

Fluctuations in serotonin transport may explain winter blues

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Why do many Canadians get the winter blues? In the first study of its kind in the living human brain, Dr. Jeffrey Meyer and colleagues at the Centre for Addiction and Mental Health (CAMH) have discovered greater levels of serotonin transporter in the brain in winter than in summer. These findings have important implications for understanding seasonal mood change in healthy people, vulnerability to seasonal affective disorders and the relationship of light exposure to mood.

CAMH's scientific team discovered that the serotonin transporter levels were significantly higher in all investigated brain regions in individuals studied in fall/winter, compared to those studied in spring/summer in a study of healthy subjects. Serotonin transporters remove serotonin so this discovery argues that there is more serotonin removal in the fall/winter as compared to spring/summer.

Also, the higher serotonin transporter binding values occurred at times when there is less sunlight. This is the first time scientists have found differences in serotonin transporter levels in the brain in fall/winter versus spring/summer.

Serotonin is involved in regulating physical functions such as eating and energy balance, and emotional functions like mood and energy levels. These phenomena vary across the seasons and the molecular background for why this happens was previously unknown. For this study, Dr. Jeffrey Meyer and his team used a world-leading positron emission tomography (PET) technology (originally created at CAMH by Dr. Alan



Wilson) to detect these seasonal variations in serotonin transporter binding (the process that removes serotonin) in the living human brain and correlations between serotonin binding and duration of daily sunshine.

As Dr. Meyer explains, this is "an important lead in understanding how season changes serotonin levels. This offers an explanation for why some healthy people experience low mood and energy in the winter, and why there is a regular reoccurrence of depressive episodes in fall and winter in some vulnerable individuals. The next steps will be to understand what causes this change and how to interfere with it."

According to the world health organization, major depressive disorder is the fourth leading cause of death and disability. Dr. Meyer points out that, "the future for treatment should be to prevent the illness itself." The presence of higher serotonin transporter levels might explain why many people experience the onset of major depressive episodes in the fall and winter.

"Over the following years, we intend to determine the specifics of the environment (such as light exposure) that influence serotonin transporter levels so as to determine what is the optimal environment to prevent illness. In the future, it may be that just like we have lifestyle recommendations to prevent heart disease, we will have lifestyle recommendations to prevent major depressive disorder."

Source: Centre for Addiction and Mental Health

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