

# THE SCIENCE BEHIND THE SILENCE

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The Use of Meditation in the Management of  
Chronic Pain

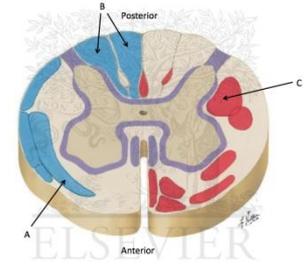
Andrew Gibson  
4<sup>th</sup> Year Medical Student  
University of Liverpool



A Brief History of Meditation



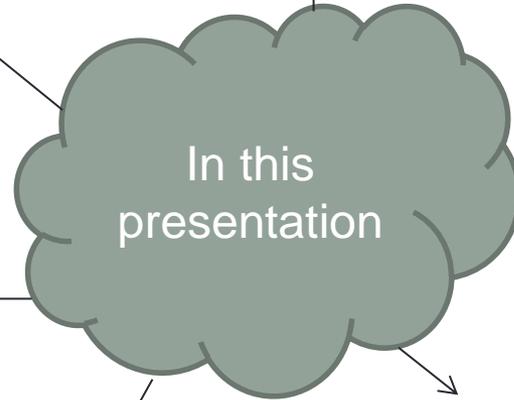
Types of Meditation



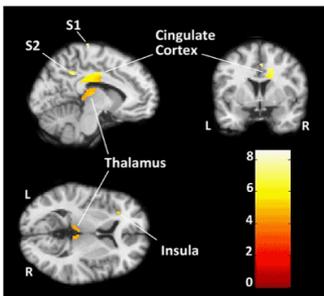
Revision of Pain Pathways



Meditation in healthcare



Interoception



Meditation and the Brain and Mind



# A Brief History



Vedantism - BCE 1500



Taoism - BCE 500

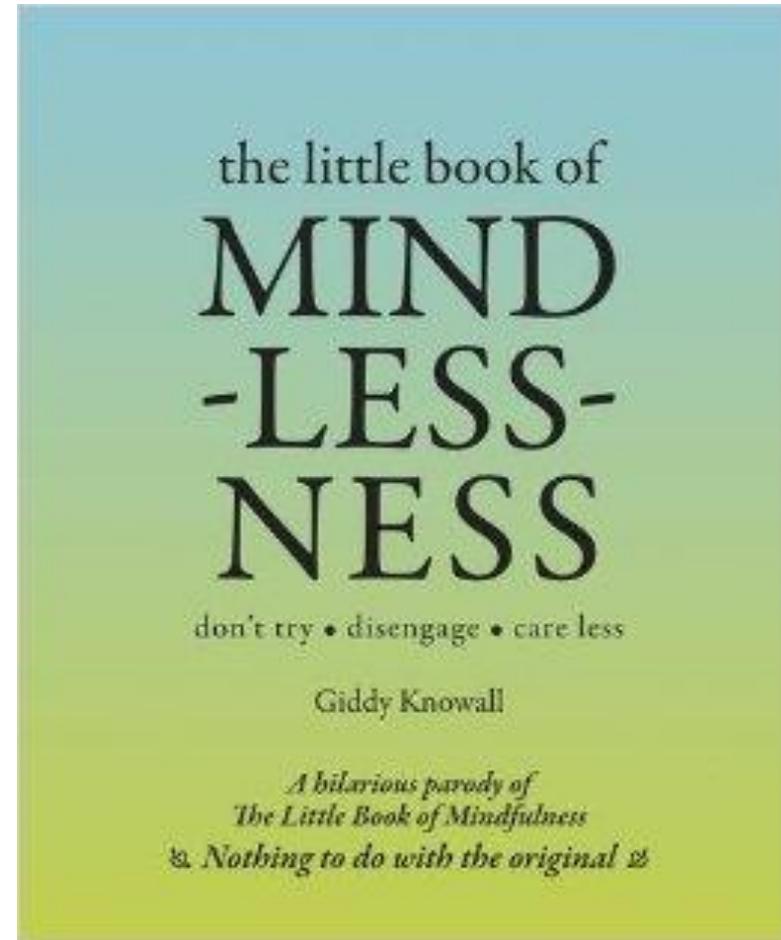
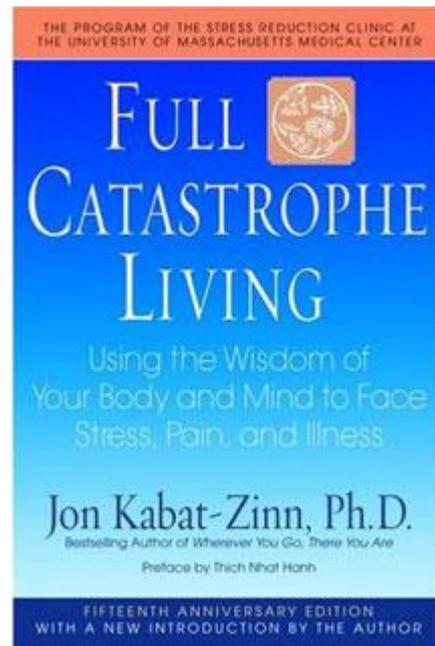
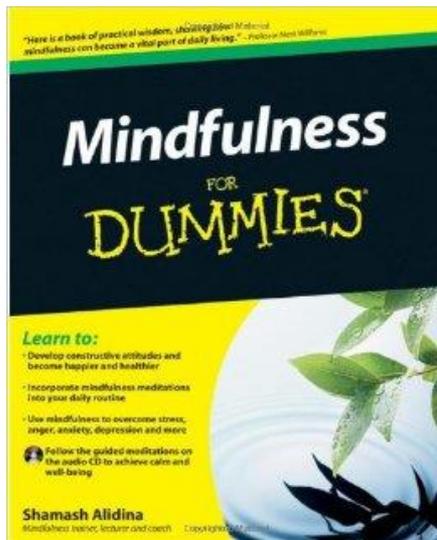
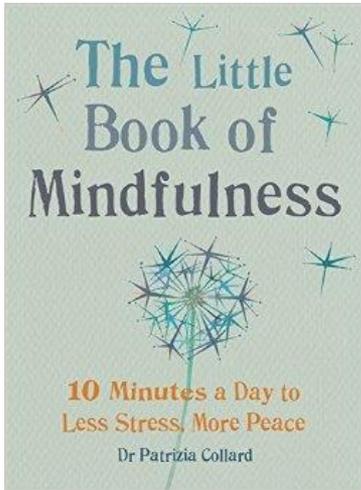


# Zen Meditation

- Direct focus of the mind
- Typically on the user's breathing
- A method of considering our very existence

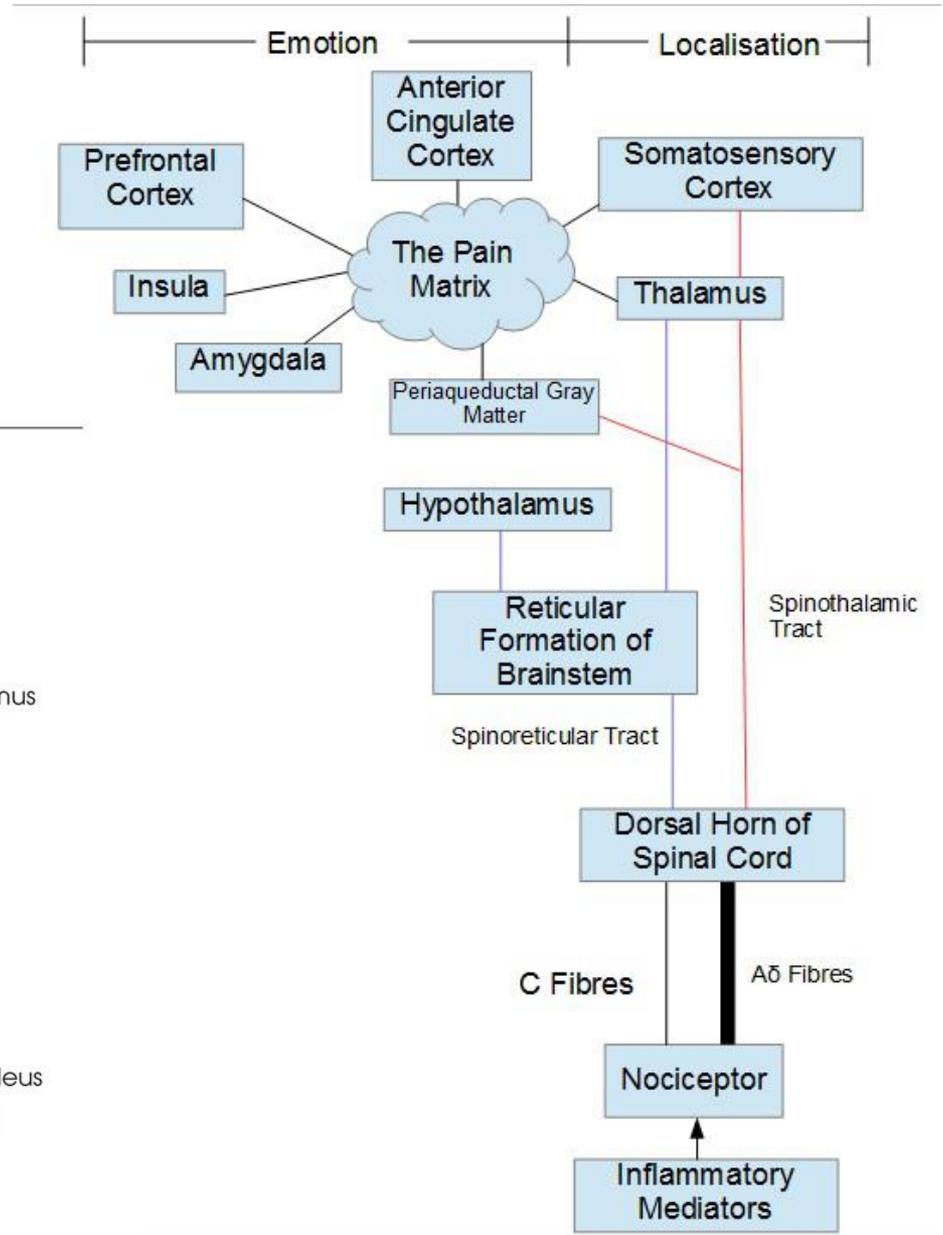
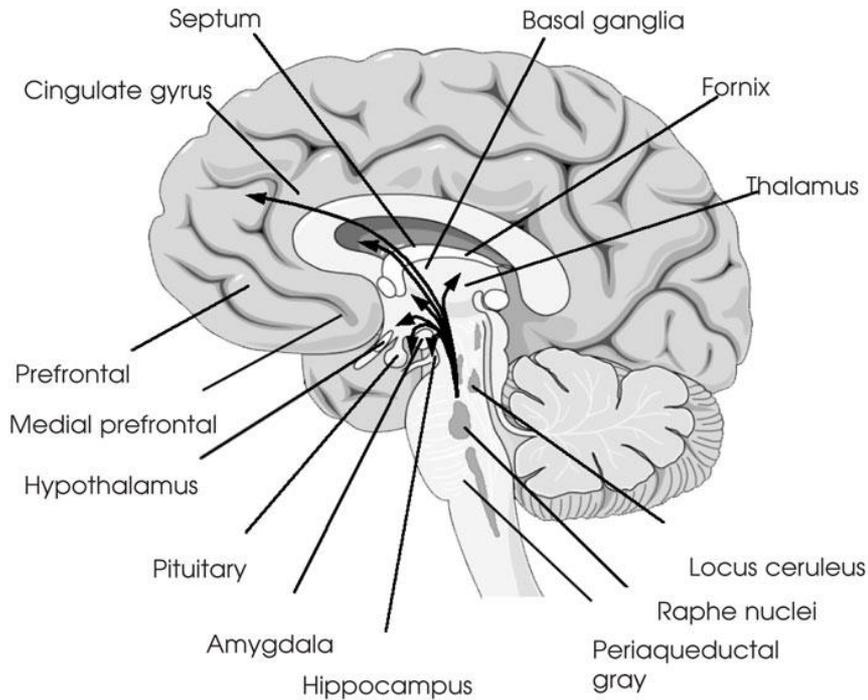
# Mindfulness Meditation

- Being consciously aware of the present moment
- Non-judgementally accepting all thoughts which enter the mind
- Recent interest due to development of the MBSR program.



# Pain Pathways

Figure 1  
Gross Anatomical Structures Involved in the Fear Circuitry\*



\*Arrows indicate movement of sensory input.  
Berlant JL. *Primary Psychiatry*, Vol 10, No 10, 2003.

# Theories Regarding Pain

Health Educ Q. 1983 Spring;10(1):3-29.

**The impact of communications on the self-regulation of health beliefs, decisions, and behavior.**

Leventhal H. Safer MA. Panagis DM.

**Abstract** *Science* 8 April 1977:  
The model of disease today is big and it leaves no room for the behavioral dimensions of pain. A framework for a new medical model, one that is more comprehensive, is proposed. This model is based on the idea that pain is a complex phenomenon that involves both objective and subjective components. The model is based on the idea that pain is a complex phenomenon that involves both objective and subjective components.

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ARTICLES

**The need for a new medical model: a challenge for biomedicine**

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ABSTRACT

PMID: 66

Objective  
Cognitive

Pain

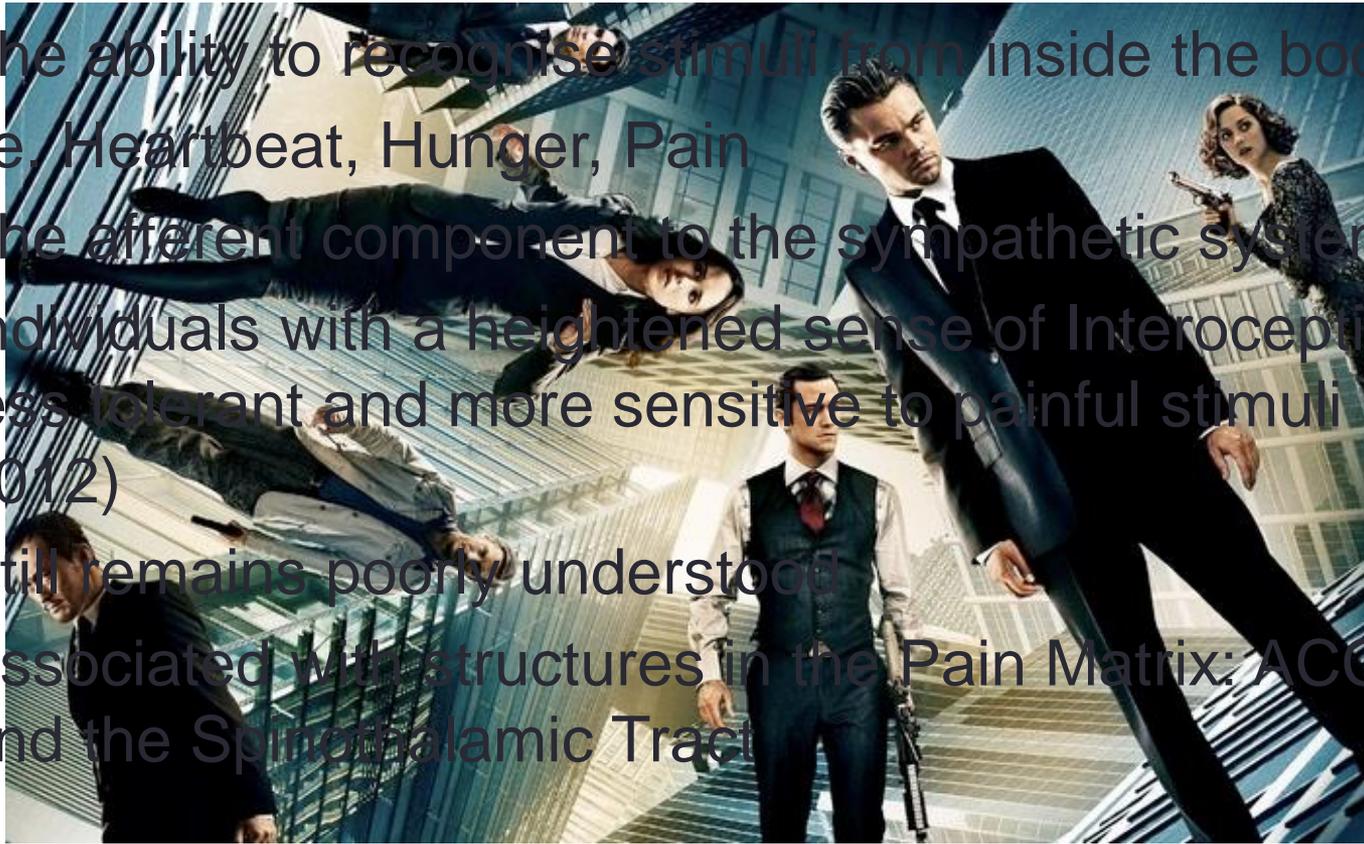
Subjective  
Emotional



of disease today is big and it leaves no room for the behavioral dimensions of pain. A framework for a new medical model, one that is more comprehensive, is proposed. This model is based on the idea that pain is a complex phenomenon that involves both objective and subjective components. The model is based on the idea that pain is a complex phenomenon that involves both objective and subjective components.

# Interoception

- The ability to recognise stimuli from inside the body.
- i.e. Heartbeat, Hunger, Pain
- The afferent component to the sympathetic system
- Individuals with a heightened sense of Interoception were less tolerant and more sensitive to painful stimuli (Pollatos 2012)
- Still remains poorly understood
- Associated with structures in the Pain Matrix: ACC, Insula and the Spinothalamic Tract



# Meditation and the Pain (Objective/Cognitive)

- **Inflammatory Markers** – Mind-body therapies such as Tai Chi, Qi Gong and Yoga were assessed for their ability to reduce circulating inflammatory markers such as C-Reactive Protein (CRP).
- Significant reductions in CRP were seen in some studies, but not all
- There is possibly a neuro-endocrine mechanism at work, associated with the hypothalamic-pituitary-adrenal axis and cortisol

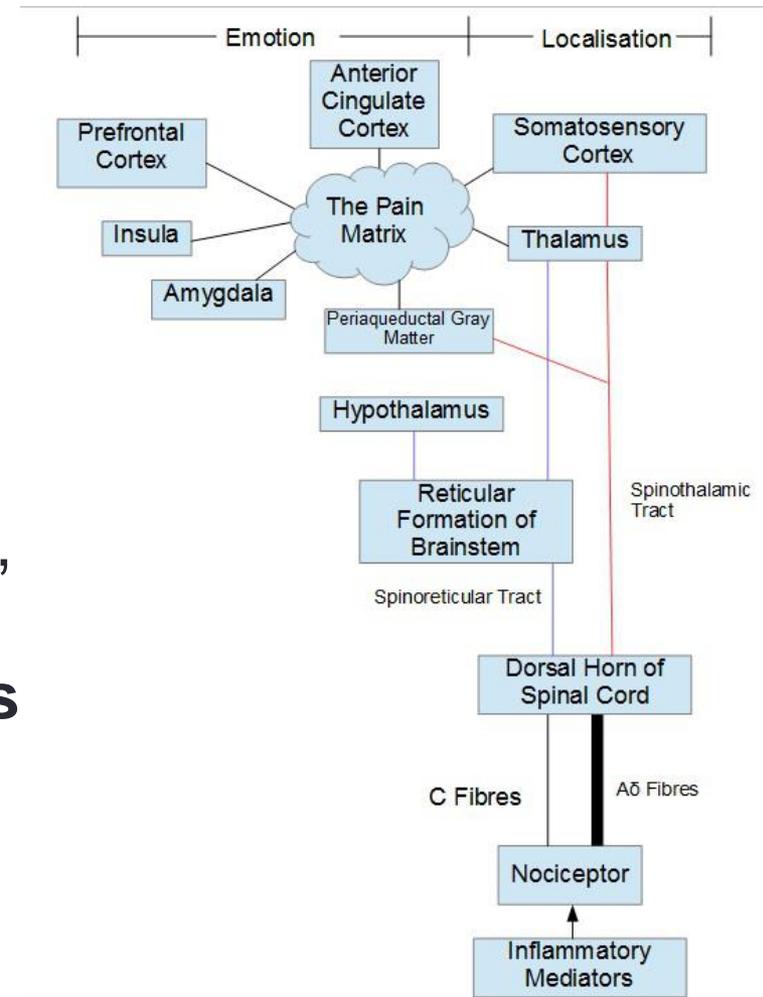
Brain Behav Immun. 2015 Jun 23. pii: S0889-1591(15)00165-8. doi: 10.1016/j.bbi.2015.06.012. [Epub ahead of print]

**Mind-body therapies and control of inflammatory biology: A descriptive review.**

Bower JE<sup>1</sup>, Irwin MR<sup>2</sup>.

# Meditation and the Brain (Objective/Cognitive)

- **Brain Changes** - fMRI studies analysed which areas of the brain were active during meditation, and also long term structural changes in experienced meditators.
- Activity Changes: Caudate Nuclei, **Amygdala**, **Insula**, Precuneus, Middle and Superior temporal gyrus, **ACC** and **Thalamus**
- Structural Changes: **ACC**, **thalamus** medial frontal gyrus, precuneus and fusiform gyrus
- Boccia et al, Grant et al



# Meditation and the Brain (Objective/Cognitive)

- **Saliience Network** – The ACC and the Insula
- Responsible for perception of stimuli
- Mindfulness meditation reduced activity in this area before painful stimuli were applied
- Experienced Meditators are able to down-regulate the anticipation of a painful stimulus, thereby reducing the overall effect

Neuroimage. 2013 Jan 1;64:538-46. doi: 10.1016/j.neuroimage.2012.09.030. Epub 2012 Sep 19.

**Altered anterior insula activation during anticipation and experience of painful stimuli in expert meditators.**

Lutz A<sup>1</sup>, McFarlin DR, Perlman DM, Salomons TV, Davidson RJ.

# Meditation and the Mind (Subjective/Emotional)

- People who suffer with chronic pain experience depression, anxiety and fearful mind states
- Meditation has been shown to decrease these aspects (Hassed 2013)
- Reduced anxiety regarding an impending painful stimulus (Zeidan 2010)
- Rheumatoid Arthritis patients underwent Kabat-Zinn's MBSR program, reducing depression and psychological distress (Pradhan 2007)
- Mindfulness prevents the mind from wandering into negativity (Kabat-Zinn 2013)

# The Place of Meditation

- Meditation offers a drug free alternative to coping with pain...in an ideal world
- The evidence is difficult to replicate
- Needs the right type of patient
- Complementary and Alternative?
- Better suited to compliment other therapies, either pharmacological or psychological

**NHS** choices Your health, your choices

Health A-Z

Live Well

Care and support

## Complementary and alternative medicine



### What is complementary or alternative medicine?

Read about treatments that fall outside of mainstream healthcare.

# Final Thoughts

- Practiced for around 3,500 years
- Very much in the mainstream today
- Biologically, meditation alters inflammatory markers, and centres in the brain associated with pain
- Psychologically it decreases depression, anxiety and fearful states
- Proven to work, but will it benefit the wider population?
- Best used to complement other therapies

# Thank you for listening - Care to try?



- <https://www.youtube.com/watch?v=64ZU2UCQdmQ>

20 minute guided  
mindfulness video

