In silico and in vitro studies of natural active compounds from Indonesian herbs targeted to inhibit survivin in human breast cancer stem cells

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BACKGROUND

Breast cancer stem cells (BCSCs) are a subpopulation of breast cancer cells owing tumorigenic, pluripotency, and self-renewal capacity. Our previous study has indicated that survivin is an essential factor in the survival of BCSCs during oxidative stress. The inhibition of survivin can lead to the inhibition of tumor growth. Indonesia is a rich of herb diversity, which could be developed for the herbal anti-cancer. BPIF (Bali People’s Indigenous Knowledge Technology) Indonesia has explored the cytoprotective effect of several natural compounds from Indonesian herbs, such as androphorin from Andrographis paniculata ("Kanri", 2015), and etoposide from Dansonia frutescens. The aim of this study was to screen and analyze the hit compounds from Indonesian herbs targeted to inhibit survivin in BCSCs.

METHODS

Using in silico study we first determined the best compound for anti-cancer. Molecular docking simulation was then performed to find a lead compound.

RESULTS: IN SILICO STUDY

<table>
<thead>
<tr>
<th>Compound</th>
<th>IC50 (μM)</th>
<th>EIC50 (μM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acanthopanax</td>
<td>0.023</td>
<td>0.132</td>
</tr>
<tr>
<td>Euphorbia</td>
<td>0.045</td>
<td>0.216</td>
</tr>
<tr>
<td>Morinda</td>
<td>0.058</td>
<td>0.256</td>
</tr>
<tr>
<td>Phytolacca</td>
<td>0.067</td>
<td>0.303</td>
</tr>
<tr>
<td>Tabernaemontana</td>
<td>0.078</td>
<td>0.348</td>
</tr>
<tr>
<td>Vernonia</td>
<td>0.085</td>
<td>0.369</td>
</tr>
</tbody>
</table>

RESULTS: IN VITRO STUDY

CONCLUSIONS

1. Among 7 sorts of compounds from Indonesian herbs, we have selected androphorin as the promising hit compound targeted to inhibit survivin in BCSCs using in vitro molecular docking analysis.

2. Using in vitro study, we suggest that androphorin could inhibit the survivin expression of cancer cells at the IC50. The inactivation of survivin could reduce the expression of oxidative stress, leading to the increase of survivin protein turnover, the ratio of the IC50 phosphoform survivin to total survivin in which was significantly decreased.

3. We conclude that androphorin could be used for BCSCs targeted therapy through oxidative inhibition.

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REFERENCES