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PURPOSE: To determine whether altering the dietary content of omega-6 (n-6) and omega-3 (n-3) polyunsaturated fatty acids affects the growth of androgen-sensitive prostate cancer xenografts, tumor membrane fatty acid composition, and tumor cyclooxygenase-2 and prostaglandin E2 (PGE2) levels.

EXPERIMENTAL DESIGN: Individually caged male severe combined immunodeficiency mice were fed isocaloric 20% kcal fat diets with the fat derived either primarily from n-6 fatty acids (n-6 group) or with the fat consisting of n-6 and n-3 fatty acids in a ratio of 1:1 (n-3 group), and injected s.c. with Los Angeles Prostate Cancer 4 (LAPC-4) cells. Tumor volumes and mouse weights were measured weekly, caloric intake was measured 3 days per week, and tumors and serum were harvested at 8 weeks postinjection.

RESULTS: Tumor growth rates, final tumor volumes, and serum prostate-specific antigen levels were reduced in the n-3 group relative to the n-6 group. The n-3 group tumors had decreased proliferation (Ki67 staining) and increased apoptosis (terminal nucleotidyl transferase-mediated nick end labeling staining). In vitro proliferation of LAPC-4 cells in medium containing n-3 group serum was reduced by 22% relative to LAPC-4 cells cultured in medium containing serum from the n-6 group. The n-6/n-3 fatty acid ratios in serum and tumor membranes were lower in the n-3 group relative to the n-6 group. In addition, n-3 group tumors had decreased cyclooxygenase-2 protein and mRNA levels, an 83% reduction in PGE2 levels, and decreased vascular endothelial growth factor expression.

CONCLUSION: These results provide a sound basis for clinical trials evaluating the effect of dietary n-3 fatty acids from fish oil on tumor PGE2 and membrane fatty acid composition, and serum and tumor biomarkers of progression in men with prostate cancer.

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