

Mother's Stress & Her Child's Brain

written by Tim Jennings, M.D. | January 11, 2011



I found much insight in your series Healing The Mind on Forest Lake Church's website and recently discovered your website. In one of your podcasts there was mention of a connection between stress during pregnancy and a child's wellbeing.

I've often wondered if there could be a relationship between the stress my mother faced during her pregnancy with me and my mental health. After ten years of marriage, my mother entered her second pregnancy. During the 5th month she lost my father suddenly to bacterial meningitis. Neurological symptoms appeared in less than 24 hours of my father feeling he had the flu and passed away in the ER. Could you expand on this subject and explain the possible mental issues a child might be more susceptible to and the neurotransmitter /hormonal changes involved?

I am sorry to hear of your family tragedy and its impact upon your life. You are quite insightful to ask this question, which has to do with brain development and the stress response.

Let's review the normal human stress response. When we encounter a stressful experience the brain's alarm circuitry (amygdala) will fire directly stimulating the adrenal glands to release adrenalin and

simultaneously activating the hypothalamus, which in turn sends hormone messengers to the adrenal glands to release stress hormones (glucocorticoids). All of this sounds rather good in the acute setting, but when one stays stressed over time these same pathways stay activated and cause significant problems to the body and brain. Chronic stress results in increased risk of obesity, heart attack, stroke, diabetes mellitus, bone loss and mental illnesses such as depression. These changes are mediated through chronic stress and the activation of the immune system with subsequent elevation in inflammatory factors, which damage insulin receptors in the body and glia (the white supporting cells) in the brain. Additionally, gene expression in the neurons of the brain is altered and proteins which cause neurons to grow and stay healthy (neurotrophic factors) are suppressed.

Now with this back ground we can examine your question of a developing fetus in the womb of a highly stressed mother. The mother's brain and body would experience the biological changes as described above. The stress hormones (glucocorticoids) cross the placenta and enter the blood stream of the developing fetus. This rise in stress hormones impairs the "braking" mechanism in the fetal hypothalamic-pituitary-adrenal (HPA) axis. The HPA axis is what regulates the rise in stress hormones (adrenalin and glucocorticoids etc). Thus the child born from a highly stressed mother will have a brain wired to be more anxious and stressed and less capable of calming itself than it otherwise would have been.

In childhood this could result in a child who is more apprehensive, fearful, socially avoidant, and sensitive to criticism. This child throughout life would be less capable of handling stressful situations of all kinds including family and relational stress. When a stressful event occurred such a child would be more likely to experience anxiety, activation of the HPA axis with rise in stress hormones, and less capable of adaptive and timely calming of the stress response once the external stressor has resolved. In other words, once the crisis was over such an individual would likely stay anxious and aroused for much longer than would typically be expected.

Such individuals, who experience a chronic overactive stress response, are more vulnerable to both metabolic problems and mental health problems including depression. Sadly, it is likely that the stress your mother went through when she was pregnant with you did cause changes in your developing brain making you more vulnerable to stress than you otherwise would have been.

However, having said all of this, the good news is that the brain is pliable and we were created by God for adaptation. This means, that despite being born with a "preset" of heightened HPA axis reactivity, one can experience the ability to calm and slow the stress response. Multiple other environmental factors impact the brain causing the birth "template" to continue to change and modify throughout life. Events which would promote a calming impact upon the stress circuits of the brain include a loving, secure, nurturing environment, avoidance of high stress and relational conflict, particularly in the primary relationships of childhood, avoidance of theatrical entertainment, developing a healthy spirituality and healthy forms of meditation, particularly on God's character of love, a healthy diet, exercise, avoidance of alcohol, tobacco, illegal drugs, caffeine, obtaining regular sleep, certain forms of psychotherapy and appropriate psychopharmacology.

One of the founders of my church wrote a beautiful idea regarding the power of the Holy Spirit to heal both our hereditary as well as cultivated problems:

In describing to His disciples the office work of the Holy Spirit, Jesus sought to inspire them with the joy and hope that inspired His own heart. He rejoiced because of the abundant help He had

provided for His church. The Holy Spirit was the highest of all gifts that He could solicit from His Father for the exaltation of His people. The Spirit was to be given as a regenerating agent, and without this the sacrifice of Christ would have been of no avail. The power of evil had been strengthening for centuries, and the submission of men to this satanic captivity was amazing. Sin could be resisted and overcome only through the mighty agency of the Third Person of the Godhead, who would come with no modified energy, but in the fullness of divine power. It is the Spirit that makes effectual what has been wrought out by the world's Redeemer. It is by the Spirit that the heart is made pure. Through the Spirit the believer becomes a partaker of the divine nature. Christ has given His Spirit as a divine power to overcome all hereditary and cultivated tendencies to evil, and to impress His own character upon His church. - Desire of Ages, pg 671

So, continue to seek God, His truth, His presence, choose to apply His principles to your life and be hopeful - your brain (and everyone else's) is constantly changing based on the choices we make!