Cancer Chemotherapeutic Effects of Modified Sodium Silicate (Alkahydroxy/Alka V6)

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Abstract
A proprietary modified sodium silicate manufactured by Cione enterprises Inc. (Cleosna, TX) was evaluated for its ability to modulate various parameters relevant to establishment and progression of cancer. Antimutagenic effects were determined using Ames test. Prevention of colon cancer cell (HT-29) attachment and growth was done using standard methods. Apoptotic induction was measured by DNA fragmentation (DNAF) assay. Methylmethane sulfonate (MMS), glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT) activity were measured using standard assays. Chemical structure determined by nuclear magnetic resonance (NMR) and infrared (IR) spectroscopy suggested that the product was a mixture of trimeric sodium silicate and sodium silicate pentahydrate. A dose-dependent induction in attachment (IC50 = 0.15 mM) and growth (IC50 = 0.18 mM) of HT-29 was observed. At low levels (0.29-3.9 mM) the product was able prevent various sodium asid induced mutations in Ames test. A dose dependent increase in DNAF suggested induction of apoptosis. A drop in MDA levels and increased in GSH, SOD and CAT activities suggested induction of antioxidant response. We conclude that the product may have cancer chemotherapeutic properties in vitro due to its unique structural and electrophysical properties. In vivo tests are imperative to determine true effectiveness. Funding source: Cione Enterprises.

Methods
Test compound was serially diluted in distilled water and filter sterilized. Silicates were quantified by the ammonium molybdate assay at 450 nm. MAM-NR and FT-IR were used for structural determination. Antimutagenic effects were determined using Ames test strains and Na2O as a mutagen. HT-29 cells were cultured in using standard protocols and were seeded at 104 cells/well with different concentrations of sterile active compound. L. tertes was cultured using standard culture techniques. Cell survival was assayed using Trypan blue exclusion enumeration. Anti-adhesive effects were evaluated in treated 6-well plates counting attached cells after 24 hrs. MDA concentration was determined by its reaction with thiobarbituric acid (TBA) at 532 nm. SOD activity was determined by assaying by the NBT/ Diforomazan assay at 562 nm. CAT activity was determined by measuring the formation of chloram fraction from dichlorom at 570 nm. Protein was measured using the Bradford assay. GSH content was determined by assaying for the GSH-DTNB (Ellman's reagent) at 417 nm.

Results

Introduction
Alkahydroxy/ALKA-V6 is a modified valued-added silicon-based compound developed by the Cione Enterprises Inc. Recent research with this compound has shown that it has several health enhancing effects in humans and animals. Results from several studies conducted at academic and private organizations have shown high antimicrobial effect against several important food, agriculture and animal pathogens. Though the structural and chemical properties of this compound have not been established, it is believed to contain silica and therefore may play an important role as a nutrient in bone and joint health. In numerous privately collected testimonials, the compound has been reported to have anticancer effect. It has been noted in these claims that this compound can reduce tumor size, prevent metastasis, reduce remissions of cancers deemed untreatable by medical doctors. Additionally, the product is believed to aid in chemotherapy by increasing effectiveness of drugs, reducing their effective dosage associated side effects.

In spite of these observed empirical effects, systematic studies that detail the exact dose dependency and mechanism of action of this potentially promising compound have not been conducted. Results from such studies can systematically validate the claims, determine effectiveness, evaluate safety and facilitate its use in management of health including different forms of cancer. As a component part of a multi-year study on this proprietary compound, our objective here was to evaluate the cancer chemotherapeutic effects of this compound in various model systems to elucidate potential biological targets responsible for its cancer-chemosuppressive effects. We evaluated the antimutagenic, apoptotic, anti-proliferative, anti-adhesive, and antioxidant activities. Chemical structure and concentration was determined by NMR, FT-IR and spectroscopic techniques.

Conclusion
Structural characterization suggested Na2.5Si2H4O4 as the formula and a concentration of 5.37 M. Antimutagenic effects were observed with test compounds in various Ames-test strains and reduced DNA-induced reversions. There was a significant decrease in the viability (IC50 = 0.18 mM) and attachment (IC50 = 0.15 mM) of cancer cells. Treatment with this compound also resulted in an increased antioxidant response as seen from fold increases in activities of antioxidant enzymes SOD and CAT. The levels of important cellular antioxidant molecule, GSH was also found to increase in a dose dependent manner. This was coupled with a decrease in MDA, an oxidative stress biomarker. It appears that this compound has a potential to decrease initial events in carcinogenesis by modulating redox mediated events, enhancing antioxidant response, promoting apoptosis and decreasing DNA mutations. However, this implication is based solely on in vitro results and endpoint in vivo evaluations are imperative. Contributions of electrophysical and structural characteristics of this compound to observed effects are being evaluated in ongoing research projects.