Habitual Dietary Intake Aligning with the Dietary Guidelines for Americans is Associated with Greater Lipid-Induced Insulin Resistance in Lean, Healthy Individuals.

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Background: The Dietary Guidelines for Americans (DGA) provide nutritional guidance to prevent disease in healthy individuals. Experimental procedures can induce insulin-resistance, a prerequisite factor to the development of type 2 diabetes. Our study aimed to assess if a habitual diet in line with the DGA provided protection from an acute and experimentally induced insulin resistance in healthy individuals.

Methods: This is a secondary analysis of a cross-over design, randomized control trial (NCT02697201). Participants were randomized to receive an overnight lipid infusion or a saline control, receiving the alternate condition after a washout period. 15 of the 19 original study participants provided adequate dietary records for analysis and were included in this report. Habitual diet was quantified by 3-day food records and the Healthy Eating Index (HEI) was used to assess DGA alignment. Insulin resistance was experimentally induced by overnight lipid infusion of 20% intralipid for 12 hours at 0.55mL/kg/hr. Lipid-induced insulin resistance was measure as the difference in insulin sensitivity calculated during a 3-hour hyperinsulinemic-euglycemic clamp between lipid or control (saline) conditions.

Results: In contrast to our hypothesis, in our study group of 15 individuals (8 male, 7 female; age: 28.9±7.6 years; BMI: 22±1.5 kg/m^2; body fat: 32.2±8.8%), higher HEI was associated with greater lipid-induced insulin resistance (r=0.579), p=0.024). Individuals with an adequate HEI score (HEI>55, “healthy diet”) consumed more fruits (1.28 cup equivalents, p=0.002) and less saturated fatty acids (SFA; 11.6 grams, equivalent to -4% of total kcal intake, p=0.019). than those with HEI<55 (“unhealthy diet”).

Conclusions: HEI scores from this trial align with reported US population averages. A high HEI according to the premise of the DGA, should be associated with reduced risk of disease. However, in this small study, where insulin resistance (a risk factor for disease development) was experimentally induced in healthy individuals, a higher HEI was associated with greater insulin resistance. This contrasts with our initial hypothesis and prevailing epidemiological reports that support the beneficial effects of HEI on reducing risk of disease in healthy individuals. Notably, it is prudent to avoid overinterpretation of this report given the landscape of the literature supports that a diet aligning with the DGA reduces insulin resistance and disease risk. This unexpected finding needs to be reproduced and the underlying biological mechanism needs to be determined before strong conclusions can be drawn.