Month of birth, ultraviolet radiation exposure, and the development of major mental illnesses

Major mental illnesses (MMIs) are a significant global health burden. Recent data confirms that MMI is associated with an individual's month of birth (MOB). Levels of ultraviolet radiation (UVR) vary during the calendar year, and over cyclic periods UVR intensity peaks. UVR can cause cellular mutations and affect epigenetic processes, therefore exposure at conception or during early gestation potentially has lifelong consequences. Research by Dr George E Davis Jr and colleagues, at Riverview Psychiatric Center, led by Dr George E Davis Jr, previously reported that higher solar energy exposure at birth was associated with decreased lifespan. Now their latest paper describes an objective method for determining the severity of major mental illness (MMI), such as SZ, BPD, and schizoaffective disorder (SZ-AF), using the month of birth (MOB) of patients compared to the MOB of the general population. The ability to assess MMI severity may help identify individuals at risk of experiencing severe mental illness who require more resources for treatment.

UVR and lifespan
Solar cycles of electromagnetic radiation occur approximately every eleven years. ‘The MAX’ (or solar peaks) refers to the period of about three years where electromagnetic radiation is highest, whereas ‘the MIN’ refers to the remaining eight years where it is lower. UVR is quantified by sunspot number (SSN), with higher sunspot numbers indicating increased UVR intensity. Specifically, sunspots represent magnetic solar storms signifying higher electromagnetic energy. Davis Jr and colleagues previously discovered that types of diseases may be influenced differently by these solar peaks, with such solar peaks associated with increased mental illness prevalence. Furthermore, the researchers, in an earlier, smaller study, found individuals conceived and born during the MAX had a shorter lifespan, 1.7 years less than those conceived and born during the MIN.

Based on a sample size of 63 million people, using the US National Centre of Health Statistics database, individuals with SSN>90 have, on average, a lifespan decrease of approximately eight years compared to those with SSN<90. The team discovered that the number of individuals with SSN>80-90 had multiple sclerosis (nervous system autoimmune disease) doubled compared to the general population. UVR photons can alter epigenetic processes, such as gene demethylation, and there is increasing evidence that sunlight exposure may affect immune-system functioning. The researchers also hypothesise that variation in UVR at birth may have a detrimental effect and may downregulate UVR receptors so that in later life more UVR is needed to prevent autoimmune disorders and inflammation.

Considering the findings, the team suggest individuals whose birth is at a time of SSN>90 should be aware of an increased risk of developing immune system and inflammatory diseases as well as triggering major mental illness. The researchers also raise the possibility of altering sunlight exposure during gestation and birth to modify autoimmune diseases, but further research is needed. When interpreting, it should be remembered that in a large statistical study not all individuals born in a high SSN period will have a shorter lifespan or have an autoimmune disease. Biological systems have high standard deviations.

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Behind the Research

Dr George E Davis Jr
Dr Matthew J Davis
Dr Walter E Lowell

Research Objectives

George E Davis Jr and colleagues are researching the link between month of birth, UVR exposure, lifespan, and MMI.

Detail

Bio
Dr George E Davis, Jr, MD, FACP, FACS, is an internist who has practised at the Riverview Psychiatric Center (formerly Augusta Mental Health Institute) for 33 years. He majored in chemistry at Cornell University and obtained his medical degree at Tufts University School of Medicine in Boston in 1968.

Dr Matthew J Davis, MD is the Clinical Director of Riverview Psychiatric Center, Immediate Past President of the Maine Association of Psychiatric Physicians, and a Distinguished Fellow of the American Psychiatric Association.

Dr Walter E Lowell, EdD is a former professor at Memorial University in Newfoundland, Canada and a Certified Professional in Healthcare Quality (CPHQ).

References


Personal Response

How will you next build on your discovery of the link between early UVR exposure and MMI?

In future research, our team intends to study multiple sclerosis (MS) in more depth. This disease is not rare at greater than approximately 40 degrees N latitude and any strategy that mitigates its incidence would be welcome. The team believes the same methodology employed for mental illness would apply to MS. The complex interaction between human genetics and the environment will continue to provide challenges to researchers worldwide.