

## Introduction

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The potential for systematic early detection and treatment of breast cancer to reduce the burden of disease is widely recognized in the European Union (EU). Population-based screening programmes using mammography, the evidence-based test recommended by the Council of the EU,<sup>1</sup> are implemented in most EU countries.<sup>2,3</sup> Italy is a prime example of the European-wide efforts to make effective and appropriate breast cancer screening accessible to all women who may benefit, where over 1.4 million women attended screening in 2009 out of 2.5 million invitation letters, covering 90% of all women aged 50–69.<sup>4</sup> Building on the achievements in the European countries, continued, concerted efforts are necessary to enable all eligible women to attend breast cancer screening, as pointed out in the paper by Giordano *et al.*<sup>5</sup> that presents EU data on coverage and participation.

Performance of the screening programmes is continuously monitored, and compared with short-term indicators and standards largely derived from the European guidelines for quality assurance in breast cancer screening and diagnosis.<sup>6</sup> Professionals in individual programmes examine issues such as communication and training. The short-term indicators are designed to show opportunities for improvement in the screening process. The cancer detection rate indicates programme sensitivity, while the recall rate deals with specificity, and other indicators are associated with logistic aspects, such as the length of time between testing and assessment of detected abnormalities. However, these indicators cannot be used to fully evaluate the impact of screening on a population which, as a whole, also includes women who did not accept their invitation. Such an evaluation is important from a public health viewpoint. Recently, several European countries, like Italy, have evaluated which outcomes have changed following the activation of screening programmes, both in terms of positive effects (reduction in presentation of advanced stage cancers, reduction of radical mastectomy rates and reduction in cause-specific mortality) and adverse effects (overdiagnosis and intervention including surgery in women who do not have breast cancer).<sup>7</sup> An accurate assessment of service screening would improve the current public discussion, enabling speculation to be replaced by fact.

A long-term perspective is required to produce a comprehensive assessment of the benefits and harms of breast cancer screening. This is illustrated by the evaluation of overdiagnosis, i.e. detection of a breast cancer, through screening, that would not have otherwise been detected in a woman's lifetime. Puliti *et al.*<sup>8</sup> show in this issue that reliable estimation of the rate of overdiagnosis must take into account trends in breast cancer incidence and

the compensatory drop in incidence after the end of the screening period. Given the 20-year age range of the female population targeted by many screening programmes in the EU, direct assessment of the magnitude of overdiagnosis has only recently been possible in a few European programmes. The same applies to other key factors, such as the impact of screening on breast cancer mortality, and the cumulative rate of false-positive tests, when considering the balance between benefits and harms. The experience in European countries differs markedly from the estimates of benefit and harm put forward by authors associated with the Nordic Cochrane review of breast cancer screening, which are largely based on a selected subset of the randomized controlled trials.<sup>9–12</sup>

Effective and accurate communication is important in breast cancer screening. The scientific evidence of the benefits and harms of population-based screening programmes in Europe was reviewed by the European Cancer Network in Warsaw in May 2010, to clarify the methodological standards that should be met for women attending screening. The efforts of scientists and professionals experienced in implementation and evaluation of most of the population-based breast cancer screening programmes currently running in the EU were also coordinated in two workshops of the EUROSREEN group held in Florence by the Italian National Centre for Screening monitoring in November 2010 and March 2011. Using the evidence-based standards developed in the workshops, pooled estimates of the key benefits and harms of breast cancer screening have been generated that are applicable to screening in the EU. Overall the current European evidence shows that about two lives are saved for every case of overdiagnosis; this is more favourable than the estimate by authors of the Nordic Cochrane review.<sup>10</sup>

Perhaps of greater importance than the numerical results is the evidence-based consensus on methodological standards of evaluation that is documented in these papers. Moss *et al.*<sup>13</sup> show that analysis of breast cancer mortality trends, a method used by some groups<sup>11</sup> to assess the impact of screening on breast cancer mortality is usually inappropriate. This is because it is prone to error due to inclusion in the screening period of breast cancer deaths occurring in women diagnosed before the screening programme started. Puliti *et al.*<sup>8</sup> also show that estimates of overdiagnosis should allow for lead time, and the changes in breast cancer incidence occurring independently of screening. The latter would mean, for example, explicitly reporting the annual increase in breast cancer incidence prior to screening and including sensitivity analyses indicating different estimates of overdiagnosis under different

assumptions in the modelling of the expected incidence trend. Application of the methods and recommendations presented in the papers in this supplement for assessing the benefits and harms of screening should enable health professionals to develop balance sheets tailored to the specific conditions in a regional or national screening programme.<sup>14</sup> These will provide more accurate information for women seeking to make an informed choice about attendance in breast cancer screening programmes in Europe.

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## REFERENCES

- 1 Council of the European Union. Council Recommendation of 2 December 2003 on cancer screening (2003/878/EC). *Off J Eur Union no. L 2003*;327:34–38
- 2 von Karsa L, Anttila A, Ronco G, et al. Cancer screening in the European Union Report on the implementation of the Council Recommendation on cancer screening – First Report. European Commission, Luxembourg, 2008
- 3 Commission of the European Communities. Report from the commission to the council, the European Parliament, the European Economic and Social committee and the Committee of the Regions – Implementation of the Council Recommendation of 2 December 2003 on cancer screening (2003/878/EC) Brussels, Report no. COM(2008) 882 final, 2008
- 4 National Centre for Screening Monitoring: Eighth Report. Marco Zappa (ed.) *Epidemiologia e Prevenzione*, 2010(Suppl 34)
- 5 Giordano L, von Karsa L, Tomatis M, et al. Mammographic screening programmes in Europe: organisation, coverage and participation. *J Med Screen* 2012;19(Suppl. 1):72–82
- 6 Perry N, Broeders M, de Wolf C, Törnberg S, Holland R, von Karsa L. European guidelines for quality assurance in breast cancer screening and diagnosis. Fourth edition – summary document. *AnnOncol* 2008;19:614–22
- 7 Impact Working Group. Epidemiological changes in breast tumours in Italy: the IMPACT study on mammographic screening programmes. *Pathologica* 2011;103:290–3
- 8 Puliti D, Duffy SW, Miccinesi G, et al. Overdiagnosis in mammography screening for breast cancer in Europe: a literature review. *J Med Screen* 2012;19(Suppl. 1):42–56
- 9 Olsen O, Gøtzsche PC. Cochrane review on screening for breast cancer with mammography. *Lancet* 2001;358:1340–2
- 10 Gotzsche PC, Hartling OJ, Nielsen M, Brodersen J, Jørgensen KJ. Breast screening: the facts – or maybe not. *BMJ* 2009;338:b86
- 11 Jørgensen KJ, Zahl PH, Gøtzsche PC. Breast cancer mortality in organised mammography screening in Denmark: comparative study. *BMJ* 2010;340:c1241
- 12 Jørgensen KJ, Keen JD, Gøtzsche PC. Is mammographic screening justifiable considering its substantial overdiagnosis rate and minor effect on mortality? *Radiology* 2011;260:621–7
- 13 Moss SM, Nyström L, Jonsson H, et al. The impact of mammographic screening on breast cancer mortality in Europe: a review of trend studies. *J Med Screen* 2012;19(Suppl. 1):26–32
- 14 Euroscreen Working Group. Summary of the evidence of breast cancer screening service outcomes in Europe and first estimate of the benefit and harm balance sheet. *J Med Screen* 2012;19(Suppl. 1):5–13