



Motivation

Cardiopulmonary bypass (CPB) poses a significant risk to patient homeostasis, making continuous acid-base balance monitoring essential. This is done using blood gas analyzers (BGAs).

Preference

Perfusionists at IKEM have their own preferences in the use of blood gas analyzers. Used BGAs by IKEM include the B-Capta, BMU 40, and CDI 500.

Transition

IKEM is transitioning fully to B-Capta. The BMU 40 will be phased out, while the CDI 500 will be reserved for cases requiring the highest measurement accuracy.

Need for statistical evaluation

Measurements from BMU 40, CDI 500, and B-Capta will be compared after calibration against laboratory results from the ABL800. The analysis will focus on arterial partial oxygen pressure (pAO_2) and total hemoglobin concentration (HGB).

Methods

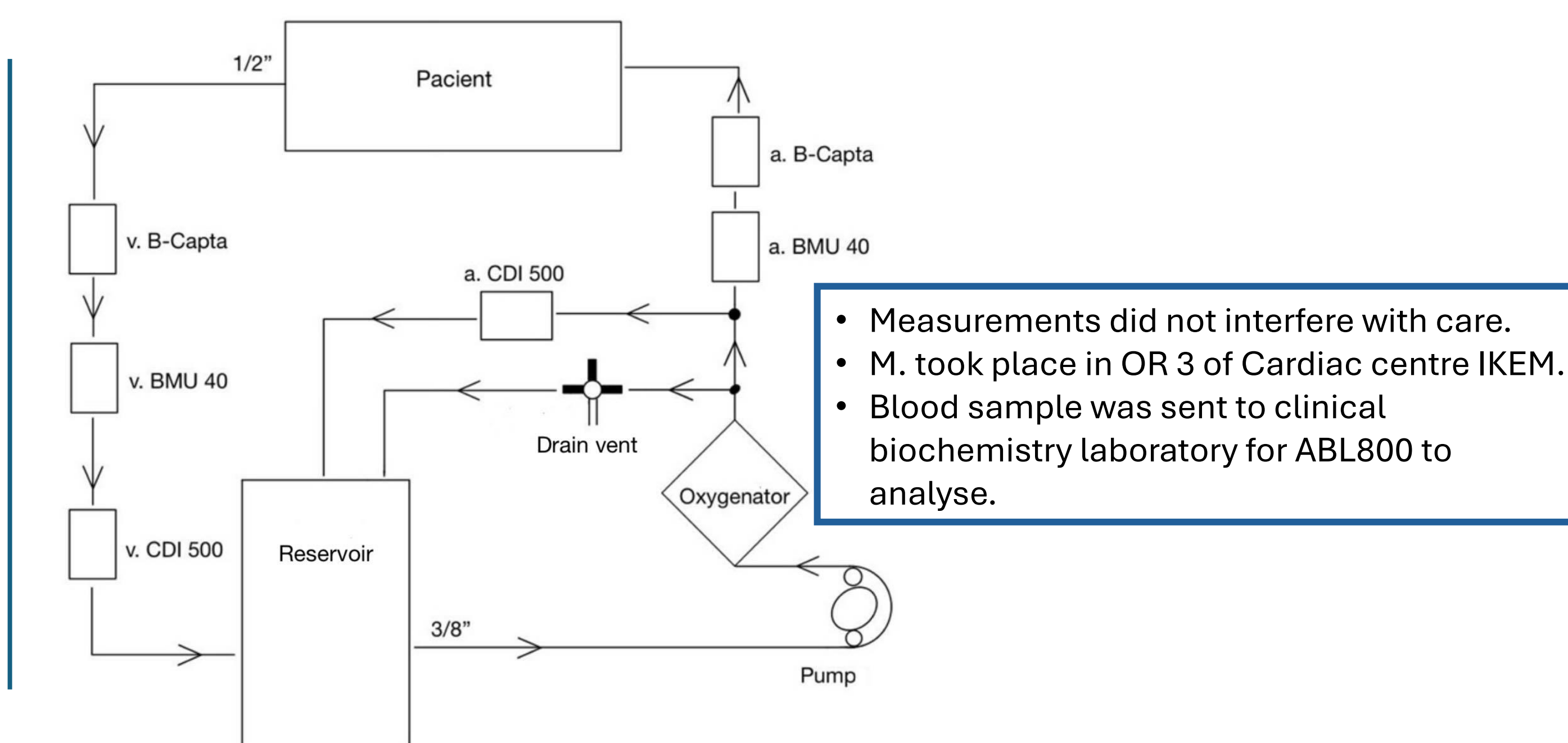
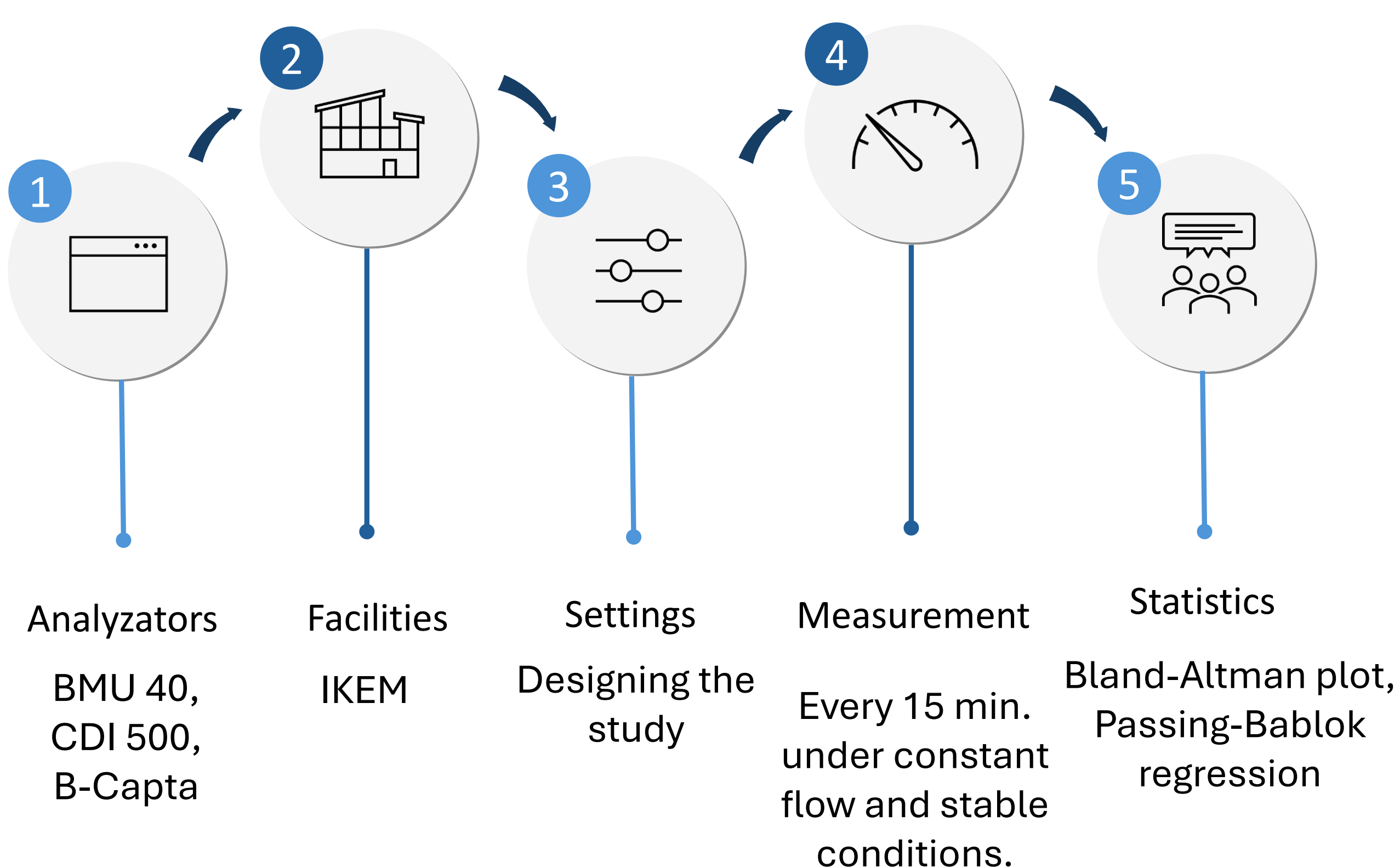


Fig. 1: Diagram of cuvette integration into the CPB system

Results

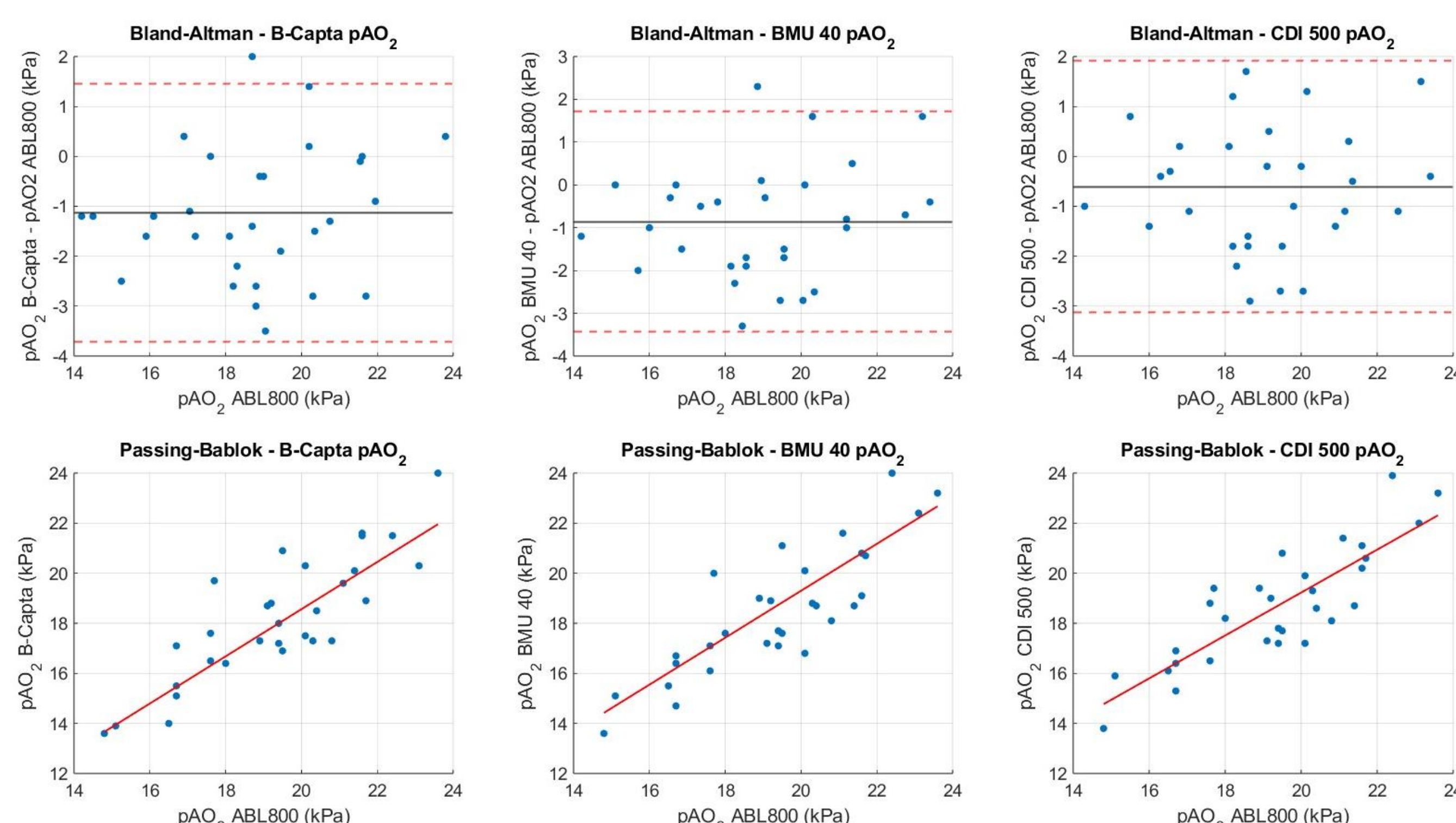


Fig. 2: Bland-Altman and Passing-Bablok regression pAO_2

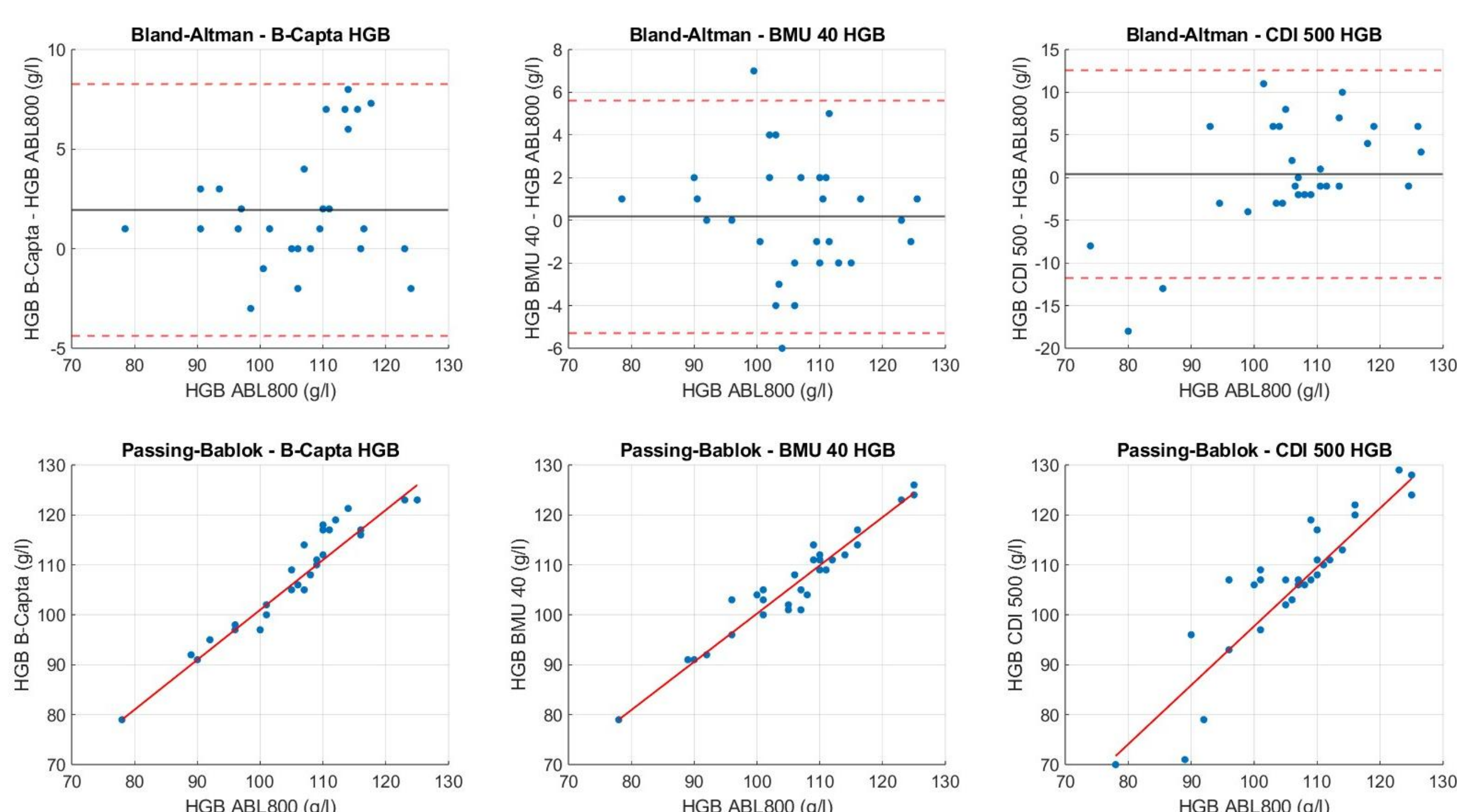


Fig. 3: Bland-Altman plot and Passing-Bablok regression HGB

Conclusion

Following calibration, B-Capta showed the largest mean error in pAO_2 (-1.13 kPa) and HGB ($+1.95$ g/l), with the highest variability in pAO_2 . All monitors overestimated HGB compared to the ABL800; BMU 40 had the smallest error ($+0.16$ g/l), while CDI 500 had the highest HGB variability (SD 6.21 g/l). Passing-Bablok regression confirmed linear agreement with the reference. Despite differences, all devices remain clinically usable, though B-Capta was the least reliable. Limitations include a small sample size ($n = 12$) and single-unit testing, reducing generalizability. Recommendation: **Use additional stable BGA for verification and perform frequent calibration when using B-Capta. Additional research is needed.**

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