Abstract

Epidemiologists, like many scientists, tend to become specialized and focused on a particular disease, even though behavioral risk factors such as physical activity have effects across many diseases. This commentary is a personal reflection by an epidemiologist on the shortcomings of this disease-oriented approach to prevention. Cancer Prev Res; 1–3. ©2013 AOCR.

When I first read the meta-analysis published in this journal by Singh and colleagues concluding that risk for gastric cancer is 21% lower among those who engage in physical activity, I must admit my reaction was "so what" (1). My first thought, frankly, was of the image of the iconic New Yorker cartoon that has frequented many epidemiology talks—a sketch of a newscaster in front of two spinning circles of chance. One of the circles lists risk factors like smoking, obesity, and physical activity, and the other lists various diseases. The newscaster is reporting about a new study showing that some random risk factor has now been linked to some random disease. What could any link between physical activity and gastric cancer possibly matter, I thought. Surely, we would not be designing prevention programs specifically promoting physical activity for a 21% reduction in gastric cancer risk, because physical activity is already known to have a larger and more certain impact on more common conditions like heart disease, stroke, and diabetes. That was my initial reaction to the finding linking physical activity to gastric cancer, but since that initial cynical impression, I have since been thinking a lot about physical activity and even more about my attitude.

I am a cancer epidemiologist. I like to think I have broad interests and an open mind, but in fact, my professional behavior tends towards narrowness. The articles I read and the meetings I attend are mostly about a few specific diseases. Although I study risk factors, I tend to regard risk factors more as pieces of puzzles to be arranged to form pictures of specific diseases than as matters of direct interest. The reality, though, is that quite often the very same risk factors impacting any single cancer site are also impacting both other cancers as well as many other chronic diseases. When it comes to public health impact, common risk factors trump common diseases every day. Physical activity is a good example. As I have reflected more in recent days on the importance of the association between physical activity and gastric cancer beyond my initial "so what" reaction, I have come to see this relationship as important in two ways—as a finding of broad epidemiologic importance and as a finding with more global implications for public health that we epidemiologists should better appreciate.

I have been concerned for some time about residual confounding between obesity and physical activity because until now the only cancer sites with convincing evidence for physical activity as a protective factor have been those that also show convincing evidence for obesity as a risk factor (2–7). Because obesity and physical activity are so closely linked and because physical activity and life-long obesity are both imperfectly estimated, there is a real risk for residual confounding. However, because gastric cancer is a site that is not particularly associated with obesity (apart from the minority of cancers occurring at the junction of the upper gastric cardia and esophagus) and because of the observation by Singh and colleagues that physical activity was more strongly associated with distal gastric cancers than with cancers of the gastric cardia, the association between physical activity and gastric cancer is unlikely to be confounded by obesity (1). There are other potential confounders to worry about, of course, such as various aspects of diet or social class-related factors that can contribute to risk for chronic infection with Helicobacter pylori, but my concern about residual confounding tied to obesity is much less for gastric cancer than for obesity-related diseases such as cancers of the breast, colorectum, endometrium, or kidney or even for other obesity-related diseases such as heart disease and stroke (2, 7–11).

With concerns about the confounding minimized, the broader epidemiologic importance of the physical activity–gastric cancer relationship is that it can support reasoned speculation about causal mechanisms apart from obesity per se and obesity-connected conditions like insulin resistance. Singh and colleagues nicely discuss the many mechanistic possibilities—that physical activity might act as a general antiinflammatory factor and/or that it might induce specific beneficial effects on immune
function (1). There is now a considerable body of evidence from randomized, controlled trials that physical activity does indeed induce antiinflammatory effects via myokines leading to reductions in circulating levels of C-reactive protein, a marker of general systemic inflammation (12–15). If the physical activity–gastric cancer relationship is, indeed, explained by general antiinflammatory systemic effects, then that same mechanism could also account for benefits to not only many other types of cancer but also to many other noncommunicable diseases that are driven in part by inflammation.

The World Cancer Research Fund (WCRF) concluded that there was convincing evidence that physical activity was associated with lower risk for cancers of the breast, colorectum, and endometrium (2). Subsequently, updated reviews have concluded that physical activity is also clearly a protective factor for cancer of the kidney, and more equivocally, for cancer of the prostate (7, 16, 17). Both for the gastric cancer relationship reviewed by Singh and colleagues and for these other cancer sites, the risk is about 20% lower for those who are more physically active as compared with those who are largely sedentary. Interestingly, this is about the same risk reduction seen in meta-analyses for physical activity as related to cardiovascular diseases and stroke (8–11).

Although a 20% risk reduction for gastric cancer will not necessarily mean that prevention programs based on physical activity promotion, the potential for benefits from physical activity of this same magnitude across many other cancers and across many other chronic diseases as well as on general longevity should not be taken lightly (18).

Epidemiologists like me who are disease-focused in our professional orientation need to reassess how we regard common risk factors such as physical activity. Physical activity is clearly a major factor accounting for many deaths and years of disability from a large set of noncommunicable diseases worldwide. In fact, the Global Burden of Diseases project recently estimated that more disability-adjusted life years are lost worldwide from physical inactivity than from obesity (19). Cancer is now the leading cause of death in the world. There will be about 8 million deaths from cancer this year, about 7 million from cardiovascular disease, about 6 million from strokes, and only about 5 million from the sum of HIV, tuberculosis, malaria, and childhood diarrhea (20). The current emphasis on infectious diseases in the United Nations Millennium goals is now being rethought for the future as noncommunicable diseases have emerged as a much bigger threat to global health (21). If we are to achieve the ambitious goal of reducing mortality from noncommunicable diseases by 25% by the year 2025, people like me who are focused more on specific diseases will need to begin thinking about chronic diseases as a general class of disorders sharing a common set of behavioral etiologies (22).

So what? Learning that those who are more physically active are at lower risk for even gastric cancer has served to remind me that public health is more likely to be improved if we epidemiologists pay more attention to risk factors and less to diseases in the way we conceptualize, analyze, and communicate the actual threats to health. That’s what.

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References


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