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β -aminoisobutyric Acid Relates to Favorable Glucose Metabolism and Adiponectin in Adults with Metabolic Syndrome

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β -aminoisobutyric acid (BAIBA) is a non-protein amino acid secreted by the skeletal muscle that relates to insulin sensitivity, fat oxidation, and anti-inflammation. While BAIBA is purportedly lower in type 2 diabetes (T2D) compared with normoglycemic (NG) controls, no work has assessed this link in people with pre-diabetes (PD). **Purpose:** Examine BAIBA in people who have metabolic syndrome (MetS), with or without PD, and its relation to metabolic health.

Methods: Adults with MetS (ATP III criteria) were categorized into NG (N=22, 20F; 48.0 \pm 2.4y; 36.9 \pm 1.2 kg/m²) or PD (N=23, 18F; 54.2 \pm 1.6; 38.4 \pm 1.2 kg/m²) based on ADA criteria (75g OGTT). Glucose, insulin, C-peptides, and free fatty acids (FFA) were collected during a 180-min OGTT to estimate fasting (HOMA-IR (liver)) and post-prandial (Matsuda Index (muscle)) insulin sensitivity as well as disposition index (DI; glucose-stimulated insulin adjusted for insulin sensitivity). Fasting fat oxidation (indirect calorimetry), adipokines (adiponectin and leptin), body composition (DXA) and fitness (VO₂max) were also determined. **Results:** People with NG had lower ATP III criteria (2.5 \pm 0.2 vs. 3.6 \pm 0.1, P <0.001), fasting plasma glucose (92.2 \pm 5.4 vs. 104.1 \pm 3.2 mg/dl, P =0.002), as well as glucose tAUC_{180 min} (20922.5 \pm 545.8 vs. 25633.4 \pm 1099.2 mg/dl-180min, P <0.001) when compared to those with PD. Moreover, people with NG had higher post-prandial insulin sensitivity (P =0.01) and DI_{muscle} (P =0.003) but lower DI_{liver} (P =0.001), FFA tAUC_{180 min} (P =0.028), and C-Peptide tAUC_{180 min} (P =0.02) than PD. Although people with NG and PD had similar fat oxidation (0.93 \pm 0.06 vs. 1.05 \pm 0.09 mg/kg FFM/min, P =0.31) and BAIBA concentrations (1.4 \pm 0.1 vs. 1.2 \pm 0.1 μ M, P =0.23), BAIBA was associated with adiponectin (r =0.37, P =0.02) adiponectin/leptin ratio (r =0.39, P =0.01) and also correlated with lower 180-min glucose (r =-0.31, P =0.03) and insulin (r =-0.39, P =0.03) during the OGTT. Adiponectin correlated with lower 180-min glucose (ρ =-0.45, P =0.005) and higher DI_{muscle} (ρ =0.42, P =0.05). **Conclusion:** While BAIBA did not differ between MetS adults with or without PD, higher BAIBA related to favorable glucose metabolism through possibly an adiponectin related mechanism. Additional work is required to understand how exercise and/or diet impact BAIBA in relation to T2D risk.

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