

A High-Fat Diet Enhances Proliferation of Prostate Cancer Cells and Activation of MCP-1/CCR2 Signaling

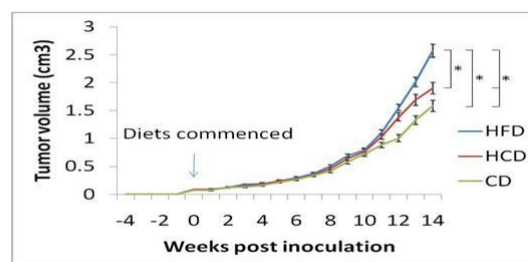
Introduction and Objective: Dietary patterns, such as high-fat (HFD), high-carbohydrate, (HCD), play an important role in prostate cancer progression. However, which of these diets have the greatest effect on tumor progression and its underlying mechanisms remains unclear.

Materials and Methods: We investigated the effect of dietary differences on prostate cancer progression using the *in vitro* and *in vivo* assessment of circulating factors including serum insulin, growth factors, and inflammatory cytokines.

Results: The tumor growth of prostate cancer LNCaP xenograft was significantly higher in the HFD group than in the HCD and control diets (CD) groups ($p = 0.010$; HFD vs. HCD, $p = 0.025$; HFD vs. CD, $p = 0.003$). The mean level of the serum monocyte chemoattractant protein-1 (MCP-1) in the HFD group was significantly higher than that in the HCD and CD groups ($p = 0.024$; HFD vs. HCD, $p = 0.033$; HFD vs. CD, $p = 0.001$). The mRNA levels of CC chemokine receptor 2 (CCR2), which is an MCP-1 receptor, and the expression of activated Akt were the highest in the HFD group. The proliferation of prostate cancer LNCaP and DU145 cells in a medium containing mouse serum from the HFD group was significantly higher than that in a medium containing sera from the other two groups, and CCR2 knockdown by CCR2 small interfering RNA inhibited HFD-induced proliferation of LNCaP cells.

Conclusions: An HFD-enhanced prostate cancer cell grows more strongly than an HCD or CD. MCP-1/CCR2 signaling may be involved in an HFD-induced prostate cancer progression.

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