ChirosAcademy.net
The science of chiropractic

PA 22 – The Spine Impacts the Brain

After many years of research, we now know beyond a doubt that spinal function impacts and changes brain function.[1] Scientists call the changes that happen in our brain's neural plastic changes.[2-4] Neural plastic changes are happening all the time because our brain is continuously adapting to our ever-changing environment.[2-4]

When your spine is not moving properly this leads to changes in the way the small muscles closest to your spine and skull send proprioceptive information to your brain.[6] Proprioception means your brain's awareness of the position of your body, so your brain's ability to know where all the parts of your body are in space. The proprioceptive information that comes from the muscles closest to your spine and skull help your brain know what is going on in your spine, which represents the core of your body. For your brain to accurately move your arms and legs your brain needs to know exactly what is happening in your spine.[5] This ability to move accurately based on sensing what is going on your body is a process known as sensorimotor integration.[5] Sensorimotor integration basically means your brain's ability to take all the information it receives from your body and environment, put it all together to make sense of it, and then then create just the right sort of movements in response to that sensory information. For example, moving your hand to catch a ball that has been thrown to you. But how does this relate to your spine?

If we look at spinal function in a very simplistic way, there are really three things you want your spine to do on a regular basis. Sometimes, for example if you are running, you want your spinal bones to move in a synchronistic or harmonious manner to disperse the forces generated from running. By moving in harmony, the forces are shared equally across your spinal bones so no damage takes place. But other times, for example if you are lifting a heavy object, then you want your spine to stiffen up to protect you. Without all your muscles stiffening up like this you could injure yourself. So how does your spine sometimes move and sometimes stiffen up? Well, your brain does this for you by activating the muscles around your spine and skull which are called your paraspinal muscles. Your brain activates the correct muscles, in the correct order, to the correct degree, with perfect timing, to either allow for synchronistic movement, for example during running, or to allow for your spine to stiffen up, for example during heavy lifting. In addition to this your spinal muscles also at times need to automatically respond during times that you're experiencing some postural challenge, such as a trip or a slip. If you're tripping over you need your brain to automatically…without consciously thinking about it… switch on and off your correct paraspinal muscles very fast and to help you maintain your balance and stop yourself from falling over. This automatic activation of your spinal muscles is also important during arm and leg movements to stabilise your body and prevent injuries.

So, when you have spinal dysfunction, or what chiropractors call a subluxation, your brain is simply not controlling the movement pattern of a part of your spine appropriately.[6-8] For example, your brain might not be moving your spinal bones in harmony when it should or it might not automatically respond to postural challenges at the right time.

So how would you know if you have a subluxation? Often you don't know because you might not feel any symptoms right away. They may end up causing neural plastic changes in your brain that lead to back or neck pain,[6] but they may not. For some people they might result in clumsiness because you're not controlling the movement of your body properly.[7] [8] For some people they might cause weak muscles, or reduced sports performance, or difficulty reading, or simply the worsening of other

conditions such as colic, bedwetting, or perhaps high blood pressure. We simply don't know how a subluxation is going to affect you, but we do know when your spine isn't functioning well, if you're subluxated, it does interfere with the way your brain and body communicates and the way your brain controls what's going on in your body.[1 6-8]

When a chiropractor adjusts these subluxations and improves the function of your spine this results in better communication between your brain and body which may have an impact on the way you feel if these subluxations were causing symptoms for you. Or it may mean that your brain is better able to control what's happening in your body so you can perform at your optimal potential. So, if you want to have a tune up of your brain/body communication, go and see your family chiropractor and have your spine tuned up so you can function at your best.

References

1. Treleaven J. Sensorimotor disturbances in neck disorders affecting postural stability, head and eye movement control. Man Ther 2008;**13**(1):2-11.
2. Kandel ER, Schwartz JH, Jessell TM. *Principles of Neural Science*. 4 ed: McGraw-Hill Companies, 2000.
3. Brown TH, Kairiss EW, Keenan CL. Hebbian synapses: Biophysical mechanisms and algorithms. Annu Rev Neurosci 1990;**13**:475-511.
4. Cooke SF, Bliss TV. Plasticity in the human central nervous system Brain 2006;**129**(Pt 7):1659-73.
5. Haavik H, Murphy B. The role of spinal manipulation in addressing disordered sensorimotor integration and altered motor control. J Electromyogr Kinesiol 2012;**22**(5):768-76.
6. Haavik H, Kumari N, Holt K, Niazi IK, Amjad I, Pujari AN, Türker KS, Murphy B. The contemporary model of vertebral column joint dysfunction and impact of high-velocity, low-amplitude controlled vertebral thrusts on neuromuscular function. Eur J Appl Physiol. 2021; 10.1007/s00421-021-04727-z. Advance online publication. https://doi.org/10.1007/s00421-021-04727-z
7. Holt KR, Haavik H, Lee AC, Murphy B, Elley CR. Effectiveness of chiropractic care to improve sensorimotor function associated with falls risk in older people: A randomized controlled trial. J Manipulative Physiol Ther. 2016;**39**(4):267-78.
8. Palmgren PJ, Sandström PJ, Lundqvist FJ, Heikkilä H. Improvement after chiropractic care in cervicocephalic kinesthetic sensibility and subjective pain intensity in patients with nontraumatic chronic neck pain. J Manipulative Physiol Ther 2006;***29***(2), 100–106.