EFFECTS OF *VERNONIA AMYGDALINA* EXTRACT AND TAXOL ON CYTOSOLIC GLUTATHIONE S-TRANSFERASE ACTIVITY IN MCF-7 CELLS

Carolyn B. Howard¹, Lecia Gresham² and Ernest B. Izevbigie²

¹Breast Cancer Research Laboratory, and ²The Laboratory of Phytoceuticals, Cancer Therapies and Prevention, Department of Biology and NIH-Center for Environmental Health, College of Science, Engineering and Technology, Jackson State University, 1400 J. R. Lynch Street, Jackson, Mississippi, USA

Abstract: Water-soluble *Vernonia amygdalina* (*V.A.*) extract treatment 1) inhibits cancerous cell growth without harmful side effects to normal cells, 2) reverses ethanol-induced stimulatory responses in human cancer cell growth, and leads to increased microsomal epoxide hydrolase (Phase 2) gene product expression levels (MCF-7 cell treatment with 10μg/ml of *V.A.* extract for 4 hrs), without affecting cytochrome P450 1A1/1A2 (Phase 1) expression, thus supporting the potential of *V.A.* as a useful chemotherapeutic agent. In this study, *V.A.* was compared to Paclitaxel (Taxol), Doxorubicin, and Vincristine, as related to their effect on Glutathione S-Transferase (GST) activity. The Phase 2 enzymes, GSTs, are ubiquitous multifunctional enzymes which play a role in cellular detoxification. They conjugate toxicants to glutathione and render them more water soluble. We hypothesize that *V.A.* extract treatment will lead to decreased cellular toxicity, as compared to the conventional anticancer therapies. The two classes of GSTs are comprised of both cytosolic and microsomal enzymes. MCF-7 cells were cultured using either 100μg/ml of *V.A.*, or 100 nM of either Taxol, Doxorubicin or Vincristine; and we assayed for levels of total GST activity (cytosolic or microsomal) by measuring the conjugation of 1-chloro-2,4-dinitrobenzene with reduced glutathione. The conjugation was accompanied by an increase in absorbance, which we measured at 340 nm. The rate of increase is directly proportional to the GST activity in the sample, and is an indicator of the toxicity of the drug. Results are presented which indicate that *V.A.* extract has similar effects on microsomal and cytosolic GSTs as Taxol. Cytosolic GST levels were also assessed using Western blotting, revealing that Doxorubicin (100 nM) samples and Vincristine (100 nM) samples were undetectable, while no mitochondrial GST proteins were detected for either treatment group. However, Vincristine (100 nM) samples yielded GST activity, but no detectable protein expression, while neither cytosolic nor mitochondrial GST activity was detected but protein levels were high, thus indicating that Taxol and *V.A.* extract are not as toxic as the other drugs. Perhaps *V.A.* may be a useful agent against breast tumor cells which survive chemotherapy with Taxol.

Keywords: Ethanol, *V. amygdalina* extract, Vincristine, Doxorubicin, and Paclitaxel.

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