

# **The Long Mile: Managing Chronic Pain**

## **Session 5**

### **GROUP HANDOUTS**

# Learning objectives

## Session 5: The Mind-Body Connection

Understanding the following:

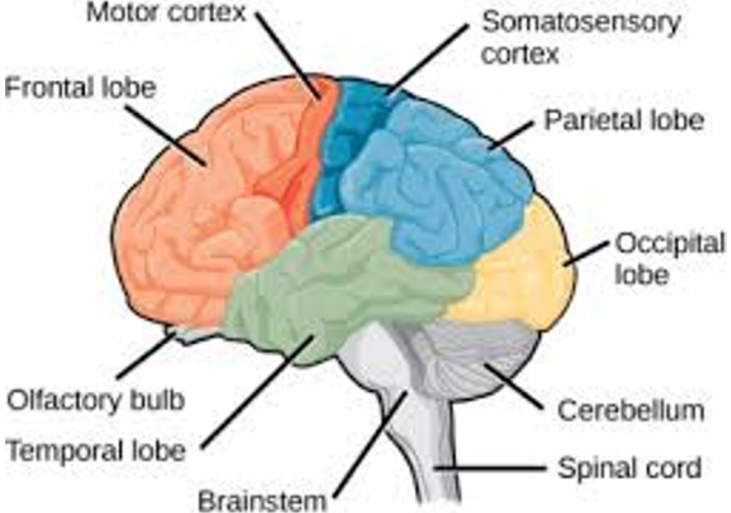
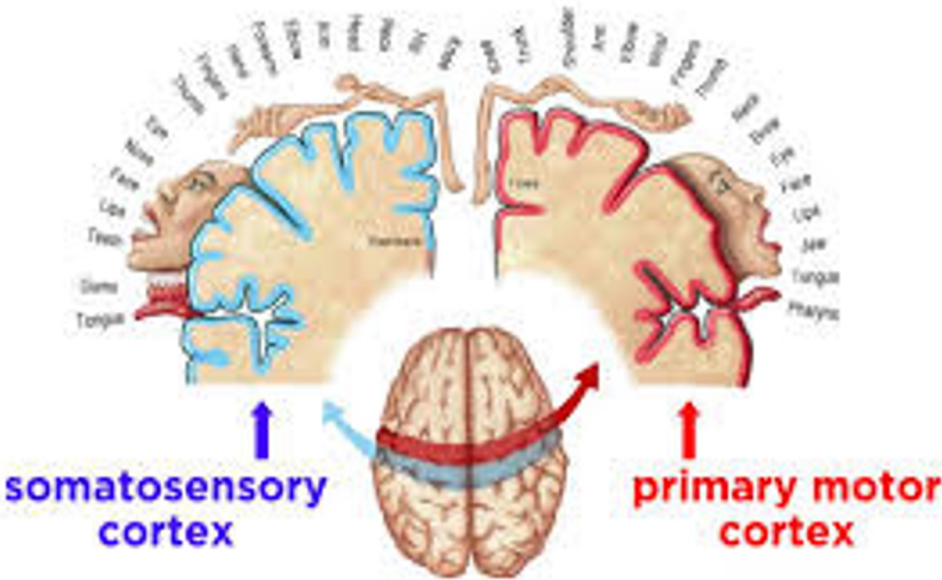
- The sensory-motor system and pain-spasm cycle
- The autonomic nervous system
- The Default Mode Network and chronic pain
- Neuroplasticity and its potential to promote recovery

# What is the mind-body connection?

- **How is the body connected to the mind and the brain?**
- **How does the mind help to promote health?**
- **What do we know of the neurobiological systems involved?**
- **What don't we know?**
- **Let's review some well-known neurobiological systems.**

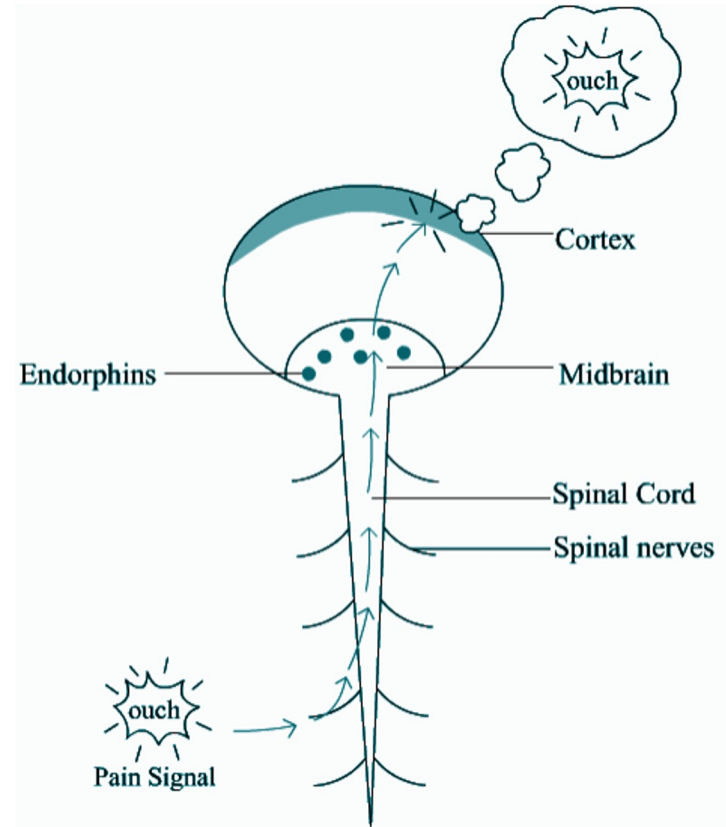


# Sensory-motor system



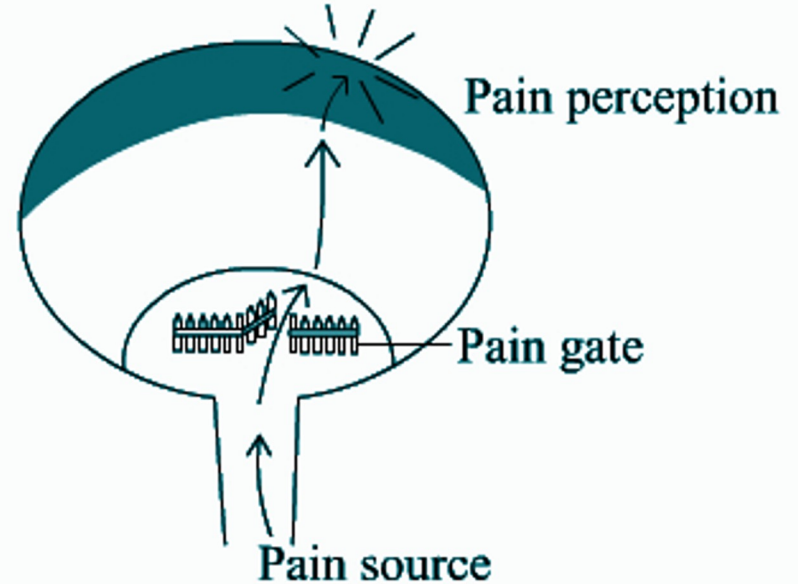
# Sensory system

- The brain's sensory cortex receives and interprets signals of sensation from various parts of the body such as pain, heat, cold
- Pain signals pass through the midbrain before reaching the cortex which experiences the "ouch"



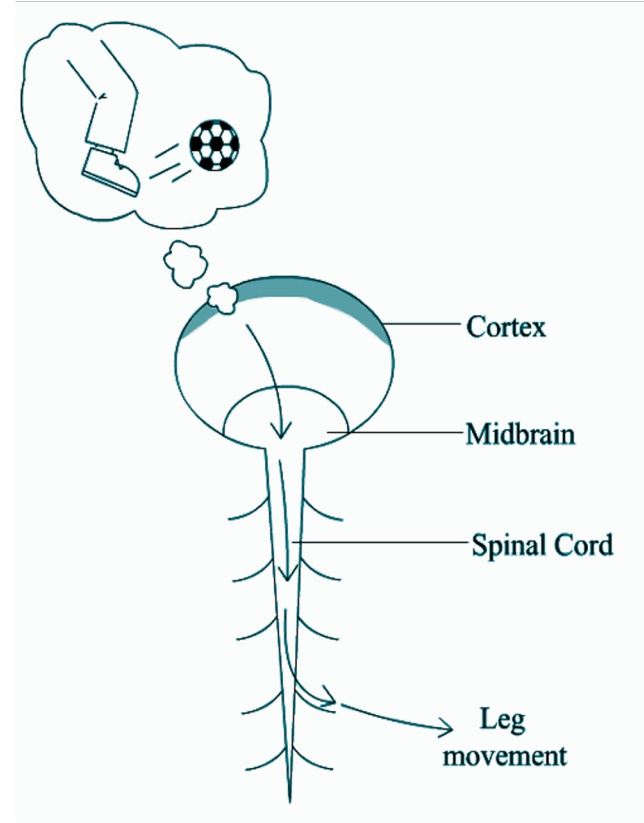
# Gate control theory

- Endorphins in the midbrain influence intensity of pain signals and help close the gate on the pain signals
- Opioids cause a drop in our natural endorphin production resulting in an increasing need for higher doses

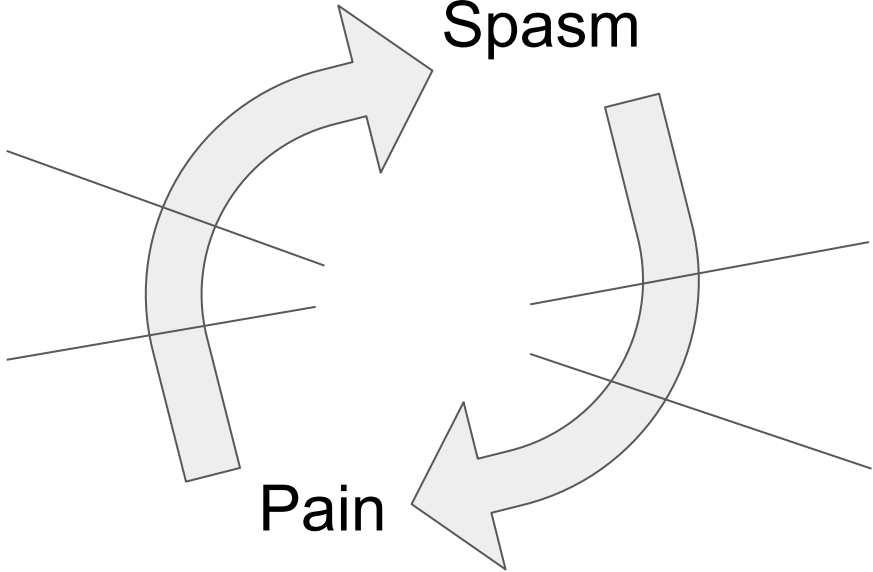
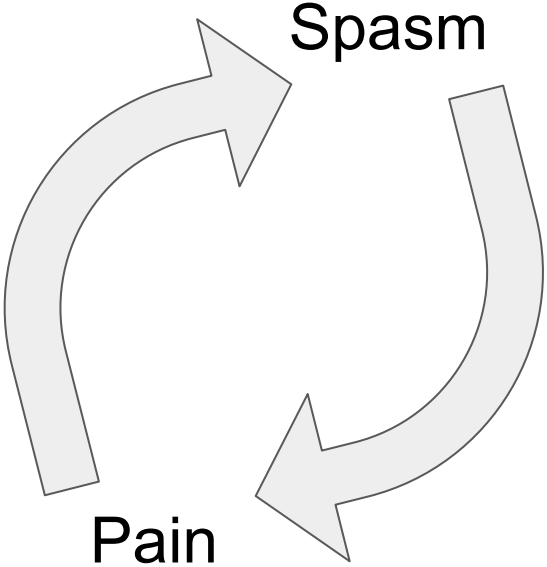


# Motor system

- The brain's motor cortex sends signals down the spinal cord to contract certain muscles resulting in coordinated movement
- Strong pain signals received by the sensory cortex transmit signals to the neighbouring motor cortex resulting in reflex muscle tension
- Example: a finger tip burned on a hot stove results in reflex withdrawal of finger
- Chronic pain signals may result in ongoing muscle spasms. Lactic acid builds up causing more pain

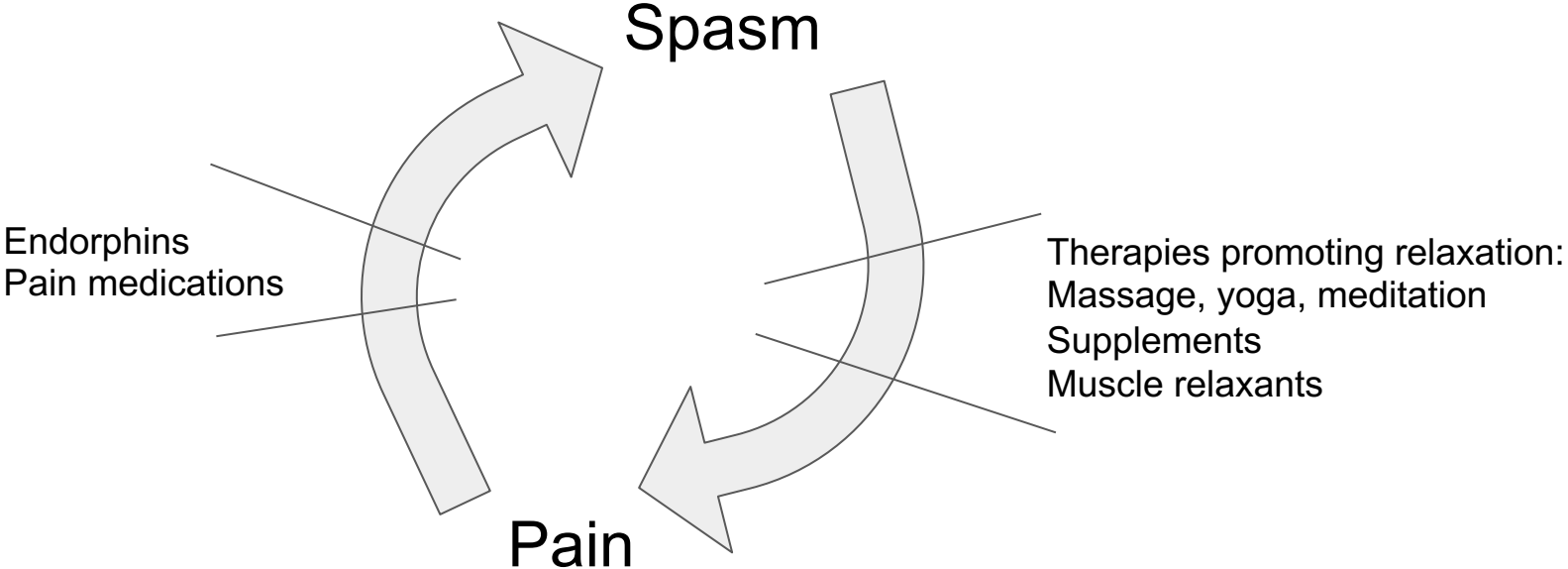


# Pain-spasm cycle





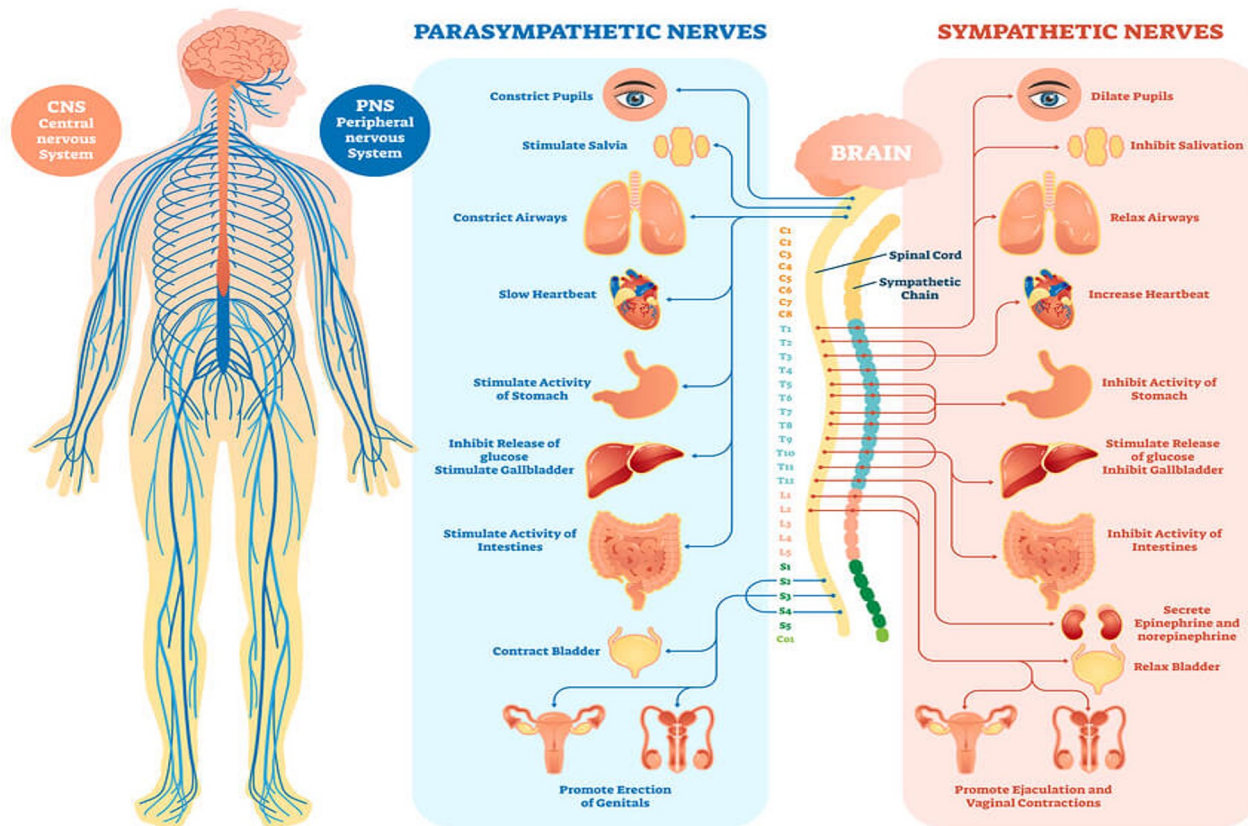
# Breaking the cycle: short term & long term



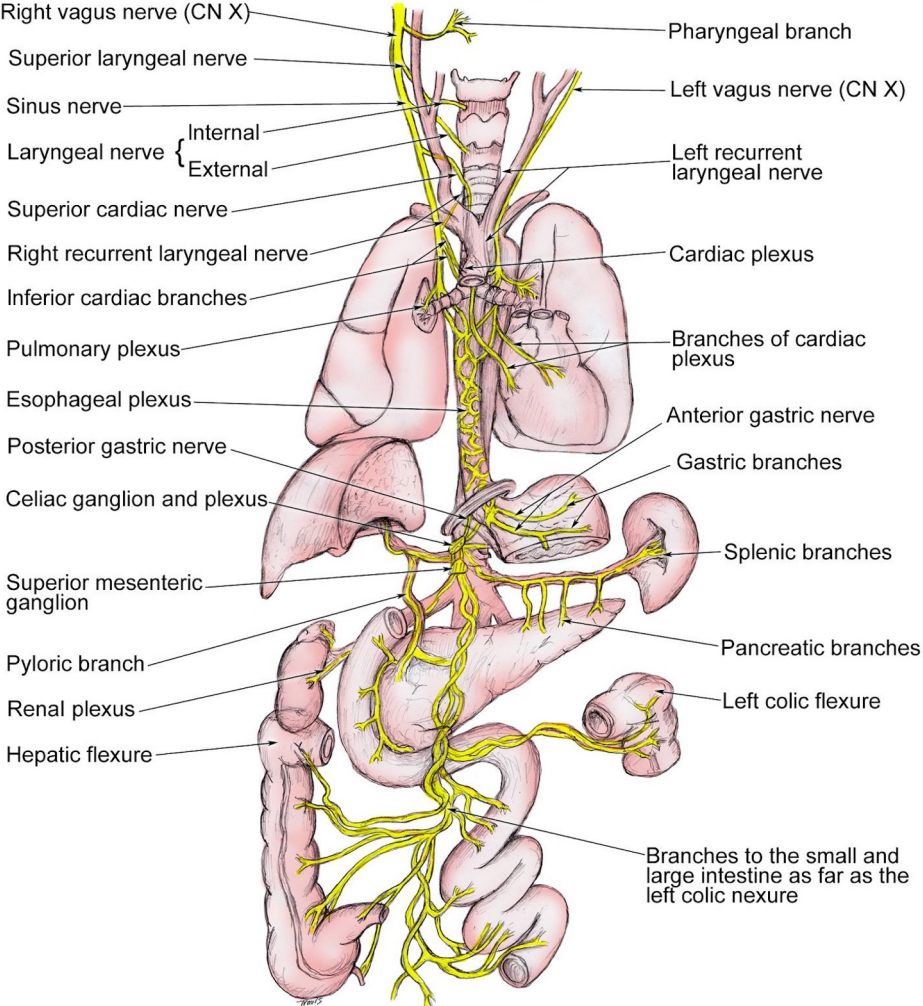
# Autonomic nervous system

- The auto-pilot of the body that controls our internal functions such as heart rate, blood pressure, digestion, breathing
- Located in the brain stem and the limbic system within the mid-brain with nerve fibres and chemical messengers extending throughout the body
- Consists of 2 parts, the parasympathetic and sympathetic system, which have a balancing yin-yang function
- Closely linked to emotional centres in the midbrain and amygdala
- Reacts to both real and imaginary events
- Affected by multiple factors such as stress, past traumas, accidents, relationship conflicts, habitual worrying
- Responds to relaxation techniques

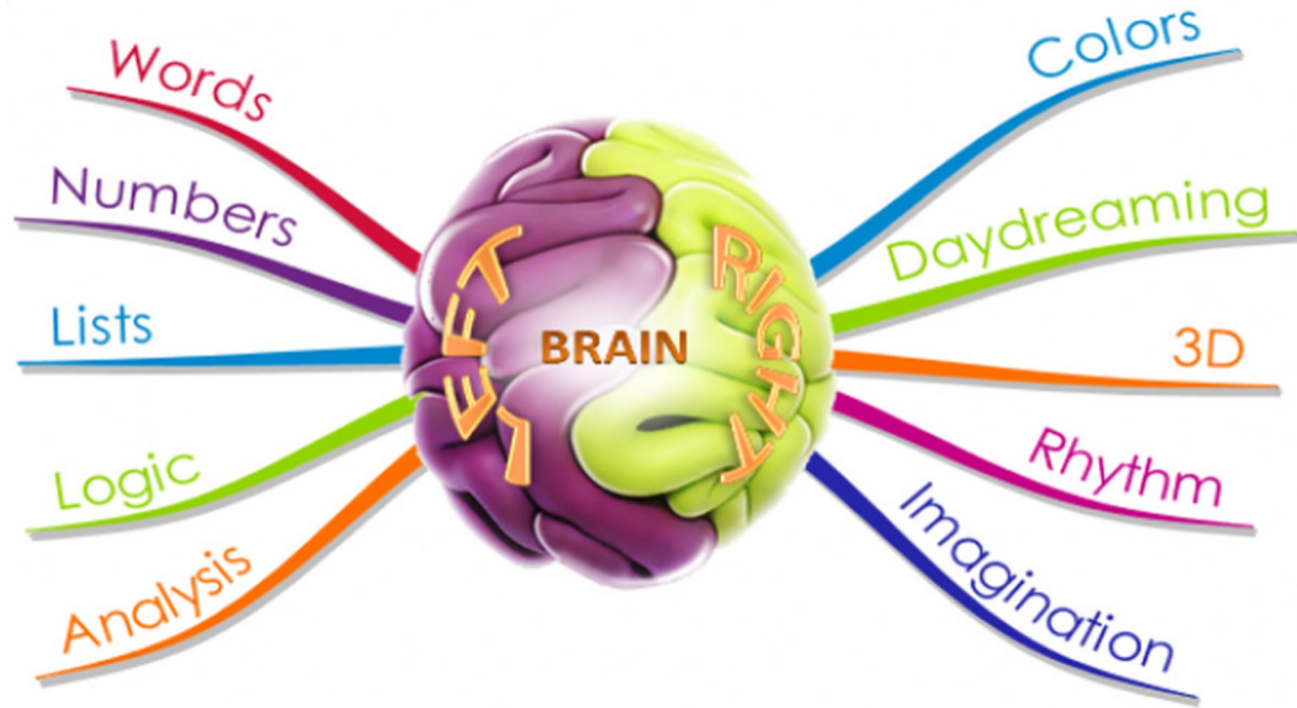
# HUMAN NERVOUS SYSTEM



# The Vagus Nerve (wandering nerve)



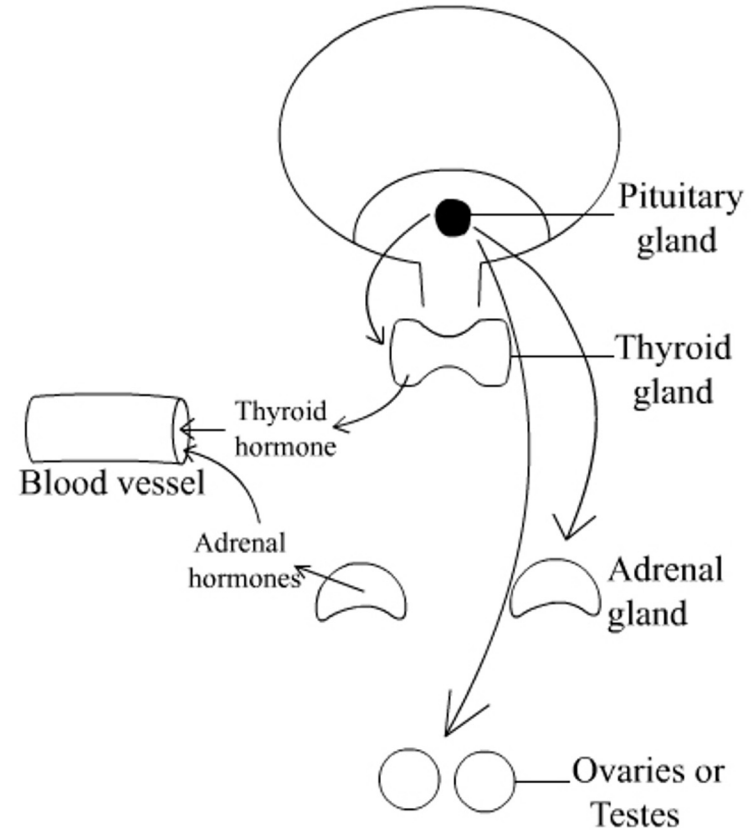
Right brain has greater influence on the vagus nerve



**+ nature**

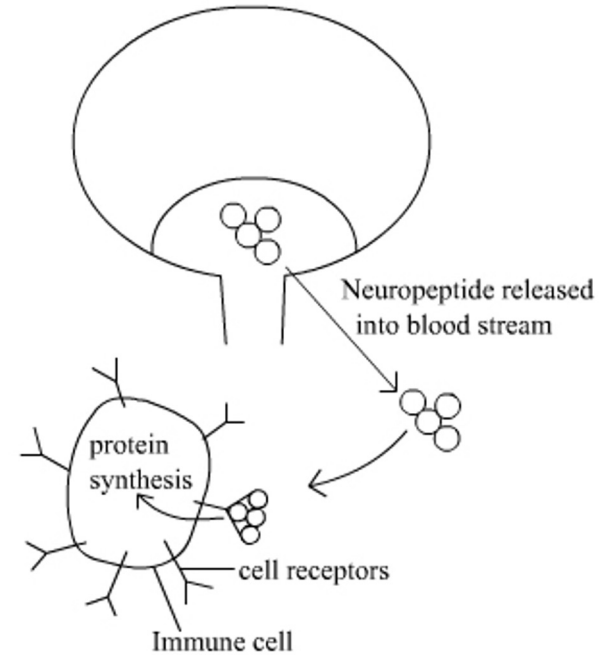
# The Endocrine System

- Not “hard wired” but chemically wired through hormones.
- Glands communicate through chemical messengers.
- Master gland is the pituitary in the midbrain. It functions with the hypothalamus to control the major endocrine functions of the body.
- Pituitary is responsible for “fight or flight” and tells the adrenal glands to produce adrenaline and cortisol at times of stress.
- Stress management is essential for balance.



# Psychoneuroimmunology

- Dr. Candace Pert discovered in 1980's that the brain makes neuropeptides which circulate in the body and link up with specific receptors on the surface of cells.
- Neuropeptides link up with a lock and key fit and triggers changes in cell receptors like flicking a switch and telling the cell what to do eg. immune cell function.
- State of mind and stress level influence production of type and quantity of neuropeptides



**Thoughts and feelings affect health!**

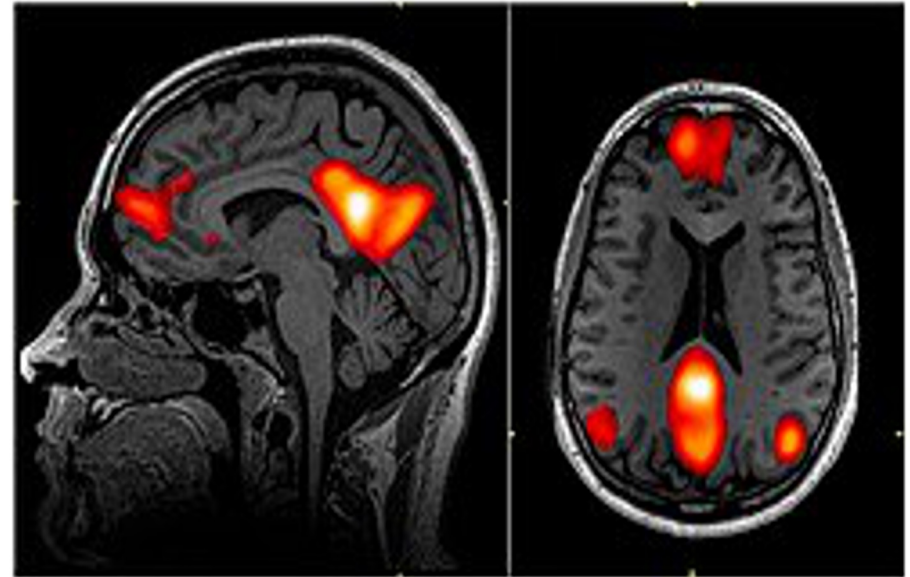
# Default Mode Network

- Coined by Dr. Marcus Raichle in 2001 who received the Kavli Prize in Neuroscience for the discovery of specialized brain networks for memory and cognition
- DMN is composed of several areas of the cortex that are active when no external tasks demand our attention
- When we relax the DMN is the most active area of the brain
- Attention network makes it possible to relate to the world. DMN makes it possible to relate to ourselves, our past and our future



# DMN structures

- Medial pre-frontal cortex
- Bilateral temporoparietal cortices
- Precuneus
- Posterior cingulate cortex
- Hippocampal formation



# Chronic Pain Changes Connectivity of the DMN

## Reorganization of the Default Mode Network across Chronic Pain Conditions

### **Abstract**

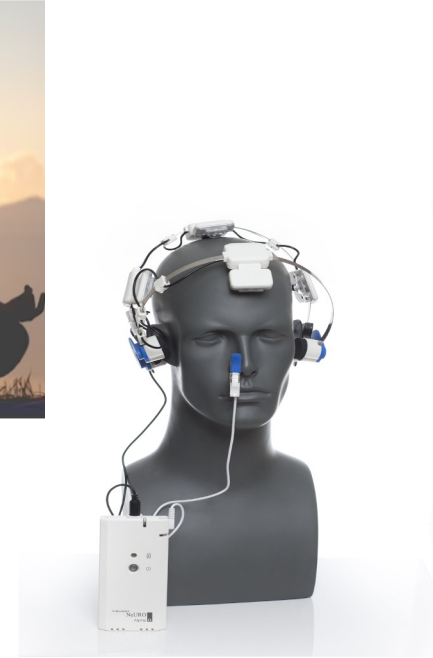
“Chronic pain is associated with neuronal plasticity. Here we use resting-state functional magnetic resonance imaging to investigate functional changes in patients suffering from chronic back pain (CBP), complex regional pain syndrome (CRPS) and knee osteoarthritis (OA). We isolated five meaningful resting-state networks across the groups, of which only the default mode network (DMN) exhibited deviations from healthy controls....

**Thus chronic pain seems to reorganize the dynamics of the DMN and as such reflect the maladaptive physiology of different types of chronic pain.”**

Baliki, Marwan N et al. “Functional reorganization of the default mode network across chronic pain conditions.” *PloS one* vol. 9,9 e106133. 2 Sep. 2014

# DMN may be modulated by:

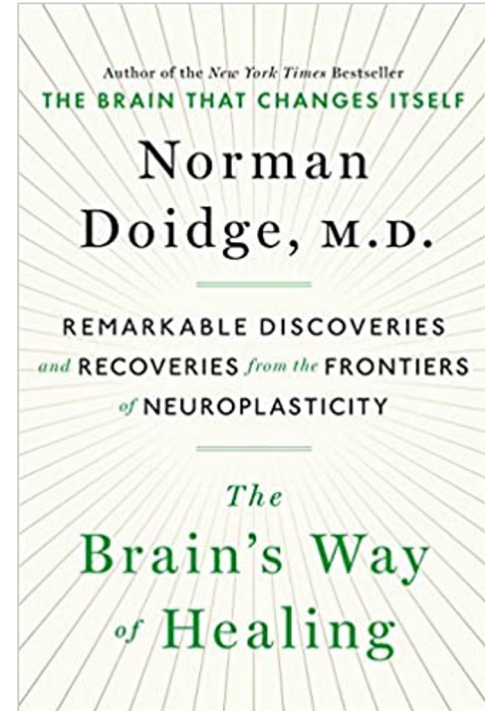
- Meditation
- Hypnosis/self-hypnosis
- Acupuncture
- Sleep
- Psychedelic drugs
- Photobiomodulation



Brewer JA, Worhunsky PD, Gray JR, Tang YY, Weber J, Kober H. Meditation experience is associated with differences in default mode network activity and connectivity. *Proc Natl Acad Sci U S A*. 2011;108(50):20254-20259

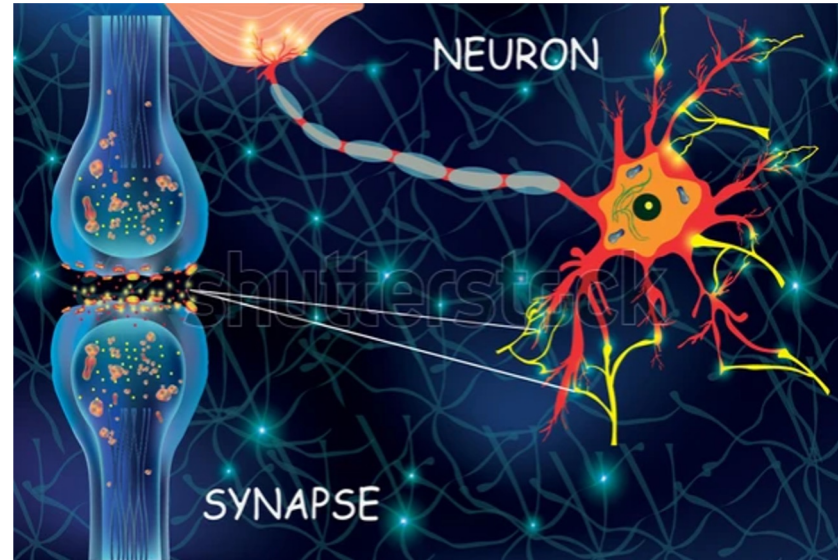
# Neuroplasticity - The ability of the brain to remodel and remap itself

- We used to think that the brain was hardwired and after childhood it could not repair, regenerate or replace damaged cells.
- Now we know the brain can change
- It can change its own structure and function in response to mental experiences
- The brain's response to light, sound, vibration and movement can awaken its healing capacities - Norman Doidge, MD



# How the brain changes

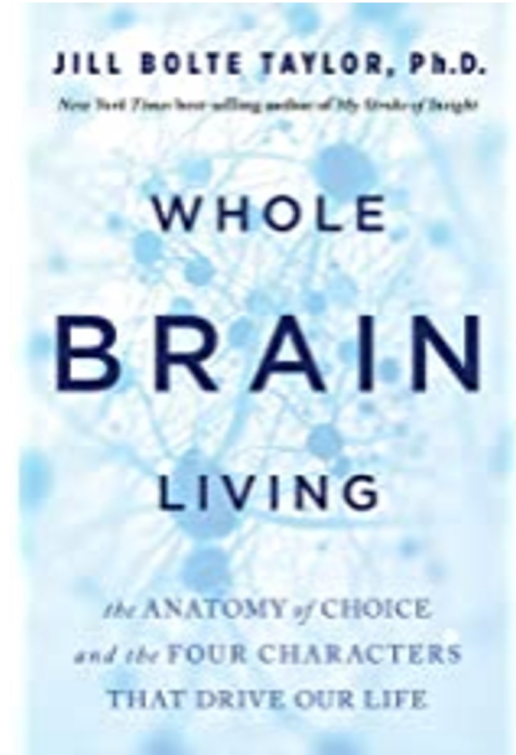
- Neurogenesis - creation of new neurons
- New synapses - learning new skills and experiences create new neural connections
- Stronger synapses - repetition and practice strengthens neural connections
- Weakened synapses - connections in the brain that are not used become weak and may be pruned



# A scientist's experience of neuroplasticity

"The more we run a circuit, the more power it begins to run on its own. . ."

Jill Bolte Taylor, neuroanatomist and author of "My stroke of insight"



# “Neurons that fire together, wire together”

Neuroplasticity can be influenced by:

- Learning
- New experiences
- Daily thoughts
- Nutrition
- Exercise
- Social interactions
- Meditation and prayer
- Emotions
- Stress and worry
- Traumatic events



Mansour, A R et al. “Chronic pain: the role of learning and brain plasticity.” *Restorative neurology and neuroscience* vol. 32,1 (2014): 129-39

# Bottom line

- We can take advantage of the mind-body connection to improve our health especially in chronic conditions where medical treatments are limited
- We can learn to engage the process of neuroplasticity to improve our symptoms and promote recovery

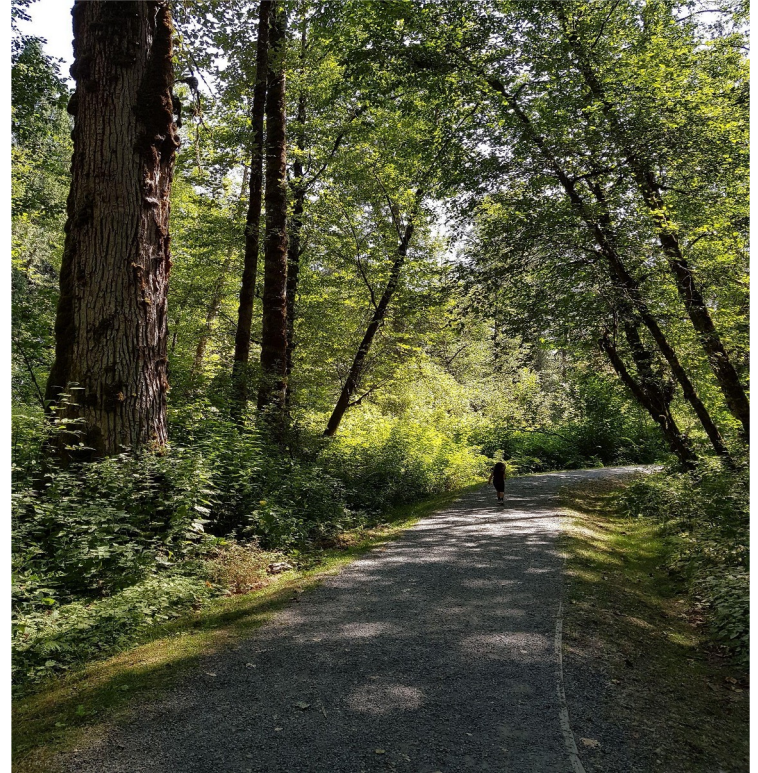
“Neuroplasticity is better than mind over matter. It’s mind turning into matter as your thoughts create new neural growth.”

Deepak Chopra, “Super Brain”



...be gentle with yourself.  
You are a child of the  
universe no less than the  
trees and the stars; you have  
a right to be here.

**Max Ehrmann, Desiderata, 1927**



## Discussion guide:

- Share successes accomplished thus far with lifestyle changes made in the areas of nutrition, exercise, sleep, relaxation practices etc.
- Discuss any “right brain” activities you enjoy: hobbies, art, music, nature etc.

# Time to kick back

## Relaxation exercise

7. Magic screen visualization

8. White light visualization



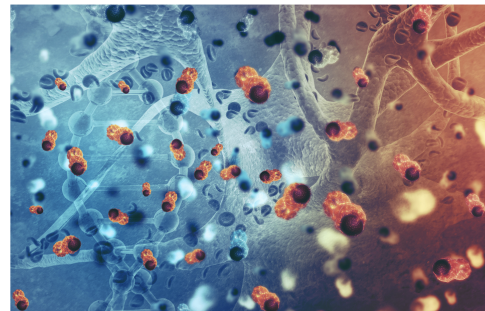
# Wellness Group Medical Visits



## The Long Mile: Managing Chronic Pain

Dr. Teresa Clarke

This 10-week series will help you on your chronic pain journey. You will learn how to promote healing through integrative approaches and optimize your physical and mental well-being.



## Immune Health & How to Optimize Your Immunity

Dr. Teresa Clarke

In this session, you will learn integrative health approaches to promoting immune health. These approaches can be added to public health recommendations to reduce your risk of serious viral illness.



## Acupressure for Chronic Illnesses

Dr. Teresa Clarke

In this series of three workshops, you will learn how Acupressure can be utilized in a self-treatment approach to improve wellbeing and symptom management in patients with chronic illnesses.



## Osteopathy & Chronic Conditions

Fabio Bocchetti

In this series of four workshops, you will learn how Osteopathy can explain and treat several types of headaches, low back pain, knees or hip pain as well as digestive issues.

[REGISTER NOW](#)

# Ask the Expert Cannabis Series

## 101: Cannabis Counselling & Treatment Plans

**By participating you will learn about:**

- The endocannabinoid system
- The differences between cannabinoids (THC & CBD)
- Routes of administration (oral oil & vaporization)
- Symptom management using cannabis
- Customized treatment plans
- How to dose your cannabis safely
- How to monitor for symptom improvements
- Potential side effects
- Drug interactions
- Supply options through a Health Canada licensed seller
- Cost of medication & discount programs available
- Extended health benefits & claiming as a medical expense
- Driving & travelling
- How to store your medication

## 201: Inhaled Cannabis; Dried Flower, Vape Pens & Extracts

**By participating you will learn about:**

- The difference between smoking & vaporization
- Is vaporization safe?
- When to consider using vaporized cannabis for symptom management
- Finding the right temperature for optimal benefit
- Types & cost of vaporizers
- Choosing the best strain to vaporize (sativa, indica, hybrids)
- How to determine your optimal dose & monitoring effects
- Taking proper care of your vaporizer
- Where am I allowed to vaporize my cannabis?
- Safe storage of vaporizer & cannabis
- Driving & travelling
- Inhaled extracts

## 301: Cannabis Edibles, Oral Preparations & Topicals

**By participating you will learn about:**

- The difference between medical & recreational cannabis
- Edibles (mints, baked goods, snacks, candy, chocolates, teas & other beverages)
- Tinctures & sprays
- Creams, salves & liniments
- Differences between onset of actions for various routes of administration
- Risks & side effects
- Choosing a product that is right for you
- Dosing of extracts and edibles; the basics
- Driving & travelling
- How to determine your optimal dose & monitoring effects

**REGISTER NOW**

# Post Group Resources



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Please remember for session 6

For next week's session you will need a sheet of blank paper, different colour crayons, colour pencils or felt markers