A Cost-Utility Analysis of Everolimus plus Exemestane for the Treatment of ER+ HER2- Metastatic Breast Cancer in the United Kingdom

Matthew Taylor1, Lily Lewis1, João Vieira2, David Chandiwana2
1York Health Economics Consortium, University of York, United Kingdom, 2Novartis Pharmaceuticals Corporation

Background & Objectives
Everolimus is an inhibitor of mammalian target of rapamycin (mTOR). This study evaluated the cost-effectiveness of everolimus + exemestane (EVE+EXE) versus placebo + exemestane (PBO+EXE) in the treatment of postmenopausal women with ER+ HER2- metastatic breast cancer in the United Kingdom. Whilst the effectiveness of treatment and costs offset have been demonstrated previously, this is the first analysis to assess the cost of the intervention alongside those benefits.

Methods
A Markov model was developed to compare treatment with EVE+EXE versus PBO+EXE in patients with ER+ HER2- metastatic breast cancer over a 10-year time horizon (UK healthcare perspective), with monthly cycles used. Three health states were modelled: stable disease, progressed disease and dead. Patients moved between health states according to the model structure outlined in Figure 1. Follow-up data on progression-free survival and overall survival were taken from the BOLERO-2 trial. Weibull functions were used to extrapolate trial data beyond the follow-up period.

Utilities
Table 1: Model inputs

<table>
<thead>
<tr>
<th>Health State</th>
<th>Utility</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-progression</td>
<td>0.798</td>
<td>Lloyd (2006), then age-adjusted</td>
</tr>
<tr>
<td>Progressed</td>
<td>0.496</td>
<td>Lloyd (2006), then age-adjusted</td>
</tr>
<tr>
<td>Dead</td>
<td>0.000</td>
<td>Assumption</td>
</tr>
</tbody>
</table>

Table 2: 10 year time horizon results

<table>
<thead>
<tr>
<th></th>
<th>LY*</th>
<th>QALY*</th>
<th>Drug costs1</th>
<th>Total costs1</th>
<th>ICER</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVE+EXE</td>
<td>3.27</td>
<td>1.91</td>
<td>£22,074</td>
<td>£44,405</td>
<td>-</td>
</tr>
<tr>
<td>PBO+EXE</td>
<td>2.41</td>
<td>1.31</td>
<td>£21,736</td>
<td>£43,127</td>
<td>-</td>
</tr>
<tr>
<td>Incr.</td>
<td>0.85</td>
<td>0.60</td>
<td>£21,466</td>
<td>£22,670</td>
<td>£37,719</td>
</tr>
</tbody>
</table>

* Non-intervention costs only  † Discounted  ‡ Undiscounted

Results
Over a ten year time horizon, EVE+EXE led to a life expectancy of 3.27 years, compared to 2.41 for PBO+EXE. EVE+EXE resulted in 1.91 QALYs, compared to 1.31 for PBO+EXE. Therefore, the incremental gains in life years and QALYs were 0.85 and 0.60, respectively. Drug costs were £22,074 and £21,736 for the two arms respectively. EVE+EXE was associated with background healthcare costs of £3,349 and £15,651 in the pre- and post-progressed states, respectively and £3,330 for terminal care (total £20,330). PBO+EXE was associated with background healthcare costs of £1,436 and £16,166 in the pre- and post-progressed health states, respectively, and £3,486 for terminal care (total £21,108). Therefore, the EVE+EXE arm led to an incremental cost of £22,670. The incremental cost per QALY was £37,719 over a ten-year time horizon. Probabilistic sensitivity analysis demonstrated that, at a threshold of £30,000 per QALY gained, EVE+EXE had a 27.3% likelihood of being cost-effective. At a threshold of £55,000 per QALY gained, the likelihood of cost-effectiveness was 77.4%.

Conclusions
EVE+EXE was associated with increased healthcare costs, but was also estimated to lead to health gains in terms of both LYs and QALYs.

References
• NHS Reference Costs 2010-11.
• NICE Clinical Guideline 81 Advanced Breast Cancer: Diagnosis and Treatment.

Contact Us
lily.lewis@york.ac.uk
Telephone: +44 1904 323621
Website: www.yhec.co.uk

Providing Consultancy & Research in Health Economics

The University of York