"The (in-)validity of volatile POCT parameters from patients beyond normothermia"
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Background: The German RLI-BAEK (A) does not deal with non-normothermia at all. RLI-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 pO₂, pCO₂ meet the true values and whether the ranges of the results lie within the RLI-BAEK borders.

Methods: Five matrices (blood from ICU patients, blood from healthy donors and 3 levels of bovine based quality control material) were tonomtered at "high" and "low" partial pressures (P) of O₂ and CO₂ within the RLI-BAEK controlled range at 22, 37 and 40 °C. One ml material was aspirated into each vacutainer and 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 (3), analyzer (4) and level of the partial pressure (2) led to a total of 1440 measurements.

Results: At 32 °C or 37 °C matrix temperature a number of 7.5 % to 27.5 % of the pCO₂(T) and between 14.5 % and 28.1 % of the pO₂(T) results were outside the borders required by the RLI-BAEK. At 18 °C and 40 °C the number of results beyond the allowed borders grows up to 82.5 % pCO₂(T) and 73 % pO₂(T) depending on the PP level.
(Figures 1 and 2)

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

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 ml/l.

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