

## Role of lipids in the pathophysiology of peripheral and autonomic neuropathy and cardiac function in patients with diabetes mellitus type 1. A preliminary report

Dear Editor,

Diabetes may cause a heterogeneous spectrum of disorders that can alter neuronal function throughout the body. Glycemic control and duration of diabetes are major determinants of diabetic neuropathy as shown in the DCCT (Diabetes Control and Complications Trial Research). The features of diabetic peripheral neuropathy are responsible for the most devastating and disabling complications of diabetes, such as amputations, foot ulcers, neuropathic pain, and for a significant proportion of the mortality and morbidity associated with the disease. Especially Cardiac Autonomic Neuropathy (CAN) may be involved in the pathophysiology of various cardiac disorders, including myocardial ischemia and infarction, hypertension, orthostatic hypotension, heart failure, arrhythmias and increases the risk of sudden cardiac death<sup>1</sup>.

Triglycerides supply the heart and skeletal muscles via their free fatty acid content with highly efficient fuel and allow for the storage of excess calories in adipose tissue. While fatty acids (FAs) are primary sources of energy for heart function, excess lipid accumulation can lead to heart dysfunction and heart failure. However, the role of the amount of triglyceride and FAs and particularly the quality i.e. FA composition of these lipids on heart function needs to be further elucidated.

Lipids and their oxidation products e.g. advanced lipid end products<sup>2</sup> may also be involved in the pathogenesis and progression of diabetic neuropathy.

Furthermore, we report the preliminary data of the first 11 patients already enrolled to the study: DM duration of 18 years, age 39 years, triglycerides 165 mg/dl, indices of cardiovascular reflex tests (CARTs, mean circular resultant 15, valsalva index 1.51, 30:15 index 1.05).

According to our preliminary data (indicating the presence of hypertriglyceridemia and diabetic neuropathy), we will investigate more extensively in collaboration with the Department of Internal Medicine IV, University of Tübingen, the role of lipids and especially triglycerides in the pathophysiology of neuropathy and cardiac function in patients with Diabetes Mellitus type 1 for 12 months. In all patients will be assessed regarding their cardiac function [Cardiac Magnetic Resonance, Michigan Neuropathy Score Instrument (MNSI) and CARTs] and FA composition. The FA composition of serum triglycerides and serum free FAs will be analyzed as follows: serum triglycerides and free FAs will be separated from other lipid fractions by thin layer chromatography and the eluate will be esterified and analyzed with gas chromatography as previously described<sup>3</sup>. Using this procedure we have successfully quantified up the fatty acid composition including the FAs from both, the n-3 and n-6 series of functionally important fatty acids.

In the current preliminary report, we report the data and the methods for investigating further the possible association between triglycerides and diabetic neuropathy and cardiac function.

**Keywords:** Diabetes mellitus, diabetic neuropathy, free fatty acids, cardiac function

### Conflict of interest

None reported.

### Acknowledgment

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