7. EVALUATION

7.1 Mammography screening

7.1.1 Mammography screening: preventive effects

There is *sufficient evidence* that screening women aged 50–69 years by mammography reduces breast cancer mortality. This evaluation is supported by randomized controlled trials of efficacy of mammography screening and by observational studies of effectiveness of both invitation to and attendance at service mammography screening. Women aged 50–69 years invited to service mammography screening have, on average, a 24% reduced risk of mortality from breast cancer. Women aged 50–69 years who attend service mammography screening have, on average, about a 40% reduced risk of mortality from breast cancer.

There is *limited evidence* that screening women aged 45–49 years by mammography reduces breast cancer mortality. There is *limited evidence* that screening women aged 40–44 years by mammography reduces breast cancer mortality. These evaluations are supported by observational studies of service mammography screening and are consistent with the one relevant randomized controlled trial. Invitation or attendance of women aged 40–49 years to service mammography screening have been associated with a reduction of about 20% in risk of breast cancer mortality; this reduction may be greater in women aged 45–49 years (~32%) than in women aged 40–44 years (~17%).

There is *sufficient evidence* that screening women aged 70–74 years by mammography reduces breast cancer mortality. This evaluation is supported by observational studies of service mammography screening.

7.1.2 Mammography screening: adverse effects

There is *sufficient evidence* that mammography screening of women aged 50–69 years detects breast cancers that would never have been diagnosed or never have caused harm if the women had not been screened (overdiagnosis). The percentage of overdiagnosis ranges from 1% to 10% when estimated by comparing the cumulative incidence of breast cancer in women screened from age 50–69 years and followed up for about 10 years after the last screen with the cumulative incidence of breast cancer in similar but unscreened women over the same period of time.

There is *sufficient evidence* that the risk of radiation-induced cancer from mammography in women aged 50–74 years is substantially outweighed by the reduction in breast cancer mortality from mammography screening.

There is *sufficient evidence* that mammography screening produces short-term negative psychological consequences when the result is false-positive.

7.1.3 Mammography screening: cost–effectiveness

There is *sufficient evidence* that mammography screening has a net benefit for women aged 50–69 years who are invited to attend organized mammography screening programmes.

There is *sufficient evidence* that mammography screening can be cost-effective among women aged 50–69 years in countries with a high incidence of breast cancer.

There is *limited evidence* that breast cancer screening can be cost-effective in low- and middle-income countries.

7.2 Other imaging techniques

7.2.1 Breast ultrasonography

There is *inadequate evidence* that ultrasonography as adjunct to screening by mammography in women with dense breasts and negative mammography reduces breast cancer mortality.

There is *limited evidence* that ultrasonography as adjunct to screening by mammography in women with dense breasts and negative mammography increases the detection rate of breast cancer.

There is *inadequate evidence* that ultrasonography as adjunct to screening by mammography in women with dense breasts and negative mammography reduces the rate of interval cancers.

There is *sufficient evidence* that ultrasonography as adjunct to screening by mammography in women with dense breasts and negative mammography increases the rate of false-positive screening outcomes.

7.2.2 Digital breast tomosynthesis/ three-dimensional mammography

There is *inadequate evidence* that screening by digital mammography with tomosynthesis reduces breast cancer mortality compared with mammography alone.

There is *sufficient evidence* that screening by digital mammography with tomosynthesis increases detection rates of breast cancers compared with mammography alone.

There is *limited evidence* that the incremental detection from mammography with tomosynthesis is mostly of invasive cancers.

There is *limited evidence* that screening by digital mammography with tomosynthesis reduces the rate of false-positive screening outcomes compared with mammography alone.

There is *inadequate evidence* that screening by digital mammography with tomosynthesis reduces the rate of interval cancers compared with mammography alone.

There is *sufficient evidence* that screening by digital mammography with tomosynthesis (from dual acquisition) increases the radiation dose received compared with that of mammography alone. Reconstructing the two-dimensional images from the tomosynthesis acquisition substantially reduces the radiation dose received compared with that of dual acquisition by mammography and tomosynthesis.

7.3 Screening of women at an increased risk

There is *sufficient evidence* that in women with a high familial risk and with a *BRCA1/2* mutation, magnetic resonance imaging (MRI) as adjunct to screening by mammography increases the sensitivity and decreases the specificity of screening.

There is *limited evidence* that in women with a high familial risk and without a known *BRCA1/2* mutation, MRI as adjunct to screening

by mammography increases the sensitivity and decreases the specificity of screening.

There is *inadequate evidence* that in women with a *BRCA1/2* mutation, MRI as adjunct to screening by mammography reduces breast cancer mortality.

There is *sufficient evidence* that in women with a high familial risk, with or without a *BRCA1/2* mutation, screening with ultrasonography alone yields sensitivity similar to or lower than that obtained with mammography alone, and lower than that obtained with MRI alone.

There is *inadequate evidence* that in women with a high familial risk screened with MRI and mammography, clinical breast examination detects additional cancers.

There is *limited evidence* that in women with a personal history of breast cancer, the sensitivity and the specificity of mammography are lower than those in women without such a history.

There is *inadequate evidence* that in women with a personal history of breast cancer, ultrasonography as adjunct to mammography detects additional cancers.

There is *inadequate evidence* that in women with a personal history of breast cancer, ultrasonography as adjunct to mammography increases the rate of false-positive screening outcomes compared with women without such a history.

There is *inadequate evidence* that in women with a personal history of breast cancer, MRI added to mammography plus ultrasonography increases the rate of false-positive screening outcomes compared with women without such a history.

There is *limited evidence* that in women with lobular neoplasia or atypical proliferations, the sensitivity of mammography is equal to and the specificity of mammography is lower than that in women without such lesions.

There is *inadequate evidence* that in women with lobular neoplasia or atypical proliferations, MRI as adjunct to mammography detects additional cancers.

There is *limited evidence* that in women with lobular neoplasia or atypical proliferations, MRI as adjunct to mammography increases the rate of false-positive screening outcomes compared with mammography alone.

7.4 Clinical breast examination

There is *sufficient evidence* that screening by clinical breast examination alone shifts the stage distribution of tumours detected towards a lower stage.

There is *inadequate evidence* that screening by clinical breast examination alone reduces breast cancer mortality.

7.5 Breast self-examination

There is *inadequate evidence* that teaching breast self-examination reduces breast cancer mortality.

There is *inadequate evidence* that teaching breast self-examination reduces the rate of interval cancers.

There is *inadequate evidence* that breast self-examination reduces breast cancer mortality in women who practise it competently and regularly.