The absolute benefit of adjuvant therapy in stage II colon cancer is small. In unselected patients, survival is improved <5% with adjuvant treatment.1  
Patient selection for treatment is currently based on clinical factors and patient preferences.  
Expert guidelines panels have proposed the following characteristics to be considered in making treatment decisions:  
- Advocacy of lymph nodes (LN) sampling  
- Prognostic pathological features (T4 tumors, perforation, peritumoral lymphocytic involvement and poorly differentiated histology)  
- Patient’s comorbidities and life expectancy  
- Mismatch Repair (MMR) status, if considering fluoropyrimidines-only therapy  
In 2009 Fear et al. reported on the validation of a 12-gene expression recurrence Score® assay (LSQ-12 RS) that quantifies a patient’s 3-year risk of recurrence on a continuous scale.12  
Prospective-retrospective validation on archival samples from QUASAR trial  
2,146 stage II colon cancer patients randomized to surgery alone vs. 5-fluorouracil/ leucovorin (5FU/LV) chemotherapy.  
The relative risk reduction (RRR) with 5-FU is consistent across RFS levels (28%)  

**Overall Objective**  
To determine the utility and cost-effectiveness of a multi-gene expression prognostic assay in guiding use of adjuvant therapy in patients with stage II colon cancer.  

**Methods**  
A state-transition (Marxov) model was developed to compute the utility and economic implications of assay adoption from a US societal perspective.  
A representative stage II colon cancer patient transitions between three health states: “no recurrence”, “remission” and “death” (Figure 1).  
Model assumes the selection of adjuvant therapy when the quality adjusted life years (QALY) gained with treatment is greater than QALY loss associated with adjuvant chemotherapy (Figure 2).  
Other model assumptions:  
- T4 tumours (high risk) and DMMR (low risk) were omitted from model  
- Relative risk reduction of chemotherapy is 28% regardless of RS  
- Current propensity to use, and daunorubicin chemotherapy (1.5 years), based on published NCIC data (Farin et al. 2007)  

**Results**  

**Figure 1. Decision Tree**  

**Table 1. Comparison of RS use for treatment decisions based on clinicopathologic factors alone**

<table>
<thead>
<tr>
<th>Model Endpoints</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in CTTX use</td>
<td>&lt;17%</td>
</tr>
<tr>
<td>QALY gained per patient</td>
<td>0.005</td>
</tr>
<tr>
<td>Net cost</td>
<td>$2,071</td>
</tr>
<tr>
<td>Incremental cost-effectiveness ratio</td>
<td>Dominant</td>
</tr>
</tbody>
</table>

**Table 2. RS reduces chemotherapy use regardless of LN sampling or high-risk pathological features**

<table>
<thead>
<tr>
<th>LSQ-12 RS (%)</th>
<th>No (90%)</th>
<th>Yes (90%)</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in CTTX use</td>
<td>-58%</td>
<td>-56%</td>
<td>-50%</td>
</tr>
<tr>
<td>QALY gained</td>
<td>0.863</td>
<td>0.704</td>
<td>0.873</td>
</tr>
<tr>
<td>Net cost</td>
<td>$81,622</td>
<td>$11,483</td>
<td>$71,522</td>
</tr>
<tr>
<td>ICER</td>
<td>Dominant</td>
<td>Dominant</td>
<td>Dominant</td>
</tr>
<tr>
<td><strong>14.48%</strong></td>
<td>Change in CTTX use</td>
<td>-11%</td>
<td>-7%</td>
</tr>
<tr>
<td>QALY gained</td>
<td>0.802</td>
<td>0.749</td>
<td>0.791</td>
</tr>
<tr>
<td>Net cost</td>
<td>$86,311</td>
<td>$52,425</td>
<td>$47,571</td>
</tr>
<tr>
<td>ICER</td>
<td>Dominant</td>
<td>Dominant</td>
<td>Dominant</td>
</tr>
</tbody>
</table>


**Data sources:**  
- Incidence of adverse events was derived from published trials.  
- Costs of treatment were computed from Medicare Part B average sales price (April 1, 2010).  
- Costs of adverse events were obtained from literature and hospital utilization datasets.  

**Expected QALY Benefit**  
**Deficient**  
No Adjuvant  
MMP  
Intact  
**Expected QALY Loss**  
No Adjuvant  
MMP  
Intact  
**Clinical & Molecular Risk**  
No Adjuvant  
MMP  
Intact  

**Proposed Future Stage II Algorithm**  

**Conclusion**  
- Clinical use of a 12-gene RS to assess risk of recurrence in T3 stage II colon cancers with intact MMR may improve quality-adjusted life expectancy and be cost-saving from a societal perspective.  
- Patient age and disability associated with chemotherapy are important considerations in adjuvant treatment decisions.  
- Further research is required to develop tools for accurate prediction of disability associated with adjuvant chemotherapy for individual patients. This would enable use of decision models such as the one presented to improve the outcome for patients and save costs.

**References**  

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Authors had complete independence in all aspects of this research project.