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FROM TYPE 2 DIABETES TOWARDS TYPE 3 DIABETES: AN LCMS STUDY AT POST-MORTEM MATERIAL OF THE ELDERLY

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In this study, a Netherlands brain bank cohort consisted of 306 patients with diagnosed diabetes of which 259 patients (84.6%) were elderly patients (>65 year). In addition, for other criteria, patients were excluded giving a total cohort of 204 patients. We have quantified this cohort of elderly patients based on microscopic classification based on histological pathophysiological characteristics as follows: Noninsulin-dependent diabetes mellitus (NIDDM) patients: 39.4% healthy (Cogroup); 32.8% Alzheimer (mild form); 13.5% real dementia; 4.2% multiple sclerosis; 3.9% several dualistic mix-forms; 3.5% vascular dementia and 2.7% Parkinson. In addition, we investigated lipid profiles of brain of post-mortem type 2 diabetes (T2DM) elderly patients in comparison to a control group (Co) of the Netherlands Brain Bank using LCMS techniques. Here, we report that brains of these T2DM patients contain more double bonds and consequently are more rigid which we designated with the term type 3 diabetes. In a small cohort (≈200 patients) we proved that these brain diseases are not interrelated with BMI so obesity is not a major cause. Our major conclusion is that diabetes and its treatment among T2DM patients are more associated with structural disturbances (lipid composition) in the brain than with glycaemic control. Therefore, we introduce the new terminology type 3 diabetes referring to the mental disorders as a consequence of a disordered lipid metabolism in the human brain related to higher degree of unsaturated fatty acids composition. Of these T2DM (>65 y) patients, frequency distributions of the ultimate scope of the lifespan in neural tissue and some histopathological post mortem determined biomarkers are given in this cohort. Brain diseases are not interrelated with body mass index (BMI) in the elderly with type 2 diabetes, so obesity is not the major cause for their morbidity. Both omega-3 fish oil, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are found in rather high concentrations, 0.277% and 0.258% respectively in blood plasma but not in the brain. EPA is not found in grey or white neocortex matter so probably it cannot pass the BBB while this is the case for DHA giving values of respectively ≈0.00015% while triacylglycerols (TGs) are the major constituent of the human brain ≈72%. We finally conclude the TGs have played a major role in the process of human brain growth and encephalization during course of evolution.

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