Not All Shifts Are Equal: It’s Time for Comprehensive Exposure Metrics in Chronodisruption Research

To the Editor:

In a prospective Nurses’ Health Study of a subset of 53,487 women, Viswanathan and colleagues found a 2-fold increase in endometrial cancer risk among obese females working rotating night shifts (1). Whereas the authors acknowledge that their findings require confirmation, this would constitute a novel end point associated with long-term nightwork beyond breast cancer. A press release that accompanied IARC’s recent classification “shift-work that involves circadian disruption is probably carcinogenic to humans” (Group 2A; ref. 2), asked exactly for that: “...more studies are needed to examine the potential risk in other professions and for other cancers” (3).

In the latter vein, meta-analyses of prostate cancer in individuals likely exposed to circadian disruption or chronodisruption evinced excess relative risks in nine studies of flight personnel (40%) and in two investigations of shift-workers (4). Intriguingly, though, the analyses left serious doubts whether the differing assessments of chronodisruption can be regarded as valid reflections of the same causative phenomenon and strongly suggested that future epidemiologic studies of the biologically plausible links between chronodisruption and cancers should appreciate details of shift-work.

To this end, epidemiologic and experimental researchers should make a concerted effort to identify comprehensive exposure metrics for chronodisruption research. Clearly, not all shifts are equal and, equally clearly, possible health effects may, and probably will, depend on a host of aspects or variables. Candidate information that could be considered in studies of shift-workers and possible cancer risks include the length, type, direction, and regularity of the shift-work, and the workers’ age, medication, tolerance, exercise, etc. Indeed, in addition to occupational exposures, what study participants experience at home, including their “light exposure history,” may critically determine the effects of chronodisruption. Importantly, valid exposure information can have implications beyond cancer research. Note that drastic alterations of circadian rhythms may not only increase tumor growth, for instance by suppressing melatonin production or deregulation of circadian genes involved in cancer development (2, 3), but could also contribute to further health problems, including sleep and bipolar disorders (4) and rhythm-related processes of aging (5).

Whereas we are aware of the challenge of this task, we feel that the biologically plausible links between chronodisruption and the development of cancer and other diseases could impact too much on public health as to witness tens of epidemiologic studies using incomparable assessments of shift-work exposures in the near future.

One suggestion would be to have IARC and/or the National Institute of Environmental Health Sciences convene an authoritative panel of scientists to develop the much needed shift-work exposure matrix.

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References

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