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Functional rehabilitation

Overview

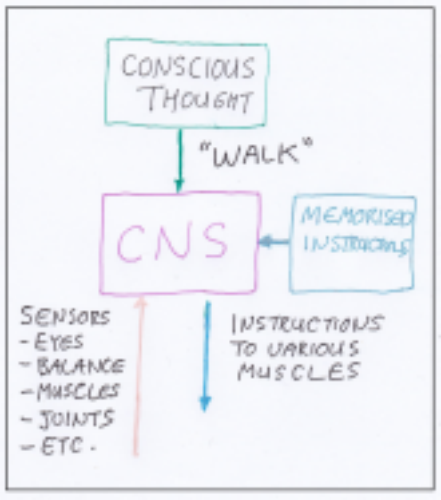
Optimal function for a human musculoskeletal system is were structures are in balance, stress on joints and other tissues is minimised, and biomechanics is optimised. Dysfunction is where this is changed, which creates abnormal stress and loads on various tissues and structures. This can lead to pain, injury and degeneration. In this article we discuss what causes dysfunction and how it can be corrected

Consider function like a wheel alignment: correct alignment drives well and lasts optimally, while out of alignment causes poor handling and rapid wear

Normal functional control

This diagram shows how neurological control works using the simple example of walking.

- You consciously decides to walk. You do not need to think about things like when to contract your hamstring muscles or what angle your ankle joint needs to be. Your Central Nervous System (CNS) takes care of all of this.
- Your CNS has access to memorised instructions on how to walk. It uses these, while constantly monitoring feedback from various sensors around your body.
- Based upon the memorised instructions and feedback the CNS sends out coordinated instructions to the many muscles needed.



Normal functional control

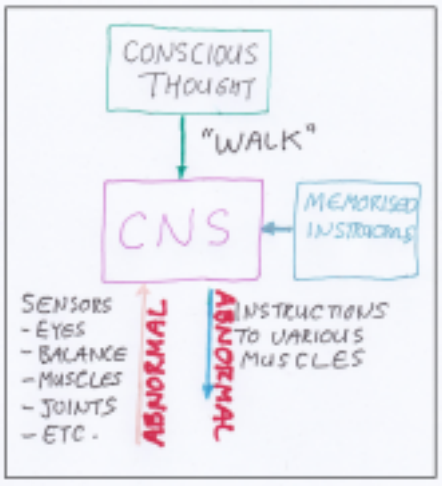
How dysfunction occurs

When sensory input is altered the CNS will alter instructions to compensate. A noticable example would be the case of an injured ankle. The CNS would re-organise the control of muscles to produce a limp, transferring much of the load to the other side. However, any alteration of sensory input or imparement of a functional element element will cause the CNS to alter it's output causing dysfunction. Examples include:

- injuries
- muscular issues (eg. shortening, trigger points)
- joint issues (eg. restrictions, abnormal sensory feedback)

Example

Later in this article we describe research showing how the presence of trigger points dramatically altered the control and coordination of shoulder muscles.



Abnormal sensory input creates compensations

How to correct dysfunction

What will not work

Before we discuss how to correct dysfunction, lets look at two commonly used ways that wont.

Rest and medication

Injuries and pain syndromes typically involve dysfunction. Rest and medication may help heal an injury and relieve pain, however they rarely address the issues that cause dysfunction.

"Corrective" exercises

It is important to realise that control of activation of muscles is predominately under the control of the CNS. Conscious efforts can do little to change this. Put simply, if sources of abnormal sensory input remain the CNS will find away to alter the control of muscle to compensate.

If the CNS (Central Nervous System) receives abnormal sensory information or that a functional element is not working it will perform exercises in a compensatory manner

What will work

Put simply, if the source of abnormal sensory input is removed or normalised the CNS will re-program and may even return to normal function without any further intervention. If the condition is chronic further assistance such as exercises may be needed to help "reprogram", or rehabilitate functional elements that may have deteriorated. Lets look at three examples.

Example One: functional restoration following the treatment of trigger points

Abduction of one's shoulder requires the coordinated effort of many muscles. (myofascial) trigger points are known to inhibit the normal function of muscles. A trial found that when trigger points were present they substantially altered the activity of the muscles resulting in un-coordinated joint movement. When the trigger points were treated the neurological control reverted back to normal (4). There has been a huge amount of research showing that these trigger points are both highly prevalent (even in asymptomatic people) and cause considerable functional abnormalities (5-17).

Example two: USA's National Academy of Sports Medicine (NASM) guidelines

The USA's National Academy of Sports Medicine in their publication NASM's Essentials of Corrective Exercise Training (1) advise that to remove impediments for normal function the following procedures be included into correction exercise plans. We consider these a big improvement on the common practice of prescribing "corrective exercises" without any considerations, but it neglects to mention the very important articular considerations discussed in the next example.

1. Inhibitory techniques to relax hypertonic muscles
2. Lengthening techniques for contracted muscles
3. Activation and integration techniques

National Academy of Sports Medicine advises to restore functional elements as part of any corrective exercise program

Example three: Clinical trial

In clinical trials comparing the use of exercise alone and exerises plus manual therapies that help address muscular and articular function abnormalities, the results were far superior when the manual therapies were included (2,3). This shows the extreme importance of addressing articular functional issues. The evaluation and correction of these requires specialised knowledge and training, such as that posessed by a Chiropractor, Osteopath or a specialist Physiotheapist.

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