MO730

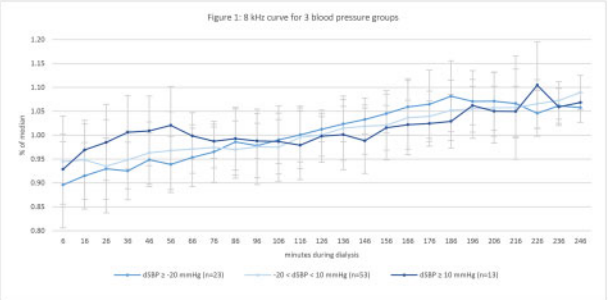
THORACIC BIOIMPEDANCE AS AN INNOVATIVE TOOL TO DETECT CHANGES IN BLOOD PRESSURE DURING HEMODIALYSIS

Melanie Schoutteten[1], Lucas Lindeboom[2], Christophe Smeets [3], Bart De Moor[4], Jacques Peeters[5], Chris Van Hoof[6], Willemijn Groenendaal [7], Pieter Vandervoort[8], Jeroen Kooman[9]

[1]UHasselt, Faculty of Medicine and Life Sciences, LCRC, Diepenbeek, Belgium, [2]imec The Netherlands/Holst Centre, Connected Health Solutions Department, Eindhoven, The Netherlands, [4]Jessa Ziekenhuis, Nephrology, Hasselt, Belgium, [5]Ziekenhuis Oost-Limburg, Nephrology, Genk, Belgium, [6]Imec Belgium, Leuven, Belgium, [8]Ziekenhuis Oost-Limburg, Cardiology, Genk, Belgium and [9]Academic Hospital Maastricht, Nephrology, Maastricht, The Netherlands

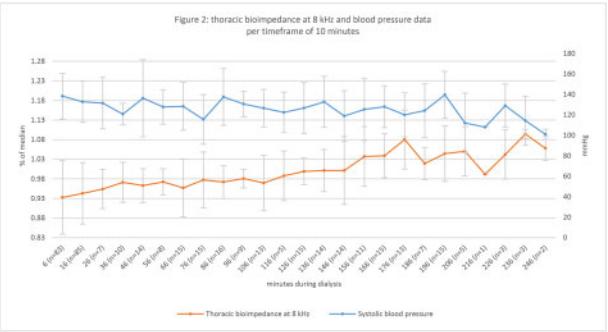
BACKGROUND AND AIMS: Blood pressure (BP) variability is an important cardiovascular risk factor that contributes to the high burden of cardiovascular mortality in hemodialysis (HD) patients. Ultrafiltration rate (UFR) and plasma refill rate modify the extracellular volume (ECV), which is a major determinant of the systolic BP. Segmental bioimpedance of the thoracic region addresses the central volume compartment of the body. We hypothesize that changes in bioimpedance reflect changes in BP and that thoracic measurements are more accurately in detecting intradialytic BP changes compared to whole body bioimpedance.
METHOD: During two consecutive short-term interval HD sessions, thoracic bioimpedance signal was registered continuously from predialysis until the end of the session. Corresponding BP, whole body bioimpedance and ultrafiltration volume (UFV) after the start and at the end of dialysis was registered. After outlier detection, valid raw bioimpedance data [Ohm] at 8 and 160 kHz for thoracic measurements, and 5 and 200 kHz for whole body measurements, were taken into further analysis. Dialysis sessions were divided into 3 groups according to the development of the systolic BP: a drop $\geq$ than 20 mmHg was defined as a hypotensive session, an increase $\geq$ 10 mmHg was considered as a hypertensive session. Pearson correlation analysis was applied (r, p-value) to the relative data, calculated as a percentage from the start value.

RESULTS: From 2 dialysis centres, a total of 46 HD patients were enrolled in the study (65.2% male, mean age 71 $\pm$ 12.6 years, mean dialysis vintage 4 $\pm$ 3.9 years), which resulted in 89 dialysis sessions to analyse. Mean systolic BP after start of dialysis was 133.2 $\pm$ 20.7 mmHg and mean UF volume was 1817.5 $\pm$ 801.5 mL. 23 sessions showed a hypotensive gradient from the start till the end of dialysis, and 13 sessions progressed with an increase of more than 10 mmHg. When the 8 kHz curve was plotted according to the 3 BP groups, a more plane increase in thoracic bioimpedance signal was observed in the group with a normal tension course (Figure 1).



MO730 Figure 1: 8 kHz curve for 3 blood pressure groups

There was a significant relationship between UFR and changes in relative bioimpedance data, as well as thoracic (r = .49 at 8 kHz, r = .46 at 160 kHz, all ps < .001), as whole body bioimpedance (r = .58 at 5 kHz, r = .52 at 200 kHz, all ps < .001). UFV correlated with changes in systolic BP (r = -.31, p < .01). Both bioimpedance techniques correlated with each other (r = .38, p = .001 for low frequencies; r = .29, p < .01 for high frequencies). Where the relative thoracic bioimpedance signal correlated with changes in systolic BP (r = -.35 at 8kHz, -.32 at 160 kHz, all ps < .01) (Figure 2), whole body did not.



MO730 Figure 2: Thoracic bioimpedance at 8 kHz and blood pressure data per time frame of 10 minutes

CONCLUSION: Thoracic bioimpedance is associated with intradialytic BP changes, whereas whole body bioimpedance is not. Thoracic bioimpedance has the potential to function as an important diagnostic and predictive tool in BP variability during HD.