Advanced stage breast cancer is less often diagnosed in women who attend breast cancer screening

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Aim
To assess age-specific incidence rates of advanced breast cancer in women who attended screening in a fully implemented, steady state screening program compared to non-attenders.

Methods
• All women, aged 49 and older, diagnosed with breast cancer between 2006-2011 were selected from the Netherlands Cancer Registry
• Data were linked to the Netherlands breast cancer screening program, including data of screened women between 2004-2011, to cover a period of at least 24 months before breast cancer diagnosis
• Incidence rates were age-adjusted using the European Standard Population 2013 as a reference
• Multivariable logistic regression was used to estimate ratios for advanced stage between subgroups

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Results
• In total 72,612 breast cancers were included
• 44,246 were screen-related cancers (61%) including 32,158 screen-detected cancers (73%)

Definitions
• Screen-related cancers: Screen-detected and interval cancers diagnosed <24 months after a screening examination
• Non-screen-related cancers: All other breast cancers
• Advanced stage breast cancer was defined using two definitions:
  1. advanced stage defined as stages III and IV cancers (vs stages 0, I, II)
  2. advanced tumour size defined as invasive tumour sizes ≥15 mm (vs <15 mm or DCIS)

Definition 1:
• Defining stage III-IV as advanced stage, incidence of advanced stage cancer was significantly lower in the screened population compared to the non-screened (38/100.000 vs 94/100.000, p<0.001, Figure 1)
• Non-screen-related cancers had a three times higher risk to be advanced stage III-IV advanced stage cancer compared to screen-related cancer (OR: 2.86, 95%CI: 2.72-3.00, Table 1)

Definition 2:
• Defining ≥15 mm as advanced tumour size also resulted in lower incidence of advanced stage cancer in the screened population compared to the non-screened population (169/100.000 vs 194/100.000, p<0.001, Figure 2)
• Using this definition of ≥15 mm resulted in much higher incidence rates for both populations compared to the definition of stage III-IV
• Non-screen-related cancers still had a higher risk to be advanced tumour size (OR: 1.85, 95%CI: 1.78-1.93)

Conclusions
Advanced breast cancer incidence rates were 2-3 times higher in women who did not attend the breast cancer screening program compared to those who did, supporting the stage shift related to early detection of breast cancer.

Data on actual screening attendance is essential to show that mammographic screening is a valuable and effective tool to reduce the burden of breast cancer. We conclude that despite critical evaluations of breast cancer screening programs, screening is a valuable tool with potential to reduce a woman’s breast cancer load.

Table 1: Multivariable logistic regression analysis for advanced stage breast cancer

<table>
<thead>
<tr>
<th>stage III-IV (vs 0, I, II)</th>
<th>≥15 mm (vs &lt;15mm or DCIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>screen related</td>
<td>OR* 95%CI p-value</td>
</tr>
<tr>
<td>ref</td>
<td></td>
</tr>
<tr>
<td>non-screen related</td>
<td>2.86 (2.72 - 3.00) &lt;0.001</td>
</tr>
</tbody>
</table>

* corrected for age and year of diagnosis

Figure 1: Age-adjusted incidence rates (ESR) per year of diagnosis, relation to screening and age, using 1st definition.

Figure 2: Age-adjusted incidence rates (ESR) per year of diagnosis, relation to screening and age, using 2nd definition.