


Cancer Risk Assessment Concern Regarding the Publication “Assessing the Risk of Secondary Cancer Induction in Radiosensitive Organs During Trigeminal Neuralgia Treatment With Gamma Knife Radiosurgery: Impact of Extracranial Dose”: A Letter to the Editor

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I compliment Geraily et al¹ on their paper related to assessing the risk of secondary cancer induction during trigeminal neuralgia treatment with high-dose, gamma-knife radiosurgery. Secondary-cancer-induction risk related to the out-of-field, gamma-ray exposure was assessed using the National Academies BEIR VII Phase 2 Report methodology (reviewed for low-dose applications and solid cancers by Taylor and Kron²). For solid cancers, the methodology is linked to linear no-threshold (LNT) theory for cancer induction. Time-after-exposure-dependent, excess absolute risk (EAR) and excess relative risk (ERR) are assigned numerical values based on LNT functions of radiation dose.²

It is important to point out to Geraily and colleagues that LNT theory for cancer induction is now known to not be supported by radiobiological data (reviewed elsewhere³), which supports a > 0 Gy population threshold dose for radiation-caused cancer. Below the threshold, natural defenses (including protective radiation adaptive responses) serve as barriers to cancer.³ With LNT theory for cancer induction, both EAR and ERR for a gamma-ray dose of 1000 nGy are assigned illogical values 1000 times larger than the assigned > 0 values for a harmless 1 nGy dose.⁴

The illogicalness of LNT theory for cancer induction is revealed by the fact that even though we humans reside in a sea of natural background ionizing radiation, we have not perished from Earth, but remain in large numbers. We are exposed to gamma-ray photons (related to cosmic rays⁵ and thunderstorms⁶) and other natural background radiation throughout our lives, including photons with energies⁵ > 10 GeV. Unfortunately, some influential epidemiologists still rely on LNT models for cancer risk assessment. They however

employ misinforming procedures in their data analyses that can essentially guarantee apparent LNT results.^{4,7} It is recommended that cancer risks (EAR, ERR) associated with out-of-field, gamma-ray exposure, related to gamma-knife radiosurgery, not be assigned based on BEIR VII LNT models. This is because for low radiation doses (e.g., < 0.1 Gy), the assigned values for EAR and ERR are likely to be unreliable and promote secondary-cancer-related, radiation phobia among patients that undergo radiosurgery.³

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