**Competing risk model; a new integrated approach to assessing contextual impacts of ionising radiation**

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Global heating is now accepted with heatwaves and forest fires seriously impacting air quality and resulting in massive areas being subjected to air pollution. Nuclear energy is therefore increasingly being identified as a “green” alternative to provide for our energy needs. However there is much public resistance due to fear of radiation effects. Radiation protection approaches do little to ease this fear as they are grounded in the idea that any dose has a potential to harm. This approach ignores other risks associated with other forms of energy production focusing solely on determining the risk from radiation alone. The model we are proposing here is an attempt to set radiation risk in context – to balance the risks of action to limit or optimise factors impacting climate change with those of inaction – for example excluding a nuclear action without proper analysis. Existing attempts to approach this problem include adverse outcome pathway analysis (AOP) which proposes to evaluate causal relationships. It links in a linear way existing knowledge along one or more causally connected key events between two points – a molecular initiating event caused by the stressor of interest, and an adverse outcome. However the commonality of response pathways between radiation and other stressors such as heat, drought, flood, food scarcity, air pollution, or environmental degradation plays into a competing cause model for the same endpoint outcome rather than a single agent risk model. The aggregate exposure pathway analysis (AEP) is a more quantitative approach known as STOP (source to outcome pathway) which tries to look at multiple stressors. Here only the most relevant pathway and stressor is considered using logical inference from available data. This is different from competing risk analysis (CRA) which is a special type of survival analysis that aims to estimate correctly, the marginal probability of an event in the presence of competing events. In a CRA all risks can be compared by using a Baysian inference to identify the most relevant risks to the system under consideration. Crucially for CRA it is not necessary to know the exact pathway involved in determining the outcome. This concept has been developed here to try to examine the important possibilities and threats to, for example, the ecosystem. If nuclear energy is to be a part of the solution to the energy and climate crisis a CRA would point to environmental benefits such as habitat preservation. Habitat degradation is a human and environmental health risk; nuclear power generation could demonstrably mitigate against this by making new builds such as small modular reactors eco-friendly – setting aside land to offset environmental harm from the build. A CRA approach would also involve attributing a societal value to biodiversity, carbon storage properties of trees and bogs etc. In conclusion the advantages of a CRA approach are that a basket of stressors can be assessed to predict different outcomes not all of which need be adverse.