local use of low temperatures (e.g., ice).

## Cupping massage

A form of massage which utilizes cupping glasses being moved over the skin once suction (negative pressure) is created. The aim is to increase local blood circulation and relieve muscle tension.

## Descending modulation

The process by which pathways that descend from the brain to the spinal cord modify incoming somatosensory information so that the perception of and reactions to somatosensory stimuli are altered, resulting in increased or decreased pain.

## Ectopic discharge

Trains of ongoing electrical nerve impulses that occur spontaneously without stimulation or originate at sites other than normal location (or both). This phenomenon typically occurs after nerve injury.

## Electric Muscle Stimulation (EMS)

A passive physical modality that stimulates muscle contraction by electrical impulses.

## Electroacupuncture

The stimulation of inserted acupuncture needles with an electrical current. The frequency and intensity of the electrical stimulation may vary.

## Enthesis

the site of insertion of tendons or ligaments into bones.

## Exercise

Any series of movements with the aim of training or developing the body by routine practice or as physical training to promote good physical health.

## Fibrosis

thickening and scarring of connective tissue, most often a consequence of inflammation or injury.

## General exercise program

An exercise program incorporating aerobic exercises, stretching, strengthening, endurance, co-ordination and functional activities for the whole body.

## Guided imagery

A technique used to induce relaxation. Recordings are designed to help individuals visualize themselves relaxing or engaging in positive changes or actions. State of awareness is similar to that of a meditative status.

## Ischemic compression

A soft tissue therapy that involves sustained pressure to a muscle that is applied with the hand or a device, performed by a health care professional.

## Kinesio tape

A thin, pliable adhesive tape applied to the skin.

## Manipulation

Manual treatment applied to the spine or joints of the upper or lower extremity that incorporates a high velocity, low amplitude impulse or thrust applied at or near the end of a joint's passive range of motion.

## Manual therapy

Techniques that involve the application of hands-on and/or mechanically assisted treatments, including manipulation, mobilization, and traction.

## Massage

A group of soft tissue therapies intended to target muscles for the purpose of specific goals and relax muscles

## Mobilization

Manual treatment applied to the spine or joints of the upper or lower extremity that incorporates a low velocity and small or large amplitude oscillatory movement, within a joint's passive range of motion.

## Multimodal care

Treatment involving at least two distinct therapeutic modalities, provided by one or more health care disciplines. The following were considered distinct therapeutic modalities: passive physical modalities; exercise; manual therapy which includes mobilization, manipulation or traction; acupuncture; education; psychological interventions; and soft tissue therapies.

## Muscle energy technique

A soft tissue therapy performed by a health care professional that involves a stretch to the muscle after the muscle was contracted against resistance.

## Myofascial Release Therapy

A soft-tissue therapy aimed at relaxing contracted muscles and improving blood and lymph circulation in associated tissues. It uses slow and sometimes deep pressure applied directly to tissues.

## Neuropathic pain

Pain caused by a lesion or disease of the somatosensory nervous system

## Neuroplasticity

The brain's ability to reorganize itself by forming new neural connections throughout life.

## Nociceptive pain

Pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors.

## Nociplastic pain

Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence of disease or lesion of the somatosensory system causing the pain.

## Pain

an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

## Patient education

A process to enable individuals to make informed decisions about their personal health-related behaviour.

## Relaxation massage

A group of soft tissue therapies intended to relax muscles, performed by a practitioner.

## Relaxation training

Used to guide individuals to relax muscles not needed for various daily Activities. This may include progressive relaxation training (different muscle groups are systematically tensed and relaxed) or autogenic relaxation training (self-control of the body's physiological reactions).

## Shock-wave therapy

A passive physical modality that is placed onto the skin; it involves acoustic waves associated with a sudden rise in pressure and are generated by electrohydraulic, piezoelectric and electromagnetic devices to send sound waves into areas of soft tissue.

## Short term

Less than three months.

## Soft tissue therapy

A mechanical therapy in which muscles, tendons, and ligaments are passively pressed and kneaded by hand or with mechanical devices.

## Spinal manipulation

Manual therapy applied to the spine that involves a high velocity, low amplitude impulse or thrust applied at or near the end of a joint's passive range of motion.

## Strain-counterstrain

A soft tissue therapy that involves applied pressure to a muscle with positioning of the neck to provide a small stretch a muscle, performed by a practitioner.

## Tensegrity

An architectural system where the structures stabilize themselves by balancing countering forces of tension and compression.

## The Fascial System

The fascial system consists of the three-dimensional continuum of soft, collagen-containing, loose and dense fibrous connective tissues that permeate the body. It incorporates elements such as adipose tissue, adventitia and neurovascular sheaths, aponeuroses, deep and superficial fasciae, epineurium, joint capsules, ligaments, membranes, meninges, myofascial expansions, periosteum, retinacula, septa, tendons, visceral fasciae, and all the intramuscular and intermuscular connective tissues including endo-/peri-/epimysium.

## Traction

Manual or mechanically assisted application of an intermittent or continuous distractive force.

## Transcutaneous Electrical Nerve Stimulation (TENS)

A passive physical modality connected to the skin, using two or more electrodes to apply low level electrical current. Typically used with the intent to help pain management.

## Triggerpoint Therapy

A form of clinical massage where pressure and/or longitudinal stroking is applied over a trigger point in a muscle.



## Yoga

An ancient Indian practice involving postural exercises, breathing control, and meditation.