Introduction
Cardiovascular functional adaptation to brainsparing in growth-restricted fetuses has not wellclarified.

Objectives
We investigated fetal cardiac output and placental blood flow in growth-restricted (FGR) and normal growing fetuses (NG).

Methods
Study design: case-control study
• singleton, 22-36wks
• exclusion: structural anomaly, arrhythmia
• CPR (cerebroplacental ratio = MCP-PI/UA-PI)
  FGR-BS: CPR<1, FGR-AREDV: absent or reverse in UA
• CCO (combined cardiac output) [mL/kg/min]
• RVO% (=RCO/CCO × 100)
• UVFV (umbilical venous flow vol.) [mL/kg/min]
• CCO/UVFV

Results

<table>
<thead>
<tr>
<th></th>
<th>NG</th>
<th>FGR</th>
<th>FGR-BS</th>
<th>FGR-AREDV</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>50</td>
<td>97</td>
<td>34</td>
<td>9</td>
</tr>
<tr>
<td>GW</td>
<td>33.2</td>
<td>31.7</td>
<td>30.1</td>
<td>28.3</td>
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<tr>
<td>EFW-Z</td>
<td>-0.13</td>
<td>0.12</td>
<td>-2.25</td>
<td>-2.66</td>
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<tr>
<td>AF-MVP [cm]</td>
<td>4.6</td>
<td>3.9</td>
<td>3.5</td>
<td>3.4</td>
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<tr>
<td>CTAR [%]</td>
<td>34.4</td>
<td>36.5</td>
<td>38.0</td>
<td>40.5</td>
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<tr>
<td>HR [/min]</td>
<td>145</td>
<td>146</td>
<td>145</td>
<td>143</td>
</tr>
</tbody>
</table>

Conclusions
• CCO was the larger in FGR and seemed to be reserved even in brain redistribution or placental hypoperfusion.
• Relative increase in right ventricular output was suggested under this pathophysiological adaptation.
• This adaptation could not secure the placental perfusion.