Herb-drug interaction between Echinacea purpurea and darunavir/ritonavir in HIV-infected patients

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Purpose of the study
To investigate the potential of a commonly used botanical supplement, Echinacea purpurea, to interact with the boosted protease inhibitor darunavir/ritonavir.

Methods
Open-label, fixed-sequence study in 15 HIV-infected patients receiving antiretroviral therapy including darunavir/ritonavir (600/100 mg twice daily) for at least 4 weeks. Echinacea purpurea root extract-containing capsules were added to the antiretroviral treatment (500 mg every 6 hours) from days 1 to 14. Darunavir concentrations in plasma were determined by using HPLC immediately before and 1, 2, 4, 6, 8, 10 and 12 hours after a morning dose of darunavir/ritonavir on days 0 (darunavir/ritonavir) and 14 (darunavir/ritonavir + echinacea). Individual darunavir pharmacokinetic parameters were calculated by using non-compartmental analysis, and were compared between days 0 and 14 by using the geometric mean ratio (GMR) and its 95% confidence interval (95% CI).

Results
Median (range) age was 49 (43-67) years, and body mass index was 24.2 (18.7-27.5) kg/m². Echinacea was well tolerated and all participants completed the study. Relative to administration of darunavir/ritonavir alone, its coadministration with Echinacea purpurea resulted in little change in darunavir pharmacokinetic parameters. Table 1

Conclusions
Coadministration of Echinacea purpurea with darunavir/ritonavir was safe and well tolerated in HIV-infected patients; data suggest that no dose adjustment for darunavir/ritonavir is necessary.

Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DRV/r</th>
<th>DRV/r + Echinacea</th>
<th>GMR (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cₜ (ng/mL)</td>
<td>2.1 (1.6-2.7)</td>
<td>1.7 (1.4-2.2)</td>
<td>0.84 (0.59-1.19)</td>
<td>0.311</td>
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<tr>
<td>AUCₜ (ng.h/mL)</td>
<td>46.2 (39.0-54.7)</td>
<td>41.6 (35.1-49.2)</td>
<td>0.90 (0.71-1.14)</td>
<td>0.374</td>
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<tr>
<td>Cmax (ng/mL)</td>
<td>64 (5.5-7.4)</td>
<td>62 (5.3-7.25)</td>
<td>0.98 (0.79-1.21)</td>
<td>0.810</td>
</tr>
</tbody>
</table>

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