

Peer Review

Review of: "Neurodegeneration: A Convergence Hypothesis Linking Chronic Low-Dose Diagnostic Radiation to Accelerated Decline"

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This manuscript proposes a systemic convergence hypothesis whereby chronic exposure to low doses of ionizing radiation for diagnostic purposes (such as dental imaging, CBCT, brain scans, and chiropractic X-rays) cumulatively contributes to neurodegenerative risk by affecting three fundamental biological systems: mitochondrial function, proteostasis, and neuroimmune regulation.

The subject is intellectually interesting and addresses a little-explored area: the potential long-term neurological consequences of repeated low-dose cranial exposure.

However, the manuscript remains highly speculative and lacks quantitative, epidemiological, and radiobiological foundations.

The main limitation lies in the lack of dose quantification (estimation of cumulative effective doses (mSv) from different types of medical imaging, organ doses, comparison with established radiobiological thresholds, discussion of dose rate effects). Without contextualising the doses, it is impossible to assess whether the proposed biological stress significantly exceeds the adaptive cellular repair capacity.

The manuscript relies heavily on mechanistic plausibility (mitochondrial stress and immune activation). However: Most of the biological mechanisms cited come from experimental studies or studies involving higher doses. No direct evidence has been reported linking diagnostic exposures to persistent neurodegenerative cascades in humans.

The conclusions of authoritative bodies, such as the ICRP, are not sufficiently considered in the manuscript. In this context, the current consensus documents do not identify neurodegeneration as a proven risk associated with low-dose diagnostic exposure.

In conclusion, this is an article that is intellectually interesting and biologically plausible, but

scientifically speculative. It currently provides no evidence that diagnostic doses increase the risk of neurodegenerative disease.

Recommendation: Major Revision

Declarations

Potential competing interests: No potential competing interests to declare.