26 Breast Health

Population-based mammography screening below age 50: balancing radiation-induced *vs* prevented breast cancer deaths

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Introduction.—Exposure to ionizing radiation at mammography screening may cause breast cancer. Because the radiation risk increases with lower exposure age, advancing the lower age limit may affect the balance between screening benefits and risks. The present study explores the benefit–risk ratio of screening before age 50.

Methods.—The benefits of biennial mammography screening, starting at various ages between 40 and 50, and continuing up to age 74 were examined using micro-simulation. In contrast with previous studies that commonly used excess relative risk models, we assessed the radiation risks using the latest BEIR-VII excess absolute rate exposure-risk model.

Results.—The estimated radiation risk is lower than previously assessed. At a mean glandular dose of 1.3 mGy per view that was recently measured in the Netherlands, biennial mammography screening between age 50 and 74 was predicted to induce 1.6 breast cancer deaths per 100 000 women aged 0–100 (range 1.3–6.3 extra deaths at a glandular dose of 1–5 mGy per view), against 1121 avoided deaths in this population. Advancing the lower age limit for screening to include women aged 40–74 was predicted to induce 3.7 breast cancer deaths per 100 000 women aged 0–100 (range 2.9–14.4) at biennial screening, but would also prevent 1302 deaths.

Conclusion.—The benefits of mammography screening between age 40 and 74 were predicted to outweigh the radiation risks (Table 3).

▶ The recent guidelines developed by the US Preventive Services Task Force that called for reducing the use of mammography in low-risk women younger than 50 years were met with considerable displeasure from researchers and clinicians alike. The development of these guidelines was based on a variety of controversial issues concerning radiation exposure, cost, and detection rate of mammography in younger women. To this end, this study from the Netherlands sought to determine whether the use of ionizing radiation mammography in women younger than 50 years would provide benefits that outweigh the risks. The authors estimated that mammography every 2 years would induce 1.6 breast cancer deaths per 100 000 women but would avoid 1121 deaths, a benefit-risk ratio that is overwhelmingly in favor of benefit

TABLE 3.—Induced and Prevented Breast Cancer Deaths and the Benefit–Risk Ratio of Breast Cancer Screening Under Various Model Assumptions, Calculated for a Glandular Dose of 1.3 mGy Per View, for 100 000 Women aged 0–100

		Induced Mortality	Prevented Mortality	Ratio Prevented: Induced Mortality
Biennial screening ages 50–74		1.6	1121	684:1
Biennial screening ages 50–74	Latency period of 10 years	1.4	1121	805:1
Biennial screening ages 50–74	BEIR-V ERR	1.7	1121	658:1
Biennial screening ages 50–74	BEIR-VII ERR	2.7	1121	419:1
Biennial screening ages 50–74	No screening benefit for induced cancers	2.4	1121	462:1
Biennial screening ages 50–74	No correction for DDREF	2.5	1121	464:1
Biennial screening ages 40–74		3.7	1302	349:1
Biennial screening ages 40–74	Screening effectiveness 50- –25%	3.8	1256	334:1
Biennial screening ages 40–74	Screening effectiveness 50- +25%	3.7	1342	362:1
Biennial screening ages 40–74	Sensitivity 50-50% lower than 50+	3.8	1225	323:1
Biennial screening ages 40–74	Sensitivity 50- same as 50+	3.7	1371	373:1
Annual screening ages 40–49 and biennial screening ages 50–74		5.4	1392	259:1

Abbreviation: BEIR-VII, 7th Biological Effects of Ionizing Radiation committee.

[a]As calculated with the BEIR-VII excess absolute rate (EAR) model corrected with a 'dose and dose-rate effectiveness factor' (DDREF) of 1.5, assuming no latency time and a potential screening benefit for induced breast cancers. For women below the age of 50, the screening effectiveness was assumed to be comparable to that in the UK Age Trial (Moss et al, 2006) and the test sensitivity was estimated to be 25% lower than that for women older than 50 years of age. The grey-shaded rows represent the baseline scenarios.

(Table 3). The profound benefit of biennial mammography as determined by this model should encourage the judicious use of mammography in low-risk women beginning at the age of 40 years, a practice that will inevitably continue to improve the outcomes associated with the detection of early breast cancers.

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Low to Moderate Alcohol Intake Is Not Associated with Increased Mortality After Breast Cancer

Flatt SW, Thomson CA, Gold EB, et al (Univ of California, San Diego, La Jolla; Univ of Arizona, Tucson; Univ of California, Davis; et al)
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Background.—Both alcohol consumption and obesity have been linked with breast cancer morbidity and mortality. An inverse association between alcohol intake and obesity suggests possible confounding between these variables (and perhaps other factors) with breast cancer outcomes.