Main Submission

Carbohydrate conundrum: Why Canadians cannot fit into their skinny genes

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The Numbers

Between 1979 and 2004, adult Canadian obesity rates increased ~67%.[1] Accordingly, from 1999-2009 age-standardized prevalence of type II diabetes rose ~70%.[2] In light of these dramatic increases, the validity of current diet recommendations warrants questioning.

The Acceptable Macronutrient Distribution Range (AMDR) recommendations contained within the North American Dietary Reference Intake (DRI) report are thought to represent the nutrient intake required to reduce the incidence of chronic disease.[3] Established at 45-65% of total daily energy intake, the AMDR for carbohydrate amounts to 255-365 g/day on a typical 2250 kcal diet. Considering the human body can produce sufficient carbohydrates to meet health requirements via hepatic gluconeogenesis[3,4] and carbohydrate overconsumption has been linked to hyperglycemia and hyperinsulinemia[3] one must question the claim that the AMDR reduces risk for chronic disease. If the AMDR for carbohydrate does not reflect physiological need, it is plausible that excess carbohydrate intake promoted by the AMDR is a contributing factor to the ongoing obesity and type II diabetes epidemics.

Cause for Questionning

Support for this hypothesis is advanced in part through a second nutrient recommendation contained within the DRI report: the Recommended Dietary Allowance (RDA). The RDA for carbohydrate is established at 130 g/day and corresponds to the dietary intake level considered adequate to meet the requirements of ~98% of the healthy population.[3]

Adult Canadian carbohydrate consumption is currently estimated at ~300 g/day;[5] an amount consistent with the AMDR recommendation. However, as obesity rates continue to increase, the question must be asked: Are the additional > 150 g of ingested carbohydrate (estimated intake – RDA) protecting Canadians from chronic disease as the AMDR suggests? The DRI report is unable to form clinically relevant conclusions on the matter and cites evidence from traditional populations and experimental studies that demonstrate humans can thrive on low-carbohydrate diets with no adverse effects on health or longevity.[3] Further, carbohydrate consumption is theoretically non-essential as the liver can synthesize sufficient glucose to sustain health (~240 g/day), provided the diet consists of adequate amounts of fats and protein.[3,4]

Given the modest amount of carbohydrate necessary to meet health requirements (RDA; 130 g/day), coupled with evidence that this amount can be produced/consumed and sustained practically without harm, is it conceivable that current carbohydrate intake may lead to metabolic complications? The DRI acknowledges such risks by explaining that chronically high-carbohydrate diets may lead to hyperinsulinemia, hyperglycemia and insulin resistance/type II diabetes.[3]

A Refined Society?

In addition to the hyperinsulinemic potential of a high-carbohydrate diet, the progressive milling and refining of grain (i.e., whole grain < cracked grain < coarse flour < fine flour) produces a stepwise increase in insulin secretion.[6] With refined breads, pastas, cereals and sweetened beverages commonplace today,[5] the associated increase in insulin stimulation[3,7] may result in heightened stress on the pancreas and liver.

Particularly troublesome is how quickly acute bouts of hyperinsulinemia can initiate the transition from a normal to insulin-resistant state. After only one-week of carbohydrate (fructose) overfeeding, fasting blood glucose

becomes elevated and symptoms of insulin resistance develop.[7] However, following weight-loss in previously obese participants with type II diabetes, signs of insulin-resistance persist and often weight-loss is not sustained.[8] It is possible this imbalance reflects a genetic-predisposition favouring the development of insulin resistance but not the reverse.

What's Old is New Again

Although the AMDR is thought to protect from disease, it is worthwhile noting that 'diseases of civilization' are typically absent in hunter-gatherer societies. Total carbohydrate content of hunter-gatherer diets[9,10] is significantly lower than both the AMDR and current consumption (22-40% vs. 45-65% of total energy intake respectively). Hunter-gatherer diets are also notably devoid of refined grains and added sugars.[10]

Recently, the health benefits of a hunter-gatherer diet have been realized and used in a clinical setting to improve metabolic status.[10] This should not be considered surprising as the carbohydrate provided by a hunter-gatherer diet closely aligns with the RDA and may be considered sufficient to support optimal health.

Canadian Carbohydrate Considerations

Canadians' carbohydrate consumption is estimated at ~300g/day. Although this intake closely aligns with the DRI-AMDR,[2] it far exceeds what both human physiological requirements and modern day hunter-gatherer diets estimate are sufficient for healthy living.[3,9] Of greatest concern, current carbohydrate intake too frequently consists of added sugars and processed foods, which can elicit hyperglycemic and hyperinsulinemic responses.

If Canada aims to improve health status, updated carbohydrate recommendations are necessary. These authors contend that carbohydrate recommendations more closely aligned with the DRI-RDA (130 g/day; or 20-40% of total calories) are a more appropriate target for optimal health. This level of intake appears to satisfy human biological requirement and is in agreement with our natural, ancestral eating patterns. To minimize unhealthy metabolic stress, nutritional recommendations must emphasize the consumption of unprocessed foods (vegetables, fruits, nuts, seeds, legumes and whole grains) at the expense of refined grains and added sugars.

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