The Longwood Herbal Task Force

(*http://www.mcp.edu/herbal/default.htm***) and**

The Center for Holistic Pediatric Education and Research

Clinician Information Summary

ANTINEOPLASTONS

SUMMARY

Antineoplastons are used to treat a variety of solid tumors in adults, presumably by inducing cell differentiation and apoptosis. Preliminary data from *in vitro*, animal and human case series support this use, but randomized controlled clinical trials have not been reported. Side effects occur in up to 30% of patients and include an unpleasant body odor, gastrointestinal upset, weakness, rash, fever and chills. Drug interactions and use in pregnancy, lactation and childhood have not been evaluated. Use of antineoplastons as a cancer treatment appears promising, but still experimental.

POPULAR USES

Antineoplastons are used primarily to treat cancer. Based on coincidental improvements in oncology patients who had concurrent morbidity that improved during treatment with antineoplastons, these products have also been used to treat Parkinson's disease, sickle cell disease and thalassemia.

CHEMICAL CONSTITUENTS

Antineoplastons include amino acids, peptides and organic acids. There are many different human and synthetic antineoplastons: A1, A2, A3, A4, A5, A10, A10-1, AS10, AS10-1, AS2-1, AS5, AS2-5, H, L, O, F, Ch and K. *Antineoplaston A10* is 3-phenylacetylamino-2,6-piperidinedione; it bears structural and chemical similarities to deoxythymidine and uridine. It is hydrolyzed to phenylacetylglutamine and phenylacetylisoglutamine, which tend to be further degraded to phenylacetic acid.

SCIENTIFIC DATA

In Vitro: Antineoplaston A10 intercalates in DNA, inhibiting mitosis. *In vitro*, antineoplastons inhibited oncogene expression, limited the proliferation of malignant cells, induced terminal differentiation and promoted maturation in malignant cell lines in a dose-dependent fashion. Antineoplaston A10 inhibited estradiol stimulated cell growth in human breast cells *in vitro* and worked synergistically with cisplatin against hepatocellular carcinoma cell lines. Sodium phenylbutyrate has significant

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cytostatic and differentiating activity against primary neoplastic myeloid cells, inducing apoptosis.

In Animals:

For cancer. In mice with solid tumors, antineoplastons A10 and AS2-1 inhibited the growth of spontaneously occurring and induced tumors both when used as a single agent and in combination with standard chemotherapy.

For Parkinson's disease: In mice and rats given antineoplaston A5, there were significant stimulation of central dopaminergic receptors and increased concentrations of dopamine and noradrenaline. A5 appeared to neutralize both hyper- and hypo-activity of central dopaminergic structures.

For thalassemia and sickle cell disease. No data

In Humans:

For cancer: As of late 1998, over 20 case series, open label, Phase I and II trials in humans in terminally ill adults with a variety of solid tumors had been conducted. Most patients had been treated with standard chemotherapy, hormonal therapy, and/or radiation prior to or concurrent with treatment with antineoplastons. In 75% of studies, over 50% of patients reported complete remission, partial response, no disease progression or disease stabilization. However, no randomized controlled trials of the effectiveness of antineoplastons have yet been published.

For Parkinson's disease: Improvement among patients with co-morbid Parkinson's disease and cancer who were treated with antineoplastons is from case reports only.

For thalassemia and sickle cell disease: Among six patients treated with sodium phenylbutyrate for two weeks to six months, two had improved HbgF levels; the other four dropped out due to dosage requirements (30 – 40 pills daily) and side effects (primarily GI).

TOXICITY AND SIDE EFFECTS

Side effects with chronic treatment occur in up to 30% of patients: gastrointestinal (upset stomach, gas), myalgias, fatigue, headache, vertigo, rash, chills and fever and a strong body odor of urine. The treatment is also expensive ($30,000 - $60,000 per year) and is only available on a limited basis.

Interactions with other medications: Unknown.

Contraindications: Unknown.

Pregnancy and lactation: Unknown.

Pediatric use: Unknown.

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ADDITIONAL REFERENCES OR RESOURCES

- University of Texas CAMR: http://www.sph.uth.tmc.edu/utcam/agents/anti.htm
- NIH NCCAM: http://odp.od.nih.gov/ods/databases/ibids.html
- HOME: http://www.mcp.edu/herbal/default.htm