

**American Academy of Clinical Toxicology  
Herbs & Dietary Supplements Special Interest Group  
Abstracting Service**

September 27, 2009

1. Verhelst X, Burvenich P, Van Sassenbroeck D, Gabriel C, Lootens M, Baert D. Acute hepatitis after treatment for hair loss with oral green tea extracts (*Camellia Sinensis*). *Acta Gastroenterol Belg.* 2009;72(2):262-4.  
Nutritional additives based on green tea have been claiming various beneficial health effects. However, several case reports on hepatotoxicity after the intake of green tea derivatives containing *Camellia Sinensis* have been published. We report a patient with an acute hepatitis after intake of an oral green tea derivative claiming protection against hair loss, showing a histological image compatible with drug induced hepatitis. Other important causes of hepatitis were excluded. After cessation of this nutritional additive there was a rapid and sustained recovery. We raise concern about the safety of nutritional additives with few proven beneficial effects and want to emphasize the importance of accurate and thorough history taking, with attention for over the counter drugs and herbal products.
2. Gottignies P, El Hor T, Tameze JK, Lusinga AB, Devriendt J, Lheureux P, De Bels D. Successful treatment of monkshood (*aconite napel*) poisoning with magnesium sulfate. *Am J Emerg Med.* 2009;27(6):755 e1-4.
3. Schep LJ, Slaughter RJ, Beasley DM. Nicotinic plant poisoning. *Clin Toxicol (Phila).* 2009;47(8):771-81.  
INTRODUCTION: A wide range of plants contain nicotinic and nicotinic-like alkaloids. Of this diverse group, those that have been reported to cause human poisoning appear to have similar mechanisms of toxicity and presenting patients therefore have comparable toxidromes. This review describes the taxonomy and principal alkaloids of plants that contain nicotinic and nicotinic-like alkaloids, with particular focus on those that are toxic to humans. The toxicokinetics and mechanisms of toxicity of these alkaloids are reviewed and the clinical features and management of poisoning due to these plants are described. METHODS: This review was compiled by systematically searching OVID MEDLINE and ISI Web of Science. This identified 9,456 papers, excluding duplicates, all of which were screened. Reviewed plants and their principal alkaloids. Plants containing nicotine and nicotine-like alkaloids that have been reported to be poisonous to humans include *Conium maculatum*, *Nicotiana glauca* and *Nicotiana tabacum*, *Laburnum anagyroides*, and *Caulophyllum thalictroides*. They contain the toxic alkaloids nicotine, anabasine, cytisine, n-methylcytisine, coniine, n-methylconiine, and gamma-coniceine. MECHANISMS OF TOXICITY: These alkaloids act agonistically at nicotinic-type acetylcholine (cholinergic) receptors (nAChRs). The nicotinic-type acetylcholine receptor can vary both in its subunit composition and in its distribution within the body (the central and autonomic nervous systems, the neuromuscular junctions, and the adrenal medulla). Agonistic interaction at these variable sites may explain why the alkaloids have diverse effects depending on the administered dose and duration of exposure. TOXICOKINETICS: Nicotine and nicotine-like alkaloids are absorbed readily across all routes of exposure and are rapidly and widely distributed, readily traversing the blood-brain barrier and the

placenta, and are freely distributed in breast milk. Metabolism occurs predominantly in the liver followed by rapid renal elimination. CLINICAL FEATURES: Following acute exposure, symptoms typically follow a biphasic pattern. The early phase consists of nicotinic cholinergic stimulation resulting in symptoms such as abdominal pain, hypertension, tachycardia, and tremors. The second inhibitory phase is delayed and often heralded by hypotension, bradycardia, and dyspnea, finally leading to coma and respiratory failure. MANAGEMENT: Supportive care is the mainstay of management with primary emphasis on cardiovascular and respiratory support to ensure recovery. CONCLUSIONS: Exposure to plants containing nicotine and nicotine-like alkaloids can lead to severe poisoning but, with prompt supportive care, patients should make a full recovery.

4. Burton A. Children's health: methylation links prenatal PAH exposure to asthma. *Environ Health Perspect.* 2009;117(5):A195.
5. Freeman K. Nutrient protection against arsenic toxicity: folate, cysteine support methylation in children. *Environ Health Perspect.* 2009;117(5):A211.
6. Dubey L, Maskey A, Regmi S. Bradycardia and severe hypotension caused by wild honey poisoning. *Hellenic J Cardiol.* 2009;50(5):426-8.  
Wild honey is taken as an alternative medicine for the treatment of gastrointestinal diseases as well as for coronary artery disease. However, wild honey made from the nectar of some species of rhododendron may be poisonous. The cause of the poisoning is the toxin grayanotoxin. Grayanotoxin is a naturally occurring sodium channel toxin that causes life-threatening bradycardia, hypotension, and altered mental status. Complete heart blocks may occur in some patients. We present an interesting case of bradycardia and hypotension due to wild honey ingestion. The symptoms, mechanism, and management of wild honey poisoning are discussed.
7. Eizadi-Mood N, Alfred S, Yaraghi A, Huynh C, Shayesteh Moghadam A. Comparison of arterial and capillary blood gas values in poisoning department assessment. *Hum Exp Toxicol.* 2009.  
The aim of this study was to compare simultaneously obtained arterial and capillary blood gas (CBG) values in comatose-poisoned patients presented with stable vital signs. Forty-five adult patients with a diagnosis of coma because of poisoning and stable vital signs were included in this prospective study. With respect to pH, the arterial blood gas (ABG) and CBG values correlated satisfactorily ( $r(2) = .91$ ) and had an acceptable limit of agreements (LOAs; -0.04 to 0.06). With respect to base excess (BE), the ABG and CBG values correlated well ( $r(2) = .85$ ), but their 95% LOAs seem too wide to allow substitution (-4.4 to 2.7).  $PCO_2$  ( $r(2) = .61$ ),  $HCO_3^-$  ( $r(2) = .71$ ) and  $PO_2$  ( $r(2) = .53$ ) correlated less reliably. A capillary  $PCO_2$  of 51.7 mm Hg had a sensitivity of 100% and a specificity of 95.12% for detecting hypercarbia (area under the curve, 0.99; 95% Confidence Interval, 0.90-0.99;  $p < .0001$ ). In conclusion, CBG analysis for pH may be a reliable substitute for ABG analysis in the initial evaluation of patients presenting with coma and stable vital signs to the poisoning emergency department (PED). Subsequent ABG may be required in patients with capillary  $PCO_2 > 51.7$  mm Hg.
8. Campolongo P, Trezza V, Palmery M, Trabace L, Cuomo V. Developmental exposure to cannabinoids causes subtle and enduring neurofunctional alterations.

*Int Rev Neurobiol.* 2009;85(117-33).

Cannabis sativa preparations are among the illicit drugs most commonly used by pregnant women in Western countries. Although they are often considered relatively harmless, increasing evidence suggests that developmental exposure to cannabinoids induces subtle neurofunctional alterations in the offspring. In the present review, we summarize human and animal evidence examining the behavioral and neurobiological effects of exposure to cannabinoids during pregnancy and lactation. These studies show that the endocannabinoid system plays a crucial role in the ontogeny of the central nervous system and its activation, during brain development, can induce subtle and long-lasting neurofunctional alterations.

9. Vohra R, Seefeld A, Cantrell FL, Clark RF. Salvia divinorum: exposures reported to a statewide poison control system over 10 years. *J Emerg Med.* 2009.  
Background: Salvia divinorum, a hallucinogenic herb, has in recent years become popular among teenagers and young adults. Salvia is presently marketed as a "legal" alternative to other drugs of abuse, but little is known about the clinical toxicity of this substance. Objectives: The purpose of this study is to describe the clinical and demographic features of this emerging substance of recreational abuse using data obtained from the records of a poison control center. Methods: We performed retrospective review of exposures to the herbal hallucinogen Salvia divinorum as reported to the California Poison Control System (CPCS) over the last 10 years. Demographic and clinical data were collected and compiled from the computerized records of the CPCS for the search terms "salvia" and "sage." Results: There were 37 exposures to S. divinorum and 96 exposures to non-hallucinogenic Salvia species. Eighteen (49%) of the exposures were to S. divinorum alone. Intentional Salvia exposures resulted in a variety of neurologic, cardiovascular, and gastrointestinal effects. Notably, the use of concomitant substances of abuse was associated with a high rate of complications and psychomotor disturbances. Conclusions: Intentional use of S. divinorum, whether alone or in combination with alcoholic beverages and other drugs, causes neurologic, cardiovascular, and gastrointestinal effects. This poison-center-based review helps to characterize the clinical toxicity of S. divinorum, but more clinical and pharmacologic research is warranted for this rapidly emerging substance of abuse.
10. Ni LJ, Zhang LG, Hou J, Shi WZ, Guo ML. A strategy for evaluating antipyretic efficacy of Chinese herbal medicines based on UV spectra fingerprints. *J Ethnopharmacol.* 2009;124(1):79-86.  
ETHNOPHARMACOLOGICAL RELEVANCE: Quality analysis and control of Chinese herbal medicines (CHM) or herbal medicines (HM) are being more and more investigated based on fingerprint analysis, and there are also some researches on correlating fingerprints of CHM to their efficacy. Multi-component analysis methods together with fingerprints are considered potential useful tools to select candidate herbal drugs from extracts of herbs in pharmacological/bio-prospecting investigations. AIM OF THE STUDY: To explore a strategy for evaluating efficacy strength of CHM samples based on their spectra fingerprints and validate it. METHODOLOGY: Radix bupleuri (RB), a typical Chinese medicinal herb for relieving exterior syndrome, and Flos lonicerae (FL), Fructus forsythiae (FF), and Radix isatidis (RI) that are widely applied Chinese herbs for heat clearing and detoxifying, were selected as herbal sources. The aqueous extracts, volatile oils and

mixtures of the extracts and oils of the four herbs, plus Ibuprofen suspension (IS), Shuanghuanglian oral liquid (SHL), mixture of SHL and the volatile oils of FL and FF, were used for subject samples to do antipyretic experiments on rats. Ultraviolet spectra were used as the spectra fingerprints to represent chemical characteristics of the samples. Principal component analysis (PCA) and canonical correlation analysis (CCA) were adopted as evaluation tools to establish the correlation between pharmacological and spectra data, from which a spectral index for evaluating antipyretic effects of CHM samples was constructed. Furthermore, four compound samples were designed by mixing 50% volatile oils and 50% aqueous extracts of the four herbs with different ratios to validate the strategy. RESULTS: Efficacy sequence of the 15 calibrating and 4 validating CHM samples, defined by the first canonical correlative variable U(1) of their UV spectra, was consistent with that given by pharmacological experiments. CONCLUSIONS: The strategy proposed in this study could be applied to evaluate efficacy strength of CHM and helpful for screening candidate herbal drugs from different herbs or prepared by different technologies.

11. Fugh-Berman A. Don't Be 'Mis-led': Few Herbal Products have Been Implicated in Lead Poisoning. *J Gen Intern Med.* 2009.
12. Murugesan GS, Sathishkumar M, Jayabalan R, Binupriya AR, Swaminathan K, Yun SE. Hepatoprotective and curative properties of Kombucha tea against carbon tetrachloride-induced toxicity. *J Microbiol Biotechnol.* 2009;19(4):397-402.  
Kombucha tea (KT) is sugared black tea fermented with a symbiotic culture of acetic acid bacteria and yeasts, which is said to be tea fungus. KT is claimed to have various beneficial effects on human health, but there is very little scientific evidence available in the literature. In the present study, KT along with black tea (BT) and black tea manufactured with tea fungus enzymes (enzyme-processed tea, ET) was evaluated for hepatoprotective and curative properties against CCl<sub>4</sub>-induced toxicity, using male albino rats as an experimental model by analyzing aspartate transaminase, alanine transaminase, and alkaline phosphatase in plasma and malondialdehyde content in plasma and liver tissues. Histopathological analysis of liver tissue was also included. Results showed that BT, ET, and KT have the potential to revert the CCl<sub>4</sub>-induced hepatotoxicity. Among the three types of teas tried, KT was found to be more efficient than BT and ET. Antioxidant molecules produced during the fermentation period could be the reason for the efficient hepatoprotective and curative properties of KT against CCl<sub>4</sub>-induced hepatotoxicity.
13. Hall MT, Howard MO. Nitrite inhalant abuse in antisocial youth: prevalence, patterns, and predictors. *J Psychoactive Drugs.* 2009;41(2):135-43.  
The purpose of this study was to examine the prevalence, patterns, and predictors of nitrite inhalant use in antisocial adolescents. Face-to-face interviews were conducted with 723 Missouri youth (M age = 15.5, SD = 1.2) in residential care for antisocial behavior. The lifetime prevalence of nitrite inhalant use was 1.7% (1.3% for boys; 4.3% for girls,  $p = .06$ ), a figure somewhat higher than comparable estimates from the MTF and NSDUH national surveys. Most lifetime users reported nitrite use in the prior year (92%) and experienced intoxication (83%) during periods of nitrite inhalation. Nitrite users had significantly higher scores on measures of somatization, obsessive-compulsive traits, interpersonal sensitivity, impulsivity, fearlessness, suicidality, and polydrug use and were significantly more likely to have suffered a serious head injury and to be White than their non-nitrite-using

counterparts. Nitrite users also reported significantly higher levels of current psychiatric distress related to periods of faintness or dizziness, hot or cold spells, difficulty making decisions, and their "mind going blank" than did non-nitrite users. Antisocial adolescent nitrite users are at substantially elevated risk for serious functional impairments given their high rates of lifetime head injury, comparatively more varied and intensive levels of involvement with psychoactive drugs, and symptom reports suggestive of psychiatric and cognitive dysfunction.

14. Anderson T, Khan NK, Tassinari MS, Hurtt ME. Comparative juvenile safety testing of new therapeutic candidates: relevance of laboratory animal data to children. *J Toxicol Sci.* 2009;34 Suppl 2(SP209-15).  
Differences in drug response in patients of various ages including children and the elderly are common, often leading to challenges in optimizing dosages and duration of use. For example, developmental changes in renal function can dramatically alter the plasma clearance of compounds with extensive renal elimination and thus can enhance renal and systemic toxicity of these drugs. Preclinical and clinical research of new therapeutics is initially focused on adults, and provides little relevant information for children especially those who are still going through skeletal and organ development. The organ systems in the pediatric population that can be most susceptible are lungs, brain, kidneys, immune, skeletal, and reproductive systems. Considering that significant differences can exist between adult and juvenile populations that may affect drug safety, major regulatory agencies around the world are encouraging and sometimes requiring companies to generate preclinical juvenile animal data to predict for potential drug toxicity in children. However, data generated from such studies are useful only if obtained using the most appropriate species at the most relevant age considering comparability of specific organ system development in question. Other factors in the design of juvenile safety studies should include the indication, existing toxicological data and likely route of human exposure. This report will discuss these factors with a focus on reviewing species-specific developmental schedules for specific target organs and relevance of preclinical data in the design and conduct of clinical pediatric studies. Specific examples will be used to discuss the relationship of preclinical juvenile toxicity observations to risk assessment in humans.
15. Fukui Y, Sakata-Haga H. Intrauterine environment-genome interaction and children's development (1): Ethanol: a teratogen in developing brain. *J Toxicol Sci.* 2009;34 Suppl 2(SP273-8).  
Exposure to ethanol during prenatal development can have devastating consequences on developing fetuses, the so-called fetal alcohol spectrum disorders (FASD). Among FASD, cases that exhibit all of three criterion; 1) central nervous system dysfunction, 2) prenatal and postnatal growth deficiency, and 3) characteristic cranial/facial abnormalities, referred as fetal alcohol syndrome (FAS). Children born to drinking mothers may suffer from severe brain damage that is expressed by a variety of behavioral alterations. We examined the effects of ethanol exposure during brain development on brain morphogenesis and circadian rhythm using a rat model. Pregnant Sprague-Dawley (SD) rats were fed a liquid diet containing 2.5-5.0% (w/v) ethanol during gestational days 10 to 21. Mean daily ethanol consumption by these dams was 11.53 +/- 2.54 g/kg/day. In rats prenatally exposed to ethanol, ectopias on the cerebral cortex, aberrant distribution of hippocampal mossy fibers, and fusion of cerebellar folia were found. Rats exposed

to ethanol during the prenatal or postnatal period suffered from a fragile synchronizing system of circadian rhythms in adulthood. Although the prevalence of FAS in Japan is lower than in the United States, the increasing number of Japanese women with the drinking habit are cause for great concern. However, the preventive action of FAS/FASD has been advanced recently, and now alcoholic beverages carry labels warning of the risk of drinking during pregnancy and breastfeeding of babies. Although little is still known about how ethanol affects brain development, the only and most certain way to prevent FAS/FASD is total abstinence from alcohol during pregnancy and breastfeeding.

16. Hayashi Y. Scientific basis for risk analysis of food-related substances with particular reference to health effects on children. *J Toxicol Sci.* 2009;34 Suppl 2(SP201-7).

Based on the advance of toxicology and related sciences, a regulatory regime for the safety of chemicals related to daily life has been rapidly established. Especially for the food-related substances, the process of risk analysis has facilitated the collaboration by all the players including consumers toward the security of their safety. On the other hand, except for pharmaceuticals, science-based decisions and governmental actions on safety issues have not always gained confidence of the public. One of the reasons was the inadequacy in the way of use of scientific knowledge, or in other words, inappropriateness of decision making by "the regulatory science". Regulatory science is a science to warrant the decision making processes for governmental acts (Mitsuru Uchiyama). In the case of chemical safety, it can be redefined as a theoretical concept to complements the uncertainty of scientific knowledge for the decision of governmental acts that is adequate in both scientific and social ways. Therefore, the regulatory science is an indispensable discipline to effectively apply risk analysis. Here, the significance of the regulatory science for the hazard assessment of the chemicals, especially for children is described. In the past, the hazard effects of chemicals have been assessed for adults. Recently, however, the importance of the assessment for children has gained international emphases. Not only for pharmaceuticals, but for food-related substances, the acceptable daily intake (ADI) and tolerable daily intake (TDI) are often set differently for adults and children. The child-specific responses against chemicals are related not only to the physiological factors such as body weight, basal metabolism, but also rapid growth of the body with developmental status of various organs. General knowledge on these issues will be discussed mainly referring the World Health Organization (WHO) documents. Although the cutting edge technology backs up the development of toxicology, it would appear that it is reaching a turning point from technology-centrism to look toward the direction for contribution to society from the stand point of regulatory science.

17. Ito T. Children's toxicology from bench to bed--Liver injury (1): Drug-induced metabolic disturbance--toxicity of 5-FU for pyrimidine metabolic disorders and pivalic acid for carnitine metabolism. *J Toxicol Sci.* 2009;34 Suppl 2(SP217-22). Congenital disorders of metabolism show a wide spectrum of symptoms as a consequence of impairment of a certain metabolic pathway by mutated enzymes resulting in abnormal accumulation of enzyme substrates, deficiency of expected products, and abnormal burden to collateral metabolic pathways, etc. However, in some occasions, depending on which pathway up to what degree of disturbance, it can be asymptomatic until a certain kind of burden is placed on to the patient.

Enzyme deficiency involved in pyrimidine degradation, such as Dihydropyrimidine dehydrogenase (DPD) and Dihydropyrimidinase (DHP), has been reported with convulsion or autism as symptoms, but many asymptomatic cases are also reported. However, when the patients are treated with 5-fluorouracil, a pyrimidine analogue anticancer drug, lethal side-effects can be seen even in asymptomatic patients. Some oral cephem antibiotics have pivalic acid side chain to increase absorption rate at intestine. These antibiotics degrade into active antibiotics and pivalic acid at the intestinal wall. This pivalic acid is carnitine-conjugated and excreted into urine. Carnitine acts as a carrier of long chain fatty acid to mitochondria and to beta-oxidation, thus an important molecule for energy production by beta-oxidation and maintenance of mitochondrial function. Because of this, long term administration of such antibiotics could induce depletion of carnitine from the body and lead to low ketotic hypoglycemia, convulsion and consciousness disturbance. This paper reports some possible serious side effects closely linked to drug metabolism.

18. Cassileth B. Complementary therapies, herbs, and other OTC agents: Reishi mushroom. *Oncology (Williston Park)*. 2009;23(8):728.
19. Realini N, Rubino T, Parolaro D. Neurobiological alterations at adult age triggered by adolescent exposure to cannabinoids. *Pharmacol Res*. 2009;60(2):132-8.  
Marijuana is consistently the most widely used illicit drug among teenagers and most users first experiment it in adolescence. Adolescence is the period between childhood and adulthood, encompassing not only reproductive maturation, but also cognitive, emotional and social maturation and is characterized by a brain in transition that differs anatomically and neurochemically from that of the adult. The endocannabinoid system plays an important role in this critical phase for cerebral development, therefore a strong stimulation by the psychoactive component of marijuana, delta-9-tetrahydrocannabinol, that acts through the cannabinoid system, might lead to subtle but lasting neurobiological changes that can affect adult brain functions and behaviour. The literature here summarized, exploiting animal models of cannabis consumption, points to the presence of subtle changes in the adult brain circuits after heavy cannabis consumption in adolescence. These alterations lead to impaired emotional and cognitive performance, enhanced vulnerability for the use of more harmful drugs of abuse, and may represent a risk factor for developing schizophrenia in adulthood. The few studies examining the neurobiological basis of the altered behaviours demonstrate the presence of stable alteration in the endocannabinoid system that can trigger subsequent alteration in synaptic protein and synaptic morphology, thus altering the responsiveness of selected brain areas to different internal and external stimuli. These pre-clinical observations are strengthened by literature in humans where longitudinal studies often support the experimental results. There is an urgent need of multidisciplinary approaches combining behaviour with neurochemical and genetic studies to build a scientific based opinion on the long-lasting consequences of cannabis use in adolescence.
20. Tuuri RE, Ryan LM, He J, McCarter RJ, Wright JL. Does emergency medical services transport for pediatric ingestion decrease time to activated charcoal? *Prehosp Emerg Care*. 2009;13(3):295-303.  
OBJECTIVE: Activated charcoal (AC) is a potentially beneficial intervention for some toxic ingestions. When administered within one hour, it can reduce absorption of

toxins by up to 75%. This study evaluated whether pediatric emergency department (ED) patients arriving by ambulance receive AC more quickly than patients arriving by alternative modes of transport. METHODS: This was a retrospective review of AC administration in children in a large, urban pediatric ED from January 2000 until January 2006. Patients aged 0-18 years were identified from pharmacy billing codes and the National Capital Poison Center's database. Charts were reviewed for age, gender, triage acuity, disposition, transportation mode, triage time, and time of AC administration; analysis of variance (ANOVA) controlling for these covariates tested the equality of mean time intervals. RESULTS: Pharmacy billing codes identified 394 cases, and poison center records identified 34 cases. Three hundred fifty-one patients met the inclusion criteria. One hundred thirty-eight (39%) were male; 216 (61%) were female. Two-hundred twenty-one (63%) patients were aged 5 years and under; in this subset, 116 were male and 105 were female. Twenty-one (6%) patients were aged 6-12 years; nine were male and 12 were female. One hundred nine (31%) patients were aged 13-18 years; 13 were male and 96 were female. One hundred eighteen (34%) arrived by emergency medical services (EMS). Time from triage to charcoal administration in patients transported via EMS was a mean of 65 minutes (standard deviation [SD] = 44 minutes). Time for the alternative transport group was a mean of 70 minutes (SD = 40 minutes) ( $p = 0.59$ ). In the subset of patients triaged as most acute and arriving by EMS, time to charcoal administration was a mean of 42 minutes (SD = 22 minutes); time to AC in the alternative transport group was a mean of 67.8 minutes (SD = 42 minutes) ( $p = 0.013$ ). CONCLUSION: The sickest patients arriving by EMS had a faster time from triage to AC administration. However, when comparing patients of all triage categories, EMS arrival alone did not influence time to AC administration. Furthermore, the interval from triage to charcoal administration was often insufficiently long. This suboptimal timing of charcoal administration demonstrates the need for reevaluation of triage and prehospital practices.

21. Beuhler MC, Sasser HC, Watson WA. The outcome of North American pediatric unintentional mushroom ingestions with various decontamination treatments: an analysis of 14 years of TESS data. *Toxicol.* 2009;53(4):437-43.  
The optimum empiric decontamination therapy for unintentional pediatric mushroom ingestion is not known. We sought to determine case outcomes for unintentional mushroom ingestions in children by decontamination therapies utilized. The 1992-2005 American Association of Poison Control Centers Toxic Exposure Surveillance System was queried for cases of unintentional acute mushroom ingestions in children age <6 years. Cases were excluded if outcome was unknown, if exposure was coded as unrelated to the symptoms, or if there was co-ingestion of a non-mycoid substance. The treatment subgroups analyzed were ipecac, single-dose activated charcoal, and no gastric decontamination. 82,330 cases met the inclusion criteria with 22,454 cases excluded. There were 16 cases with major effects and no deaths. There were 57,531 cases in the three treatment subgroups. There was a significantly smaller percentage of cases with moderate or major outcomes in the ipecac subgroup compared to the no decontamination subgroup. There was a significantly greater percentage of cases with moderate or major outcomes in the activated charcoal compared to the no decontamination subgroup. If decontamination therapy is being performed, and this data suggests it may not be necessary, syrup of ipecac could still be considered an effective option.

22. Tarantino G, Pezzullo MG, Dario di Minno MN, Milone F, Pezzullo LS, Milone M, Capone D. Drug-induced liver injury due to "natural products" used for weight loss: a case report. *World J Gastroenterol.* 2009;15(19):2414-7.  
Taking herbal-extracts to lose weight is an underestimated health hazard. Often, these products contain active agents that can cause acute liver damage. In this case report, a 22-year-old female patient, who presented with a feature of cholestatic syndrome, was so sure that the "natural products" were not dangerous that she did not inform her physicians that she had taken them, making their task that much more challenging. Clinical presentation mimicked acute cholecystitis and the patient underwent a cholecystectomy. Surgery was without any consequences and complications, although it did not completely cure the illness. She later admitted to having taken herbal remedies and this led to the correct diagnosis of phytotherapy-related hepatotoxicity and a successful therapeutic approach. The true incidence of phytotherapy-related hepatotoxicity and its pathogenic mechanisms are largely unknown. It is important to increase the awareness of both clinicians and patients about the potential dangers of herbal remedies.
23. Tunon MJ, Alvarez M, Culebras JM, Gonzalez-Gallego J. An overview of animal models for investigating the pathogenesis and therapeutic strategies in acute hepatic failure. *World J Gastroenterol.* 2009;15(25):3086-98.  
Acute hepatic failure (AHF) is a severe liver injury accompanied by hepatic encephalopathy which causes multiorgan failure with an extremely high mortality rate, even if intensive care is provided. Management of severe AHF continues to be one of the most challenging problems in clinical medicine. Liver transplantation has been shown to be the most effective therapy, but the procedure is limited by shortage of donor organs. Although a number of clinical trials testing different liver assist devices are under way, these systems alone have no significant effect on patient survival and are only regarded as a useful approach to bridge patients with AHF to liver transplantation. As a result, reproducible experimental animal models resembling the clinical conditions are still needed. The three main approaches used to create an animal model for AHF are: surgical procedures, toxic liver injury and infective procedures. Most common models are based on surgical techniques (total/partial hepatectomy, complete/transient devascularization) or the use of hepatotoxic drugs (acetaminophen, galactosamine, thioacetamide, and others), and very few satisfactory viral models are available. We have recently developed a viral model of AHF by means of the inoculation of rabbits with the virus of rabbit hemorrhagic disease. This model displays biochemical and histological characteristics, and clinical features that resemble those in human AHF. In the present article an overview is given of the most widely used animal models of AHF, and their main advantages and disadvantages are reviewed.