and does not alter our conclusion that this meta-analysis provides support for an association between occupational exposure to benzene and increased risk of multiple myeloma, acute lymphocytic leukemia, and chronic lymphocytic leukemia (Vlaanderen et al. 2011).

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References

Sorahan T, Kinlen LJ, Doll R. 2005. Cancer risks in a historical UK cohort of benzene exposed workers. Occup Environ Med 62:231–236.

Vlaanderen J, Lan Q, Kromhout H. Rothman N, Vermeulen R. 2011. Occupational benzene exposure and the risk of lymphoma subtypes: a meta-analysis of cohort studies incorporating three study quality dimensions. Environ Health Perspect 119:159–167.

In Favor of Controlling Proven, but Not Probable, Causes of Cancer

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We wish to compliment and complement the editorial by Landrigan et al. (2011) who *inter alia* synthesized the "Asturias Declaration" during the "International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention" [World Health Organization (WHO) 2011]. Although the authors list recommendations that are certainly commendable, we strongly disagree with the inclusion of "probable" in the suggestion that "the WHO should develop a global framework for control of environmental and occupational carcinogens that concentrates on the exposures identified by IARC [International Agency for Research on Cancer] as proven or probable causes of human cancer."

Indeed, we would strongly suggest the need to focus on the causes of human cancer that have been identified by IARC as proven, but not on "probable" causes [59 agents have been classified by IARC as group 2A, i.e., probably carcinogenic to humans (IARC 2011)] to then direct premature prevention efforts on the latter. Soberingly, IARC's diligent evaluation process of what can and what cannot cause cancer in humans would be blurred when equating group 1 (proven carcinogen) classifications with group 2A classifications, as recommended in the Asturias Declaration. A group 2A classification is not necessarily part of a one-way street to a group 1 verdict.

To provide a recent, empirical example, shift-work that involves circadian disruption was classified as a probable human carcinogen (Straif et al. 2007). Importantly, though, as long as causality is not established, we should clearly be deterred from activities that are not driven by data. Moreover, means for primary prevention are elusive (Erren et al. 2009): Shift-work is unavoidable in our 24/7 societies, and it is impossible with today's state of knowledge to identify workers who are robust to shift-work conditions and to dissuade others who may be susceptible to the effects of circadian disruption or chronodisruption (Erren et al. 2008; Erren and Reiter 2008). An IARC classification of "probable" human carcinogen, which implies uncertainty and the possibility that future research may exonerate the "culprit in question," is certainly not an appropriate yardstick to guide valuable and limited resources. Instead, we should invest in controlling established carcinogens such as asbestos and smoking.

Overall, when Richard Nixon declared the war on cancer on 23 December 1971, he remarked, "I hope in the years ahead that we may look back on this day and this action as being the most significant action taken during this administration" (Nixon 1971b). That initiative certainly is not—not only because of the Watergate scandal but, importantly, because of the highly ambitious goal "to find a cure for cancer" (Nixon 1971a). Lacking insights into how to cure cancer in the majority of cases, our objective for now—and presumably for many years to come—should be improved primary prevention of environmentally and occupationally caused cancers. Clearly, although progress in prevention is necessary and feasible, it is imperative to identify realistic and defensible goals and strategies. To this end, a sensible recommendation for strategy would be that "a new global policy framework for environmental cancer" (Landrigan et al. 2011) should focus on established carcinogens such as asbestos, "smoking, overweight, and inactivity" (Willett et al. 2011)—but not on probable culprits.

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References

Erren TC, Morfeld P, Stork J, Knauth P, von Mülmann MJ, Breitstadt R, et al. 2009. Shift work, chronodisruption and cancer? The IARC 2007 challenge for research and prevention and 10 theses from the Cologne Colloquium 2008. Scand J Work Environ Health 35:74–79.

Erren TC, Pape HG, Reiter RJ, Piekarski C. 2008. Chronodisruption and cancer. Naturwissenschaften 95:367–382.

Erren TC, Reiter RJ. 2008. A generalized theory of carcinogenesis due to chronodisruption. Neuro Endocrinol Lett 29:815–821.

IARC (International Agency for Research on Cancer). 2011. Agents Classified by the IARC Monographs, Volumes 1–102. Available: http://monographs.iarc.fr/ENG/Classification/index.php [accessed 18 July 2011].

Landrigan PJ, Espina C, Neira M. 2011. Global prevention of environmental and occupational cancer [Editorial]. Environ Health Perspect 119:A280–A281.

Nixon R. 1971a. Annual Message to the Congress on the State of the Union. Available: http://www.presidency.ucsb.edu/ws/index.php?pid=3110#axzz1abbi3E1P [accessed 12 October 2011].

Nixon R. 1971b. Remarks on Signing the National Cancer Act of 1971. Available: http://www.presidency.ucsb.edu/ws/index.php?pid=3275&st=cancer&st1=nixon#axzz1abbi3E1P [accessed 12 October 2011].

Straif K, Baan R, Grosse Y, Secretan B, El Ghissassi F, Bouvard V, et al. 2007. Carcinogenicity of shift-work, painting, and fire-fighting. Lancet Oncol 8:1065–1066.

WHO (World Health Organization). 2011. International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention. Asturias Declaration: a Call to Action. Available: http://www.who.int/phe/news/events/international_conference/Call_for_action_en.pdf [accessed 18 July 2011].

Willett WC, Colditz GA, Hiatt RA. 2011. Combating environmental causes of cancer. N Engl J Med 364:2266.

In Favor of Controlling Proven, but Not Probable, Causes of Cancer: Landrigan et al. Respond

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We thank Erren et al. for their positive comments about our editorial on environmental and occupational causes of cancer (Landrigan et al. 2011). In particular, we acknowledge their support of our central thesis, expressed in the Declaration of Asturias [World Health Organization (WHO) 2011], that control of the toxic chemical causes of cancer must be a core component of global cancer control programs, equal in importance with efforts to understand and control

"lifestyle" carcinogens such as diet, alcohol, and tobacco.

Erren et al. assert that programs aimed at control of chemical carcinogens must focus solely on chemicals that have been designated by the International Agency for Research on Cancer (IARC) as proven (class 1) human carcinogens (IARC 2011). Clearly class 1 carcinogens such as asbestos, benzene, benzidine, and dioxin merit very high priority in cancer control. There is no excuse, for example, for the continuing export of any form of asbestos to low- and middle-income countries.

We are of the view, however, that programs for control of chemical carcinogens must also encompass certain judiciously chosen class 2A or "probable" human carcinogens, such as diesel exhaust, indoor emissions produced by combustion of biomass fuels, and dimethylnitrosamine, for which there is already strong evidence of carcinogenicity in animal, cellular, or molecular models and limited human data (IARC 2011). In years past it would have been a serious lost opportunity not to have taken actions to control such carcinogens as formaldehyde or 1,3-butadiene during the years in which those compounds were classed by IARC as "probable" human carcinogens before they were upgraded to class 1.

For the future, as incidence rates of cancer and cardiovascular disease (CVD) continue to increase worldwide with accelerating global spread of the "Western lifestyle" and concomitant global diffusion of toxic synthetic chemicals, it will be imperative that disease control programs in countries around the world address both lifestyle as well as chemical causes of chronic illness. Strong synergies have been documented between lifestyle and toxic chemical exposures, for example, between cigarette smoking and asbestos in causation of lung cancer (Selikoff et al. 1968) and between diet and urban air pollution in causation of CVD (Brook and Rajagopalan 2010). Approaches to disease causation therefore need to address both lifestyle and toxic chemicals as causes of illness if they are to be fully effective in improving health and saving lives.

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References

Brook RD, Rajagopalan S. 2010. Particulate matter air pollution and atherosclerosis. Curr Atheroscler Rep 12(5):291–300.

IARC (International Agency for Research on Cancer). 2011. Agents Classified by the IARC Monographs, Volumes 1–102. Available: http://monographs.iarc.fr/ENG/Classification/index.php [accessed 18 July 2011].

Landrigan PJ, Espina C, Neira M. 2011. Global prevention of environmental and occupational cancer [Editorial]. Environ Health Perspect 119:A280–A281.

Selikoff IJ, Hammond EC, Churg J. 1968. Asbestos exposure, smoking, and neoplasia. JAMA 204(2):106–112.

WHO (World Health Organization). 2011. International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention. Asturias Declaration: A Call to Action. Available: http://www.who.int/phe/news/events/international_conference/Call_for_action_en.pdf [accessed 18 July 2011].

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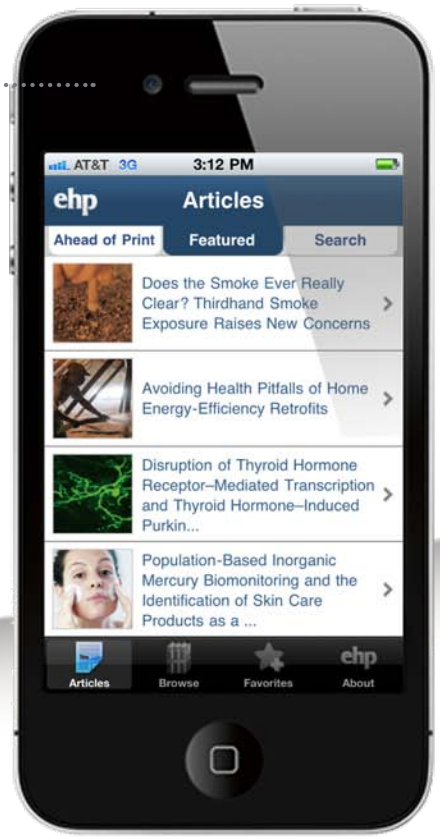

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