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Letter to the Editor

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Response to Two Letters Concerning Radiation Doses and Risks in Breast Screening

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I thank both authors for their letters concerning my recent "Science of Screening" article on radiation doses and risks (1). I was invited to write this article and based it on the best available evidence on radiation risks. The National Academy of Sciences' Biological Effects of Ionizing Radiation (BEIR) VII radiation risk estimates are the most relevant to breast imaging because they are age specific and gender specific, and they are the most credible. BEIR VII assumes a linear, no-threshold estimate of risk versus dose at low doses based on the linear dose–risk relationship that exists at organ doses higher than 100 mGy (2). Such an assumption is needed because reliable studies at low-dose exposures do not exist and would require millions of exposed subjects to have adequate power. Since radiologists and medical physicists have a duty to protect patients from unnecessary radiation, it would be irresponsible to assume otherwise about the extrapolation of risk versus dose to low-dose levels.

With regard to the higher radiation doses and risks by geographic location, there are greater cancer risks due to natural background radiation in Colorado than in Louisiana (3). It would be unwise, however, to attempt to correlate those higher risks of cancer induction by location without controlling for other risk factors such as smoking, diet, obesity, and chemical exposure. Louisiana residents in particular suffer high levels of manufacturing chemical exposure compared to Colorado residents (4). Radiologists and other physicians do not usually recommend where people should live, but they are often asked to recommend breast cancer screening tests, and that is why understanding the radiation risks and potential benefits of those tests is important.

One letter decries my article's use of "flawed theoretical models" to "'calculate' spurious biological risks." The other cites Dr Huda's warning about computing the total number of cancers in a patient population without noting the collective benefits associated with the exam. My response is that it is impossible to compare risks and benefits of various breast screening tests, as my article and others referenced therein do, without first estimating the risks in terms of cancers induced and deaths caused by ionizing radiation.

Both letters expressed concerns that my article casts molecular breast imaging (MBI) in a dim light as a screening tool. That was (and is) not my intent. I would note that the clinical data supporting MBI as a supplemental screening tool, and the benefit to risk ratios that result, apply only to women with dense breasts who receive a low-dose MBI exam consisting of a 300 MBq (8 mCi) drawn dose of Technetium-99m sestamibi (5,6).

Conflict of Interest Statement

Dr Hendrick has served as a consultant to GE Healthcare on work unrelated to his referenced papers or this letter.

References

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