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Authors' response

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We thank Bulliard and Levi for their interest in our international population-based survey of women's perception of the benefits of mammography screening.[1,2] Our survey showed that in the US and three European countries (UK, Italy, Switzerland) a high proportion of women overestimated the benefits that can be expected from screening mammography.

Bulliard and Levi argue that the questions used in our survey could not adequately measure perceptions and that simpler, open-ended questions should have been used. Survey questions can always be improved, particularly in the light of answers received, but we do not think that the use of open-ended questions would have led to different conclusions. For example, even when classifying the answer that biannual screening in women older than 50 years reduces breast cancer mortality 'by about half' as correct, 20% (Switzerland) to 38% (US) of women would overestimate benefits (Table 1 in ref. 2). These findings are in line with the results of a survey in the Canton of Geneva conducted in 1998.[3]

Bulliard and Levi believe that the wording of the question on whether screening 'prevents' or 'reduces' the risk of contracting breast cancer may have been misunderstood and that using the phrase 'avoids breast cancer' would have yielded more appropriate responses. It is clear that the wording of closed questions can affect responses[4] but the change suggested by Bulliard and Levi is subtle and unlikely to be of great importance. The question was asked in four different languages (English, Italian, German, French) and the frequency with which women erroneously chose to answer that 'regular mammography prevents' or 'reduces the risk of breast cancer' was above 50% in all countries. We think that a more plausible explanation for these results is the quality of the information that is disseminated on mammography screening. For example, an analysis of the contents of leaflets in Australia revealed a worrying emphasis on cancer incidence, despite the fact that the incidence of breast cancer is not reduced by screening.[5] Similar results were recently obtained by Jørgensen and Gøtzsche who investigated relevant websites in Scandinavian and English speaking countries with national breast cancer screening programmes.[6]

Finally, Buillard and Levi disagree with the conclusion that our results 'raise doubt on informed consent procedures within mammography screening programmes'. We agree with Buillard and Levi that women's perception will be shaped by several sources of information, and we acknowledge that we did not ask about these sources. Nevertheless, women with misconceptions about mammography who participate in breast cancer screening programmes may well have given consent that is not truly informed. Interestingly, the number of correct answers among British women aged 50–59 (the women in our study with access to a national screening programme) was lower compared with women from Switzerland and the US, where opportunistic screening dominates. In Switzerland, when using the same question in a survey of women aged 50–69 living in the Morges district of the Canton of Vaud, where a pilot breast cancer screening programme has been in place since 1995, 80% of respondents believed that that regular mammography reduces or prevents breast cancer[7] compared with 65% in the national survey.[2] These findings may reflect the dilemma that organized screening programmes face when attempting both to achieve high coverage and to provide balanced information.[8] Indeed, the quality and the extent of the

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information provided about both the possible benefits and adverse events of a screening test may dramatically change the willingness of people to participate.[9] We therefore maintain that the female populations studied in our survey in four countries appear to be poorly informed about the likely benefit of mammography screening and that many women offered screening may not be able to exercise informed choice.

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Letters to the Editor

Using capture–recapture methods to study recent transmission of tuberculosis

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Sirs—A recent paper of Inigo *et al*. deals with a very interesting subject: use of the capture-recapture method to estimate the number of tuberculosis (TB) cases attributable to recent transmission.[1] While estimating numbers of TBcases in the general population is an important topic, and the capture-recapture method may be a useful method to achieve this, we believe that the novel application in the study of Inigo *et al.* is seriously flawed.

When applying the capture-recapture method in a standard way, the number of people belonging to different groups or databases, and the extent to which these databases overlap, are determined. In the study of Inigo *et al*., capture-recapture is used not to get the total number of cases but to get the number attributable to recent transmission. Below we argue that this leads to invalid results, because the different databases use different case definitions of recent transmission, neither of which is 100% specific.

The amount of recent transmission identified with the two methods (contact investigation and restriction fragment length polymorphism [RFLP] results, respectively) was very different. This is not surprising. Epidemiological contact information has low sensitivity since casual contacts are often missed, while its specificity may be limited in high-risk populations.[2] If we understand Inigo *et al*. correctly, epidemiological identification of recent transmission in their study had a positive predictive value of 55% since of 29 contacts with known RFLP results, 16 (55%) were found to be clustered, while 13 were not clustered. Incidentally, this result should also have been applied to the 20 epidemiologically linked cases without RFLP results available. RFLP typing on the other hand may have limited sensitivity if sampling is incomplete[3,4] and limited specificity in stable populations.[5,6]

In the Table we show a theoretical example of a population which is completely captured, and in which two tests are used to identify cases of recent transmission. One test has low sensitivity (8/30 = 27%) and high specificity (63/70 = 90%) (epidemiological information on contact) and the other higher sensitivity (26/30 = 87%) and lower specificity (56/70 = 80%) (RFLP typing). The Table does not claim that sensitivity and specificity of these techniques are known to have these values, but explores the consequences of sub-optimal sensitivity and specificity of different diagnostic tests if their results are used in a capture-recapture analysis.

In the Table, A and B summarize the 'test' results in a population in which 30% of cases are attributable to recent transmission. C and D compare the results of the two tests in 'true' positives and 'true' negatives, assuming errors in the two tests are independent (thus, for example, the expected value for Epi recent transmission = yes and RFLP recent transmission = yes is (8×26)/30). E provides a comparison of test results in the total population (by summing C and D), and F applies the capture-recapture analysis as proposed by Inigo *et al*. on those

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