



HYPOTHALAMIC NEWSLETTER

Welcome to this edition's Hypothalamic Newsletter! We will be discussing the effects of the environment on neurology, the the resilience of the brain, handedness, and the most likely causes of migraines.

How does the environment affect neurology?

There has been long standing research of how the environment can exacerbate pre-existing genetic conditions. However, this can happen at an even deeper neurological level - the genes themselves. Genes can become methylated, as in, stress can inhibit certain genes from exhibiting and trigger other genes to "switch on". Researchers have found that early life experiences in particular contribute to vulnerability and/or resilience to stress in one's life.

A lack of this appropriate parenting may preclude an individual to become more vulnerable to emotional setbacks throughout their life due to dysfunctional neurotransmitter synthesis or structural weaknesses. Many studies found antisocial behaviour to be linked with certain alleles of the MAOA gene, which encodes for an enzyme that is important for neurotransmitter synthesis. As more research is unearthed, the importance of good, healthy parenting and environment is shown to be ever more crucial for a growing and developing brain.

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Sixty percent of the human brain is made of fat

The Resilience of the Brain

The brain has remarkable capabilities in surviving stressful experiences. Acute and non-chronic stress triggers the overdevelopment of the dorsolateral prefrontal cortex, which allows for more executive functioning in the face of some novel stress. However, the brain does have its limits. The hippocampus is particularly important for cognition, memory, and general emotional processing. When too many stressors pile up in an individual's life, the hippocampus decreases its connection with other structures in what's known as dendritic retraction, creating more possible behavioural dysfunction. The glucocorticoid receptors (GR) in the hippocampal region may degrade in their ability to bind to glucocorticoids, creating more circulating cortisol and therein more stress on the body and brain.

Furthermore, there may be serious problems after persistent dendritic retraction - the longer this goes, the more the hippocampus is at risk of damage. Giving your body and mind rest and time for recuperation is important for the long haul.



Handedness Explained

For every ten individuals globally, only approximately one individual would have a preference of using their left hand while an even smaller percentage is ambidextrous (mixed handedness). Throughout the years, many have developed the perception that left-handed individuals have higher IQ and artistic abilities. In an attempt to explain such assumptions, tons of research has been conducted over the past few decades to investigate the relationship between handedness and brain structures. Although just 10% of humans are left-handed, they tend to be overrepresented in the artistic and musical industries, have better mathematical abilities, and have a lower predisposition to certain diseases such as arthritis. Instead, they face heightened risk of a range of health issues, including cardiovascular disease, dyslexia, asthma, multiple sclerosis, etc.

Explaining Handedness continued

Over the years, constant handedness has also evolved to include a small percentage of individuals who experience inconsistent handedness, where they are able to change their hand preference depending on the task at hand. Some scientists have the perception that these individuals experience poorer mental and physical health, with lower cognitive parameters and elevated rates of dyslexia and attention deficit hyperactivity disorder (ADHD). Research has shown that mixed-handedness is linked to greater atrophy of the hippocampus and amygdala, which are responsible for memory storage and decision making respectively. While many think that handedness could be influenced by environmental factors, the possibility of detection at early stages of fetal development disproves such arguments.

Ultrasound examinations have revealed that at the 10th week of gestation, most fetuses move their right arm more frequently than the left one. At the 15th week, it is observed that the majority of fetuses suck their right thumb. Such behaviours are predictive of the fetuses future handedness and are indicative of their brain structure, which plays an important role in neurological development. Handedness is an incredibly strong piece of evidence to suggest the asymmetric functioning of our brain. The cognitive and functional asymmetry between the two brain hemispheres are important in the analysis of hand dominance. The left hemisphere which functions to process speech, language abilities and logic controls right-handedness, while the right hemisphere related to intuition and creativity controls dominant left-handedness. A study was conducted where early childhood handedness was investigated to find its influence on language development. The authors assessed the handedness of infants every month as they grew from 6 to 24 month. They found that constant use of the right hand during infancy was associated with having greater language skills while children who were lateralized at later ages received the average expected language scores.



Explaining Handedness continued

Among other things, left-handedness is also allegedly linked to larger brain matter, more frequent nighttime awakenings due to sleep disorders caused by periodic limb movements and reduced risk of glioma (a brain tumor) compared with the right-handers.

Nevertheless, these brain structure differences seem to reflect the more diverse and creative processing of language and emotions by left-handers than by right-handed individuals. This may explain why a greater proportion of left-handers are professional artists and musicians. As such, brain structure is essential to inform one's handedness. It reflects the ability to perform different tasks and achieve success in different professions. However, there is no doubt that further investigations are still needed to elucidate the origins of our preference to use one hand or the other.

The Most Likely Causes of Migranes

The cause of migraines is a mystery even to doctors. Changes in the amount of a bodily component called serotonin appear to have a role in migraine headaches. Serotonin has a variety of functions in the body, including affecting blood vessels. Blood arteries constrict when serotonin levels are high. Blood arteries dilate as serotonin levels drop. This swelling might result in discomfort or other complications. Another issue being researched is the correlation between migraine headaches and a spreading pattern of electrical activity in the brain. According to some study, migraines may have a hereditary component, implying that they run in families. Some genes have been linked to migraines, according to research. However, they are baffled as to why certain genes appear to affect some people more than others. According to the American Migraine Foundation, if one of your parents suffers from migraines, there is a fifty percent risk that you will as well. Chronic migraines, migraines lasting longer than 15 days at a stretch, are more common in women, since hormones are most likely to blame. Hormones change throughout the month, especially around the time of your menstruation. If you're pregnant or going through menopause, they may change.

Your brain isn't fully formed until age 25