INVITED COMMENTARY

Water balance in insulin-dependent diabetes mellitus can now be studied with non-invasive techniques: an invited commentary

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Brizzolara and colleagues have utilized the non-invasive technique of bioelectrical impedance analysis (BIA) to determine total and relative distribution of body water in relation to metabolic control in uncomplicated type I diabetic patients (1). In conducting this study the investigators have made several advances in our knowledge. First, they have further demonstrated the utility of this non-investigative technique in studying water distribution in diabetics, similar to observations in non-diabetics (2–4). Using this technique, they have demonstrated that type I diabetic persons in relatively good glycemic control, as assessed by glycated hemoglobin methods, have increased total body water compared to non-diabetic controls matched by age, gender and body mass index.

Expansion of total body water in these type I diabetic persons was not associated with modifications of extracellular/intracellular water distributions compared to the normal controls. In contrast, type I diabetic patients in poor long-term glycemic control had a disproportionate increase in intracellular water, with resultant decreases in extracellular/intracellular ratios. These data corroborate prior studies on body water distribution in diabetic patients utilizing isotopic techniques (5, 6). Brizzolara et al., as those previously demonstrating these changes in water distribution (5, 6), have suggested several possible explanations for these water distribution changes associated with diabetes. The notion has been suggested that mild to moderate hyperglycemic osmotic stress shifts water from the intra- to the extracellular space (1). The paradoxical shift from the extra- to the intracellular space in the more severe hyperglycemic state has been attributed to the metabolic accumulation of extracellular "osmolytes". Regardless of the mechanisms involved in this increase in intracellular water with poor glycemic control, this phenomenon may help to explain the relationship between degree of hyperglycemia and development of microangiopathic disease (7).

The availability and proven utility of a non-invasive method to monitor changes in intracellular/extracellular water distribution should enable us to prospectively design studies that will allow us to investigate the relationship between these changes and hyperglycemia-induced micro- and macrovascular disease.

References


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