Most Research Findings Might be False, But Some Are Still Worth Doing

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Introduction

- Published research findings have the transformative potential to influence policies and many aspects of society.
- However, researchers have shown that under a broad set of reasonable statistical assumptions, most published research findings are likely false [1].
- Further, recent replication studies have empirically supported this conclusion [2].
- Some researchers have suggested solutions to this apparent paradox by making the statistical decisions more stringent (e.g., smaller p-value thresholds [3]).

Research Question

- Is there published research that is likely false but still worth doing?

Findings

Above two figures are illustrations of how the sign (positive or negative) of the outcome from decision function changes over pre-study odds in breast cancer research and ovarian cancer research.

Cost and Benefit Analysis of Cancer Research: the required pre-study odds for positive return shows that even though some research findings are more likely to be false, they are still worth doing, after considered the cost and benefit of research.

<table>
<thead>
<tr>
<th>Cancer Types</th>
<th>The Change of Mortality-Incidence Rate</th>
<th>Cost ($B)</th>
<th>Benefit ($B)</th>
<th>Pre-Study Odds for Positive Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>-0.28%</td>
<td>0.67</td>
<td>5.85</td>
<td>0.8%</td>
</tr>
<tr>
<td>Liver</td>
<td>-1.11%</td>
<td>0.085</td>
<td>2.42</td>
<td>0.2%</td>
</tr>
<tr>
<td>Lung</td>
<td>-0.53%</td>
<td>0.35</td>
<td>9.32</td>
<td>0.24%</td>
</tr>
<tr>
<td>Ovary</td>
<td>-0.0637%</td>
<td>0.118</td>
<td>0.22</td>
<td>7.2%</td>
</tr>
</tbody>
</table>

Conclusion

- Research on some cancers benefit society by decreasing the mortality incidence rate of these diseases.
- The benefit of cancer research is not just about reducing mortality-incidence rate, but it is also about how to improve the well-being of patients.
- Therefore, we argue that if the benefit of research is high, then those research should be conducted carefully.
- Also, we indeed found that there are some instances of research (such as breast and ovarian cancer) that are worthy of doing even if the research findings are more likely to be false (pre-study odds < 1).