

# Chapter 8

## Proposal for future work

Previous studies have shown that children have age and height-dependent normal values of bioimpedance vector analysis (BIVA). The Prof. Dr. Antonio Piccoli et al. have provided normal data in more than 3,000 healthy Italian children, giving reference values for different age groups for children with normal height and weight with a narrow body mass index (BMI) range. These are normal values in a selected group of children. There are no other published data in normal children or sick children or children of other ethnic origin. To advance the field to better practical usefulness and to allow the use of this method in the clinical situation, it is important to study children with pathological body weight (obesity, malnutrition) and altered fluid content (dehydration, overhydration) i.e. children who do not fall into the defined narrow range given by Piccoli et al.

For this reason, the following studies are planned: (*Project BIVA and BMI*)

1. Approximately 1,000 children should be analyzed in 4 groups in the age ranges of 6-9, 10-12, 13-15, 16- 18 years, and separated for males and females. They should be analyzed by the method of Piccoli (for age, with normal BMI) and by a new index, ZBMI.
2. Confidence limits for each age group should be defined (5<sup>th</sup> and 95<sup>th</sup> percentile curves for BIVA(BMI) .
3. Finally, children with known diseases should be analyzed whether or not BIVA values fall within the limits of normal distribution. These include children with dehydration, overhydration and obesity and wasting.
4. In addition, there should be a small study of the geometric relationship between BMI and BIVA: is there a linear relationship over the whole range of distribution or another form of relationship, e.g. with extreme values of BMI (non-linear relationship, e.g. exponential).

In a second study, we will analyze BIVA in RS and legs of normal subjects and in patient groups by analyzing the segmental transversal bioimpedance in the extremity (*Project STB*). The hypothesis of this study is that segmental transversal impedance correlates with well-known parameters of endothelial dysfunction. This study builds on previous work (to be

published in *Kidney International*), showing for the first time that several parameters of endothelial dysfunction („atherosclerosis risk factors“) like cholesterol, total serum homocysteine and PTH were correlated with bioimpedance in both hemodialysis and peritoneal dialysis patients. One possible explanation is that STB measures tissue water in this region and that the arteriolar and/or capillary perfusion of this region is significantly influenced by endothelial function, leading to altered water distribution if endothelial function is disturbed. It should be contemplated how this explanation could be confirmed.

The research will be development in Nephrology Paediatric department, Charité Campus Virchow-Klinikum in Berlin under direction of the Prof. Dr. Uwe Querfeld.