S04.5 Geomagnetic Disturbance and Ultraviolet Exposures Influence Multiple Sclerosis Onset Timing

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Background: The age at onset (AAO) of multiple sclerosis (MS) may be influenced by solar-related environmental factors, such as geomagnetic disturbances (GMD) and ultraviolet radiation (UVR). The life stages during which these exposures may affect AAO remain unclear.

Objective: To investigate the potential associations between GMD and UVR exposures at key life stages and the AAO of MS, using a large global registry.

Methods: Data from 75,359 individuals with MS were collected from the MSBase registry. GMD data were obtained from NASA and the German Research Centre for Geosciences; UVR data came from the TEMIS database. Exposures were evaluated during fetal life, early childhood (⩽10 years), and the 12 months preceding the symptom onset (symptom-onset year). Associations with AAO were analyzed using partial correlations, group comparisons, and random forest regression (RFR).

Results: GMD exposure during the symptom-onset year showed a moderate inverse correlation with AAO, indicating earlier disease onset with higher GMD. UVR in the same period showed a very weak positive correlation. Group comparisons revealed a lower AAO with higher GMD exposure. RFR identified symptom-onset year GMD exposure as the strongest predictor of AAO, followed by symptom-onset year UVR exposure. Early-life exposures showed no meaningful associations.
Conclusion: Higher GMD exposure in the symptom-onset year is associated with an earlier MS onset. UVR exposure also influences AAO but to a lesser extent. GMD may be a potential environmental risk factor for earlier MS onset, highlighting the need for further mechanistic research.