Intratumoral Concentrations and Effects of Orally Administered Micellar Curcuminoids in Glioblastoma Patients.


Abstract

BACKGROUND: The oral bioavailability of curcuminoids is low, but can be enhanced by incorporation into micelles. The major curcuminoid curcumin has antitumor effects on glioblastoma cells in vitro and in vivo. We therefore aimed to determine intratumoral concentrations and the clinical tolerance of highly bioavailable micellar curcuminoids in glioblastoma patients.

METHODS: Thirteen glioblastoma patients ingested 70 mg micellar curcuminoids [57.4 mg curcumin, 11.2 mg demethoxycurcumin (DMC), and 1.4 mg bis-demethoxycurcumin (BDMC)] three times per day for 4 days (total amount of 689 mg curcumin, 134 mg DMC, and 17 mg BDMC) prior to planned resection of their respective brain tumors. Tumor and blood samples were taken during the surgery and analyzed for total curcuminoid concentrations. $^{31}$P magnetic resonance spectroscopic imaging was performed before and after curcuminoid consumption.

RESULTS: Ten patients completed the study. The mean intratumoral concentration of curcumin was 56 pg/mg of tissue (range 9-151), and the mean serum concentration was 253 ng/ml (range 129-364). Inorganic phosphate was significantly increased within the tumor ($P = 0.034$). The mean ratio of phosphocreatine to inorganic phosphate decreased, and the mean intratumoral pH increased ($P = 0.08$) after curcuminoid intervention.

CONCLUSION: Oral treatment with micellar curcuminoids led to quantifiable concentrations of total curcuminoids in glioblastomas and may alter intratumoral energy metabolism.

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