Capillary blood gas – a more “patient friendly” alternative to arterial blood gas?

S. Richter, C. Kerry, N. Hassan & A. Chari, University of Oxford
Your vote:

Arterial sample

Capillary sample
Blood Gas Sampling in Germany

arterialise

collect

analyse

Pictures: http://www.lungenarztparaxis-hoerde.de
1. Do patients prefer CBG over ABG?

2. Are CBGs as accurate as ABGs?

3. How does clinical context influence CBG accuracy?
Systematic review

P: Human Adults

I: ABG

C: Earlobe CBG

O: pO2, pCO2, pH, sO2
   Patient preference

Reported in English
Search summary

No. of records identified through database searching:
- EMBASE: 74
- PubMed: 309
- Web of Knowledge: 383
- Hand Search: 9

Total: 775

After removal of duplicates: 577

Irrelevant: 515

Articles for full text review after screening titles and abstracts: 62

Not eligible:
- Incorrect sampling site: 13
- No or insufficient information (e.g. meeting abstract/letter/editorial): 11
- Wrong language: 3
- Reviews: 2
- Same article also published in different journal: 2

Total no. of studies included for systematic review: 31

TOTAL: 31

Duplicates: 198

No. of records identified through database searching:
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Total: 775
1. Do patients prefer CBG over ABG?
2. Are CBGs as accurate as ABGs?
### All 31 studies

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>PO2 (mmHg)</th>
<th>PCO2 (mmHg)</th>
<th>SO2 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>469</td>
<td>1091</td>
<td>802</td>
<td>184</td>
</tr>
<tr>
<td>Weighted Mean Difference</td>
<td>-0.002</td>
<td>7.123</td>
<td>0.392</td>
<td>0.004</td>
</tr>
<tr>
<td>(Arterial - Capillary)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>0.375</td>
<td>102.904</td>
<td>22.082</td>
<td>14.930</td>
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<tr>
<td>95% CI</td>
<td>0.034</td>
<td>6.106</td>
<td>1.528</td>
<td>2.157</td>
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<tr>
<td>SIGNIFICANT DIFFERENCE?</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>
Primary data for PO2 – 12 studies

$\begin{align*}
n &= 203 \\
r &= 0.990 \\
p &< 0.001
\end{align*}$

Normal range OUH = 90 – 120 mmHg
Primary data for PO2 – 12 studies < 150mmHg

n = 149
r = 0.940
p = 0.646
CBG reliable in relevant pO2 range for n= 149

but further evidence needed
3. How does clinical context influence CBG accuracy?

<table>
<thead>
<tr>
<th>Clinical Context</th>
<th>No of Samples</th>
<th>Weighted Mean Difference</th>
<th>PO2 in mmHg</th>
<th>SD</th>
<th>SE</th>
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</thead>
<tbody>
<tr>
<td>Lung Disease</td>
<td>325</td>
<td>15.666</td>
<td>93.922</td>
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<tr>
<td>Normal</td>
<td>165</td>
<td>6.404</td>
<td>28.794</td>
<td>2.242</td>
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<tr>
<td>Shocked</td>
<td>310</td>
<td>2.461</td>
<td>28.747</td>
<td>1.633</td>
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<tr>
<td>Peri-operative</td>
<td>96</td>
<td>0.156</td>
<td>7.907</td>
<td>0.807</td>
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</tr>
<tr>
<td>ALL DATA</td>
<td>1091</td>
<td>7.123</td>
<td>102.904</td>
<td>3.115</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

1. Patients prefer CBG

2. CBG as accurate as ABG
   - sO2, pCO2, pH $\rightarrow$ same
   - pO2 $\rightarrow$ reliable < 150 mm Hg $\rightarrow$ more evidence

3. Reliable in various clinical contexts except severe hyperoxia


Previous Meta-analysis:
Questions?