Current Topics

Cancer and “Bad Luck”: Risk Perception, Decision Making, and Risk-Reducing Behavior

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If success of a scientific study is measured by how much conversation it triggers, then the article “Variation in Cancer Risk Among Tissues Can Be Explained by the Number of Stem Cell Divisions” has been very successful.¹ Unfortunately, the ensuing public discussion demonstrates how flawed communications can turn potentially valuable research into a public health failure. In addition to raising important discussion points about the study’s methodology and the language of its press release, observers have noted three intertwined messages highlighted by media accounts of the study:²

1) It is unsettling to people to believe that we have limited ability to control our cancer destinies (e.g., by living a healthy lifestyle in a hazard-free environment).

2) A significant degree of randomness to cancer could help to reduce the sense of responsibility or guilt that people feel when they or their loved ones (especially children) are afflicted by cancer.

3) Attributing most cancers to “bad luck” could undermine effective cancer prevention behaviors (e.g., not smoking), thereby ceding what control does exist in terms of cancer risk.

At first blush, items (1) and (2) seem to be opposing sides of the same coin—that is, we can either feel better that our behavior did not cause the cancer, or we can believe that our actions could have prevented it. There is, however, some opportunity for having it both ways—for example, as some critics have claimed, the original authors could have been more clear about the interaction between the number of stem cells in an organ and environmental conditions that lead to the growth of cancerous cells. Thus, when the environmental conditions are present, the process of creating cancerous cells from stem cells is more likely to be triggered when there are more stem cells in the organ. Presenting this more clearly in the article would have helped people to understand why behavioral choices that lead to these environmental conditions still matter. After observing some misinterpretations of their study, the authors issued a follow-up press release that uses a metaphor to make that interaction more clear.³

The third category of comments (the concern about changes in people’s actions related to reducing cancer risk) offers the opportunity for a deeper look at risk perception, decision making, and risk-reducing behavior. Behavioral psychologists, health promotion experts, and other social science researchers and practitioners struggle to find ways to encourage (or “nudge”) people to choose health-protective and risk-reducing behaviors. Behavior affects many areas of public health concern, from cardiovascular disease, diabetes, and sexually transmitted diseases to cancer. Knowledge of risks is a necessary but not always sufficient condition for changing behavior to improve health outcomes.⁴ Although the science of behavior change has advanced in recent years, large impacts are noteworthy because they are so rare.

So, how likely is it that media reports like these would change behavior away from taking precautions to reduce cancer risk? As ever, that is an empirical question that could be investigated. One way to investigate it is to study potential changes in the rates of cancer-specific behaviors like screening tests (colonoscopy) and vaccines (HPV) that can actually

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prevent cancers. In improving our understanding of how information can change risk-reducing behavior, it might be useful to investigate whether the January 2, 2015 publication of the study reduced the rate at which people obtained these medical procedures. If they did, it would show a misunderstanding of the study results and suggest a false belief that cancer, when it is caused by bad luck, is inevitable.

A second kind of study would look directly at how information on “bad luck” causing cancer affects mental models related to cancer-protective behaviors. Do people, upon being told that they can only reduce risks for 35% of cancers, decide not to do so at all? Such effects would be understood best in terms of a more comprehensive description of existing mental models, as well as individual differences in numeracy and decision-making competence. Some people may integrate the result with previous beliefs about the degree of randomness in cancer risk; others may create an entirely new section in their mental model to account for this new idea. Studies of numeracy suggest that some people will have difficulty incorporating a probabilistic statement such as “65% due to chance” in their thinking, and some may use it to strengthen their propositional belief that cancer is due to “bad luck.”

Third, one might study how alternative ways of reporting the study results might have avoided such controversy and confusion in the first place. For example, how can one best convey: (a) the idea of an interaction between environmental and behavioral factors, (b) the meaning of stem cells and their prevalence in particular organs, and (c) the strength of the science underlying a breathtaking new result? Once these basic research questions have been raised by the cancer-luck study, they can be pursued in other contexts, revealing the generality of the findings and the ways that domains differ. For example, could this type of information update the mental models that people use, not only for cancer, but also for the other chronic diseases that have been associated with similar behaviors or lifestyle choices? Lay mental models can connect ideas and draw comparisons among items that, in the expert world, are unrelated. Many behaviors that reduce cancer risk also help reduce risk of other chronic diseases. Smoking increases risk of lung cancer and also of emphysema and stroke. Eating a healthy diet decreases risk of cancer, and also decreases risks of cardiovascular disease, diabetes, and even Alzheimer’s disease. Using sunscreen not only reduces risk of skin cancer, but also reduces wrinkles. The similarity of the items on the one side of the cause-and-effect relationship may lead people to extend conclusions from cancer to other chronic diseases. Only in-depth and focused mental model research would reveal how individuals’ thinking generalizes, and differs across domains. It is not far-fetched to wonder whether people who took the cancer-luck study seriously started to question the value of other health-related behaviors.

One benefit of Risk Analysis research, which lies at the interface between disciplines and between research and practice, is that practical problems can both benefit from the basic science and stimulate its development.

REFERENCES

1. Tomasetti C, Vogelstein B. Variation in cancer risk among tissues can be explained by the number of stem cell divisions. Science, 2015; 347(6217):78–81.