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Fatty acid analysis of wild ruminant tissues: evolutionary implications for reducing diet-related chronic disease

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Abstract

Hypotheses: Consumption of wild ruminant fat represented the primary lipid source for pre-agricultural humans. Hence, the lipid composition of these animals' tissues may provide insight into dietary requirements that offer protection from chronic disease in modern humans.

Method: We examined the lipid composition of muscle, brain, marrow and subcutaneous adipose tissue (AT) from 17 elk (*Cervus elaphus*), 15 mule deer (*Odocoileus hemionus*), and 17 antelope (*Antilocapra americana*) and contrasted them to wild African ruminants and pasture and grain-fed cattle.

Results: Muscle fatty acid (FA) was similar among North American species with polyunsaturated fatty acids/saturated fatty acids (P/S) values from 0.80 to 1.09 and n-6/n-3 FA from 2.32 to 2.60. Marrow FA was similar among North American species with high levels (59.3-67.0%) of monounsaturated FA; a low P/S (0.24-0.33), and an n-6/n-3 of 2.24-2.88. Brain had the lowest n-6/n-3 (1.20-1.29), the highest concentration of 22:6 n-3 (elk, 8.90%; deer, 9.62%; antelope, 9.25%) and a P/S of 0.69. AT had the lowest P/S (0.05-0.09) and n-6/n-3 (2.25-2.96). Conjugated linoleic acid (CLA) isomers were found in marrow of antelope (1.5%), elk (1.0%) and deer (1.0%), in AT (deer, 0.3%; antelope, 0.3%) in muscle (antelope, 0.4%; elk, trace), but not in brain.

Conclusions: Literature comparisons showed tissue lipids of North American and African ruminants were similar to pasture-fed cattle, but dissimilar to grain-fed cattle. The lipid composition of wild ruminant tissues may serve as a model for dietary lipid recommendations in treating and preventing chronic disease.

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