

# Comparison of diagnostic strips Calla and Beckman glucose analyzer – possibility of microdialysis calibration

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## INTRODUCTION

Microdialysis can be used as part of a reliable glucose monitoring system. However, external calibration methods are required to provide useful data. Here we have tested the methods of reference glucose measurement which can be used as standard. Four methods were tested:

- Glucose analyzer Beckman
  - Glucose analyzer Super GL
  - External biochemical laboratory (plasma stored at -80°C)
  - Wellion Calla Glucose strips
- The methods with maximum mutual agreement was chosen as reference glucose measurement.

## EXPERIMENT AND METHOD

The study was made on 25 probands. Their structure is in table 1. The nursing staff was trained in Calla glucometer handling. The analysis on Beckman analyzer was carried out at the same time as measurement with glucose strips from 6 to 14 o'clock.

The samples collected from 14 to 24 o'clock were analyzed on Beckman next day.

The same procedure was used for Super GL analyzer, however the analysis was stopped due to low precision. The plasma samples were frozen in five minutes after collection (including centrifugation) and frozen to -80°C. Each set of approx. 65

(60 – 70) samples was analyzed in certified laboratory after 1 month as whole.

Proband	Man	Woman	Healthy	DM 1	DM 2	Other diseases	Age		
							20-40	41-60	>60
P01	X		X					X	
P02	X				X			X	
P03	X			X				X	
P04	X			X					X
P05	X			X					X
P06	X		X					X	
P07	X			X		coeliakie	X		
P08		X	X				X		
P09		X	X				X		
P10		X	X	X				X	
P11		X	X			lipodystrofie			X
P12	X			X					X
P13	X			X					X
P14	X		X			asthma	X		
P15	X			X					X
P16	X			X					X
P17	X			X				X	
P18	X			X				X	
P19		X	X	X				X	
P20	X		X					X	
P21		X	X				X		X
P22		X	X				X		X
P23		X			X				X
P24	X		X					X	
P25	X		X				X		
TOTAL	17	8	11	7	7	3	9	8	8

Tab. 1. Structure of probands

## RESULTS AND DISCUSSION

Surprisingly the best correlation was obtained between glucose analyzer Beckman and glucose strips Calla. The correlation between Beckman analyzer and Calla strips is in fig. 1.

Typical result (proband 23) of measurement with Beckman analyzer and Calla strips is in fig.2.

Typical correlation between Beckman and Calla is in fig. 3. An example of statistical analysis, which was carried out for all probands is in fig. 4.

Surprisingly good correlation between glucose strips and Beckman analyzer enable to use them as a tool to refine calibration or check the calibration in CGMS or other glucose monitoring systems.

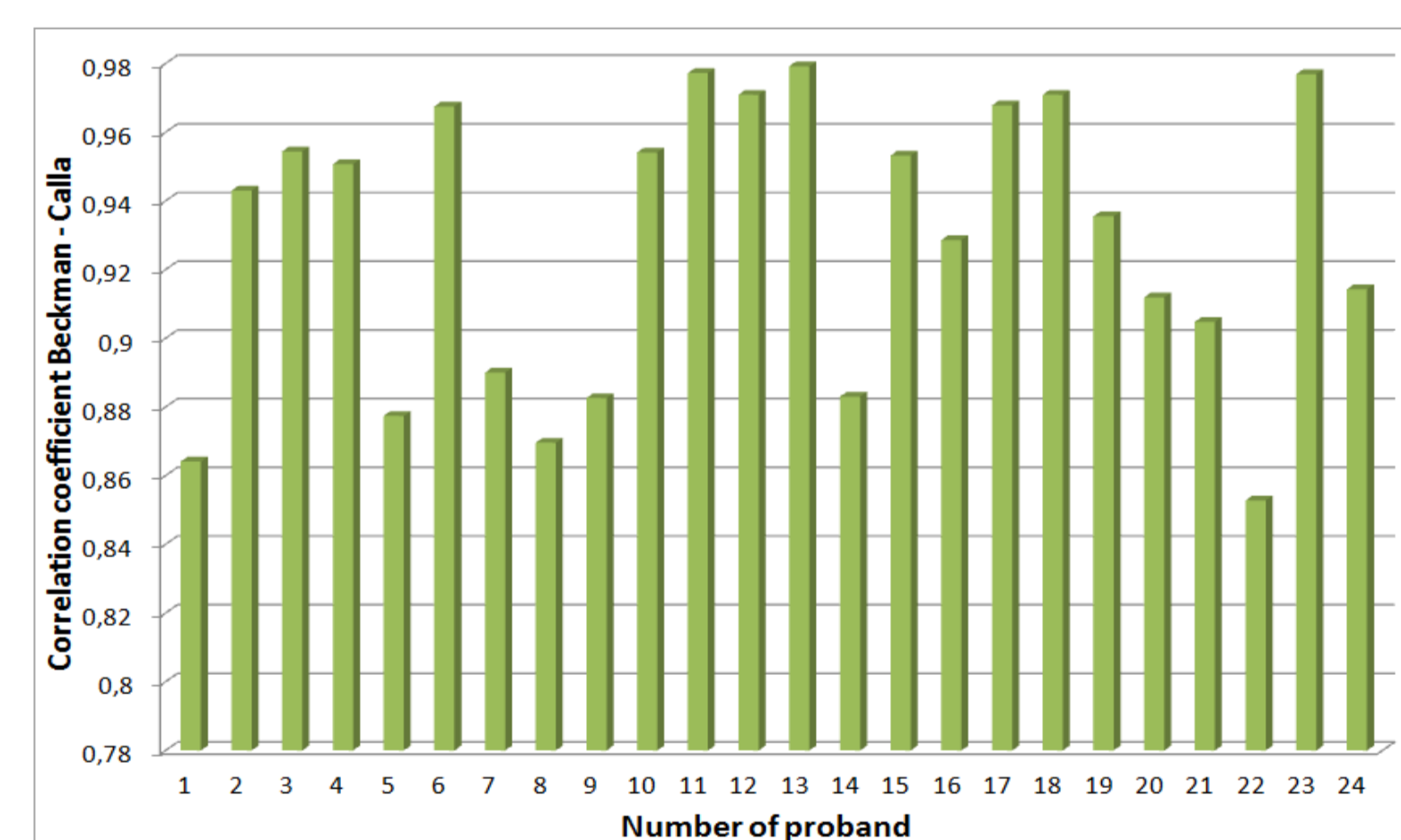


Fig. 1. The correlation between Beckman analyzer and Calla strips for all probands

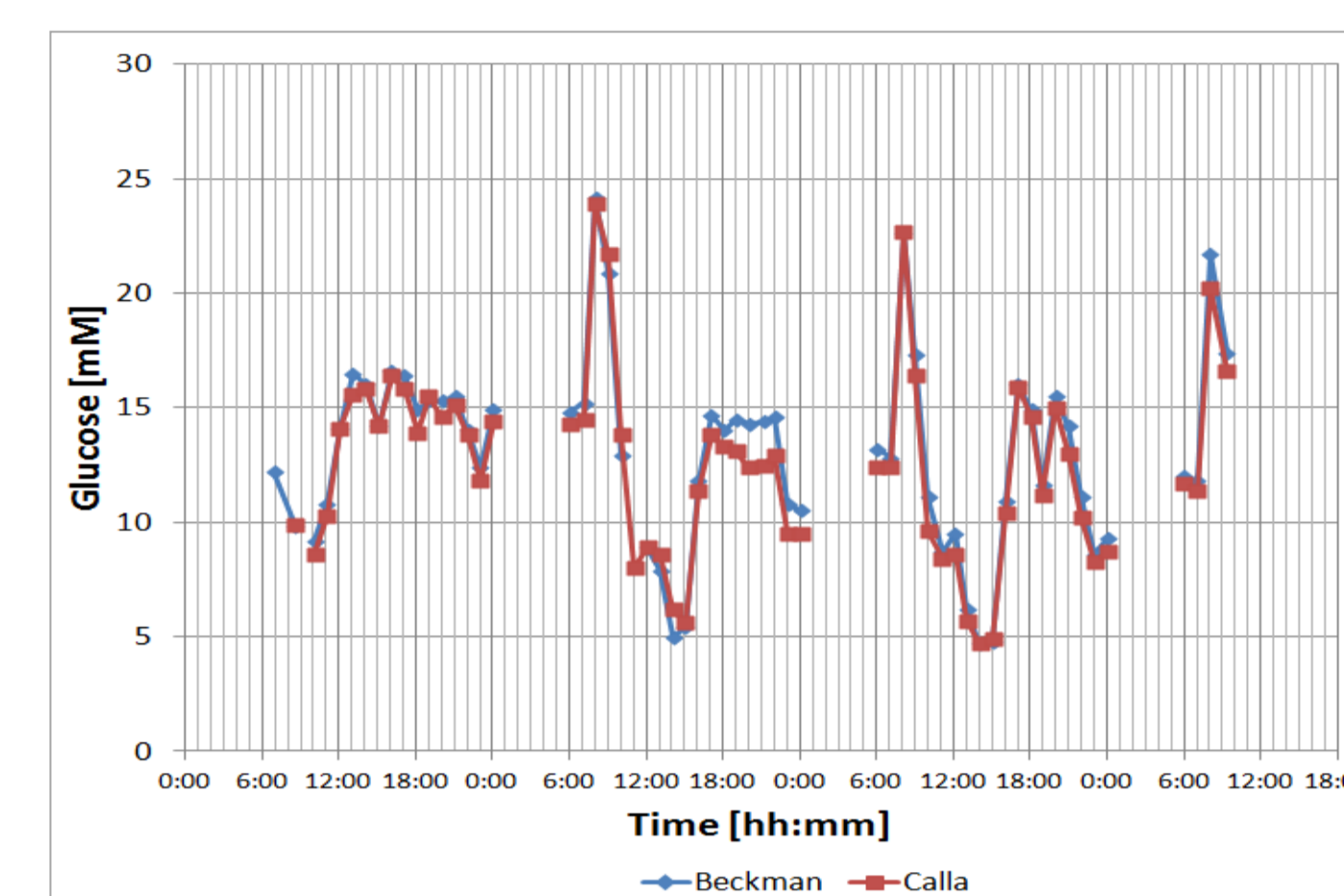


Fig. 2. Measurement of blood glucose by Calla strips and Beckman on proband 23

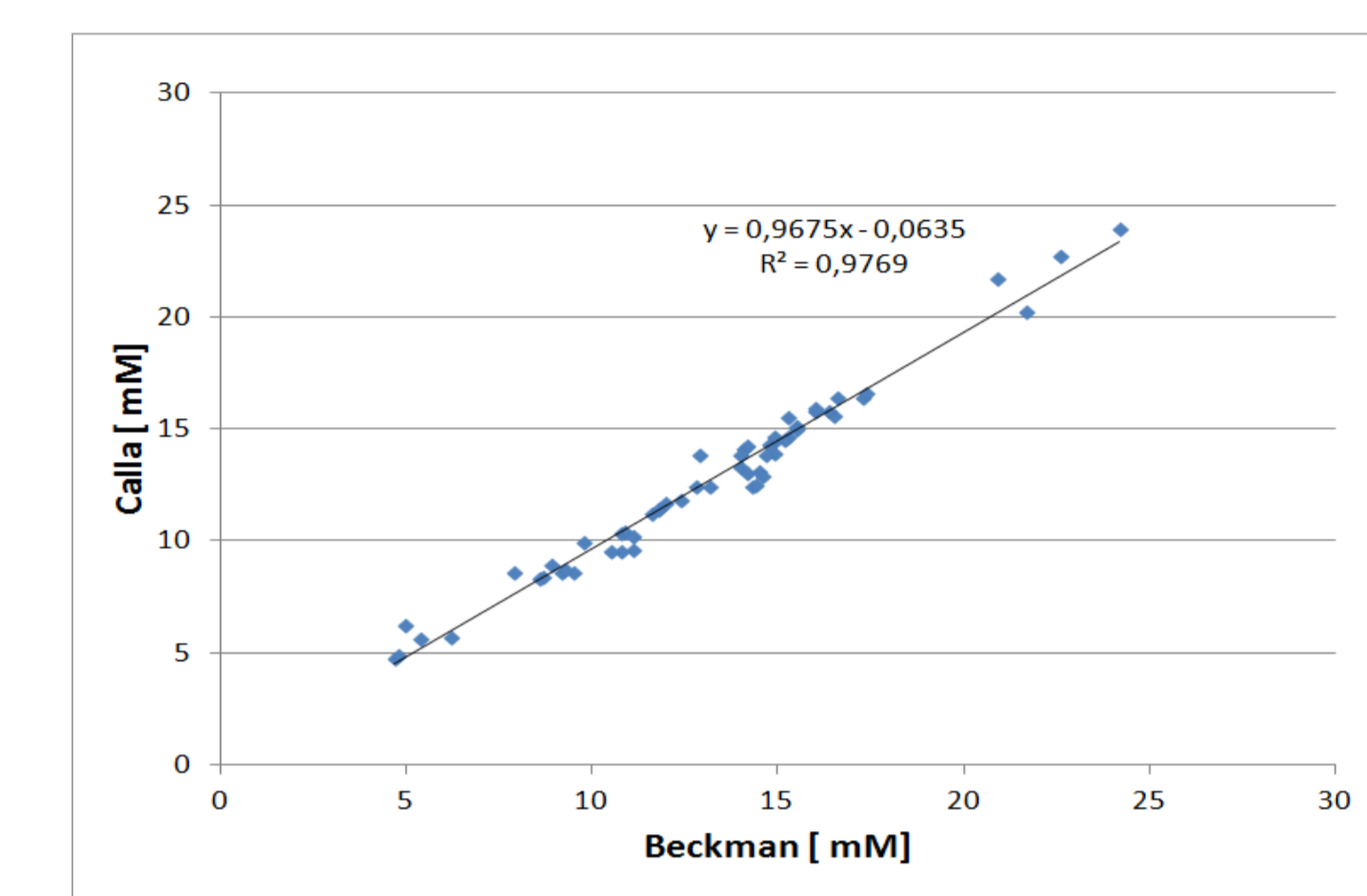


Fig. 3. Correlation between Beckman and Calla for proband 23

The analysis of Beckman – Calla correlations for different production batches show that the results does not depend on the batch and expiration date. (Fig.5)

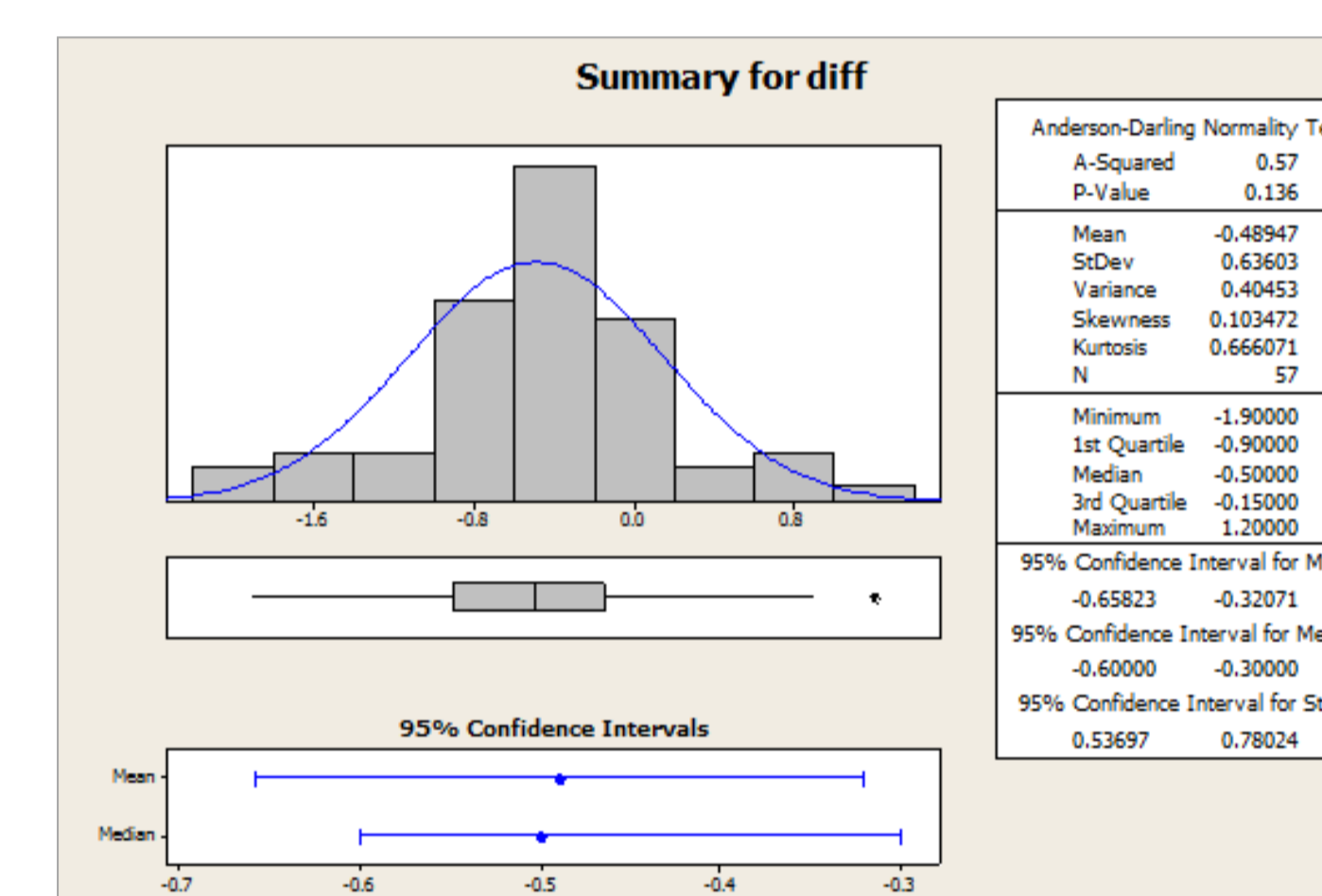


Fig. 4. Summary of diff Calla and Beckman for proband 23

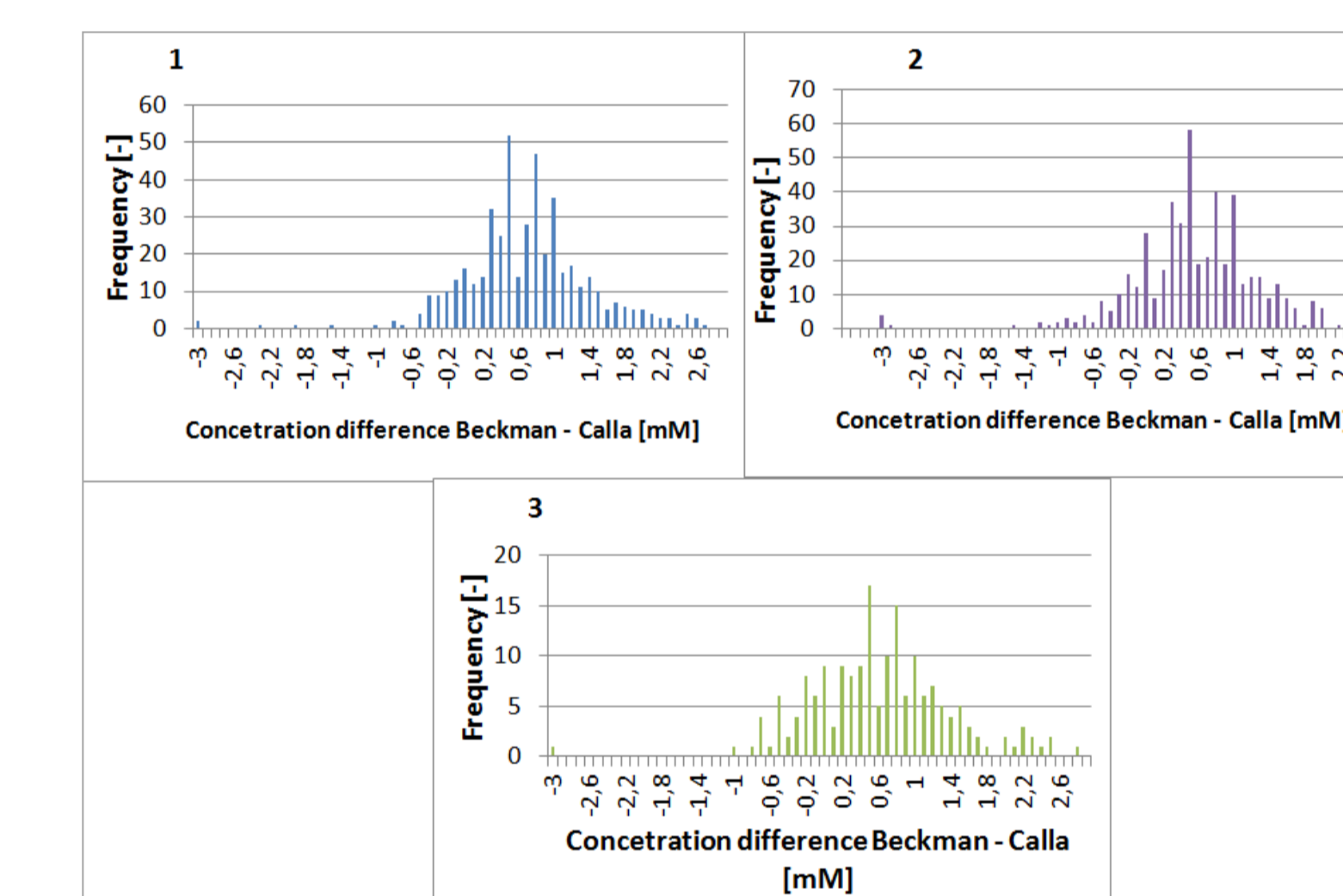


Fig. 5. Histograms of deviations of Beckman – Calla strips [Batch no. 1) BN. TJS025PR, 2) BN. TJS 1301003, 3) BN. TJS 1301006]

## CONCLUSION

- Glucose strips Calla can not be used as certified method of glucose concentration measurement in principle. The measurement depends on skills of user.
- If the Calla strips are used by trained and qualified user they bring the identical results as certified analyzer Beckman. It enables to use them as cost effective and fast method to refine the microdialysis calibration.
- Some of the data from patients with DM1 or DM2 appeared to be from lognormal distribution, but this did not apply for all of them.
- The good properties of Calla strips as tool for calibration refinement was proved for three different production batches with different expiration time .

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