THE EFFICACY AND SAFETY OF TRADITIONAL PLANT MEDICINES

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THE EFFICACY AND SAFETY OF TRADITIONAL PLANT MEDICINES

Introduction

There has been a growing body of evidence and research, which validates the efficacy and safety of employing traditional knowledge based approaches to health sustenance and healing, with a particular emphases on the employment of plant medicines in the prevention and treatment of human disease, disorders and injuries. This comes as no surprise since the experiential knowledge base of plant medicine usage has been progressively improving in varied cultures over many centuries, and has well proven its worth. Indeed, recent scientific discoveries about the richness and intricate design of the human mind-body complex represent an affirmation of the underlying holistic philosophy of more simple *nature-based* approaches to health sustenance and healing. Such discoveries also point to the limitations of conventional approaches to health care, especially efforts to deal forcefully and invasively with the delicately balanced/inter-dependent human body-mind complex, which consists of as many as 100 trillion cells.

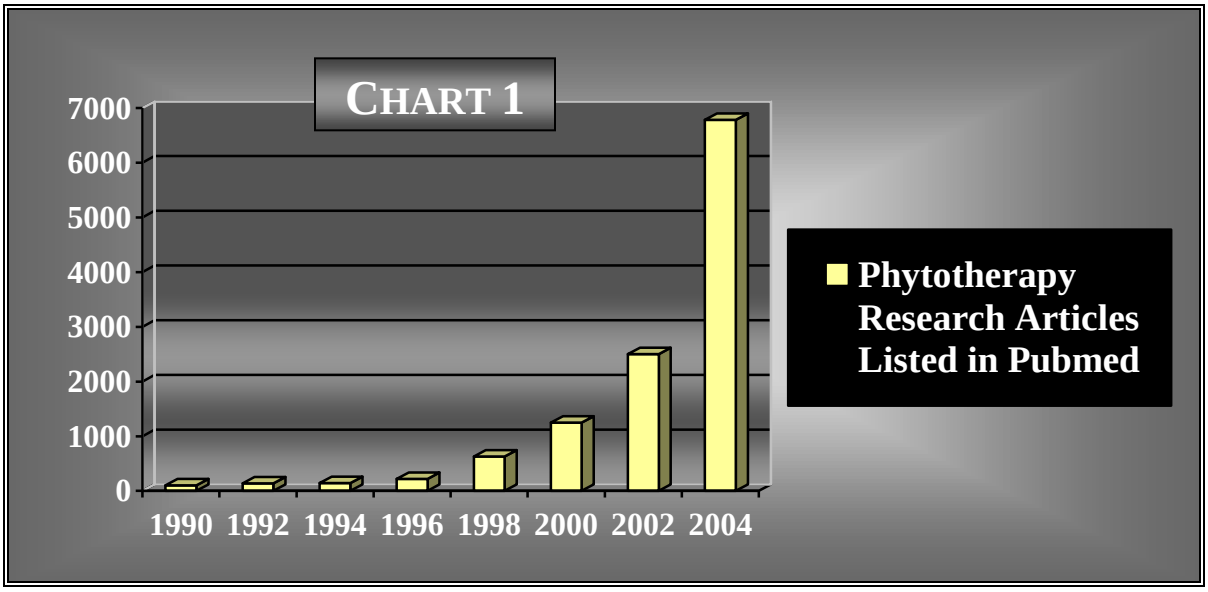
To effect genuine healing it is vital to incorporate a multi-factorial health restoration model that seeks equilibrium between mind, body and the environment, and places a greater emphasis on the multiple causes of health than on simply palliating the symptoms of pathology. It is also important to employ a philosophy which perceives that certain types of disease processes serve an intelligent purpose in balancing and cleansing the natural world including the human body. With this ecological perspective on health and disease, the healer's focus is shifted toward addressing primary underlying or environmental causes of illness, and not the simple suppression of outward symptoms.

Since plant medicine usage has developed in diverse regions and is contextual to varied cultures, of necessity it has been dynamically adaptive to differing natural and social environments. We thus find that there is no simple or uniform approach to its evaluation. Moreover, requirements and methods to research and evaluate the safety and efficacy of plant medicines are actually far more complex than are those for conventional pharmaceuticals.

A single medicinal plant may contain hundreds of natural constituents, and a mixed herbal medicinal product may contain several times that number. For example, common Juniper, called "*boughs of the supernatural*" as translated from the Gitskan language, has been used widely by Aboriginal peoples in both western and eastern Canada as a traditional treatment for a wide range of health conditions, including a variety of infections. Juniper "berries" and other parts of the plant, include inter alia: umbelliferone; camphene; camphor; myrcene; delta-3-carene; alpha-pinene and limonene; rutin; borneol; citronellol; and umbelliferone. These compounds exhibit diverse activities, including: antiseptic; bactericidal; fungicidal; antiviral; analgesic; anesthetic; antihistaminic; anti-inflammatory;

expectorant; antitussive; spasmolytic, spasmogenic; sedative; antiedemic; antidiabetic; anticancer and cancer preventative; antiatherogenic; liver protection; and fever reduction. [1]

The amount of scientific research that is being undertaken on phytotherapy, defined as: the use of plants or plant extracts for medicinal purposes, has being growing at a phenomenal rate (see **Chart 1** below). [2] The increased knowledge of plant medicine efficacy and safety that is being generated by this research – though at times methodologically flawed – betokens significant hope for strengthening the future usage of traditional plant medicines by Indigenous peoples and the human family at large.



The Major Shift to Synthetic Drugs

In the year 1806 Freidrich Serturner managed to isolate an organic alkaloid compound from the the opium poppy and called it morphine, making it the first isolate drug in recorded history. [3] In the ensuing decades withering digoxin and other glycosides and alkaloids were synthesized and a new drug era emerged. By the mid 20th century most companies engaged in drug discovery and manufacture had already made a major shift away from whole (bio-chemically complex) botanical medicines - which actually extended back from time immemorial - to single chemical entity compounds that could be synthesized in a laboratory. This change has led to today's major emphases on synthetic drugs (75% of the modern pharmacopoeia) and stems primarily from the fact that such agents are far easier to patent, which ensures greater profitability for drug companies.

The development of modern drugs that are still being derived from plant sources is also patent driven, which translates into drug manufacturers seeking to find, isolate and usually synthesize a particular active ingredient to the exclusion of all other properties, rather than studying or employing the beneficial medicinal elements of whole plants. The idea that a given herb contains a sole or primary active ingredient is unsound since the dozens (sometimes hundreds) of constituents normatively provide diverse benefits. Some constituents aid in neutralizing toxicity,

others may increase bioavailability, while others synergistically enhance and complement therapeutic efficacy. Indeed, the conventional approach to drug development carries an unfavorable cost to society, for allopathic drugs due to their high concentration of a single active ingredient - in virtually all cases - carry a toxicological burden, which may or may not be readily apparent to the recipient.

Applying Conventional Drug Testing to Plant Medicines

To this day the majority of western trained drug researchers, pharmacists and physicians cling to the position that before traditional plant medicines can be employed in public health care systems there must first be extensive laboratory and/or clinical testing of each medicine, followed by scientific consensus on safety and efficacy, and official governmental approval. Since the time and resources required to isolate and test all of the active ingredients in any given medicinal plant is impracticable to the point of being prohibitive, the rule is that a pre-selected biochemical ingredient or two will be employed for testing in isolation of all others. However, there are some basic reasons why this conventional drug research and development methodology is flawed. When any one active ingredient is extracted, concentrated and prescribed it will usually manifest in the recipient toxicological and unwanted adverse reactions.

With the exception of a comparatively small number of patently toxic plants, complementary and neutralizing substances as found in whole plants generally serve to mitigate and/or eliminate any toxicological effects of the identified active ingredients. This conventional methodology of identifying, extracting, and purifying active alkaloids or other substances from plant medicines thus represents a bungled attempt by science to try and improve upon the infinitely wise design embodied in the original creation. Moreover, as has already been pointed out, in taking this approach one forfeits by default the synergistic therapeutic impact that is available in whole medicinal plants. One example of this synergism is that St. John's wort does not elicit an antidepressant effect in the absence of the relatively inactive flavonoid rutin as found in the whole plant. This approach also precludes the common traditional medicine practice of intelligently blending selected plant medicines in order to strengthen therapeutic efficacy in a chosen course of treatment. In recent years conventional medicine has recognized that the single magic bullet approach is not optimal for it now employs “cocktail” approaches when prescribing drugs for conditions such as AIDS, cancer, hypertension, and diabetes.

It is important to differentiate between traditional and modern drug investigation and approval processes. Traditionally indigenous peoples by a process of trial and error over decades and centuries engaged in the experimental testing of plant medicines with a primary motivation to heal the sick or wounded, end suffering, and not make anybody rich. This efficacy and safety knowledge was progressively cumulative, and was passed down over the generations. Some oral traditions and legends speak of supernaturally derived instructions imparted by the Creator, or spirit intelligences which linked the use of specific remedies with various illnesses or conditions (e.g. wounds, factures or burns.). Lessons learned in the multi-step detoxification food processing of cassava, acorns, chestnuts and other foods with some toxicity were experimentally applied to those plant medicines which exhibited toxicity.

The conventional drug research and development process of in vitro blind screening of compounds or chemical substances that have never been used in human activity generally bears

little or no relevance to human use. The employment of animal experimentation models to establish efficacy and safety represents a very inhumane (non-traditional) process which is primarily motivated by a primary goal to create an economic blockbuster. Such drugs although eventually approved for marketing at great cost (including the inflicted suffering of animals) are often withdrawn due to problems with human usage. An added albeit important consideration is the considerable time and enormous financial costs involved to obtain approval for and to bring to market a new palliative or therapeutic drug. Capitalizing out-of-pocket costs to the point of obtaining marketing approval the average drug yields a pre-approval cost estimate of roughly US $800 million to a billion dollars. [4] An analysis carried out n the 1990s by a **Federal Trade Commission** analyst found that the drug approval process in the U.S. exceeds "what is socially optimal because the **FDA** [itself] is more adversely affected by approving harmful drugs than by denying approval of beneficial drugs". [5]

The fact that at minimal cost most plant medicines can be selectively grown in a garden, harvested in the wild, or sold freely over the counter is one of the primary reasons why **World Health Organization** supports the use of traditional plant medicines.

Unreliable and Biased Reporting on Plant Medicine Safety

Traditional medicines have been effectively used for thousands of years, while some Chinese traditional medicines actually date back more than 4,500 years. However, in the modern world for the most part botanical or plant medicines are poorly understood by the general public, pharmacists, conventional medical practitioners, and the media. Numerous medical publications including the *Canadian Medical Association Journal*, the *New England Journal of Medicine*, and *Lancet* seem to have a negative bias against herbal medicine articles since the overwhelming majority of their published articles in this area are highly critical or negative, while editors seem to selectively refuse to publish positive articles.

It is not uncommon to hear the generalized observation made that since medical science has done only minimal research on the efficacy and safety of most herbal medicines, it is not really wise or safe to use them. Furthermore, an inadequate working knowledge of traditional medicine practices - including phytochemistry based therapeutics - has frequently led to poor research designs. We thus find a number of studies and trial reports with faulty research conclusions and exaggerated criticisms. For example, information on the potential dangers of an isolated and concentrated active ingredient can be confused with the whole plant, which will likely prove to be non-toxic. This type of misinterpretation and misunderstanding gives rise to inaccurate data which often continues to be repeated even decades after an original research conclusion has been discredited, disproved, or demonstrated as meaningless.

An interesting case in point is found with the ongoing controversy surrounding comfrey, which has been used for many centuries to inter alia stop hemorrhages, and speed the healing of both wounds and fractures, [6] with excellent results. In recent years there has been a lot of publicity about the extreme dangers of Comfrey and some governments have actually made it illegal to sell this long used herb. For example on July 6, 2001 the U.S. **FDA** advised all dietary

supplement manufacturers to remove products containing comfrey from the market. So is comfrey in actuality a dangerous toxic plant that should be legally banned from human use? It turns out that the pyrrolizidine alkaloids (PAs) found in comfrey, (fresh roots contain about ten times the quantity of PAs than do fresh young leaves) can under certain conditions manifest liver toxicity.

It is widely acknowledged that virtually any substance will be biologically harmful, if taken inappropriately or in great enough quantities. For example, one study isolated and concentrated the Pas in comfrey, and injected them multiple times interperitoneally to 2-week-old rats over a period of seven (7) weeks, after which liver damage was observed. It was thus concluded that comfrey (and any other plants) which contain unsaturated pyrrolizidine alkaloids, will cause liver damage in humans. The amount of PAs that were injected into each newborn rat in that 7-week period was the equivalent of a rat the size of an adult human being ingesting of over 5,600 (young) comfrey leaves. [7] The idea of injecting high dosage herbal isolates of any kind into the bloodstream of a patient flies in the face of *Traditional Medicine* philosophy and practice. Moreover, isolating and concentrating virtually any phytochemical substance and unnaturally injecting it in high dosages into infant mammals for a protracted period is going to predictably cause some damage. Detractors not unreasonably point out that this kind of research is methodologically flawed and even meaningless when we compare it with how whole Comfrey is topically or in moderation orally employed therapeutically by humans.

Whole plants used sensibly by people cannot be compared with such artificially contrived excesses. Britain's **National Institute of Medical Herbalists** has gone on record to state that, "No man, woman, or child has been recorded as suffering toxic effects from taking recommended doses of Comfrey leaf… [alone] as medicine." Interestingly when the leaf is fully mature and dried, laboratory testing has shown a total absence of any PAs. [8] Experiments done in Sweden, showed that boiling herbs containing PAs in water for 20 minutes effectively neutralizes the alkaloids. [9]

In a landmark study published in Science, cancer authority Bruce Ames, Ph.D., chairman of the **Biochemistry Department** at the **University of California at Berkeley**, attempted to estimate the average person's lifetime cancer risk from exposure to hundreds of man-made and naturally occuring carcinogens. He estimated one cup of comfrey tea posed:

- About the same cancer risk as one peanut butter sandwich, which contains traces of the natural carcinogen aflatoxin.
- About one-third the risk of eating one raw mushroom, which contains traces of the natural carcinogen hydrazine.
- About half the risk of one diet soda containing saccharin.
- And about one-hundredth the risk of a standard beer or glass of wine, which contains the natural carcinogen ethyl alcohol. [10]

Another medicinal herb that has been posed by public health authorities as being dangerous is chaparral. Chaparral contains over 600 medicinally active ingredients some of which are extremely antimicrobial against both Gram positive and Gram negative bacteria. [11] It contains nor-dihydroguaretic acid which is a strong antioxidant and anti-cancer agent. It was widely used by Native Americans in the southwest for a diversity of conditions. Herbal industry surveys show that more than 200 tons were sold in the United States between 1970 and 1990, during which time there was not a single complaint of side effects arising from the use of this herb. In fact, very large doses resulted in lowered blood pressure and other health benefits. Coupled with this very positive safety history, **U.S. Food and Drug Administration** (**FDA**) chemists could not find any in-vitro or in-vivo evidence of liver toxicity being caused by chaparral use. However in the year 1992, three people who were using multiple tablets on a daily basis developed some liver problems that disappeared after they had ceased taking the tablets. As a result of these cases, the **FDA** issued a public warning that a "causal relationship" exists between chaparral and liver damage. It is quite possible that these tablets had a high concentration of nor-dihydroguaretic acid, and did not reflect whole plant usage. Furthermore, in light of vast usage of the plant by unnumbered people without any problems, the particular tablets being taken may have been contaminated. [12]

The root bark of sassafras contains the compound safrole, which is banned by the **FDA** for use in foods, along with sassafras itself. This ban was instituted in 1960, after small laboratory animals developed cancer when injected with large amounts of safrole. Small quantities of safrole are also found in black pepper, basil, cinnamon leaf, nutmeg, sage and witch hazel, but so far none of these herbs have come under fire. Research has subsequently shown that when people are given small doses of safrole, it clearly does not create any cancer-producing substances in the human body. This finding led the researchers to conclude that toxic reactions in humans may be quite different from that of mice or rats. [13]

Several reports have been published suggesting that echinacea may be hepatotoxic (damaging to the liver). However there is no valid evidence to back this conclusion. echinacea does contain very small amounts of pyrrolizidine alkaloids (PA's), some forms of which if isolated, concentrated and injected are apparent hepatotoxins. Unfortunately, researchers failed to differentiate between unsaturated PA's which (if concentrated) can be hepatotoxic in rat experiments, and the totally non-toxic saturated PA's that are found in echinacea. This is an easy error for the uninformed to make, but one that creates unnecessary fear and confusion. [14] It seems apparent that we have much more to learn about truly understanding and validly determining "herbal toxicity".

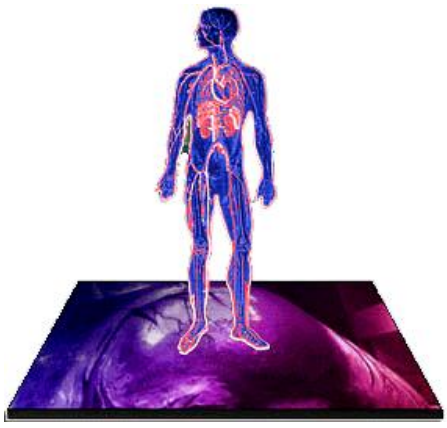
Working in concert with the **Federal Trade Commission** and the **Mexico–United States–Canada Health Fraud Working Group** the **U.S. FDA** recently issued warning letters to 23 different U.S. companies and two foreign entities marketing a range of natural products, most of which were plant medicines or plant medicine derived products, which the agency affirms are being "fraudulently" represented as either preventing or reversing cancer. The warning states that "*parties that fail to properly resolve violations cited in Warning Letters are subject to enforcement action up to and including seizure of illegal products, injunction, and possible criminal prosecution*." This process was of course widely publicized in major media outlets such as the **New York Times**. [15] Some years ago a friend who is a prominent figure in Ottawa,

advised me that he had developed a serious melanoma on his back which would require surgical intervention, and asked if I knew of any alternatives. I gave him the name of a naturopathic physician practicing in the Pacific Northwest who in turn prescribed one of the simple multi-herb treatment salves now placed on the just noted proscribed list of "fraudulent" cancer treatments. He used it as instructed, and to the amazement of his regular physician and interested hospital staff experienced total success in eliminating the cancer. I've been reliably informed of numerous other parallel successes in treating this type of cancer employing this product.

Additional Issues Surrounding Plant Medicine Safety

Quinine was first isolated and extracted from cinchona (Peruvian) bark in the year 1820. By the early 1900's it had become the preferred treatment for malaria. It only lasted as a potent treatment for malaria for about 50 years, for over time the parasite causing malaria became quinine-resistant. Today, it is more likely that a person will be prescribed quinine for leg cramps than for malaria. However, to this day there are no strains of malaria resistant to the whole cinchona bark, only to the isolated and concentrated quinine. Furthermore, unlike the stronger isolated drug, there are no known side-effects of cinchona bark when moderately prescribed. In contrast, a standard quinine prescription can cause life-threatening side-effects, including: uneven heart rhythm, weak pulse, fainting or collapse, fever, confusion, weakness, unusual muscle weakness, severe blistering, peeling, rashes, sore throat, fever, severe nausea, vomiting, stomach pain, diarrhea or hearing and vision problems. [16]

This and other examples demonstrate that whole botanical (plant) medicines contain natural checks and balances for their strong bio-chemical compounds. This includes built-in enzymes and protective chemistry that assist the human body in dealing constructively with the actions that they help to precipitate. Nonetheless, we are regularly warned about the dangers of herbs by a medical profession that is methodically trained in reductionistic concepts (also called atomism) and has learned both theoretically and experientially as they practice on their patients, of the dangers of allopathic drugs. Reductionism is the idea that the body can be reduced to its individual parts, with such parts being subject to adventitious (externally induced) manipulation. This is built on the idea that any action upon a particular organ or system in the body must be the action of the isolated drug or inert chemical substance, versus the intelligent vital reaction of the body itself to a foreign or introduced substance. [17]



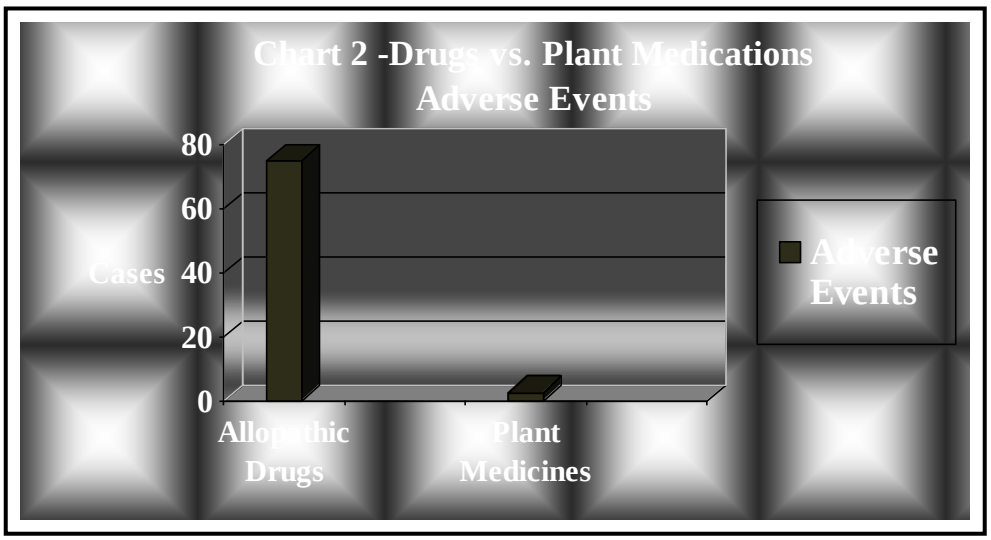
Traditional healers understood that the human mind-body complex is far more than simply the sum of its parts, but rather that it is an intimately integrated, dynamic and synergistic intelligence that learns, and has intelligently adapted to the natural world in many beneficial ways. This includes the capacity to recognize and intelligently use the symbiotic gifts of nature, including thousands of beneficial healing foods and plant medicines.

Since most physicians have little or no training in the use of plants as medicine, it is to be expected that they will tend to fear what they do not understand, and in turn to scorn what they fear. Furthermore, the doctrinal tenets of allopathy cause its practitioners to distrust or disbelieve in the remedial or regenerative potential of whole plant medicines, and due to their training and drug prescribing experience medical doctors tend to over-exaggerate their presumed dangers. For example, a doctor will advise his/her patient to never risk using any one of a number of harmless plant medicines, but to instead use baby Aspirin or Tylenol, which is in reality would likely be more dangerous.

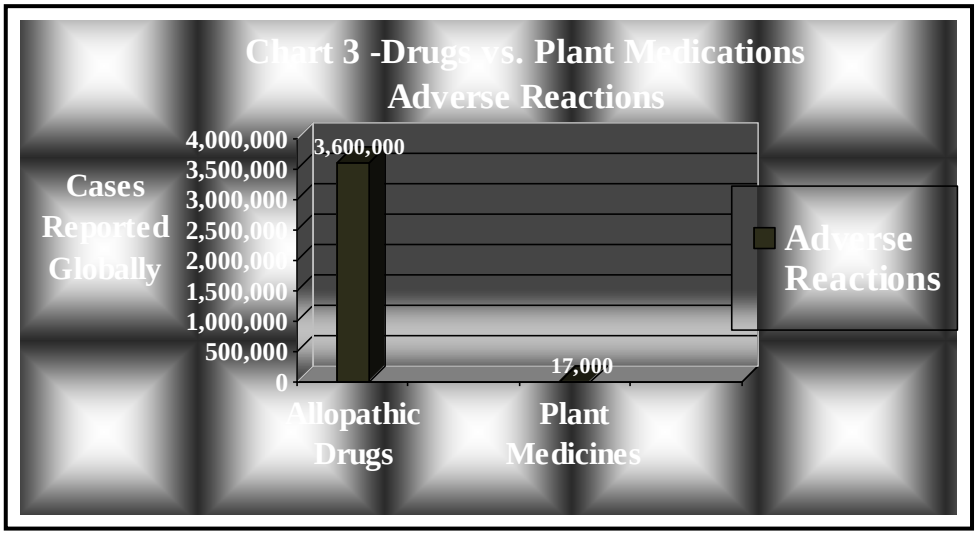
There is a notable difference between attempting to manipulate targeted body organs or systems employing isolated chemicals (drugs), and the *Traditional Medicine* model of benefiting the entire psycho-physiological system by using – orally or topically – whole plant foods and/or whole plant medicines, that inherently provide for the requisites of life and health. Healers (traditional and herbal) who use botanical medicines in their practice tell us that as humans have diverged more and more from nature they have become out of harmony with it and resistant to its aid. They indicate that when a whole food natural diet is adopted, the person becomes more easily and reliably healable with the appropriate plant medicines.

It has been observed that "the most dangerous herb still in use is far safer than the safest over-the-counter drug." In doing comparisons between herbal medicine and drug dangers it is reasonable to conclude that whole plant medicines are significantly safer even in a worse case scenario. For an average year, despite extensive usage (tens of millions of doses) plant medicine related mortality annually in North America totals of 5-6 people per year, and herbal medicines get abused all the time. [18]

Chart 2 below illustrates that out of 1,701 consecutive patients admitted over an eight month period to the **Prince of Wales Hospital** in Hong Kong, three (0.2%) had had adverse effects attributed to traditional Chinese plant medicines, and 75 (4.4%) to "Western" drug medications. [19] This represents a 25 times greater incidence of patients experiencing adverse events with the use of allopathic drugs.



The **World Health Organization Collaborating Centre for International Drug Monitoring** in Uppsala, Sweden is charged with monitoring adverse drug reactions globally with 80 participating national pharmocovigilance centres found in all world regions. Its mandate includes the monitoring of traditional plant medicines, a process that it refers to as "herbal pharmacovigilance". In the Year 2006 the Centre received over 3,600,000 Adverse Drug Reaction (ADR) reports. Of these there were just over 17,000 (0.5%) where a herbal drug is listed as being the suspected or interacting cause. [20] The data shows that the greatest problem in this 0.5% is from herb-drug interactions, which means it's not even possible to verify if an herb caused the adverse effect. Also, most effects recorded were minor in nature. Moreover, when herbs alone were clearly associated with adverse effects it was due to unintentional poisonings, by an individual plant and almost never herbal formulas. [21] Keeping in mind that plant medicines are actually used far more widely than allopathic drugs in most developing world countries, with many thousands of species being used for medicinal purposes, it is notable that the statistic reveal an over 200 times greater incidence of patients experiencing adverse events with the use of allopathic drugs. The comparative adverse reaction figures are illustrated below in **Chart 3**.



In all known cases where mortality can be reasonably attributed to whole herbal medicine usage this has occurred only when a poisonous plant has been unnecessarily used, or in the case of non-toxic plants (usually reduced to a marketable powdered form) there has been overuse of a manufactured product significantly contaminated with heavy metals, or where an unscrupulous manufacturer has intentionally mixed into the product one or more highly potent allopathic drugs.

If we take the year 1998, statistically about 100 people died in the U.S after ingesting common, ordinary nuts. In the same time period, despite millions of doses, less than 100 died after consuming an herb or herbal product, with more than 90 percent of these persons having intentionally engaged in either misuse or abusive usage. Research for the same year suggest that there were no deaths due to ingestion of an herbal product when employing a safe recommended dosage. [22] By comparison a report published within a few years in the Journal of the American

Medical Association (JAMA) confirmed an estimated death rate of 106,000 annually in the U.S. from non-error, adverse effects of allopathic medications. [23]

If we consider the broader picture, the levels of iatrogenic (physician related) mortality under conventional medical treatment regimes are actually far more severe than the death rate given in the just noted JAMA article. **Dalhousie University Medical School** graduate Carolyn Dean (MD) points out: "*In my book, Death by Modern Medicine, using the… medical industry's own official reports, I document how 784,000 people die every year in the American medical system while following doctors' orders in a highly-regulated allopathic system.* [On the other hand] *proof that dietary supplements and the practitioners who promote them are safe and work as expected is evidenced everywhere*." Dean's annual mortality estimate stems from: surgery and anesthesia complications; acknowledged drug adverse effects and drug induced diseases; prescribed drug overdoses and abuses; unnecessary procedures; all acts of documented malpractice including resultant infections, bedsores and malnutrition. [24]

Aside from what has already been suggested as a blanket prohibition in the medicinal use of known toxic plants, there remain some notable health risks related to the potential contamination and/or adulteration of the vastly larger number of non-toxic whole plant medicines. Contamination can occur due to environmental factors such as herbicides, pesticides, polluted waters and soils. Heavy metals such as lead, arsenic, mercury, and cadmium can be unintentionally introduced in the processes of manufacture, or in some traditions such as the Ayurvedic can be added as a presumed enhancement. A U.S. survey found about 20% of Ayurvedic medicines were thus adulterated. These were all produced in India in contrast with domestically produced products which were unadulterated. Furthermore, most formulas included metals as actual ingredients.

Adulteration with synthetic or prescription drugs has also been found when a manufacturer intentionally (without disclosure) adds these modern pharmaceuticals in order to render their product more "clinically effective", and thus more saleable. In a California study, 7% of marketed Chinese herbal products (from China, i.e. not those domestically produced) were found to have undeclared allopathic pharmaceuticals. [25] Herbicides, pesticides, microbes, mycotoxins, fungi, and insects can also cause contamination, in some cases due to post-harvest storage conditions. In consideration of these factors a number of herbal supplement companies in the western world have progressively put into place the capacity to monitor and test plant medicines and associated products for purposes of quality control and assurance of freedom from contaminants. [26]

Another concern is the issue of identity and quality verification of plant medicines. Since the chemical stability of these products is complex, it remains a challenge to determine expiration or shelf-life dating. Additionally the possibility exists for:

i misidentification at time of harvest because different plants may have a very similar appearance;

ii accidental or intentional product mislabeling; and

iii notable variance in quality and efficacy due to the same type of plant medicine coming from varying sources. Multiple factors may come into play to cause this variance such as:

- climatologic conditions;
- soil quality;
- timing of harvest;
- storage conditions;
- methods of processing; and
- different parts of a plant are used when preparing the final product. [27]

International Support for and Experience with Plant Medicines

In going back several decades to the historic Alma Ata Conference on Primary Health Care (1978) we find pragmatic approval given at a political level by most nations of the world, to the recommendation that essential drugs and biologicals be locally produced and distributed *"at the lowest feasible cost".* In concert with this recommendation, the Conference recognized the need to curb the growing over-dependency on medical drugs. It was further affirmed that *"proved traditional remedies be incorporated in primary health care, including the establishment of effective 'supply systems'".* [29] The importance of local servicing of medical need is recognized in the *Alma-Ata Declaration*'s recommendation on drugs, partly in the provisions on local manufacture and use of *"indigenous remedies".* [29]

From within the **World Health Organization**, Bannerman subsequently played a vital leadership role in spearheading a renewed recognition of *"well known and tested plant medicines in primary health care".* During his tenure he was pleased to observe a growing interest on the part of Developing World governmental and research institutions in Africa, Asia, and Latin America with respect to the possibilities of further developing and re-utilizing their own traditional medicinal plant resources. He forcibly argued that:

> *Medicinal plants are generally locally available and relatively cheap, and there is every virtue in exploiting such local and traditional remedies when they have been tested and proven to be non-toxic, safe, inexpensive and culturally acceptable to the community... There are many records of traditional therapies employing herbal medicines that are said to be effective against common ailments and usually without any side-effects....*

As well, Bannerman advocated that community health workers should be afforded with a working knowledge of the therapeutic value of local medicinal plants, including their identification, cultivation, collection, preparation, and therapeutic application. He maintained

that provisions for such training and practice represent a fundamental strategy in the strengthening of local and community self-reliance in health care. [30]

Since a significant number of plant medicines have been used successfully for centuries, and in some cases millennia, where there has been a long and established history of efficacy, no apparent adverse side effects, and social acceptance, the only common sense response is to fully permit and encourage continued usage. Some researchers have forcefully maintained that the endorsement of and reliance upon traditional plant medicines in indigenous communities especially in the underdeveloped regions of the world, cannot and should not be made conditional upon the full assemblage and weighing of "chemical, pharmacological, clinical and toxicological evidence", as such requirements "would be untenable". This is particularly true in poorer communities and regions where conventional therapies may be inaccessible, unpayable or socio-culturally unacceptable". Consequently, the most practical course recommended, as a means of attaining more immediate health care improvements is to conduct simple assays on a series of traditional plant medicines, rather than undertake costly and detailed chemical, clinical and toxicological studies of each and every particular medicine. [31] As an added and important point, throughout the world such simple assays, as well as some very sophisticated pharmacological and clinical studies, already exist on a number of traditional plant medicines, with the former primarily found in the bio-ethnographic, and the latter in the bio-science literature.

In my own experience, while conducting a primary health care evaluation mission in Northeast Thailand, in the company of **UNICEF** officer Dr. Supote Prasertsri, I visited the **Reanunakorn District Health Centre** to examine its experimental traditional plant medicine program. Program Director Pradit Tongyus, who also then directed the Center's health, mental health, nutrition and sanitation services, explained why he was inspired to establish the program. His son had previously developed a serious urinary infection which failed to respond to regular antibiotic treatments throughout 10 days of hospitalization. Upon turning to the use of a known local plant medicine, virtually all symptoms of infection subsided within a 10 hour period. He went on to describe various local plant medicines which had proven to be non-toxic and highly efficacious in the remediation of a wide range of conditions such as: burns; herpes simplex; snake and scorpion bites, kidney stones, ulcers, and high blood pressure. Indeed, such reputable attestations exist worldwide, and only await honest inquiry and further clinical confirmation.

In the year 2001 the **World Health Organization** issued a report on the legal status of traditional and complementary medicine worldwide. In this report it observed that:

Traditional and complementary/alternative medicine has demonstrated efficacy in areas such as mental health, disease prevention, treatment of non-communicable diseases, and improvement of the quality of life for persons living with chronic diseases as well as for the ageing population. Although further research, clinical trials, and evaluations are needed, traditional and

complementary/alternative medicine has shown great potential to meet a broad spectrum of health care needs. [32]

In reality, this **WHO** appraisal is both modest and conservative, for a significant body of research has in fact shown that *Traditional Medicine* has proven itself experientially in managing and in some cases reversing a variety of life threatening disease conditions, whether degenerative or infectious.

We will now consider a few selected plant medicines and blended formulations for which documented evidence of efficacy exists. However, before proceeding with the examination of some modern research-based evidence, there does exist in historical reports a large number of case history reports on the efficacy of various plant medicines. For example, in the year 1910 a medical doctor authored a book highlighting numerous well documented case histories of the use of Echinacea in effectively treating venomous bites. Out of several dozen cases involving (some potentially fatal) copperhead, cotton mouth (water moccasin), rattlesnake, centipede and poison spider bites, two will be shared.

i In Florida, a young boy, bitten by a large rattlesnake, suffered for twelve hours before a physician reached him. The infected leg was black, far above the knee, and into the thigh, the foot swollen nearly to bursting of the skin, and seemingly gangrenous at the point of the wound. The physician immediately bandaged the leg and foot with cotton, saturated it with echinacea, and directed that the bandage over the entire surface be kept continually moist with the medicine. Internally, he gave half a teaspoonful of the echinacea, in water, every thirty minutes. Within a short time, the effects became apparent. The color disappeared progressively downward, the swelling abated, and within a reasonable period after onset of treatment, the child was able to walk.

ii In Texas a three year old child, was bitten by a copperhead snake on the leg, just above and in front of ankle. A physician arrived in two hours finding the child crying in pain with the entire foot and leg extremely swollen, and the muscles corded (visibly ribbed). An incision was made of the wound and echinacea was applied being freely soaked into a cotton bandage. Echinacea was additionally administered internally. The treatment began at about 7 in the evening, and by the next day the child was fully recovered and able to walk about. Within three days all symptoms of the venomous bite had subsided. [33]

The traditional medicinal use of *Artemisia annua* (a variety of wormwood) for malaria was lost over time but rediscovered during an archaeological dig in the 1970s that unearthed recipes for ancient medical remedies. Taking vital clues from scientific analyses of its traditional use, experimenters at the **University of Washington** (Seattle, USA) have found that this non-toxic

plant causes rapid, as well as extensive death of cancer cells in both in vitro, and in vivo trials such as retarding fibrosarcoma tumours implanted in animals. In one study, researchers exposed human leukemia cells and white blood cells to an artemisinin compound. While the leukemia cells quickly died, the white blood cells remained essentially unharmed. In an early animal experiment, a dog with bone cancer so severe it couldn't walk made a complete recovery in five days after receiving the treatment. In fact cancer patients from throughout the world are today using this low-cost, highly safe and exceptional cancer-fighting plant, many under the supervision of physicians, with numerous life-saving results. Nonetheless, its potential usage as an approved cancer treatment in North America still remains many years away. [34]

A Nonrandomized, nonplacebo controlled, observational study was conducted to determine the effectiveness of traditional herbal treatments used for *herpes zoster* (HZ) by a great number of people living with acquired immunodeficiency syndrome in Uganda. Inclusion criteria included HIV seropositivity and a recent HZ attack. In the first segment of a longer study, a total of 104 patients were enrolled, treated, and followed for up to three (3) months with 52 being treated at three traditional healers' clinics, and another 52 patients (serving as a comparison control group) treated with the synthetic drug acyclovir (Zovirax) at an allopathic TASO Clinic. The results were that traditional healer patients and the controls experienced similar rates of resolution of their HZ attacks. However, significantly fewer traditional healer patients than controls experienced super-infection (18% versus 42%). Furthermore, fewer traditional healer patients experienced scar formation (with less statistical significance). Lastly, zoster-associated pain was resolved substantially faster among traditional healer patients. [35]

PROMETRA (Association for the Promotion of Traditional Medicine, Dakar, Senegal) reported on a clinical study on three cohorts of AIDS cases (62 persons) who were treated with METRAFAIDS, a proprietary blend of five (5) African traditional plant medicines, for six (6) month intervals between 1999 to 2002 at the **Experimental Center for Traditional Medicine** in Fatick, Senegal under the supervision of traditional healers and a physician (MD). Previous treatment with pharmaceutical preparations was an exclusion criterion. Admission history and weekly physical examinations provided serial determinations of opportunistic infections and symptoms. Under treatment over half of the patient population (54%) experienced a viral load decrease exceeding 66%. The treatment also improved the status of opportunistic infections, dermatosis, weight, and clinical symptoms in 85% of the patients treated. There were no observed or documented adverse reactions throughout the study. [36] Another report was issued in 2004 on a METRAFAIDS phase II efficacy study on PLWAs (People Living With AIDS). The study took place over six months and was double blind, randomized, parallel group, and placebo controlled. Comparisons with laboratory analyses done at baseline showed, on average (based on two months of treatment), increases in CD4 cell counts of 199%, decreases in viral loads of 79% and patient weight gain by an average of 23%. [37]

A traditional medicine blend of two (2) plants was employed to treat 268 AIDS patients in the Democratic Republic of the Congo, all of which had a CD4 count below 450 and at least one opportunistic infection, for 180 days. In 95% of participants, fever was reduced within five days and diarrhea cured within 10 days; 76% gained weight; and 75% had CD4 counts increased by up to 400%. Viral loads were also significantly decreased. [38] By way of comparison, it's worth noting that in August, 2006 The Lancet, carried a landmark report on *Highly Active Anti-retroviral Therapy* (HAART) treatment on 20,000 AIDS patients over an eight year period at 12 different locations in Europe and North America. The treatment led to no significant improvements in early immunological response, no reduction in all-cause mortality, and a significant increase in combined AIDS/AIDS-related death risk in more recent years. The drugs employed in HAART have been linked to cardiovascular diseases; liver and kidney failures; osteoporosis; thyroid dysfunctions; neuropathy; Parkinson's disease; and non AIDS-specific classes of cancer. [39]

Multiple Dimensions Required for Clinical Research on Traditional Plant Medicines

Although the "gold standard" of randomized controlled trials have an important place in measuring the efficacy of traditional plant medicines, they generally focus on only one, limited, question, namely whether a tested therapy has a statistical effect on a particular disease condition. Efficacy and safety research trials need to more fully examine all of the factors as to why particular intervention(s) work or do not work, which can include how participants experience the treatment(s), and what meaning they give to these clinical experiences, including the role played by their unique beliefs and individual outcome expectations. Such broader research could also aid in understanding the impacts of the context and the process of the intervention. Using this approach when assessing traditional medicine interventions would help to ensure that more socially and culturally appropriate outcome measures are used. Both evidence and common sense suggest that the incorporation of qualitative research methods in the design and execution of controlled trials could aid researchers in better understanding the value and potential of traditional therapies and interventions [40]

David Winston who has been in herbal clinical practice for over 28 years and is a consultant on plant medicines to many physicians and other healthcare professionals throughout the North America observes that:

> *In addition to controlled double-blind trials and meta-analysis, less definitive but still valuable are well-designed unblinded trials, small uncontrolled clinical trials, population (epidemiological) studies, as well as some animal and phytochemical studies…. Additional information often ignored by academicians [are] traditional herb use, ethnobotanical use, and practical clinical experience [all of which] are extremely valuable tools that stand as the basic foundation of good herbal practice.*
>
> *When you find three disparate groups of people using the same herb or closely related species for the exact same use you can be fairly certain that it does indeed have the stated effect. A good example would be Coptis, used as an effective antibacterial and antifungal agent by Native Americans, Northern Europeans, and the Chinese… Keen observers of their world native people used what worked… Modern research has now confirmed the usefulness and safety of what*

has been used as primary medical care by much of the world's population... All of this data is valuable and, along with personal clinical experience, gives the individual clinician a strong understanding of the appropriate, safe, and effective use of a herb or herbal protocol. [41]

In Aboriginal traditions throughout North America the employment of plant medicines in treating disease or injuries was invariably complemented by prayers, ceremonies, and songs, with the extended family and community involved in the healing process. When the medicines are harvested, prayers were offered to the Creator for providing the medicine and also to obtain His favor and blessings upon its usage. In addition to herbal treatments, other therapeutic methods and practices were traditionally practiced such as sweat baths, fasting, massage and special diets, the use of enemas, hydrotherapy, as well as mud, clay and charcoal poultices. [42] All of these added dimensions need to be considered when evaluating the efficacy and potential impact of traditional medicine as a system of healing.

Another practical consideration is that, most modern practitioners who employ plant medicines prescribe such treatment in conjunction with recommending key dietary and lifestyle modifications including areas such as stress reduction and exercise, etc. In this case, while an herbal medicine used on its own may or may not reach a conventional medical threshold of clinical significance, when it is used synergistically with these other measures the treatment program will very likely reach a level of significance that leads to independence from reliance on the herbal medicine once complete healing or recovery has occurred. This model stands in stark contrast with the life-long dependence that patients almost invariably experience with the conventional medications employed in "managed care".

Cost Effectiveness of Traditional Medicine Systems

Evidence suggests that nature-derived approaches to healing are not only therapeutically effective, but also cost-effective. This observation was demonstrated in a South American study co-sponsored by the **Pan American Health Organization** which compared *Complementary Alternative Medicine* (CAM) with *Allopathic Medicine* practices, as used in clinics and hospitals. (Note: Since CAM encompasses major elements of *Traditional Medicine* philosophy and practice, it has become quite common in the literature to employ the designations CAM and *Traditional Medicine* interchangeably.) The relative effectiveness of CAM was evaluated in terms of:

- observed clinical efficacy
- user/patient satisfaction
- reduction of future medical risks

Treatments were compared for selected pathologies, of the same degree of severity, as registered in case histories and/or clinical evaluations. A total of 339 patients - 170 being treated with CAM and 169 with allopathic medicine - were monitored over the course of one year. Treatments for the following pathologies were analyzed: osteoarthritis; back pain; anxiety based neuroses;

asthma; peptic acid disease; migraine headache; exogenous obesity; and peripheral facial analysis.
The conclusions (95% significance) can be summarized as follows:

i The overall average of direct costs using CAM was less than that incurred using conventional therapy (costs actually incurred during treatment were calculated and compared.)

ii For each of the criteria evaluated - clinical efficacy, user satisfaction and future risk reduction - CAM's efficacy was higher than that of conventional treatments, including:

- fewer adverse effects and events
- higher correlation between patient perception of efficacy and clinical observation of efficacy
- higher recognition among patients of the role played by treatment in resolving their health problems.

iii The overall cost-effectiveness of CAM was 53–63% greater than that of conventional treatments for the selected pathologies. [43]

Conclusion:

A well known author and some say the world's leading authority on plant medicines is James Duke who served for 30 years in the **US Department of Agriculture** specializing in the field of ethnobotanical medicine. He put together a table in which he delineated the relative risk of death entailed by human usage of certain substances, or undergoing certain medical related interventions and factors. The larger figures represent the total number of persons engaging in usage, or experiencing the intervention before one in that number dies from the cause listed.

- Plant Medicines: 1 in 1,000,000
- Poison Mushrooms: 1 in 100,000
- Hospital Surgery: 1 in 10,000
- Improper Use of Medication: 1 in 2,000
- Angiogram: 1 in 1,000
- Prescribed Medication (Properly Used): 1 in 333
- Medical Mistakes or Mishaps: 1 in 250
- Iatrogenic Hospital Infection: 1 in 80
- Bypass Surgery: 1 in 20 [44]

Duke makes the following observation:

> I've been a botanist specializing in medicinal plants for most of my 30-year career, and I've personally seen medicinal herbs successfully treat conditions that pharmaceuticals could not touch. The reason that herbs are not more popular… is that the drug companies cannot patent them…. The Green Pharmacy with its herbal therapies may, in many cases, prove to be more economical, more effective and safer – all with fewer side effects – than the pharmaceuticals. Our challenge is to transcend the assumptions that are made by doctors, the advertising and promotion of the drug companies and the narrow and restrictive drug approval process… Economics drives the pharmaceutical companies, but what drives the

> Green Pharmacy and the green lifestyle in general is ecology, the idea that we're connected to everything else on the planet and that we all thrive or fall together. [45]

When traditional healers prescribe plant medicines their therapeutic decisions are based upon a sound working knowledge of the created properties and synergistic action of whole plants, taken alone or in strategically combined with other plants. As already implied, such an employment of unrefined non-toxic plants for human medicine essentially eliminates the dangerous adverse effects associated with modern drugs, whether they are synthetically produced, or consist of the singular concentrated extracts of plants. In fact, the adoption of this traditional approach as a matter of simple policy, while knowingly avoiding the usage of an established list of proscribed poisonous plants, would (aside from concerns surrounding potential contamination and/or adulteration) essentially resolve the issue of "safety". Indeed, given the profusion of efficacious and non-toxic whole botanicals, the use of poisonous plants for healing such as Belladonna, Black Hellebore, Henbane and Ranunculus, is neither necessary, nor desirable.

In response to the issue of whether it is essential to require routine checks for adverse effects or physiological abnormalities on patients taking herbal remedies, clinical managers of the **Cavendish Health Centre**, in London, UK came to a decision that their routine monitoring was unessential and should be discontinued. Over a six year period this **NHS** health centre employed a traditionally trained herbalist who treated over 90 patients between six (6) months and 90 years of age. These patients had all been prescribed herbal medicines, with 40% of them having used the herbs for more than six (6) months. Regular monitoring for potential toxicity included full blood count and tests for liver and kidney function at intervals of one (1), two (2), three (3) and six (6) months thereafter, as long as the treatments continued. Over this six (6) year period "there were no abnormal results attributable to the herbs." [46]

On the specific issue of efficacy, with traditional plant medicines having been put under the magnifying glass of high tech bio-medical research, the results have frequently confirmed efficacy levels equivalent to or significantly exceeding that of conventional pharmaceuticals. The greater part of this research has aligned in vitro and in vivo clinical testing on specific conditions for which the plant medicines have been employed in traditional healing practice systems. The **Annex 1** table affords a brief summarization of research results on the efficacy of a number of whole plant medicines (and as well a number of plant derived phytochemicals), taken from various areas of the world in treating a range of illnesses or inimical health conditions. Plant derived phytochemical study results are included since this is indicative of the therapeutic value of one or more element(s) found in a given plant. It should be noted that the demonstrated efficacy of a selected phytochemical, doesn't necessarily reflect or substantiate the actual effects and/or potential value of whole plant usage. In reviewing these published research results, keep in mind that this represents only a modest sampling of the many thousands of efficacy research studies available. In addition to the modern clinical research, there is as well

a vast body of data contained in unnumbered “ethnomedicine” studies - from all inhabited world regions - which testifies to the efficacy of many thousands of plant medicines as traditionally used by indigenous and agrarian peoples.

It is abundantly evident that many centuries of experience by hundreds of cultures in all world regions, coupled with a considerable and rapidly growing body of corroborative research have demonstrated marked efficacy for a wide range of plant medicines covering many specific diseases and conditions. Coupled with this impressive record is the fact that, unlike conventional pharmaceuticals, whole plant medicines - when appropriately used - have no or very minor side effects, and thus pose negligible danger to the highly sensitive human mind-body complex. Also, because plants come from a wisely designed creation, their use by humans enhances and strengthens the body’s multiple internal systems, and fit well into a synergistic program of prescribed “lifestyle medicine” changes, such as dietary change, rest, and exercise. Unlike conventional drugs, non-toxic herbals can be used on both a preventative and curative basis, and they are far less expensive to produce, and to procure. They also do not pose any dangers to the ecosystem and all higher life forms which is clearly the case with the “pharmaceutical pollution” that is today being caused by the widespread use of standard drugs. [47] The case is compellingly clear that a progressive return to and greater dependence upon traditional medicines would greatly benefit Aboriginal peoples who’ve largely lost this knowledge and practice, and as well the entire human family.

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ANNEX 1 - CROSS SAMPLING OF RESEARCH STUDIES CONFIRMING THE EFFICACY OF PLANT MEDICINES IN TREATING A DIVERSITY OF PATHOLOGICAL CONDITIONS

Note: Relative to the issues of safety and efficacy, a pharmacological effect observed *in vitro* or with *in vivo* animal models is not necessarily applicable to humans. In vitro data usually serve to verify the reported mechanism of action in animals or humans. However, such data have to be confirmed by clinical studies.

PLANT MEDICINES	TYPE OF STUDY	EFFICACY FINDINGS	SAFETY FACTOR	SOURCE REFERENCE
Echinacea	Comprehensive review of in vivo experimentation on mice conducted over five (5) years at McGill Univ.	This plant is prophylactic (immune system strengthening), extends the life span of aging mice, significantly abates leukemia, and extends the life span of mice with leukemia	Evidence suggests, "no in vivo toxic level, i.e. overdose level"	**Echinacea: a Miracle Herb Against Aging and Cancer? Evidence In vivo in Mice;** Sandra C. Miller; *Evidence Based Complementary and Alternative Medicine;* ***Vol. 2 Issue 3, pp. 309–314, 2005;*** Department of Anatomy and Cell Biology, McGill Univ., Montreal, Canada
Eucalyptus globolus* Labill, *Punica granatum* L., *Artemisia mexicana* Willd., and *Bocconia arborea	Laboratory in vitro	Strong antimicrobial activity exhibited by all plants against a wide range of pathogenic microorganisms	Not addressed	**Antimicrobial Evaluation of Some Plants Used in Mexican Traditional Medicine For The Treatment of Infectious Diseases;** Victor Navarro et. al; ***Journal of Ethnopharmacology; Vol. 53, Issue 3, pp. 143-147, Sept. 1996*; Mexicano del Seguro Social, Morelos, México; Hospital de Especialidades, México D.F., México**
***Zingiber officinale* (Ginger) and *Juglans cinerea* (Butternut)**	Laboratory in vitro	Pronounced antifungal activity against a wide variety of fungi	Ethnobotanic Evidence of Safety	**Inhibition of Human Pathogenic Fungi by Ethnobotanically Selected Plant Extracts; Christine E. Ficker, M. L. Smith et. al.;** ***Mycoses, Vol. 46 (1-2), pp. 29-37, Feb. 2003*; Vol. 46, Issue 1-2, pp. 29-37, Feb. 2003; Carleton Univ., Ottawa, Canada;**
Sodium ferulate, extracted from *Angelica sinensis, Cimicifuga heracleifolia,* and other plants	Review of clinical practice results	Outstanding clinical results in helping to reverse coronary heart disease, atherosclerosis, pulmonary heart disease and thrombosis	Clinical Evidence of Safety	**Pharmacological Actions of Sodium Ferulate in Cardiovascular System; Bao-Hua Wang, Jing-Ping Ou-Yang;** ***Cardiovascular Drug Reviews, Vol. 23, Issue 2, pp. 161-172, June 2005*; School of Medicine, Wuhan Univ., Wuhan, PR China**
Glycyrrhiza glabra, Picrorhiza kurroa,	Review of randomized placebo	*Glycyrrhiza glabra* liver protective and induces interferon; *Picrorhiza*	Not Addressed	**Herbal Medicines for Liver Diseases in India; S.P. Thyagarajan, S. Jayaram, V.**

Phyllanthus amarus	controlled clinical trials	*kurroa* anti-inflammatory, liver protective and immunomodulatory; *Phyllanthus amarus* anti-viral against hepatitis B and C, liver protective, and anti-inflammatory		**Gopalakrishnan, R. Hari, P. Jeyakumar, Ms. Sripathi; *Journal of Gastroenterology and Hepatology, Vol. 17, Issue s3, pp. S370-S376, Dec. 2002*; Univ. of Madras, Taramani, Chennai, India**
Peppermint oil and Eucalyptus oil	Double-blind, placebo controlled, randomized clinical trial on 32 subjects	Oils applied topically enhanced cognition, relaxing muscles and mind. Use of Peppermint oil alone caused a significant reduction in pain (both tests used oils in ethyl alcohol solution)	Not Addressed	**Effect of Peppermint and Eucalyptus Oil Preparations on Neurophysiological and Experimental Algesimetric Headache Parameters; H. Göbel, G. Schmidt, D. Soyka; *Cephalalgia, Vol. 14, Issue 3, pp. 228-234, June 1994*; Neurological Clinic of the Univ. of Kiel, Kiel, Germany**
Curcumin extracted from Turmeric	In vitro and In vivo experiments with mice	Affords protection against chromosomal aberrations; exerts antitumor activity and enhances the scavenging of free radicals	Evidence of negligible toxicity and protective qualities for chemotherapy	**Antineoplastic and Anticlastogenic Properties of Curcumin in Signal Transduction Pathways, Part C: Cell Signaling in Health and Disease; Tzvetan Alaikov et al.; *Annals of the New York Academy of Sciences, Vol. 1095, pp. 355-370, Jan. 2007*; Medical Univ. of Sofia, Sofia, Bulgaria; German Cancer Research Center, Heidelberg, Germany; Bulgarian Academy of Sciences, Sofia, Bulgaria**
Peppermint and Caraway	Review of nine randomized clinical trials	In non-ulcer dyspepsia (indigestion) 60–95% of patients reported improvements in symptoms	Encouraging safety profile	**Herbal Medicinal Products for Non-Ulcer Dyspepsia; J. Thompson Coon, E. Ernst; *Alimentary Pharmacology and Therapeutics, Volume 16, Issue 10, pp. 1689-1699, Oct. 2002*; Dept. of Complementary Medicine, Univ. of Exeter, Exeter, UK**
Andrographolide, extracted from *Andrographis paniculata*	In vitro and in vivo experiments	Inhibited In Vitro proliferation of tumor cell lines, for various cancers; In Vivo enhanced tumor necrosis (cell death) and increased cytotoxic activity of lymphocytes against cancer cells	Not Addressed	**Andrographolide, a Potential Cancer Therapeutic Agent Isolated from *Andrographis Paniculata*; Sriram Rajagopal, R. Ajaya kumar, Dhanvanthri S. Deevi, Chitkala Satyanarayana, R Rajagopalan; *Journal of Experimental Therapeutics and Oncology, Vol. 3, Issue 3, pp. 147-158, May 2003*; Discovery Research, Dr. Reddy's Laboratories, Miyapur, Hyderabad, India**
Phenylethanoid acteoside isolated from *Plantago lanceolata* L.	In vivo experiments with mice	Significantly ameliorated colitis and reduced mucosal tissue damage	Not Addressed	***In Vivo* Treatment with the Herbal Phenylethanoid Acteoside Ameliorates Intestinal Inflammation in Dextran Sulphate Sodium-Induced Colitis; M. Hausmann, et. al.; *Clinical and***

				***Experimental Immunology, Vol. 148, Issue 2, Page 373-381, May 2007*; Univ. of Regensburg, Straubing, Germany**
Honey	In vitro experiments using monkey kidney cell cultures infected with Rubella virus	Results indicated that honey had good anti-Rubella activity	Not Addressed	**Effect of Honey versus Thyme on Rubella Virus Survival *in Vitro*; Bassam Zeina et. al., *The Journal of Alternative and Complementary Medicine, Vol. 2, Issue 3, pp. 345-348, September 1, 1996*; Teshreen Hospital, Damascus, Syria and Churchill Hospital, Oxford UK; Pasteur Institute of Tunis, Tunisia**
12 whole plants, Ginseng, Cinnamon bark, Angelica root, astragalus root, Peony root, Citrus unshiu peel, Rehmannia root, Polygala root, Atractylodes rhizome, Schisanda fruit, Poria sclerotium, and Glycyrrhiza	Studied therapeutic effects of traditional herbal formulation in a 7 week clinical case study	Elderly patient with lung cancer experienced: decrease in tumor marker levels; cough disappeared; appetite recovered; and positive effect on life expectancy	Not Addressed	**The Effect of a Traditional Chinese Prescription for a Case of Lung Carcinoma; Tsutomu Kamei, Hiroaki Kumano, Kentaro Iwata, Yasuo Nariai, Tadashi Matsumoto; *The Journal of Alternative and Complementary Medicine, Vol. 6, Issue 6, pp. 557-559, Dec. 1, 2000*; Shimane Institute of Health Science, Izumo, Japan; Tohoku Univ., Sendai, Japan; Okinawa Chubu Hospital, Gushikawa, Japan; Izumo Citizens Hospital, Izumo, Japan; Nagasaski Univ., Nagasaki, Japan**
Oils of Clove; Geranium; Nutmeg; Oregano; Black Pepper and Thyme	Laboratory in vitro research	Considerable inhibitory effects against 25 different genera of bacteria, e.g. animal and plant pathogens, food poisoning and spoilage bacteria	Not addressed	**Antimicrobial Agents from Plants: Antibacterial Activity of Plant Volatile Oils; H. J. D. Dorman, S. G. Deans; *Journal of Applied Microbiology, Vol. 88, Issue 2 pp., 308-316, Feb. 2000*; Scottish Agricultural College, South Ayrshire, UK**
Echinacea compound herbal tea preparation (Echinacea Plus®)	Random double-blind placebo controlled study of 95 human subjects with early flu or cold symptoms	Treated subjects experienced significant effectiveness in symptom relief and in a shorter time period than placebo	No adverse effects or reactions	**The Efficacy of Echinacea Compound Herbal Tea Preparation on the Severity and Duration of Upper Respiratoryand Flu Symptoms: A Randomized, Double-Blind Placebo-Controlled Study; G. Frank Lindenmuth, Elise B. Lindenmuth; *The Journal of Alternative and Complementary Medicine, Vol. 6, Issue 4, pp. 327-334; Aug. 1, 2000*; York College of Pennsylvania, York, Pennsylvania, USA.**
Tien-Hsien (A liquid blend of traditional plant medicines of China)	Laboratory in vitro testing in which 15 human cancer cell lines and normal	Tien-Hsien effectively induced apoptosis (cell suicide) in all human cancer cell lines tested (including human cervical and lung	No adverse effects or reactions reported in human usage	**The Chinese Herbal Medicine *Tien-Hsien* Liquid Inhibits Cell Growth and Induces Apoptosis in a Wide Variety of Human Cancer Cells; Andy Sun, et. al.; *The Journal of Alternative and***

	human cells were analyzed	carcinomas), but not in normal/healthy human cells, demonstrating a broad-range tumor killing function		***Complementary Medicine, Vol. 11, Issue 2, pp. 245-256 April 1, 2005*; College of Medicine, National Taiwan Univ., Taipei, Taiwan; and Graduate Institute of Microbiology, College of Medicine, National Taiwan Univ., Taipei, Taiwan.**
Leaves of *Ageratum conyzoides* (extract)	Laboratory in vivo testing of diabetic rats	Significant reduction of blood glucose level in orally treated animals occurred at a rate of 9.5% after 1 hour and 21.3% after 4 hour post-treatment	Not addressed	**Blood Glucose Lowering Effect of Aqueous Leaf Extracts of *Ageratum Conyzoides* in Rats; N Nyunaï, Njifutie Njikam, Catherine Mounier, Philippe Pastoureau; *African Journal of Traditional, Complementary and Alternative Medicines, Vol. 3, Issue 3, pp. 76-79, 2006***
Root bark of *Ceiba pentandra* (extract)	Laboratory In Vivo testing of fasted normal and diabetic rats, with control group	40 mg (per kg of body weight) of extract, caused significant reduction in blood glucose levels after 8 hours post-treatment, with blood -glucose-lowering effects of 40.0% for normals and 48.9%, diabetics	Not addressed	**Hypoglycaemic and antidiabetic effect of root extracts of *Ceiba pentandra* in normal and diabetic rats; Paul Désiré Dzeufiet Djomeni et al.; *African Journal of Traditional, Complementary and Alternative Medicines Vol. 3, Issue 1, pp. 129-136, 2006* Faculty of Science, Univ. of Yaounde I, Yaounde, Cameroon**
Traditional multiherbal preparation, *Brahmi rasayana*	Laboratory in vivo testing of young and aged mice	Significantly improved learning and memory in young animals and effectively reversed both induced amnesia and amnesia caused by natural aging	Not addressed	***Brahmi rasayana* Improves Learning and Memory in Mice; Hanumanthachar Joshi and Milind *E-Complementary and Alternative Medicine, Vol. 3, Issue 1,Oxford Univ. Press, pp.79–85, 2006*; Parle Div. of Pharmacology, Guru Jambheshwar Univ., Hisar, Haryana, India**
Extract of *Adhatoda vasica* (L) Nees leaves	In vivo treatment and irradiation of mice compared with 8 Gy radiation-exposed mice with testis damage and chromosomal aberrations in bone marrow cells, and 100% mortality within 22 days)	Adhatoda leaf extract 800 mg per kg of per mouse for 15 days and then exposed to radiation. Death of -irradiated mice was reduced to 70% at 30 days. Significantly less damage to testis tissue architecture and various cell populations. Significantly prevented radiation-induced chromosomal damage in bone marrow cells.	Not addressed	**Protective Effect of Adhatoda vascia Nees Against Radiation-Induced Damage at Cellular, Biochemical and Chromosomal Levels in Swiss Albino Mice; Meenal Kumar1 et. al.; *Evidence-based Complementary and Alternative Medicine, Vol. 4, Issue 3, pp. 343-350, published online Dec. 5, 2006*; Laboratory of Radiation and Cancer Biology, Univ. of Rajasthan, Jaipur 302004, India and Hoag Comprehensive Cancer Center, Newport Beach, CA, USA**
***Agaricus brasiliensis* KA21 (i.e. *Agaricus blazei* - mushroom)**	In vivo testing on mice and human volunteers	Antitumor effects, leukocyte-enhancement, hepatopathy (liver damage) alleviation and endotoxin shock-alleviation effects	Not addressed	**Immunomodulating Activity of Agaricus brasiliensis KA21 in Mice and in Human Volunteers; Ying Liu et al.; *Evidence-based***

		confirmed in mice. Percentage of body fat and visceral fat reduced; blood cholesterol and blood glucose levels decreased; and natural killer cell activity increased in humans.		***Complementary and Alternative Medicine, published. online April 12, 2007*** **http://ecam.oxfordjournals.org/cgi/content/abstract/nem016 Institute of Preventive Medicine, Tokyo, Japan; Juntendo Univ. School of Medicine, Tokyo, Japan; Tokyo Univ. of Pharmacy and Life Science, Tokyo, Japan; Suzuka Univ. of Medical Science and Mie, Japan; and Toei Pharmaceutical Co., Ltd., Tokyo, Japan**
***Gynura procumbens* (Lour.) Merr.**	In vivo testing in which plant extracts (500 mg per kg) were given orally to spontaneously hypertensive rats - daily for 4 weeks, with untreated controls	Testing resulted in significantly lower blood pressure in spontaneously hypertensive rats compared with untreated spontaneously hypertensive rats. Treated rats had significantly lower serum lactate dehydrogenase (marker of tissue breakdown), creatine phosphate kinase (marker of muscle damage).	Not addressed	**Antihypertensive Effects of *Gynura procumbens* Extract in Spontaneously Hypertensive Rats; Mi-Ja Kim et. al.; *Journal of Medicinal Food; Vol. 9, Issue 4, 2006, pp. 587–590*; Dongduk Women's Univ., Seoul; College of Medicine, Kangwon National Univ., Chuchon; Hanseo Univ., Chungnam, Seosan, Republic of Korea; and Center for Natural Product Medicine Studies, Univ. of Indonesia, Depok, Indonesia**
Glucolevel - plant mixture (leaves of Walnut, Olive, Nettle, and Salt bush)	Clinical testing of sixteen human volunteers, with recent onset of type 2 Diabetes Mellitus	Glucolevel tablets 3 times daily for a period of 4 weeks. (Amount in capsules for each diabetic patient/day equivalent to 7–10 gm dried plant leaves.) Within first week, baseline glucose levels were significantly reduced. Clinically acceptable glucose levels were achieved for all participants in a period of two to four weeks.	No evidence of toxicity	**Maintaining A Physiological Blood Glucose Level with 'Glucolevel', A Combination of Four Anti-Diabetes Plants Used in the Traditional Arab Herbal Medicine; Omar Said et. al.; *Evidence-based Complementary and Alternative Medicine, Published online May 17, 2007*; Antaki Center for Herbal Medicine Ltd Kfar Kana; Research and Dev. Regional Center - affiliated with Haifa Univ., Haifa, Israel; Faculty of Allied Medical Sciences, Arab American University Jenin, Jenin, Palestine; and Sprunk-Jansen A/S, Hellerup, Denmark**
***Catharanthus roseus* L. (Apocyanaceae)**	Blood glucose lowering activity of the leaf juice was studied by in vivo testing of normal and diabetic rabbits	The study found significant antidiabetic activity with notable reductions in blood glucose occurring in both normal and diabetic rabbits. Improvements were found to be comparable with that of the standard diabetic drug, glibenclamide. Also noted was a prolonged	Not addressed	**The Juice of Fresh Leaves of Catharanthus roseus Linn. Reduces Blood Glucose in Normal and Alloxan Diabetic Rabbits; Srinivas Nammi; et al. *Complementary and Alternative Medicine, (Bio-Med Central), Volume 3, Issue 4, Sept. 2, 2003*; Dept.of Pharmaceutical Sciences Andhra Univ., Visakhapatnam,**

		effect in the reduction of blood glucose levels.		**Andhra Pradesh, India; and Faculty of Pharmacy, Univ. of Sydney, Sydney, NSW-2006 Australia**
***Cordia curassavica* (Boraginaceae) crude extracts and artemetin enriched fraction**	In vivo testing in male Swiss mice with induced edema (swelling)	The extract (1 gm per kg of body weight) showed significant anti-edematogenic activity, reducing the edema by 69%, 5 hours after administration	Not Addressed	**Evaluation of the Antiedematogenic Activity of Artemetin Isolated from Cordia Curassavica DC; M.C. Bayeux et. al.; *Brazilian Journal of Medical and Biological Research Vol. 35, Issue 10, pp. 1229-1232, 2002*; Centro Pluridisciplinar de Pesquisas Químicas, Biológicas e Agrícolas; and Faculdade de Medicina, Universidade Estadual de Campinas, Campinas, SP, Brasil**
***Rhizoma curculiginis* and *Rhizoma drynarie* extract**	In vivo testing of 10 mice fed Rhizoma curculiginis, and 10 fed Rhizoma drynarie and 10 controls	Rhizoma curculiginis extract added to meals over 5 weeks demonstrated an increase in bone density by 3.13 % and Rhizoma drynarie by 6.45%. Both herbs have systemic positive effects on both bone formation and localized bone healing.	Not Addressed	**The effects of Rhizoma Curculiginis and Rhizoma Drynariae Extracts on Bones; Ricky WK Wong, Bakr Rabie, Margareta Bendeus and Urban Hägg; *Chinese Medicine* Vol. 2, Issue 13, 2007, http://www.cmjournal.org/content/2/1/13, Biomedical and Tissue Engineering Research Group, Univ. of Hong Kong; and Prince Philip Dental Hospital, Hong Kong SAR, China**
Celastrus aculeatus Merr.	In vivo laboratory testing of rats with a control group	Celastrus feeding suppressed both the induction as well as the progression of Autoimmune Arthritis, and the latter effectiveness was comparable to that of the anti-rheumatic drug Methotrexate. It also enhanced the production of anti-Bhsp65 antibodies, which are known to be protective against Autoimmune Arthritis	Not addressed	**Celastrus Aculeatus Merr. Suppresses the Induction and Progression of Autoimmune Arthritis by *Modulating* Immune Response to Heat-Shock Protein 65; Li Tong and Kamal D. Corresponding author: Kamal D Moudgil; *Arthritis Research and Therapy Volume 9:R70, 2007*;; Univ. of Maryland School of Medicine, Baltimore, MD, USA;**
***Cissus quadrangularis* formulation (supplemented with green tea, soy, chromium, selenium, and B-vitamins)**	Randomized, double-blind, placebo-controlled design with 92 obese and 31 overweight human participants divided into treated groups with and without calorie restricted diets, and a placebo group without calorie	In an 8 week period the treated obese group underwent significant reduction in many anthropomorphic measures: weight; percentage of body fat; body mass index (BMI); waist circumference; as well as reduced fasting blood glucose; total cholesterol; LDL-cholesterol; and triglycerides; regardless of whether diet was calorie restricted or not	Few, "if any" side effects	**The Use of a *Cissus Quadrangularis* Formulation in the Management of Weight Loss and Metabolic Syndrome Julius Oben, et al.; *Lipids in Health and Disease, Vol. 5, Issue 24, 2006*; Dept. of Biochemistry, Univ. of Yaoundé I, Yaoundé, Cameroon; Institute of Medical Research and Medicinal Plant Studies, Yaounde, Cameroon**

	restriction.			
***Aspilia africana* (Compositae)**	In vivo testing of rats receiving experimentally-induced wounds, and additional testing on Guinea pigs and mice	Testing demonstrated that the leaves possess constituents capable of significantly arresting wound bleeding, reducing time required for coagulation (clotting); inhibiting the growth of microbial wound contaminants; and accelerating wound healing.	Limited evidence of concentrate's toxicity if used internally	**Potentials of Leaves of Aspilia africana (Compositae) in Wound Care: an Experimental Evaluation; C. Okoli, P. Akah, and A. Okoli; *Complementary and Alternative Medicine, Vol. 7, Issue 24, 2007*; Univ. of Nigeria, Nsukka, Nigeria; and Faculty of Medicine, Univ. of New South Wales, Sydney, Australia**
***Duhuo Jisheng Tang* (mixture of 15 traditional medicine plant species)**	Sixty-eight osteoarthritis patients, received treatment at a rate of 2.5 grams, twice daily for four weeks	Among all 68 participants, there were statistically significant reductions in the established index scores for pain, stiffness and physical functioning in the second and fourth weeks, with effects initially appearing during the second week.	4 "potential" minor adverse reactions	***Duhuo Jisheng Tang* for treating osteoarthritis of the knee: a prospective clinical observation; Jung-Nien Lai et al.; *Chinese Medicine, Vol. 2, Issue 4, March 30, 2007* School of Medicine, National Yang-Ming Univ., Taipei, Taiwan; Taipei City Hospital, Taipei, Taiwan; Dept. of Health, Taipei, Taiwan; Institute of Statistical Science, Academia Sinica, Taipei 115, Taiwan and National Taiwan Univ. College of Public Health, Taipei, Taiwan**
Modified *Zhengan Xifeng Tang* (blend of 18 traditional plant medicines of China)	Clinical case study	Remarkable improvement attained over 60 days in Spinocerebellar ataxia (gait disturbance, ataxia and dizziness)	Not Addressed	**Successful Treatment of Spinocerebellar Ataxia With Medicinal Herbs; Tetsuro Okabe, Michio Fujisawa, Takasi Sekiya, Yaeko Ichikawa, Jun Goto; *Geriatrics and Gerontology International, Vol. 7, Issue 2, pp. 195-197, June 2007*; Univ. of Tokyo, Tokyo, Japan**
Amla *Emblica officinalis* (*Phyllanthus emblica*)	Review of various in vivo and in vitro studies	Protects mice against the chromosome-damaging effects of well known carcinogen; significantly reduced solid tumors in mice; mice with tumors experienced 35% increased life span; inhibited the proliferation of four human tumour cell lines in vitro	Not Addressed	**Immunomodulatory Plants: A Phytopharmacological Review; Hemant Sagrawat and Md. Yaseen Khan; *Pharmacognosy Reviews Vol. 1, Issue 2, July-Dec, 2007*; Getz Pharma Research Pvt. Ltd., Mumbai, India; Institute of Pharmacy, Nirma Univ. of Science and Technology, , Ahmedabad, India**
Silymarin, extracted from the seeds of Milk Thistle (*Silybum marianum*)	Review of multiple in vivo and in vitro studies	Effective against poisoning from death cap mushrooms; effective in the treatment of both acute and chronic hepatitis; helps it inhibit the carcinogenic action of many chemicals; useful in prevention and treatment of many neurodegenerative and neurotoxic processes; and topical application inhibits skin cancer	Intravenous infusion data demonstrate that acute, sub-acute and chronic toxicity of silymarin is very low.	**Silymarin: A Review of Pharmacological Aspects and Bioavailability Enhancement Approaches; Nitin Dixit et. al., *Indian Journal of Pharmacology, Vol. 39, No. 4, July-August, 2007, pp. 172-179* Dept. of Pharmaceutics, New Delhi, India**

Astragalus Root (*Astragalus membranaceus and var. mongholicus*)	Review of multiple in vivo and in vitro studies	Restores suppressed immune system functions including increased: stem cell generation of blood cells and platelets; numbers of antibody producing cells and spleen cells; cytotoxicity of natural killer cells; and stimulates phagocytic activity by macrophages and leukocytes. Affords relief from angina, and congestive heart failure.	No adverse effects are cited in the literature	**Astragalus Root, Astragalus membranaceus and Astragalus membranaceus var. mongholicus, Analytical, Quality Control and Therapeutic Monograph; R. Upton Editor, C. Petrone Assoc. Editor, , D. Swisher and C. Siverly Research Assoc.; *American Herbal Pharmacopoeia and Therapeutic Compendium, Aug. 1999*; American Herbal Pharmacopoeia, Santa Cruz, Ca, USA**
Bilberry Fruit (*Vaccinium myrtillus L.*)	Review of multiple in vivo and in vitro studies	Possesses strong antioxidant activity; able to improve circulation and thus useful in treating circulatory problems due to vascular insufficiency. Effective in treating diabetic and hypertensive retinopathy. Promising in the treatment of uterine/pelvic pain during menstruation.	No adverse effects are cited in the literature	**Bilberry Fruit (Vaccinium myrtillus L.) Standards of Analysis, Quality Control,and Therapeutics; R. Upton Editor, A. Graff and C. Petrone Assoc. Editor and Monograph Development Coordinator, D. Swisher, Research Assoc.; S. Sudberg Analytical Methods Substantiation Coordinator; *American Herbal Pharmacopoeia and Therapeutic Compendium, 2001;* American Herbal Pharmacopoeia, Santa Cruz, Ca, USA**
***Hawthorn Berry* (*Crataegus spp.*)**	Review of multiple in vivo and in vitro studies	Strong anti-inflammatory activity; increases coronary blood flow; aids in preventing cardiac arrhythmia; decreases LDL cholesterol and body fat in human hyperlipidemic subjects	No adverse effects are cited in the literature	**Hawthorn Berry, *Crataegus spp.* Analytical, Quality Control, and Therapeutic Monograph; R. Upton Editor, C. Petrone Assoc. Editor, , D. Swisher Research Assoc.; *American Herbal Pharmacopoeia and Therapeutic Compendium, June 1999;* American Herbal Pharmacopoeia, Santa Cruz, Ca, USA**
Umckaloabo (*Pelargonium sidoides*)	Nine randomized trials conducted on a total of 1,477 patients (680 of them children ages 6 to 12 years)	Extract was shown to safely and effectively shorten the severity and duration of acute bronchitis and tonsillopharyngitis	Well-tolerated and safe for short-term treatment of children and adults	**Extract of Pelargonium sidoides: South African Herbal Remedy; Mark Blumenthal, Executive Editor; *HerbalGram; Volume 63, pp.17-19, 2004*; American Botanical Council, Austin, Texas, USA**
A Cheval *Artocarpus tonkinensis* (*Artocarpus*)	In vivo testing on Female and male rats aged 8–12 weeks	Treatment with extract decreased arthritis incidence and severity and delayed disease onset. When treatment was started after the onset of arthritis, a arthritis amelioration observed. Inhibits immune-mediated mechanisms	No adverse or toxic effects observed	**Inhibition by Artocarpus tonkinensis of the Development of Collagen-Induced Arthritis in Rats; D. Ngoc, et al.; *Scandinavian Journal of Immunology Volume 61, 2005, pp. 234-241*; Centre of Molecular Medicine, Karolinska Institute, Stockholm, Sweden**

		regarded as disease promoting or initiating.		
Ashwagandha (*Withania somnifera*)	Multiple in vivo studies involving rats	Strong antibacterial activity against a range of bacteria. Significantly increases hemoglobin concentration, red blood cell count, white blood cell count, and platelet count. Chemopreventive effects against skin cancer and antitumor effects in lung. Decreases total cholesterol lipids, and triglycerides in hypercholesteremic animals.	Chronic administration did not exhibit any dependence liability	**Withania somnifera (Ashwagandha): A Review; Girdhari Lal Gupta and A. C. Rana; *Pharmacognosy Reviews Vol. 1, Issue 1, January-May, 2007, pp. 129-136*; Dept. of Pharmacology, B. N. College of Pharmacy, Rajasthan, India**
Terminalia chebula	Multiple in vivo and in vitro studies on humans and various animals	Demonstrated antifungal, antiviral, anticarcinogenic, antimutagenic, antidiabetic, antispasmodic, anti-ulcerogenic, and antioxidant properties. Hypolipidemic effects aid in reversing ahteroslcerosis. Protects DNA against radiation poisoning. Measurably assists in wound healing.	No observed cytotoxic or genotoxic effects. One study indicating hepatic lesions in rats "cannot be reliably extrapolated to human usage."	**Terminalia chebula: An Update; R.R. Chattopadhyay, and S.K. Bhattacharyya; *Pharmacognosy Reviews Vol 1, Issue 1, January-May, 2007, pp. 151-156*; Agricultural and Ecological Research Unit, Indian Statistical Institute, Kolkata, India**
Kalmegh (*Andrographis paniculata*)	Multiple in vivo and in vitro studies on humans and using various animal models	Clinical trials show that the extract safely and effectively blocks growth of prostate and breast cancer, as well as non-Hodgkin's lymphomas. Antivenom activity – for mice poisoned with cobra venom, treatment markedly delayed the occurrence of respiratory failure and death. Twenty human cases of infectious hepatitis (A) received 40 grams (of crude compound) over 24 days and showed an 80% recovery rate.	Toxicity tests in mice (oral) 10,000 mg/kg of body weight daily for seven days, became lethargic but exhibited totally healthy heart, kidney, liver, and spleen.	**Andrographis paniculata (Kalmegh): A Review; Siddhartha K. Mishra, et al.; Pharmacognosy Reviews, Vol 1, Issue 2, July-Dec, 2007, pp. 283-298; Central Institute of Medicinal and Aromatic Plants Luckow, India**

ANNEX 2

GLOSSARY OF TERMS RELATED TO TRADITIONAL PLANT MEDICINES, DRUGS AND SAFETY

Adverse Event (Also Drug Reaction, or Side Effect)
In pharmacology, this describes any unexpected, unwanted or dangerous reaction associated with an administered drug. Adverse events can range from mild to severe. Serious adverse events are those that can cause disability, are life-threatening, result in hospitalization or death, or cause birth defects.

Allopathy
Also known as "conventional medicine" in Western societies. Allopathy focuses on treating the symptoms of diseases primarily through prescription drugs. This approach utilizes a process of reductionism (focusing on the symptoms exhibited in a part of the organism rather than focusing on the organism as a whole.)

Ayurvedic Medicine
Ayurveda means the "science of life." Practiced in India for more than 5,000 years, Ayurvedic tradition holds that illness is a state of imbalance among the body's systems that can be detected through such diagnostic procedures as reading the pulse and observing the tongue. Nutrition counseling, massage, natural plant medications, meditation, and other modalities are used to address a broad spectrum of ailments, from allergies to AIDS.

Biological Activity
During in vivo animal testing this refers to a change in the base-line condition or function of an animal or part of an animal brought about by the administration of a test substance.

Boxed Warning
This type of warning is also commonly referred to as a "black box warning." It appears on a prescription drug's label and is designed to call attention to serious or life-threatening risks.

Characterizing Compound
A natural constituent of a plant part that may be used to assure the identity or quality of a plant preparation, but is not necessarily responsible for the plant's biological or therapeutic activity.

Compliance and Enforcement
As part of its regulatory responsibilities, *Health Canada* is responsible for compliance monitoring and enforcement activities related to health products in order to verify that regulatory requirements are being applied appropriately. The *Health Products and Food Branch Inspectorate* is primarily responsible for health product compliance monitoring activities such as industry inspection and product investigation. The *Inspectorate* develops and implements enforcement strategies in these areas.

Evidence-Based Medicine (EBM)
The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine requires the integration of individual clinical expertise with the best available external clinical evidence from systematic research, and a knowledge of a patient's or patient population's unique cultural values and circumstances.

Herbalism
The use of natural plants and/or plant-based substances to treat a range of illnesses and to enhance the functioning of different systems of the body. This approach to therapeutics is many thousands of years old, and still continues to be widely used throughout much of the world. Although herbalism is not specifically licensed as a distinct professional modality in most countries, herbs are routinely "prescribed" by traditional medicine practitioners, herbalists, holistic M.D.'s, and naturopaths, etc.

Herbal Medicine
A plant-derived material or preparation with therapeutic or other human health benefits which contains either raw or processed ingredients from one or more plants. In some traditions, materials of inorganic or animal origin may also be present.

Holistic Medicine
Holistic medicine is a broadly descriptive term for a healing philosophy that views a patient as a whole person, not as just a disease carrier, or a collection of symptoms. In the course of treatment, holistic medical practitioners may address a client's emotional and spiritual dimensions as well as the nutritional, environmental, and lifestyle factors that may be contributing to an illness.

Medical Devices
The term Medical Devices, as defined in Canada's *Food and Drugs Act*, covers a wide range of health or medical instruments used in the treatment, mitigation, diagnosis or prevention of a disease or abnormal physical condition.

Medicinal Preparations of Plant Materials
Medicinal preparations that contain one or more of the following: powdered plant materials, extracts, purified extracts, or partially purified active substances isolated from plant materials. In certain cases, materials of animal or mineral origin may also be included in such preparations.

Natural Health Products
Under Canada's Natural Health Products Regulations, which came into effect on January 1, 2004, natural health products (NHPs) are defined as:

- Vitamins and minerals
- Herbal remedies
- Homeopathic medicines
- Traditional medicines such as traditional Chinese medicines
- Probiotics, and

- Other products like amino acids and essential fatty acids.

Natural Health Products must be safe for consideration as over-the-counter products, be available for self-care and self-selection, and not require a prescription to be sold.

Naturopathic Medicine
Naturopathic medicine is a holistic approach to primary health-care that emphasizes the curative power of nature's provisions, (e.g. oxygen, sunlight, water, rest, exercise, etc.) and treats a wide range of acute and chronic illnesses at all age levels. Naturopathic physicians work to restore and support the body's own healing ability, employ a variety of natural modalities including therapeutic nutrition, botanical medicines, hydrotherapy, massage, fasting, etc.

Pharmacovigilance
The science and activities relating to the detection, assessment, understanding and prevention of adverse effects, or any other medicinal drug-related problems.

Prescription Drug Labeling
Drug labeling, commonly called the package insert or the prescribing information, provides information to the physician about what a prescription medication is supposed to do, who should and should not take it, and how to use it. Labeling also includes information on a drug's side effects and warnings, and information from the clinical trials of the drug. Some prescription drug labeling also includes a description of the prescribing information in words that consumers will understand.

Processed Plant Materials
Plant materials treated according to traditional procedures to improve their safety and/or efficacy, to facilitate their clinical use, or to make medicinal preparations.

Recalls, Market Withdrawals and Safety Alerts
Governmental regulatory agencies and manufacturers provide public information on drug products that have been recalled due to manufacturing problems and/or safety concerns. In addition to information released to the public by a manufacturer using the normal media channels, most government agencies post information about these recalled drug products at their respective websites – for example *MedEffect Canada* at: http://www.hc-sc.gc.ca/dhp-mps/medeff/index_e.html and advisories, warnings and recalls at: http://www.hc-sc.gc.ca/dhp-mps/advisories-avis/index_e.html

Therapeutic Activity
This refers to an intervention that results in the improvement or amelioration of the manifestations of human disease.

Traditional Chinese Medicine: A 3,000-year-old holistic system of medicine combining the use of medicinal herbs, acupuncture, food therapy, massage, and therapeutic exercise. Chinese physicians look for the underlying causes of imbalance(s) which lead to disharmony in the energy systems in the body. TCM addresses how illness manifests itself in a patient and treats the patient, not the ailment or disease.

Traditional (also Indigenous, Aboriginal or Tribal) Medicine
A healthcare system that generally incorporate various medicines from botanical, animal, and nature based sources, and frequently employing specific ceremonial rituals in order to treat a wide range of disease conditions and injuries. Health and healing practices, diagnostic, therapeutic and medicinal knowledge is normatively passed down from generation to generation primarily through heads of families and/or healers through oral traditions. Traditional healing systems tend to reflect the unique characteristic of the specific culture and natural environment in which it is found.

Traditional Midwifery/Childbirth Support
Traditional Midwives (sometimes called traditional birth attendants) provide education and support during pregnancy, assist the mother during labor and delivery, and provide follow-up care.

ANNEX 3

SOME ACTUAL SIDE-EFFECTS OF HERBS EXAMINED

By far the most common complaint and recorded side-effect of taking herbs is gastrointestinal. This is because herbs frequently cause the liver to dump bile (something herbalists are happy about) or stimulate peristalsis (which they are also happy about) or contain strong bitter elements that stimulate a surge of digestive juices (again, happy!). This cocktail of actions is beneficial to the digestion and overall health of the body, but it can lead to things like nausea, diarrhea, gas, indigestion or other similar complaints. This is particularly true when herbs are just started.

Then there are herbs that are irritants... This is partly because a slight irritation is part of how herbs operate. Let's take the blood cleansing herb: Red Clover Blossoms. Red Clover contains coumaric acid. This acid functions to purify the mucus membranes, clean the congested mucus off of them, get them producing healthy mucus and supplied with adequate blood (which means better immune response) all by irritating the mucus membranes…

Poke root is used for a similar ability that it has to irritate the lymphatic ducts and nodes. It causes them to activate and eliminate wastes in places you might never otherwise reach, even on a good cleanse. One of the ways that herbalists have mediated the strong action of herbs like poke root, is by putting them in a formula that includes some herbs that create protective barriers in the body. Some examples of barrier-producing herbs are licorice, slippery elm, calendula and marshmallow. This is particularly important when using something that is a kidney irritant like… chaparral. These herbs are not really harmful by themselves, and yet it is customary for them to be combined with other herbs that will help ease or change the irritating action. Irritating action of juniper berries, for example, can be eased with marshmallow or it can be changed with ginger, or (more frequently) both. Certainly none of the above herbs are dangerous enough to really get compared to any known over-the-counter drug....

Then we have the issue of herb-drug interactions. Now this is a legitimate concern for one of two reasons. Either the herb will detoxify (make less potent) the drug, as happens with some drugs and St. John's Wort, or the herb will potentiate (make more potent) the drug, as happens with grapefruit. A few interactions have developed a history. This list includes the ability of ginseng, particularly (and maybe only) red processed ginseng to potentiate blood thinners and detox blood pressure drugs; the ability of St. John's Wort to detox MAO inhibitors and indinavir; and the ability of saponin-containing herbs (yucca, licorice, sarsaparilla and others) to slightly strengthen or weaken various drug actions.

It is much more likely that the drugs you take will kill you or hurt you. There is not an herb in use today that is nearly as dangerous as the most benign of drugs. Generally, the action of herbs on drugs is neither desirable or undesirable simply because it usually goes entirely unnoticed… Sometimes, physicians will go on a witch hunt with herbs. If anything goes other than expected and you own up to taking an herb or supplement, the physician will tend to blame the herb. This is certainly not helping the issue or clarifying real concerns. This can happen without even investigating whether it is likely to be true… Fortunately, well trained herbalists will know the interactions and can guide you responsibly. Many physicians are also receiving training in botanical medicines as well and their understanding is growing.

Source:

K. Sellers; *The Side-Effect Challenge: Whole Plant Medicines vs. Drug Counterparts*; http://www.naturalnews.com/022628.html

ANNEX 4

KEY RECOMMENDED READING

Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines; **World Heath Organization Regional Office for the Western Pacific**, Manila, Philippines, 1993; available for download at: http://www.wpro.who.int/NR/rdonlyres/0B3858CD-699A-42FE-AF46-0227FAC43920/0/Research_Guidelines_Evaluating_the_Safety_and_Efficacy_Herbal_Medicines.pdf

General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine; **World Heath Organization**, Geneva, Switzerland, 2000, available for download at: http://whqlibdoc.who.int/hq/2000/WHO_EDM_TRM_2000.1.pdf

WHO Guidelines on Safety Monitoring of Herbal Medicines in Pharmacovigilance Systems; **World Heath Organization**, Geneva, Switzerland, 2004, available for download at: http://www.anvisa.gov.br/farmacovigilancia/trabalhos/who_guidelines.pdf

Good Manufacturing Practices: Updated Supplementary Guidelines for the Manufacture of Herbal Medicines (final draft); **World Heath Organization**, Geneva, Switzerland, July 2005, available for download at: http://www.who.int/medicines/services/expertcommittees/pharmprep/QAS04_050Rev3_GMPHerbal_Final_Sept05.pdf

Safety Issues in Herbal Medicine: Implications for the Health Professions; by: A. K. Drew and S. P. Myers; Medical Journal of Australia, Vol. 166, pp. 538-541, 1997; available for download at: http://mja.com.au/public/issues/may19/drew/drew.html

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Global Harmonization of Herbal Health Claims; by: G. B. Mahady; Journal of Nutrition, Vol. 131, pp. 1120S-1123S, 2001; Program for Collaborative Research in the Pharmaceutical Sciences, College of Pharmacy, **University of Illinois at Chicago**, Chicago, IL USA; available for download at: http://jn.nutrition.org/cgi/content/full/131/3/1120S

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Expertise about Herbs and Dietary Supplements Among Diverse Health Professionals; BMC K. J. Kemper et al.; Complementary and Alternative Medicine, Vol. 6, p. 15, 2006; **Wake Forest University School of Medicine**, Winston-Salem, NC, USA, and **Harvard Medical School**, Boston, MA, USA; available for download at: http://www.biomedcentral.com/content/pdf/1472-6882-6-15.pdf

R. W. Wicke; *Herb Herb & Herb Drug Interactions: Modes of Interaction*; Herbalist Review, Issue 2004 #3; **Rocky Mountain Herbal Institute**; Available to view at: http://www.rmhiherbal.org/review/2004-3.html

M. Borins; *Native Healing Traditions Must be Protected and Preserved for Future Generations*; Canadian Medical Association Journal, Vol. 153 No. 9, Nov. 1995; Available for download at http://www.pubmedcentral.nih.gov/picrender.fcgi?artid=1487479&blobtype=pdf

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