ABSTRACTS OF POSTER PRESENTATIONS

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The potential physiological role of NAO, a unique water-soluble natural antioxidant from spinach

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Antioxidants comprise a group of compounds capable of neutralizing free radicals and inhibiting peroxidation of unsaturated fatty acids. the objective of the current presentation is to describe the efficacy of a new natural water-soluble antioxidant, nao, in various biological systems in comparison to other natural antioxidant, such as vitamin E and apocynin.

NAO is a mixture of aromatic polyphenols which has been isolated from spinach leaves, purified and characterised. It has been found superior to vitamin E and BHT in preventing lipid peroxidation using both *in vitro* and *in vivo* studies. Skin application experiments performed on mice, rats and humans have indicated that NAO penetrates the skin, much more effectively than vitamin E, and significantly reduces the level of peroxides in the epidermis following UV irradiation. NAO was effective and superior to apocynin treatment in reducing the lipopolysacharide (LPS)-related lipid peroxidation and pathological changes in various organs in rat and rabbit.

Moreover, the efficacy of NAO in combination with a very low concentration of dexamethasone in preventing LPS-induced uveitis in rats was demonstrated.

NAO was found highly effective in protecting the male reproductive system by reducing morphological changes induced by hydrogen peroxide treatment in spermatozoa.

The antitumour activity of NAO was demonstrated in a methylcholanthrene-induced fibrosarcoma mouse study in which NAO treatment reduced the number of tumours during a 20-wk period.

The possible beneficial effect of NAO in reducing the oxidative stress toxicity caused by chemotherapeutic agents such as doxorubicin (DOX) was studied in mice, and NAO treatment was found to have a beneficial effect protecting against DOX-induced myocardial degeneration. The prophylactic effect of NAO on various pathologies and the significant decrease in levels of oxidative stress products suggest the use of NAO as an efficient cellular protector.

Corydalis roots east and west

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Species of the genus Corydalis are used in both Traditional Chinese Medicine and Native American herbalogy. There are approximately 300 species in this genus which is the major genus of the Fumitory family (Fumariaceae). Some include this family in the Poppy family (Papaveraceae) but it has a more complex flower and lacks coloured latex. Distribution is mainly throughout the North Temperate region, but a few species are found in southern Africa.

In China, *Corydalis yanhusuo* and several other species roots are collected after the herbaceous parts have withered. The powdered root is a very potent analgesic. There is considerable variation in the alkaloid content reflected in almost a threefold difference in the LD_{50} in mice.

Turkey corn (*C. canadensis*), indigenous to North America, is named for its multiple yellowish brown kernel-shaped tuberous root. Native Americans employed several species of Corydalis for medicinal purposes. The Ojibwas would inhale the smoke from roasted tubers of golden corydalis (*C. aurea*) aka golden smoke to relieve congestion. Corydalus was an official entry in the *National Formulary* from 1916 until 1947. A tincture of the roots collected during flowering was used to treat syphilis, scrofula and various skin disorders.

The roots of corydalis (Corydalis cava) aka early fumitory, which is indigenous to southern and central Europe, are collected when the plant is dormant and dried. Fresh tubers collected just before flowering are also used. An extract containing a complex breed-specific mix of isoquinoline alkaloids is used to treat mild depression and nerve trembling. Effects of the extract include

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sedation, hypnotic, spasmolytic and blood pressure lowering. Although no human poisonings have been reported overdoses can induce clonic spasms with tremors. Several alkaloids isolated from Corydalis species are illustrated and their properties described.

Effect of ginseng on endurance exercise and oxidative metabolism in untrained LA/Ntul rats

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Objective: The objective of this study was to determine the effects of Asian ginseng (P. ginseng) on endurance exercise in an untrained sedentary rodent model, and to determine if the observed effects were additive to those of an ergogenic complex containing a highly absorbable form of magnesium- and potassium-glycinate.

Experimental Design: To determine the effects of P. ginseng on exercise performance, groups of sedentary young adult congenic lean virgin female LA/Ntul rats were administered ginseng (Gin), magnesium + potassium glycinate (MgK-Gly), or a combination of the two ergogenic compounds suspended in 1 ml dH2O p.o., via gavage for three consecutive days, followed by a swim to the onset of fatigue under controlled conditions (water temp 30°C, 12 inches depth) exactly two hours after the last treatment. Animals were exercised more than once, with a two week interval to allow adequate time for recovery, and to minimise potential beneficial effects of exercise training. Aliquots of peripheral blood were obtained before and immediately following exercise for determination of blood glucose and plasma lactate concentration.

Results: Body weights of animals remained constant during the experimental treatments. Both Ginseng and the Magnesium + Potassium Glycinate complex improved the duration of swim time to fatigue when compared to a similar group of animals that had received equal volumes of water only (MgK − Gly > Gin). The combination of Ginseng and magnesium-potassium glycinate further enhanced the duration of swim time to fatigue by 50% or more compared to dH2O alone, and 15% more than the MgK-Gly complex. Additionally, the measures of plasma glucose concentration and lactate accumulation were indicative of improved glycolytic flux and peripheral glucose utilisation following MgK-Gly and MgK − Gly + Gin treatment.

Summary and Conclusions: Although P. ginseng has been used for many years as a dietary supplement to increase energy and stamina, specific effects of ginseng on metabolism and physiologic performance are incompletely characterised. The observations of this study are consistent with a ginseng-mediated ergogenic effect of moderate intensity on swim endurance in rats. Moreover, the ergogenic effects of P. ginseng on exercise endurance were additive to the ergogenic effects of a magnesium-potassium glycinate complex, and suggest that the enhanced ergogenic effects of P. ginseng and this magnesium complex may be secondary to improved peripheral glucose utilisation in otherwise sedentary, untrained rats. The specific physiologic mechanism(s) which contribute to an improved peripheral glucose utilisation with magnesium treatment could not be determined, but may be linked to processes of glucose transport and uptake in peripheral tissues, oxidative metabolism, or some combination of both. Regardless of the specific mechanisms which contribute to the physiologic and biochemical responses observed, Ginseng and Magnesium-Potassium complex, alone or in combination, resulted in a significant enhancement in the duration of swim time to fatigue in this strain of rats.

Pyrrolizidine alkaloids from the root of *symphytum officinale* – isolation of symlandine

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Objective: *Symphytum officinale* L. (Boraginaceae, common comfrey) has been used as a medicinal herb and as a tea. The presence of several toxic pyrrolizidine alkaloids from the leaf and root of *S. officinale* has been well studied.

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In order to provide reference standard for an evaluation of the toxicity of comfrey, the isolation, identification, and structure determination of pyrrolizidine alkaloids present was necessary.

Design: In order to isolate pyrrolizidine alkaloids from *S. officinale*, countercurrent chromatography procedure was developed. The methanol extract of the root of *S. officinale* was fractionated using standard acid/base partition to afford the crude alkaloid extract. Countercurrent chromatography of this concentrated mixture was performed using a mixture of hexane-ethyl acetate-methanol-water (pH 4.5 using trifluoroacetic acid).

Results: Symphytine, symlandine, and echimidine were isolated by the countercurrent chromatography procedure. The purity of isolates was determined by HPLC and the structures were confirmed by several spectroscopic techniques including 2D NMR methods.

Conclusions: Three major pyrrolizidine alkaloids from the root of *S. officinale* were isolated by the one-step countercurrent chromatography using an appropriate solvent system. Symlandine, which has been reported previously only as a mixture with its C-19 stereoisomer, symphytine, was isolated for the first time.

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Bioassay based quality assurance (biofit): pharmacologic substantation of botanical product claims

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Objectives: To compare variance in pharmacologic activity of botanical products and raw material extracts of *Echinacea*, *Hypericum perforatum* (St. John's Wort), and *Ginkgo biloba* in bioassays relevant to described clinical results and label benefit claims. The assays developed evaluated macrophage activation (*Echinacea*), inhibition of synaptosomal serotonin and dopamine re-uptake (St. John's Wort), and free radical scavenging and inhibition of platelet activating factor-induced platelet aggregation (*Ginkgo biloba*).

Results: *Echinacea* raw herb and root powders were found to possess activity in terms of macrophage activation. In contrast, chemically standardised *Echinacea* extracts were found to be inactive as macrophage stimulators but did display anti-oxidant and anti-inflammatory properties. St. John's Wort and *Ginkgo biloba* products with a demonstrated clinical history possessed reproducible biological activity. Other products, chemically standardised to the same specifications, demonstrated a high degree of variability in pharmacologic potency.

Conclusions: Chemical standardisation of botanicals commonly sold as dietary supplements in the United States does not necessarily ensure consistent pharmacological activity. Botanical preparations that can be shown to consistently produce equivalent pharmacological action should be utilised for future studies evaluating safety and clinical efficacy.

Testing echinacea's effect on the common cold through electronic mail

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Objective: Echinacea's efficacy on the severity of the common cold was tested.

Design: In this double blind, placebo-controlled clinical trial, subjects were instructed to e-mail staff when they began to show cold symptoms. Once contacted, representatives sequentially assigned subjects to one of three groups: 1 = Echinacea, 2 = Placebo, or 3 = No treatment. If the subject was assigned to group 1 or 2, their respective treatment was delivered to them. The treatment consisted of a flavoured alcoholic Echinacea purpurea and angustifolia tincture. The placebo consisted of a flavoured parsley juice. All subjects were daily e-mailed a cold-severity,

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assessment survey until their colds ended. Post-cold surveys tested the blinding. The symptoms severity scores were analysed using a One-Way ANOVA.

Setting: The study was conducted for approximately 6 months at Cornell University.

Subjects: Of the 82 cold patients, 27, 30, and 25 received treatments one, two, and three, respectively. All subjects were Cornell University undergraduates or staff.

Results: Subjects receiving Echinacea or Placebo displayed more severe symptoms than the control for certain symptoms. The sore throat severity score was significant ($p = 0.013$) and a strong trend towards statistical significance was seen in the severity scores for headache and loss of appetite ($p < 0.053$).

Conclusion: Increasing the time and sample size in a further study would unlikely produce a difference between the Echinacea and Placebo groups. Electronic mail was found to be an effective means of communicating with subjects.

Water stress and developmental stage significantly affect the medicinal constituents of *Hypericum perforatum* and *Echinacea purpurea*, two cultivated herbaceous perennials widely used in dietary supplements

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St. John's wort (*Hypericum perforatum* L.) and purple coneflower (*Echinacea purpurea* (L.) Moench.) are two herbaceous perennial plants widely used in the U.S. and Europe in dietary supplements and other herbal preparations. Recent clinical research concerning the efficacy of St. John's wort and purple coneflower preparations has been favourable; however, the exact constituent (or constituents) and mode of action responsible for their effectiveness, remains unknown. Currently, St. John's wort and purple coneflower dietary supplements are standardised to 0.3–0.5% hypericins, and/or 2.0% hyperforins; and 1% isobutylamides, and 4% phenolics, respectively. While standardisation provides both suppliers of raw materials and consumers of the final product clear quality guidelines in terms of production and insurance of batch-to-batch consistency; this procedure is not necessarily ideal to insure total quality and potential efficacy of the herbal product. Indeed, if several mechanisms based on compound interactions are responsible for the clinically observed activities, standardising the therapeutically used extracts on one single class of constituent may not be sufficient. Given the fact that a large proportion of these plants are cultivated, environmental conditions such as water stress, time of harvest, and plant age greatly influence the chemical content of all harvested organs; and therefore, the quality and potential effectiveness of the herbal preparation. Data will be presented on approximately twenty individual constituents quantified by high-performance liquid chromatography (HPLC), including phenolic acids, flavonal glycosides, napthodianthrones, phloroglucinols, and isobutylamides, and their relationships to organ, water stress, and plant developmental stage.

The application of NP-HPLC for analysis of tocopherols and tocotrienols in nutritional supplements and human serum

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Objective: To develop and validate the use of a NP-HPLC method for the analysis of the 4 tocopherol and 4 tocotrienol isomers in nutritional supplements and human serum.

Design: The separation of the 8 isomers of vitamin E and an internal standard, tocol, was achieved using a diol column with both UV and fluorescent detection. The mobile phase consisted of 5% dioxane in hexane.

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Validation was performed using analyte standards, nutritional supplements, endogenous and spiked human serum.

Results: With the incorporation of both UV and fluorescence detectors in the method, we found that analyte concentration is an important factor in reliable quantitation. When analytes are present in a matrix, such as serum, at concentrations below 1 μG/mL, the levels measured using the detectors may vary by more than 10%. This is primarily due to interferences contributed by the sample matrix which are more prominent in the UV, but are less likely to fluoresce at the same excitation and emission wavelengths. As prepared, the detection limit for tocols in a serum matrix is 40 nG/mL. Higher concentrations, such as those present in the supplements, are more reliably quantitated using UV detection caused by the loss of linearity in the fluorescence response at concentrations over 15 μG/G. Diluting samples such that analyte concentrations fall within the linear range can circumvent this. Spiked recoveries for the isomers ranged from 97.5–103%.

Conclusion: The method permits the quantitative measurement of tocopherols and tocotrienols in nutritional supplements and in serum of human subjects.

Home remedies used during pregnancy

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Background: To determine the prevalence of home remedies to relieve various pregnancy symptoms, women were queried as part of a longer telephone questionnaire conducted at 24–29 weeks of gestation.

Methods: This abstract includes responses from the first 200 participants in the Pregnancy, Infection and Nutrition (PIN) Study at the University of North Carolina obstetrics clinics since inclusion of the relevant questions in January 1999.

Results: Twenty-five women (15%) reported using a home remedy for relief of nausea and/or vomiting among 161 women reporting any nausea/vomiting. In response to listed items, 9 used ginger tea/root, 5 drank ginger ale, one or two used each of the following items: vitamin B^6, chamomile tea, cola, and 18 responded to "other". Home remedy users for nausea/vomiting were more likely to be non-smokers, and more highly educated. Seven women (6%) reported using a home remedy for relief of vaginal symptoms among 125 women reporting vaginal symptoms not diagnosed as a specific infection. In response to listed items, there was one affirmative report for consumption of yoghurt and cranberry juice/pills, and five responded to "other". Home remedy users for vaginal symptoms were more likely to be non-smokers, have a pre-pregnancy history of yeast infection, and to be black.

Conclusion: Use of home remedies in this population was three times more common for nausea/vomiting than vaginal symptoms. Nearly all home remedy users were non-smokers.

Inhibition of aldose reductase by fruit anthocyanins

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Objectives: The enzyme aldose reductase has been implicated in many medical complications of diabetes. Bilberry dietary supplements and fruit products were screened for aldose reductase inhibition; a second objective was to determine whether specific anthocyanins and their aglycones are effective inhibitors.

Design: Aqueous extracts of bilberry dietary supplements and fruit powders were used; anthocyanins and quercetin were dissolved in ethanol for use in the recombinant human enzyme assay. DL-glyceraldehyde was the substrate used, and change in absorbance at 340 nm over 5 minutes was recorded.

Results: Bilberry products demonstrated inhibition of 10–52%. Enzyme inhibition was correlated with anthocyanin content ($r = 0.82$). Among fruit powders, inhibition followed the following trend: raspberry > blueberry > cranberry > grape. Quercetin, cyanidin, and delphinidin inhibited the enzyme by over 90% when 10 μL of 200 μM

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flavonoids were used in the 1 mL reaction. Malvidin showed only 70% inhibition; its glycosides had inhibition of less than 40%.

Conclusions: Fruits and dietary supplements containing anthocyanins may have value in ameliorating side effects of diabetes via aldose reductase inhibition. Substitutions around the basic flavylium rings appear to influence inhibition. Confirmation with animal and human testing is needed.

Preparation of literature reviews for herbal medicines nominated to the national toxicology program

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During the past four years, Integrated Laboratory Systems, Inc., (ILS) has prepared in-depth reviews of the publicly available toxicological literature for substances nominated for potential testing by the National Toxicology Program. Four of these reviews were on the herbal products comfrey, saw palmetto and its major phytosterol (-)-β-sitosterol, goldenseal and constituent alkaloids berberine and (-)-β-hydrastine, and pennyroyal constituents pulegone and menthofuran. To prepare these reviews, ILS information scientists perform comprehensive literature searches on commercially and publicly available online databases; search in-house secondary resources, including CD-ROMs and diskettes; and examine other resources at local libraries. Full database records and selected pages from other references are examined, subject coded, and sorted by topic. Topics include chemical identification and properties, production, use, environmental occurrence, human exposure, regulations, and various toxicological endpoints. A priority score is assigned to each reference to indicate its potential value for the review. As a result of these efforts, Internet sites and resources of scientific value on herbal products have been identified, and strategies for identifying active constituents and for finding information on their metabolites and adverse effects have been developed. The literature reviews are supported by NIEHS contract N01-ES-65402.

Toxicological properties of goldenseal (hydrastis canadensis) and two of its constituent alkaloids, berberine and hydrastine

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Goldenseal, a member of the plant family Ranunculaceae, is a top-selling herbal dietary supplement in the United States. Two of its major alkaloids are berberine (0.5 to 6%) and (-)-β-hydrastine (1.5 to 4%). Goldenseal is sold as an ingredient in several herbal dietary supplements, ear drops, feminine cleansing products, cold/flu remedies, allergy relief products, laxative products, and digestive support products. Former OTC drugs containing hydrastine and/or berberine have included eyewash products and decongestant nasal sprays. Reported adverse effects in humans include gastrointestinal upset and labour induction in pregnant women; chronic use may inhibit vitamin B absorption. A comprehensive literature review found no toxicity information from experimental or clinical studies on goldenseal and only acute toxicity information on hydrastine and its salts. Berberine has been the subject of animal studies on chemical disposition and pharmacokinetics; acute and subchronic toxicity, genetic toxicity, and immunotoxicity but not on teratogenicity, carcinogenesis, or other chronic toxicity. The National Toxicology Program is currently evaluating goldenseal and berberine for genotoxicity, short-term toxicity, and developmental toxicity. ILS literature reviews are supported by NIEHS contract N01-ES-65402.

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Characterisation of herbal materials for use as test articles in the bioassay

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Objective: bioassays must be based on a reproducible dosing scheme. Herbal materials are complex and may be inconsistent between lots. Formulations normalised to active components may minimise the impact of variability. Our objective was to evaluate the feasibility from the standpoints of compound recovery and quantitation as well as variability between lots of comfrey herb, goldenseal root, and echinacea extract.

Design: two different lots of each material were purchased from three suppliers. Active components were identified and quantitated. Nutritional analyses were also conducted for comfrey and goldenseal.

Setting: contract laboratory

Subjects: none

Results: active components of goldenseal root powder were present at expected concentrations. For comfrey, our experiments did not agree well with the level and number of active components cited in the literature. One cited active component of echinacea is identifiable, but quantitation is difficult because of background. Variability between lots with regard to active components was small for goldenseal, but considerable for echinacea. Variability in nutritional parameters between lots was generally small.

Conclusions: active component determinations and variability between lots are both test article and study specific, but must be known. Lead time to evaluate these issues is important for planning a defensible bioassay.

Photosensitization by herbal components and extracts

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Objective: To determine whether singlet oxygen ($^1O_2$) phosphorescence can predict possible phototoxicity from herbal products, and to examine selected herbal components/extracts for photosensitization.

Design: Herbs may contain compounds (photosensitises) producing adverse effects upon sunlight exposure in humans who consume these herbs or place them on the skin. Photosensitises accumulate light energy in the form of excited (triplet) states that live long enough to react with tissue components, and/or to collide with oxygen producing $^1O_2$. Thus $^1O_2$ phosphorescence may be used to predict phototoxicity.

Results: We used St. John's Wort herb and commercial materials and observed intense $^1O_2$ phosphorescence in extracts from all products caused by hypericin, a known phototoxin. Many herbal components may show photosensitization under specific conditions. We found curcumin and berberine to be good examples of mild photosensitizers in a non-aqueous environment. Curcumin is derived from *Curcuma longa* whose powdered root, turmeric, is utilised as spice. Upon irradiation curcumin and turmeric extract produced $^1O_2$ with a quantum yield of 10%. Berberine is an akaloid from Goldenseal, a herb used in eyewash preparations and skin lotions. Berberine showed photosensitization (quantum yield, 4%) that was preserved in a crude herbal extract from Goldenseal herb.

Conclusions: Our data show that $^1O_2$ phosphorescence can be used to easily detect photoactivity exerted by (unknown) herbal photosensitizers in crude herbal mixtures.

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Trans-resveratrol chemopreventive properties are associated with inhibition of activation of iκb kinase

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Objective: Increasing evidence indicates that dietary constituents can suppress the onset or progression of certain human diseases. In particular, *trans*-resveratrol, a phytoalexin found in grapes and grape products has been shown to function by blocking inflammation and oncogenesis in certain animal models. *trans*-Resveratrol has been shown to have anti-oxidant properties as well as anti-proliferative properties of some cancer cells *in vitro and in-vivo*. Since the transcription factor-kappa B (NF-κB) is involved in inflammatory diseases and in oncogenesis, we tested whether *trans*-resveratrol can modulate NF-κB activity.

Design: All experiments were *in-vitro* analysis. For NF-κB DNA binding, NF-κB dependent gene transcription and kinase assay experiments, we used two macrophage/monocyctic cell lines, THP-1 and U937, both of which are well characterised regarding activation of NF-κB. The oncogenic model of initiation used was an isopropyl-β-D-thiogalactopyranoside (IPTG)–inducible oncogenic H-RasV12 allele stably integrated in the Rat-1 cell line. In this model inhibition of NF-κB following IPTG-induction of H-RasV12 led to apoptosis, whereas activation of H-RasV12 when NF-κB was active led to a transformed phenotype.

Results: *trans*-Resveratrol is a potent inhibitor of NF-κB activation and NF-κB dependent gene expression through its ability to inhibit IκB kinase (IKK) activity, the key regulatory component in NF-κB activation. Relative to cancer chemopreventive properties, *trans*-resveratrol enhanced apoptosis in Rat-1 fibroblasts undergoing transformation following the induced expression of oncogenic H-Ras.

Conclusions: Thus, *trans*-resveratrol is likely to function by inhibiting inflammatory and oncogenic diseases, at least partly, through the inhibition of NF-κB activation by blocking IκB-α degradation. Thus, the data may explain aspects of the so-called "*French paradox*" and may provide a significant and clinically relevant role of this potent chemopreventive compound in blocking the initiation of oncogenesis.

Effect(s) of Chinese herbal remedies on normal and carcinoma cell lines in vitro

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Objective: To Investigate the Effect(s) of 5 Chinese Herbal Remedies on Normal and Carcinoma Cell Lines in Vitro.

Design: Human embryonic intestinal cells (Int407) and human colon adenocarcinoma cells (Caco-2) were exposed to normal doses of 5 Chinese herbal remedies: Cordyceps sinensis; Radix angelicae sinensis; Ganoderma lucidum; Panax pseudo-ginseng; and Polygonum multiforum. Controls were also set up.

Exposure times were 24 h, 48 h and 72 h. Following exposures, cell viability/proliferation assays, 3-(4,5-dimethythiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and adenosine triphosphate (ATP) were carried out and percentage viability determined.

Results: The MTT test showed the remedies to be cytotoxic to Int407 cells, however the degree of cytotoxicity was markedly variable. For example, C. sinensis reduced percentage viability by 90% but P. multiforum reduced percentage viability by not more than 22%. For the ATP assays, the remedies exhibited some degree of cytotoxicity, however these effects varied between remedies and exposure times. In addition, the decreases in percentage viability were not as marked as those for the MTT test. For the Caco-2 cells, with the exception of A. sinensis, which had no effect on percentage viability at all exposure times, the remedies were shown to be cytotoxic using the MTT test; In contrast, the ATP assays showed the remedies to be

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stimulatory in action with percentage viability for Caco-2 cells exposed to the herbal remedies ranging from 100 to 300%.

Conclusion: Overall, this study suggests that the remedies have both cytotoxic and stimulatory effects, and that these effects vary with the cells and viability/proliferation tests used.

Dietitians' attitudes and understanding about complementary therapies affects counselling on these therapies

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Objective: Dietitians' knowledge and attitude about complementary therapies (CT) was assessed to determine whether continuing education programs, as well as inclusion of CT in dietetic didactic programs, is needed to prepare dietitians to counsel clients who follow these regimens.

Design: A questionnaire was sent to selected dietitians to assess their understanding, attitude and ability to counsel on CT.

Setting/subjects: Five hundred dietitians who primarily practice individual client counselling were randomly selected from the American Dietetic Association's membership.

Results: Fifty percent of the surveys were returned and deemed valid. A multiple regression analysis indicated that understanding was a significant predictor of ability to counsel on CT ($p = 0.000$); however, attitude was not a significant predictor on ability to counsel on these therapies ($p = 0.230$). Bloom's taxonomy of education objectives in the cognitive domain supports the finding that understanding affects ability to advise clients on CT.

Conclusion: The dietetic profession needs to develop didactic and continuing education programs that will provide a fundamental level of understanding about CT to prepare dietitians to evaluate these therapies. Dietitians' inability to address clients requests for information on CT will diminish their effectiveness as nutrition counsellors. Currently the profession lacks practice protocols and curriculum guidelines on CT.

High concentrations of dietary genistein may have an adverse effect on tumor outcome in erαko mouse cancer models

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The underlying molecular mechanisms of soy's cancer protective effects are not characterised. It is important to identify potential toxic effects of soy phytonutrients before accurate dietary recommendations can be made. In two separate and independent cancer models using the ERαKO mouse, dietary genistein appears to promote an increase in the severity of induced tumours by enhancing dedifferentiation of transformed cells. The first model was designed to examine the effect of genistein on DMBA-induced mammary tumour development in estrogen receptor-alpha knockout (ERαKO) mice. The design was a 2×2 factorial with wild type (ERαWT) and ERαKO mice fed a casein-based diet with or without genistein. Diets were fed *ad libitum* from weaning. Mammary tumours were induced by oral dosing of DMBA (1 mg/dose) at 9, 10, 12 and 13 weeks of age. Tumours of several classifications developed in 85% of ERαWT and 0% of ERαKO mice. No statistically significant differences in tumour number, weight, or latency were observed. Tumours from mice fed dietary genistein were less differentiated than those of control mice. The second is a prostate cancer model designed to study the molecular mechanistic effects of genistein on

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tumour progression. ERαKO mice were crossed to the TRAMP (TRansgenic Adenocarcinoma of the Mouse Prostate) mouse with male weanling ERαWT and ERαKO offspring given the same diets described in the first model. Preliminary gross examination in this model also suggests that high concentrations of dietary genistein in the ERαWT mice promote dedifferentiation of transformed prostatic epithelium. This suggests ERα may have a role in this change. In both models, genistein also reduces body weight gain in ERαWT and ERαKO mice, suggesting and ERα independent mechanism for this effect. The results of these studies prompt more detailed research and understanding of the potential mechanisms involved in the observed adverse effects.

Harvesting medicinal herb research: the challenge of information literacy in phytomedicinals

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Researching the efficacy and safety of medicinal herbs is challenging. Culling the scientific literature for reliable research level information can be exasperating. As researchers and clinicians become increasingly information literate, the limitations in identifying and locating citations become more apparent. Compared to other science disciplines that have specific in-depth indices to their literature (e.g., Chemical Abstracts or Medline) and well-developed controlled vocabularies, the citations to medicinal herbal research are spread across the indices of many disciplines and include little standardised terminology.

This quest for inclusive knowledge is a challenge reaching across all levels of searchers. Scientists need to conduct thorough literature reviews for information that is pertinent to their inquiries. Clinicians and health educators require wisdom at levels appropriate to both answer their professional needs and to distribute to their patients or clients.

The general population expects to be able to find reliable information that is appropriate to their knowledge level in order to supplement the information provided by their healthcare professionals.

This poster will present an overview of strategies for searching the scientific literature, suggest indices that include both citations to medicinal herb research and are easy to access, and suggest specific data to be included in publications in order to facilitate retrieval by other searchers.

Educating professionals and the public about herbs using CD-ROMs

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The American public is using herbals and botanicals in unprecedented amounts. This is of concern to many health professionals who may also be uninformed about herbs and botanicals and the efficacious use of these products. Three CD-ROMs on herbs and botanicals have been researched and developed by the Oregon Health Sciences University and Veterans Affairs Medical Center (OHSU/VAMC) Dietetic Internship Program. "To Herb or Not to Herb? A Guide to Over-the-Counter Herbals and Botanicals" focuses on 31 herbal products readily available without a prescription in pharmacies and health food stores. "The World According to Herbs: Culinary and Medicinal Uses" discusses 46 herbs that are commonly used in food preparation, but are also advocated by herbalists for their medicinal benefits. The third CD-ROM entitled "Herb & Drug Interactions…What You Need To Know", focuses on interactions of herbs with both prescription and non-prescription drugs. Each CD-ROM is designed to allow quick access to information on a variety of commonly used herbals and botanicals. The information is valuable to health professionals, information centers, and the lay public seeking personal information about a particular herb. Information on each CD-ROM is available through the dietetic internship program at (www.ohsu.edu/som-dietetic/nutr_frame.html) or via email at (dietetic@ohsu.edu).

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In vivo study of a herbal medicine by lc/ms/ms

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Keywords: LC/MS/MS, Herbal medicine, Cardiac glycosides.

Objectives: An HPLC/MS/MS method has been developed for characterisation and quantification of the cardiac glycosides oleandrin, odoroside, neritaloside and the aglycone oleandrigenin, all contained in an extract of Nerium oleander L (Anvirzel™).

Experimental: QqTOF instrument used in current investigation was a prototype constructed from a PE-Sciex API 365 platform with an orthogonally oriented TOF mass analyser substituted for quadrupole 3. All acquisitions were obtained using a PE-Sciex API 3000 triple-stage quadrupole mass spectrometer for quantitative analysis.

Results: The qualitative analysis of such extracts was achieved using a hybrid tandem quadrupole time-of-flight mass spectrometer. Target analyte fragmentation pathways were readily characterised by the measurement of product ions with a mass accuracy <5 ppm; all CID mass spectra were measured at resolutions in excess of 8,000 (FWHM). Preliminary pharmacokinetic evaluations of compound half-lives after an intramuscular injection of Anvirzel™ in a human were investigated. The limit of quantitation for oleandrin is 20 pg; the dynamic range for oleander quantitation is 1 ng/mL to 10 μg/mL. A plasma concentration-time profile for oleandrin from a cancer patient who had been administered a therapeutic dose of Anvirzel™ was determined. The half-life for neritaloside, oleandrigenin and odoroside are approximately 4 h, while the half-life for oleandrin appears to be much longer.

Conclusion: The present results demonstrate specificity and sensitivity of hybrid tandem quadrupole time-of-flight and triple stage quadrupole mass spectrometers coupled with HPLC and their application to herbal medicine pharmacology. The present study can provide important pharmacokinetic information that may be of relevance in helping to elucidate which components are the possible active ingredients within the herbal medicine.

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Effect of ginseng on endurance exercise and oxidative metabolism in LA/Ntul rats

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Although ginseng has been used for many years as a dietary supplement to increase energy and stamina, specific effects of ginseng on metabolism and physiologic performance have not been fully clarified. To determine the effects of gensing on exercise performance, groups of sedentary young adult congenic lean virgin female LA/Ntul rats were administered gensing, chelated magnesium + potassum glycinate, or a combination of the two ergogenic compounds p.o. via gavage for three consecutive days, followed by a swim to onset of fatigue under controlled conditions (water temp 30°C, 12 inches depth) exactly two hours after the last treatment. Bloods were obtained before and immediately after exercise for determination of blood glucose, lactate, and magnesium concentrations. At the end of the study, diaphragm, digitorum longus, and auricular appendage muscle excised for determination of glucose oxidation to CO2. Body weights of animals remained constant during the experimental treatments. Both ginseng and Magnesium + potassium glycinate improved the duration of swim time to fatigue when compared to a similar group of animals that had received equal volumes of water. The combination of Ginseng and magnesium-potassium glycinate further enhanced the duration of swim time to fatigue, and improved glycolytic flux and glucose utilisation modestly. These observations are consistent with an ergogenic potentiation of magnesium actions with ginseng, and suggest that the enhanced ergogenic effects of ginseng may be secondary to improved peripheral glucose utilisation in otherwise sedentary rats.

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