Cancer and night shift work: what we still don't know and why

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The International Agency for Research on Cancer (IARC) have categorised night shift work as probably carcinogenic to humans[1]. That's potentially concerning – but what does this assessment mean, and, perhaps more importantly, what doesn't it mean?

Most importantly, like all such IARC categorisations, it tells us nothing at all about the actual risks to night shift workers. The assessments weigh up the strength of evidence that there *could* be a potential risk under certain circumstances. Whether in practice there *is* an actual risk, and if so, how big that risk is, is something that the IARC does not consider in deciding the category. This is made clear in the Q&A document[2] that they released. So here, their conclusion is that night shift work probably can increase the risk of cancer in humans under certain circumstances – that's exactly what they mean by "probably carcinogenic to humans". But they do not state *which* circumstances or *how much* increased risk. And, because they say "probably", there remains a possibility that shift work cannot affect human cancer risk at all.

The classifications that IARC uses for things that potentially could cause cancer are broad. They have just four categories for everything they investigate. The "probably" category currently contains 82 different agents, including the rocket fuel hydrazine and the burning of wood fuel in the home. These examples illustrate how far this classification is from defining the detailed real-world risks. Rocket-testing workers can be exposed to hydrazine, but most of us will never come upon it. And the risk from your wood-burning stove clearly depends in a complicated way on the wood, the stove, and how much you use it.

The remaining doubt on shift working is largely because clear evidence in humans is very hard to obtain. There is good evidence, the IARC conclude, that interfering with rhythms of light and dark in experimental animals can increase the probability of cancer, and indeed on how these changes occur. But do things work in the same way in humans? There are also inconsistencies in the evidence. It isn't ethical or feasible to carry out long-term experiments in humans, so instead researchers observe people, and record their working patterns and cancer diagnoses. Unavoidably, there are many possible biases in such studies. Perhaps the people studied aren't typical, or their

[1] 'Carcinogeneity of night shift work', *Lancet Oncology*, July 2019, http://dx.doi.org/10.1016/S1470-2045(19)30455-3

[2] '*IARC Monographs* Meeting 124: Night Shift Work (4-11 June 2019) Questions and Answers.' https://www.iarc.fr/wp-content/uploads/2019/07/QA_Monographs_Volume124.pdf

work records were inaccurate. Also, people who work shifts differ from those who don't in many ways, and perhaps these other differences are the real cause of any increase in cancer risk.

The IARC assessment, "probably carcinogenic in humans", has not changed since they last considered shift working in 2007. They have certainly considered much new evidence; all but one of their references describe work published since 2007. But the new evidence from human studies still has unavoidable inconsistencies and potential biases. Future research might make things clearer, but that won't be easy.

Should you be concerned by this classification, if you work night shifts? IARC have left open the possibility that shift working has no effect at all on cancer risk. If it has, the evidence on the size of any risk is not clear. If the risks were really substantial, the research results in humans could well have been clearer and more consistent. My feeling is that this shouldn't be a major worry for you now.

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