ADA-Microcirculation- 2005

Postprandial Impairment of Microvascular Function in Patients with Type 2 Diabetes Mellitus (T2DM) – Effects of the Advanced Glycation Endproducts (AGE) Content

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Food AGEs can increase after 2-6 weeks serum markers of endothelial dysfunction in vivo (e.g. TNFα, VCAM-1). Acute effects of food AGEs on functional parameters of microcirculation in humans have not yet been studied.
We therefore investigated 10 inpatients with T2DM (age 61.8±6.5 years, HbA1c:8.9±1.8%, 7 noninsulin-/3 insulin-treated without acute cardiovascular events within the previous 6 months) on standard diabetic diet for the 6 day study period. On day 4 and 6 we assessed in an investigator-blinded, cross-over design the acute effects of a low-AGE (LAGE) and a high-AGE (HAGE) meal on reactive hyperemia (RH) measured at the right hypotenar site by laser-doppler flowmetry (LEA Medizintechnik, Germany) at baseline and 2, 4 and 6 hours after the meal. RH is expressed as the ratio of blood flow (BF) increase following a 4.5 min forearm ischemia (RH= post-ischemic BF/basal BF).
The HAGE and LAGE meal were similar (580 kcal, 54 g protein, 17 g lipids, 48 g carbohydrates) differences of AGE amount (15100 vs. 27500 kU) were obtained by varying only the cooking conditions (e.g. temperature and time).
RH transiently decreased 2, 4 and 6 hours postprandial after the HAGE meal by 60.6% from 3.3±0.8 to 1.3±0.2*, 2.0±0.5* and 1.96±0.6 at 2, 4, and 6 hours (*$p<0.05$ vs. baseline) and after the LAGE meal by 39.3% from 2.8±0.5 at baseline to 1.7±0.4*, 1.6±0.3* and 1.9±0.4
The basal BF increased after HAGE from 190.3±35.8 to 345.1±44.7*, 307.2±51.2* and 298.6±39.7* PU ($p<0.05$ vs. baseline; PU=perfusion units), and after LAGE from 222.1±41.1 to 337.6±40.7*, 349.1±32.5* and 290±7 PU ($p<0.05$ vs. baseline). A non-significant decrease in maximal reactive BF was noticed.
In conclusion, a standardised real-life meal induces a transient impairment in microvascular function explained in part by postprandial basal vasodilatation. AGEs seem to have an additional effect on postprandial microvascular dysfunction.