

Indecent exposures

I have a potential conflict regarding the following discussion. I am a gastroenterologist, a Division Chief and a member of the Board of Trustees of the American College of Gastroenterology (ACG). I perform colonoscopies, a large component of my Division's income is derived from performing colonoscopies and the ACG advocates colonoscopic screening for the prevention of colon cancer.

Although *primum non nocere* has long been a dictum of our profession, patient safety has, once again, come to the fore. Indeed, US policy makers have intensified efforts to improve patient safety; to the point that "the Centers for Medicare & Medicaid Services (CMS) will not pay for certain preventable complications" (Pronovost, P. J. & Faden, R. R. *JAMA* 302, 890–891 [2009]). The potential risk to patients from the increasing use of diagnostic radiation must surely be considered a preventable complication, and is the focus of discussion in two Perspectives articles: one in the *New England Journal of Medicine* by Michael Lauer (Lauer, M. S. *N. Engl. J. Med.* 361, 841–833 [2009]) and the other in this issue by David Johnson, Paul Helft and Douglas Rex (Johnson, D., Helft, P. & Rex, D. *Nat. Rev. Gastroenterol. Hepatol.* 6, 738–740 [2009]). Lauer comments on a study in the *New England Journal of Medicine* that describes the increasing exposure to 'low-dose' ionizing radiation from coronary CT scans being used for the diagnosis of coronary artery disease (Fazel, R. *et al. N. Engl. J. Med.* 361, 849–857 [2009]). Johnson *et al.* discuss exposure to ionizing radiation from CT colonography used as a potential screening tool for the prevention of colon cancer.

Regardless of medical specialty, the increasing use of, and demand for, diagnostic imaging along with the resulting potential for serious downstream effects of ionizing radiation, even at low doses, is a serious public health concern and an illuminating issue for physicians, policy makers and the public. In their study, Fazel *et al.* estimated the cumulative effective doses of radiation from imaging procedures in a population of more than 600,000 health-plan enrollees between 2005 and 2007 (Fazel, R. *et al. N. Engl. J. Med.* 361, 849–857 [2009]). Nearly 70% of enrollees underwent at least one imaging procedure associated with radiation exposure. Although the mean cumulative effective dose of ionizing radiation from imaging was low (2.4 + 6.0 mSv per enrollee per year), there was a wide distribution, which means that moderate doses were incurred in nearly 200 enrollees per 1,000 per year, and approximately 20 enrollees per 1,000 per year were exposed to radiation doses that were high to very high. CT scans and nuclear imaging accounted for approximately 75% of the cumulative effective dose, the majority of which was administered to outpatients. When generalized to the American population,

Fazel *et al.* estimated that 4 million individuals would be exposed to effective doses of ionizing radiation that exceed 20 mSv per year.

Johnson *et al.* point out "Radiography in medical diagnostic procedures is the largest manmade source of radiation exposure in the general population" and Lauer refers to estimates made by Brenner and Hall that 2% of all cancers in the US could be attributable to radiation exposure from CT scanning (Brenner, D. J. & Hall, E. J. *N. Engl. J. Med.* 357, 2277–2284 [2007]). In an attempt to quantify the risk associated with ionizing radiation, it has been estimated that a single dose of 10 mSv produces a lifetime risk for developing cancer of 1 in 1,000. Fazel *et al.* used estimates of exposures from single CT examinations of the abdomen (8 mSv) and pelvis (6 mSv), which combined already exceed the 10 mSv 'threshold'. Furthermore, the use of CT scans for diagnostic purposes has quadrupled since 1993 (Brenner, D. J. & Hall, E. J. *N. Engl. J. Med.* 357, 2277–2284 [2007]).

The data discussed above pertain to the utilization and risks of diagnostic CT scans. The commentaries by Johnson *et al.* and Lauer both extend the potential risks to the expanding use of CT scans for screening purposes in the settings of cardiovascular disease and colon cancer prevention. Here the potential for harm could be greatly intensified considering the application of CT scans as a 'routine' method for screening the general population. How ironic it would be if screening procedures increased the risk of developing a disease class they were employed to prevent.

While the FDA recognizes radiation from radiological sources as a carcinogen, Johnson *et al.* point out that policy makers have not yet established guidelines for doses and indications, and highlight the ethical and legal need for an adequate discussion between physician and patient regarding "...the related latent risks." In contrast to the US, countries such as Germany and Switzerland forbid the use of any screening tests involving radiation exposure. As Johnson and colleagues advocate adequate discussion of specific risks, the potential risks of radiation exposure from diagnostic and/or screening imaging should be assessed as a matter of priority for the sake of public safety.

Pronovost and Faden advocate the introduction of a formal process in the US to develop processes and policies regarding patient safety. They propose a coordinated effort from the US Secretary of Health and Human Services and the White House Office of Health Reform. Clearly, before we can accept an expanding role for diagnostic imaging for screening purposes, the potential harm from adopting such a policy should be assessed via a transparent, accountable and ethical process.

doi:10.1038/nrgastro.2009.204

“How ironic ... if screening ... increased the risk of ... a disease ... [it was] employed to prevent”

Stephen B. Hanauer is the Editor-in-Chief of *Nature Reviews Gastroenterology & Hepatology*.

Competing interests
S. B. Hanauer declares associations with the following organization: ACG. See the article online for details of the relationship.