A rationale for starting breast cancer screening under age 50

Most countries which have implemented service screening on breast cancer invite women from age 50 [1]. With regard to younger women, findings from the UK age trial [2] showed the same trend as previous studies [3] that screening below age 50 has a positive effect on breast cancer mortality. For women screened at 40–49, Moss et al. [2] reported a breast cancer mortality reduction of 17% at 10-year follow up (relative risk 0.83, 95% confidence interval 0.66–1.04). The statistical nonsignificance of these results hampers decisions on lowering the starting age of mammographic screening. On the other hand, these results also cast doubts on the validity of age 50 as the lower age limit for breast screening.

We evaluated (surrogate) impact indicators for mortality reduction, such as screen-detected lymph node status, tumour size, and tumour stage; sensitivity of the mammographical screening test; mammographic density; and breast cancer occurrence along the continuum of age, to address the question whether breast screening should be extended to women under age 50. Our analysis thus addresses the matter of a gradual change with age in screening outcome measures instead of a sudden change, which seems to appear if data are analysed according to age dichotomised in <50 and ≥50.

Data were used from the Nijmegen breast-screening programme in The Netherlands [4]. Tumour stage II or worse represents breast cancer with either tumour size ≤2 cm and lymph node positivity or tumour size >2 cm; stage I represents breast cancer with tumour size ≤2 cm and a negative lymph node status; and ductal carcinoma in situ was classified as stage 0. We calculated the rate of invasive disease with lymph node positive breast cancer, the rate of invasive disease with a diameter >2 cm, and the rate of tumour stage II or worse. The mammographic screening test sensitivity was calculated as the number of breast cancer detected through screening divided by the number of breast cancer detected through screening plus the number of interval cancers. Mammographic density was classified by a radiologist in one of two categories depending on the relative amount of dense tissue: ≤25% was defined as lucent and ≥26% as dense [5]. Dutch breast cancer incidence rates were calculated for two calendar years (1989 and 2003) with data from the National Cancer Registry and Statistics Netherlands.

We observed a gradual change with increasing age in screening outcome measures and breast cancer incidence (see Figures 1 and 2). This confirms the results from an earlier study by Kopans et al. [6] that screening outcome measures do not change abruptly at age 50. Between 40 and 60 years, the detection rate of lymph node-positive disease remained roughly the same (~0.75 per 1000 screenees); the detection rate of tumour size >2 cm rose from 0.4 per 1000 women screened at age 45 to 0.5 per 1000 women screened at age 55; the detection rate of stage II or worse rose from 0.4 per 1000 screenees at age 45 to 0.9 per 1000 screenees at age 55; the mammographic screening test sensitivity rose from 42% at age 45 to 55% at age 55; the number of women with dense breasts gradually declined from 50% at age 46 to 10% at age 60 (Figure 1); and the breast cancer incidence rates rose in 1989 and 2003 (Figure 2).

Breast cancer incidence rates in 2003 were higher compared with 1989, an increase which is not only limited to the age group eligible for screening but also between 45 and 50 years of age. The breast cancer incidence rate at the start of the national
mammographic screening programme, i.e. the incidence rate at age 50 in 1989 (228/100,000), now equals the rate at age 46 in 2003 (233/100,000). This increase may be explained by changes in risk factors for breast cancer related to endogenous hormones as stated by MacMahon [7], such as age at first birth, nulliparity, or onset of menses.

In conclusion, our analysis addresses the matter of a gradual change along the continuum of age in screening outcome measures and breast cancer incidence. The results indicate that the starting age of 50 years is to some extent arbitrary. Keeping the increase in breast cancer incidence below age 50 in mind, the starting age may have to be reconsidered in favour of a younger age.

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