



Letter to the editor

Population-attributable fractions in gastric cancer risk factors: the necessity to focus on *Helicobacter pylori* infection

To the Editor:

Although cancer is known to be, in part, genetically determined, most malignancies evolve as a consequence of interactions between the host and environmental/behavioral/lifestyle factors [1]. Recently, Danaei and colleagues [2] published a comprehensive review article proposing that mortality from 11 major cancers is largely attributable to nine factors, working singly or in combination: overweight and obesity (high body mass index); low fruit and vegetable intake; physical inactivity; smoking; alcohol use; unsafe sex; urban air pollution; indoor smoke from household use of solid fuels; and contaminated injections in healthcare settings. The implication is that most cancers are theoretically preventable if we could modulate exposure to the respective factors that affect specific organs.

In regard to infection-related malignancies, the focus was solely on hepatocellular carcinoma, with contaminated injections (therefore hepatitis B/C viruses) concluded to be responsible for 18% overall, and cancer of the cervix uteri, where the population-attributable fraction (PAF%) due to unsafe sex and, thus, the human papilloma virus, was calculated to be 100%. However, there are other organs in which infections are well known to play major roles; in particular, the stomach.

Danaei et al. computed PAF% for gastric cancer attributable to smoking and low fruit and vegetable intake to be 27% in low- and middle-income countries and 34% in high-income areas. Observational studies, including our own experience with cross-country comparisons, have indicated that *Helicobacter pylori* (*H. pylori*) infection is essentially related to stomach cancer, at least to cancers in the noncardia zone [3–8]. In fact, similar to the PAF% for cancer of the cervix uteri, the PAF% for noncardia gastric adenocarcinoma is

conceivably 100% attributable to *H. pylori* infection, acting in combination with other environmental/behavioral/lifestyle factors [1,9].

Accordingly, we feel that more stress should be placed on categorizing stomach cancer as one of the infection-related malignancies. Prevention of *H. pylori* infection and eradication measures appear to be crucial for the prevention and control of noncardia gastric cancer.

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References

1. World Cancer Research Fund/American Institute for Cancer Research. Food, nutrition and the prevention of cancer: a global perspective. Washington, DC: American Institute for Cancer Research; 1997.
2. Danaei G, van der Hoorn S, Lopez AD, Murray CJ, Ezzati M, Comparative Risk Assessment Collaborating Group (Cancers). Causes of cancer in the world: comparative risk assessment of nine behavioural and environmental risk factors. *Lancet* 2005;366:1784–93.
3. Uemura N, Okamoto S, Yamamoto S, Matsumura N, Yamaguchi S, Yamakido M, et al. *Helicobacter pylori* infection and the development of gastric cancer. *N Engl J Med* 2001;345:784–9.
4. Graham KS, Graham DY. *H. pylori*-associated gastrointestinal diseases. 2nd Ed. Newtown, PA: Handbooks in Health Care Co; 2002.
5. Brenner H, Arndt V, Stegmaier C, Ziegler H, Rothenbacher D. Is *Helicobacter pylori* infection a necessary condition for noncardia gastric cancer? *Am J Epidemiol* 2004;159:252–8.
6. Ohata H, Kitauchi S, Yoshimura N, Mugitani K, Iwane M, Nakamura H, et al. Progression of chronic atrophic gastritis associated with *Helicobacter pylori* infection increases risk of gastric cancer. *Int J Cancer* 2004;109:138–43.
7. Tokudome S, Soeripto, Triningsih FXE, Ananta I, Suzuki S, Kuriki K, et al. Rare *Helicobacter pylori* infection as a factor for the very

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- low stomach cancer incidence in Yogyakarta, Indonesia. *Cancer Lett* 2005;219:57–61.
8. Tokudome S, Samsuria WD, Soeripto, Triningsih FXE, Suzuki S, Hosono A, et al. *Helicobacter pylori* infection appears essential for stomach carcinogenesis: observations in Semarang, Indonesia. *Cancer Sci* 2005;96:873–5.
 9. IARC. Monographs on the evaluation of carcinogenic risks to humans. Tobacco smoke and involuntary smoking. Vol. 83. Lyon: IARC; 2004.