
In the metabolism of acetate several enzymes are involved, which play an important role in free fatty acid oxidation. Fatty acid metabolism is altered in diabetes patients and therefore acetate might serve as a marker for pathological changes in the fuel selection of cells, as these changes occur in diabetes patients. Acetylcarnitine is a metabolic product of acetate, which enables its transport into the mitochondria for energy production. This study investigates whether the ratio of acetylcarnitine to acetate, measured by noninvasive hyperpolarized [1-(13)C]acetate magnetic resonance spectroscopy, could serve as a marker for myocardial, hepatic, and renal metabolic changes in rats with Streptozotocin (STZ)-induced diabetes in vivo. We demonstrate that the conversion of acetate to acetylcarnitine could be detected and quantified in all three organs of interest. More interestingly, we found that the hyperpolarized acetylcarnitine to acetate ratio was independent of blood glucose levels and prolonged hyperglycemia following diabetes induction in a type-1 diabetes model.