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Paleolithic nutrition: what can we learn from the past?

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Background - Anthropologists and some nutritionists have long recognised that the diets of Paleolithic and recent hunter-gatherers (HG) may represent a reference standard for modern human nutrition and a model for defense against certain western lifestyle diseases.

Boyd Eaton of Emory University (Atlanta) has spent over 20 years reconstructing prehistoric diets from anthropological evidence and observations of surviving HG societies, put this succinctly: "We are the heirs of inherited characteristics accrued over millions of years, the vast majority of our biochemistry and physiology are tuned to life conditions that existed prior to the advent of agriculture some 10,000 years ago. Genetically our bodies are virtually the same as they were at the end of paleolithic some 20,000 years ago. The appearance of agriculture and domestication of animals some 10,000 years ago and the Industrial Revolution some 200 years ago introduced new dietary pressures for which no adaptation has been possible in such a short time span. Thus an inevitable discordance exists between our dietary intake and that which our genes are suited to". This discordance hypothesis postulated by Eaton, could explain many of the chronic "diseases of civilisation".¹ But what did hunter-gatherer populations actually eat?

Review - The lines of investigation used by anthropologists to deduce the evolutionary diet of hominids include the study of: (i) changes in cranio-dental features¹, (ii) isotopic chemical tracer methods, including carbon isotope (13C/12C), strontium isotope (87Sr/86Sr) and trace element Sr/Ca ratios in enamel and bone of fossils², (iii) comparative gut morphology of modern humans and other mammals³, (iv) the energetic requirements of a developing a large brain:body size ratio⁴, (v) optimal foraging theory and food selection⁵, (vi) the study of dietary patterns of surviving hunter-gatherer societies.⁶

Findings show clear cranio-dental changes including, a decrease in molar teeth size, jaws/skull became more gracile and front teeth became well-butressed, all indicative of less emphasis on grinding coarse foliage and more on biting and tearing.¹ Carbon isotope studies indicate the dietary intake of C4 grasses, undoubtedly in the form of herbivorous animals, at a level which increased substantially during the progression of our genus from *A. aferensis* to *H. sapiens*. Even as far back as 3.5 million years, the Sr/Ca ratio falls in between those typical for herbivores and carnivores.² Gut morphology studies indicate a closer structural analogy with carnivores than the folivorous or frugivorous mammals.³ Energetic requirements of a relatively enlarged brain have been balanced by reduction in size and energy requirement of the digestive system, a phenomena requiring a high quality diet.⁴ Investigation of food procurement habits of hunter-gatherer societies indicates the advantage of hunting of game animals compared with plant foraging in terms of energy gain versus expenditure.⁵ Study of macronutrient energy proportions in the diet of HG societies (n=229) show a relatively high protein intake 19-35%, highly variable fat intake 28-47% and low carbohydrate level 22-40%.⁶

Conclusions - It is postulated that changes in food staples and food processing procedures introduced during the Neolithic and Industrial era have fundamentally altered seven crucial nutritional characteristics of our ancestral diet: (i) glycaemic load, (ii) fatty acid balance, (iii) macronutrient balance, (iv) trace nutrient density, (v) acid-base balance, (vi) sodium-potassium balance, (vii) fiber content.⁷

References

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