

The Hunter-Gatherer Diet

In reply: We appreciate Dr Hays' interest in our recent review article,¹ but several points he made require further clarification. His assertion that ancestral human (*Homo sapiens*) diets were dominated by animal foods is correct and is supported by both ethnographic² and quantitative³ studies of hunter-gatherer diets as well as by isotopic analyses of Upper Paleolithic human fossils.⁴ However, it is erroneous to conclude that these animal food-based diets would have been high in saturated fatty acids (SFAs). Furthermore, little or no objective data support the assertions that dietary SFA is nonatherogenic under eucaloric conditions or that SFA represents an effective satiating macronutrient.

From stone tool cut marks detected on the fossilized bones of animals that coexisted with humans during the Paleolithic era (approximately 2.6 million to 10,000 years ago), one can infer the species of animals that were consumed.⁵ Many of the African animals eaten during the Paleolithic period still exist today. These include the wildebeest, hippopotamus, and zebra. Similar fossil evidence exists for mammals such as musk oxen and caribou that were hunted by hominids during glacial (ice age) periods in the Paleolithic era. Total body fat analyses of both caribou⁶ and musk oxen⁷ show that fat mass varies seasonally in a cyclic, waxing-and-waning manner. Hence, maximal or peak body fat percentages are maintained only for a few months during the course of a year, even for mammals residing at tropical and southern latitudes.⁸ In most mammals, storage of excess food energy as fat occurs primarily as triacylglycerols in subcutaneous and abdominal fat depots. The dominant (>50% fat energy) fatty acids in the fat storage depots (adipocytes) of wild mammals are SFAs, whereas the dominant fatty acids in muscle and all other organ tissues are polyunsaturated fatty acids (PUFAs) and monounsaturated fatty acids (MUFAs).⁹ Since subcutaneous and abdominal body fat stores are depleted during most of the year in wild animals, PUFAs and MUFAs constitute the majority of the total carcass fat.⁹ Because of the seasonal cyclic depletion of SFAs and enrichment of PUFAs and MUFAs, a year-round dietary intake of high levels of SFA would not have been possible for preagricultural hominids preying on wild mammals.

With the advent of agriculture and the domestication of wild animals, it became possible to attenuate or prevent the seasonal decline in SFAs by provisioning animals with stored fodder. Additionally, domesticated animals can be slaughtered at peak body fat percentages, whereas hunter-gatherers preying on wild animals were at the mercy of the seasons. In the United States, 99% of the beef we consume is produced in feed lots¹⁰ in which a characteristically obese (30% body fat¹¹) animal is always slaughtered at its peak fat mass regardless of the season.

By employing known seasonal changes in the whole-body fat mass of caribou, the known fatty acid composition and mass of all edible tissues and organs, and third-order polynomial equations regressing carcass fat mass to carcass

fat energy,² it is possible to estimate total edible carcass SFA on a month-by-month basis. For a group of 3 caribou (mature bull, mature female, young bull),¹² the yearly mean total edible carcass SFA content represents 11.1% of the total available calories, a value similar to that recommended by the American Heart Association for reducing the risk of cardiovascular disease (10% of total energy).¹³

We do not recommend consuming a high-SFA diet because SFA down-regulates the low-density lipoprotein receptor,¹⁴ thereby elevating total plasma cholesterol and low-density lipoprotein cholesterol concentrations even in normal-weight individuals. Numerous epidemiological studies have shown that elevated plasma cholesterol concentrations increase the risk for coronary heart disease.^{15,16} A necessary caveat to this statement is that dietary SFAs elicit this effect only under chronic hypercaloric or eucaloric conditions.¹⁷ Recent clinical trials of high-SFA diets such as the Atkins diet¹⁸⁻²⁰ have proved them to be effective in improving the blood lipid profile on a short-term basis (<1 year); however, these beneficial blood lipid changes occurred only under hypocaloric conditions.

A final point is warranted. Ancestral hunter-gatherer diets would always have contained less carbohydrate and more protein in comparison to contemporary Western diets.² This macronutrient composition (elevated protein at the expense of carbohydrate) was recently shown to be effective in both promoting²¹ and maintaining²² weight loss because of the greater satiety and thermic effect of protein compared to either carbohydrate or fat.²³ Consequently, it is elevated protein that promotes satiety, not elevated SFA.

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