

"The (in-)validity of volatile POCT parameters from patients beyond normothermia"

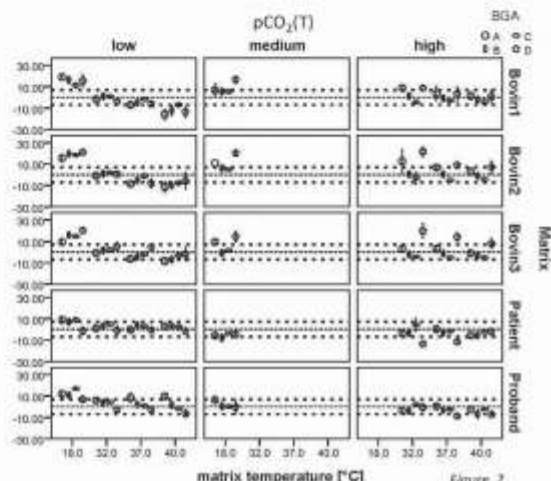
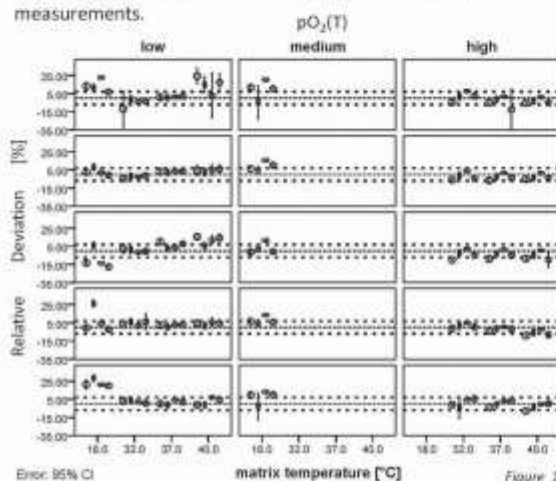
Michael Gruber, Martin Kieninger, Stefan Felbermeir
Klinik für Anaesthesiologie der Universität Regensburg



Background: The German RiLi-BAEK (A) does not deal with non normothermia at all. RiLi-BAEK defines precisely the borders within which results from quality control measurements may vary without a temperature requirement. For us the question arose, whether temperature corrected BGA results of pO_2 , pCO_2 meet the true values and whether the ranges of the results lie within the RiLi-BAEK borders.

Methods: Five matrices (blood from ICU patients, blood from healthy donors and 3 levels of bovine based quality control material) were tonometered at "high" and "low" partial pressures (PPs) of O_2 and CO_2 within the RiLi-BAEK controlled range at 32, 37 and 40 °C. One mL material was aspirated into each BG syringe and analysis was accomplished immediately after. The procedure was repeated 10 fold for "high" and "low" gas concentrations. At 18 °C instead to the "high" one a "median" gas ($n = 10$ as well) was employed. Every condition which constitutes of temperature (4), matrix (5), analyzer (4) and level of the partial pressure (2) led to a total of 1600 measurements.

Results: At 32 °C or 37 °C matrix temperature a number of 7.5 % to 27.5 % of the $pCO_2(T)$ and between 14.5 % and 28.1 % of the $pO_2(T)$ results were outside the borders required by the RiLi-BAEK. At 18 °C and 40 °C the number of results beyond the allowed borders grows up to 82.5 % $pCO_2(T)$ and 73 % $pO_2(T)$ depending on the PP level. (Figures 1 and 2)



As analyzing systems (Figure 3) were used: ABL 90 (Radiometer), Cobas b123 (Roche), GEM 4000 (Werfen) and a Rapidlite 500 (Siemens) which were controlled according to the internal quality control guidelines (6). The syringe was a Siemens Rapidlite. Transfer of the tonometered matrix (1 mL) into the analyzer was accomplished within 30s.

For this study the used Tonometer (Figure 4) was a high performance gas mixing system TM 8000 (MEON Medical Solutions, Graz, Austria) with a gas flow of 5 NL/h.



Conclusions: High precision in automated quality control (at a constant matrix temperature) is given in modern BGAAnalyzers but is counteracted in practice by non normothermial patient's temperature and unavoidable sample handling effects.