AACT Herbal Dietary Supplements SIG Abstracts November 2018

1. Given Their Potential for Harm, It's Time to Focus on the Safety of Supplements. Carroll AE.

JAMA. 2018 Oct 2;320(13):1306-1307. doi: 10.1001/jama.2018.13147.

(Commentary, paragraph one) Supplements, including vitamins,minerals, and herbal products, are a huge business in the United States. US consumers spend about $30 billion on them every year. Despite uncertain benefits and possible harm, their interest in supplement use, for children as well as adults, remains undeterred.

DOI: 10.1001/jama.2018.13147
PMID: 30285165 [Indexed for MEDLINE]

2. Naturally complex: Perspectives and challenges associated with Botanical Dietary Supplement Safety assessment. Shipkowski KA, Betz JM, Birnbaum LS, Bucher JR, Coates PM, Hopp DC, MacKay D, Oketch-Rabah H, Walker NJ, Welch C, Rider CV.

Food Chem Toxicol. 2018 Aug;118:963-971. doi: 10.1016/j.fct.2018.04.007. Epub 2018 Apr 4.

Due to the extensive use of botanical dietary supplements by consumers in the United States, there is a need for appropriate research and data to support safety assessments. Complexity and variability, both natural and introduced, of botanical dietary supplements make research on these products difficult. Botanical dietary supplements are regulated by the Food and Drug Administration (FDA) under the Federal Food, Drug, and Cosmetic Act (FD&C Act), as amended by the 1994 Dietary Supplement Health and Education Act (DSHEA). They are regulated as a category of food, which differs from the regulation of pharmaceutical products. Both manufacturers and the FDA are faced with the challenge of determining the best approaches for evaluating and monitoring the safety of botanical products. High quality botanicals research requires accurate identification and characterization of the material being studied. Inconsistent results in efficacy studies of botanical dietary supplements have led to efforts to improve the rigor and reproducibility of research in the field. Addressing the challenges associated with botanical dietary supplement safety is a global effort requiring coordination between numerous stakeholders, including researchers, suppliers, manufacturers, and regulators, all of whom play a role in ensuring that high quality products are available on the market.

DOI: 10.1016/j.fct.2018.04.007
PMCID: PMC6087675 [Available on 2019-08-01]
PMID: 29626579 [Indexed for MEDLINE]

3. A Review of the Toxicity of Compounds Found in Herbal Dietary Supplements. Hudson A, Lopez E, Almalki AJ, Roe AL, Calderón AI.

Planta Med. 2018 Jul;84(9-10):613-626. doi: 10.1055/a-0605-3786. Epub 2018 Apr 19.

Use of herbal dietary supplements by the public is common and has been happening for centuries. In the United States, the Food and Drug Administration has a limited scope of regulation over marketed herbal dietary supplements, which may contain toxic botanical compounds that pose a public health risk. While the Food and Drug Administration has made efforts to prohibit the sale of unsafe herbal dietary supplements, numerous reports have proliferated of adverse events due to these supplements. This literature review investigates bioactive plant compounds commonly used in herbal dietary supplements and their relative toxicities. Using primarily the National Library of Medicine journal database and SciFinder for current reports, 47 toxic compounds in 55 species from 46 plant families were found to demonstrate harmful effects due to hepatic, cardiovascular, central nervous system, and digestive system toxicity. This review further contributes a novel and comprehensive view of toxicity across the botanical dietary market, and investigates the toxicity of the top ten botanical dietary supplements purchased in the United States of America to gauge the exposure risk of toxicity to the public. The criteria of measuring toxicity in this review (plant compound, family, quantity, and toxicity effects) across the entire market in the United States, with special attention to

those supplements whose exposure to the consumer is maximal, provides a unique contribution to the investigation of botanical supplements.

DOI: 10.1055/a-0605-3786
PMID: 29672820 [Indexed for MEDLINE]

4. Fatal poisoning by ingestion of Taxus Baccata leaves. Pilija V, Djurendic-Brenesel M, Miletic S.

Forensic Sci Int. 2018 Sep;290:e1-e4. doi: 10.1016/j.forsciint.2018.07.017. Epub 2018 Jul 24.

In this report we describe a first suicide case in Serbia related to ingestion of Taxus baccata leaves. A 30-year old woman was found dead, and the green plant material in a plastic bag was found near her bed. Autopsy revealed dark green needle-like leaves in the stomach, similar to that contained in the plastic bag, and both were botanically identified as Taxus baccata, also known as yew. Using gas chromatography-mass spectrometry (GC-MS), 3,5-dimethoxyphenol (3,5-DMP) as toxicological evidence for the ingestion of yew leaves, was detected in biological samples. As the autopsy showed unspecific findings, and also the routine toxicological examination, based upon 3,5-DMP identification, the cause of death was determined to be suicide, caused by yew poisoning.

DOI: 10.1016/j.forsciint.2018.07.017
PMID: 30064830 [Indexed for MEDLINE]

5. **Case 6: 17-year-old Girl with a Skin Reaction from a Home Remedy.** Fick T, Keshavaram R, McLaughlin D.

Pediatr Rev. 2018 Apr;39(4):218. doi: 10.1542/pir.2016-0201.

DOI: 10.1542/pir.2016-0201
PMID: 29610434 [Indexed for MEDLINE]

6. The second case of a young man with L-arginine-induced acute pancreatitis. Binet Q, Dufour I, Agneessens E, Debongnie JC, Aouattah T, Covas A, Coche JC, De Koninck X.

Clin J Gastroenterol. 2018 Oct;11(5):424-427. doi: 10.1007/s12328-018-0862-4. Epub 2018 Apr 21.

BACKGROUND: Dietary supplementation of arginine has been used by numerous world-class athletes and professional bodybuilders over the past 30 years. L-Arginine indeed enhances muscular power and general performance via maintaining ATP level. However, L-arginine is also known to induce acute pancreatitis in murine models. CASE REPORT: We report the case of young man presenting with upper abdominal pain and increased serum lipase levels. Contrast-enhanced computed tomography confirms a mild acute pancreatitis. Common etiologies have been ruled out and toxicological anamnestic screening reveals the intake of protein powder. This is, to the best of our knowledge, the second case in human of arginine-induced acute pancreatitis. CONCLUSION: This case report suggests that every patient presenting with acute pancreatitis without obvious etiology should be evaluated for the intake of toxics other than alcohol, including L-arginine.

DOI: 10.1007/s12328-018-0862-4
PMID: 29680982 [Indexed for MEDLINE]

7. **Khat (Catha edulis) and its oral health effects: An updated review.** Al-Maweri SA, Warnakulasuriya S, Samran A.

J Investig Clin Dent. 2018 Feb;9(1). doi: 10.1111/jicd.12288. Epub 2017 Aug 19.

Khat or qat (Catha edulis) is a plant that grows in East Africa and southern Arabia. The leaves and twigs of this small tree are chewed by several millions of people worldwide for their stimulating amphetamine-like effects. The reported prevalence of khat chewing in Europe and the USA is on the rise, especially with global migration. Long-term khat chewing has several detrimental general and oral health effects. The aim of the present study was to review the current literature regarding khat use and its association with oral and dental diseases, with particular emphasis on its link with oral keratotic white lesions and oral cancer. We searched

the literature to identify all relevant articles. Studies showed that khat is associated with several oral and dental conditions, including keratotic white lesions, mucosal pigmentation, periodontal disease, tooth loss, plasma cell stomatitis, and xerostomia. There are limited data on the incidence of dental caries among khat chewers. The evidence that khat chewing is a risk factor for oral cancer is still weak, and is mainly based on anecdotal case reports and uncontrolled studies.

DOI: 10.1111/jicd.12288
PMID: 28834423 [Indexed for MEDLINE]

8. The safety of St John's wort (Hypericum perforatum) in pregnancy and lactation: A systematic review of rodent studies. Avila C, Whitten D, Evans S.

Phytother Res. 2018 Aug;32(8):1488-1500. doi: 10.1002/ptr.6099. Epub 2018 Apr 30.

Herbal products are popular among women during the perinatal period. St John's wort (SJW), Hypericum perforatum, is a common remedy for mild depression, a problem prevalent in this population. Although the safety of herbal products must be investigated, ethical issues constrain intervention studies in humans. Hence, animal studies often inform clinical decisions. The objective of this study is to systematically review rodent studies assessing the safety of SJW during the perinatal period. A literature search to November 10, 2017, identified 10 rodent studies that met a priori inclusion criteria. Study quality was evaluated according to both the Systematic Review Centre for Laboratory animal Experimentation tool for assessing bias and recommendations for appropriate reporting of herbal medicine research. Significant methodological limitations were found in each of the studies reviewed. These limitations include the lack of botanical verification and omission of extract characterization, inadequate explanation of dosage rationale, and absence of bias limiting protocols. Critical appraisal with contemporary tools indicates that each of the reviewed studies lacks appropriate rigour, rendering the results unreliable. Despite this, these papers are used in the rationale for recommending or contraindicating SJW during pregnancy and lactation.

DOI: 10.1002/ptr.6099
PMID: 29708295 [Indexed for MEDLINE]

9. The medieval Persian manuscript of Afyunieh: the first individual treatise on the opium and addiction in history. Moosavyzadeh A, Ghaffari F, Mosavat SH, Zargaran A, Mokri A, Faghihzadeh S, Naseri M.

J Integr Med. 2018 Mar;16(2):77-83. doi: 10.1016/j.joim.2018.02.004. Epub 2018 Feb 5

According to historical evidence, the abuse of opium has been reported all over the globe-specifically throughout Eastern nations-since the sixteenth century. Before that, opium had mostly been applied as medication. Reference has been made in traditional Persian medical literature to the method of cultivation, properties, side effects and toxicity. In sixteenth century Iran, during the reign of the Safavids, opium abuse began. It was from then that prominent Persian scholars started to think of solutions to this societal problem. One of the most famous scholars was Imad al-Din Mahmud ibn Mas'ud Shirazi, who composed a book concerning addiction-Afyunieh, a comprehensive book on the topic of opium and all issues of opium. Furthermore, he recommended methods for reducing opium dose as well as substitution with other medications that had a narrower range of side effects, in order to eradicate dependency upon opium and opium-derived materials. This is most likely the first book that comprehensively addressed opium and discussed drug rehabilitation methodology, in traditional Persian medical literature. In this historical review, the authors have introduced the book Afyunieh, which presents methods for treating addiction to and giving up opium; the text comprises a synthesis of the author's opinions, professional experience and references to the work of other famous physicians.

DOI: 10.1016/j.joim.2018.02.004
PMID: 29526240 [Indexed for MEDLINE]

10. **The safety of green tea and green tea extract consumption in adults - Results of a systematic review.** Hu J, Webster D, Cao J, Shao A.

Regul Toxicol Pharmacol. 2018 Jun;95:412-433. doi: 10.1016/j.yrtph.2018.03.019. Epub 2018 Mar 24.

A systematic review of published toxicology and human intervention studies was performed to characterize potential hazards associated with consumption of green tea and its preparations. A review of toxicological evidence from laboratory studies revealed the liver as the target organ and hepatotoxicity as the critical effect, which was strongly associated with certain dosing conditions (e.g. bolus dose via gavage, fasting), and positively correlated with total catechin and epigallocatechingallate (EGCG) content. A review of adverse event (AE) data from 159 human intervention studies yielded findings consistent with toxicological evidence in that a limited range of concentrated, catechin-rich green tea preparations resulted in hepatic AEs in a dose-dependent manner when ingested in large bolus doses, but not when consumed as brewed tea or extracts in beverages or as part of food. Toxico- and pharmacokinetic evidence further suggests internal dose of catechins is a key determinant in the occurrence and severity of hepatotoxicity. A safe intake level of 338 mg EGCG/day for adults was derived from toxicological and human safety data for tea preparations ingested as a solid bolus dose. An Observed Safe Level (OSL) of 704 mg EGCG/day might be considered for tea preparations in beverage form based on human AE data.

DOI: 10.1016/j.yrtph.2018.03.019
PMID: 29580974 [Indexed for MEDLINE]

11. Hepatoprotective effects of berberine on acetaminophen-induced hepatotoxicity in mice. Zhao Z, Wei Q, Hua W, Liu Y, Liu X, Zhu Y.

Biomed Pharmacother. 2018 Jul;103:1319-1326. doi: 10.1016/j.biopha.2018.04.175. Epub 2018 May 7.

Acetaminophen (APAP) hepatotoxicity remains the leading cause of drug-induced liver injury due to the lack of safe and effective therapeutic agents. Berberine (BBR) is a natural alkaloid derived from traditional medicine Rhizoma Coptidis and possesses various pharmacological properties. The aim of this study was to explore the hepatoprotective effects and underlying mechanisms of BBR on APAP-induced hepatotoxicity. Our results indicated that BBR pretreatment significantly ameliorated APAP-induced hepatic pathological abnormalities and attenuated the elevations of serum aminotransferases and liver/body weight ratio. Compared to APAP group, BBR notably increased the levels of hepatic UDP-glucuronosyltransferases and sulfotransferases, whereas failed to ameliorate APAP-induced GSH depletion. Pretreatment with BBR significantly reduced hepatic MDA and MPO levels, inhibited JNK phosphorylation and up-regulated the expression of nuclear Nrf-2 and its downstream gene Mn-SOD. Additionally, BBR obviously prevented APAP-induced DNA fragmentation. Furthermore, BBR pretreatment dramatically reduced the expression of pro-inflammatory cytokines, HMGB1, p-p65 and cleaved caspase-1 and inhibited the infiltration of macrophages and neutrophils. Taken these results together, BBR exhibits notable preventive effects on APAP-induced hepatotoxicity by inhibiting oxidative stress, hepatocyte necrosis and inflammatory response.

DOI: 10.1016/j.biopha.2018.04.175
PMID: 29864914 [Indexed for MEDLINE]

12. Acute ingestion of neuromuscular enhancement supplements do not improve power output, work capacity, and cognition. Bunn JA, Crossley A, Timiney MD.

J Sports Med Phys Fitness. 2018 Jul-Aug;58(7-8):974-979. doi: 10.23736S0022-4707.17.07022-0. Epub 2017 Feb 21.

BACKGROUND: Improving motor unit recruitment and function is trainable and positively affects performance. Evidence suggests that supplementation of choline, uridine, and docosahexaenoic acid (DHA) may also enhance neuromuscular function. The purpose of this study was to assess the influence of acute ingestion of these supplements on anaerobic exercise performance and cognition. METHODS: Twenty college-aged trained males (21.2±1.4 years, 181.2±6.1 cm, 94.4±20.5 kg, and 15.9±6.6% body fat) received the supplements (SUPP: 500 mg alpha glycerophosphocholine [AGPC], 250 mg uridine-5'-monophosphate, and 1500 mg DHA) or a placebo (PLA) in a randomized cross-over study design. All participants completed one familiarization and two experimental testing sessions, consisting of a warm up, vertical jump assessment, 61-kg bench press rep max, and completion of the ImPACT neural cognition test. In the two testing sessions, participants received, in random order, either the SUPP or a PLA, 90 minutes before testing. RESULTS: There was no significant difference between SUPP and PLA on exercise performance or neural cognition ($P>0.05$). CONCLUSIONS: The results of this study indicated no benefit from acute ingestion of a DHA, uridine, and choline supplement versus a placebo on anaerobic performance or cognition. It is likely that acute ingestion of these supplements did not provide the necessary elements to increase acetylcholine

concentration or number of dendritic spines, rather ingestion for a longer time period and subsequent days may provide a benefit.

DOI: 10.23736/S0022-4707.17.07022-0
PMID: 28222577 [Indexed for MEDLINE]

13. Ephedra alkaloid contents of Chinese herbal formulae sold in Taiwan. Chang CW, Hsu SY, Huang GQ, Hsu MC.

Drug Test Anal. 2018 Feb;10(2):350-356. doi: 10.1002/dta.2209. Epub 2017 Jun 23.

Consumption of Ephedra alkaloids is prohibited in-competition by the World Anti-Doping Agency (WADA). In Taiwan, colds are often treated with Chinese herbal formulae containing Herba Ephedrae. We screened products sold in Taiwan and preliminarily assessed their relationships with WADA threshold violations. Fifty-six concentrated powder products, including 19 Chinese herbal formulae that contained Herba Ephedrae, were collected. The content of Ephedra alkaloids, namely ephedrine (E), methylephedrine (ME), norpseudoephedrine (NPE; cathine), pseudoephedrine (PE), and norephedrine (NE; phenylpropanolamine), was determined using a validated high-performance liquid chromatography method. The results revealed that the phenotypic indicators of the collected products, E/PE and E/total ratios, were 1.52-4.70 and 0.49-0.72, respectively, indicating that the Herba Ephedrae species in these products was probably E. sinica or E. equisetina, but not E. intermedia. The contents of E, ME, NPE, PE, and NE and the total alkaloid contents in the daily doses of the products were 0.45-34.97, 0.05-4.87, 0.04-3.61, 0.15-12.09, and 0.01-2.00 mg and 0.68-53.64 mg, respectively. The alkaloid contents followed a relatively consistent order (E > PE > ME ≈ NPE > NE), even for products from different manufacturers. We calculated that single doses of 50.0% and 3.6% of the products would result in the WADA thresholds of E and NPE being exceeded, respectively. Our data provide critical information for athletes and medical personnel, who should be wary of using complex Chinese herbal formulae in addition to over-the-counter products.

DOI: 10.1002/dta.2209
PMID: 28444836 [Indexed for MEDLINE]

14. Use of Dietary Supplements at a Comprehensive Cancer Center. Luo Q, Asher GN.

J Altern Complement Med. 2018 Sep/Oct;24(9-10):981-987. doi:10.1089/acm.2018.0183.

OBJECTIVES: The objectives of this study were to define dietary supplement (DS) use by cancer patients and to investigate factors associated with DS use during cancer treatment. METHODS: A cross-sectional survey of adults diagnosed with breast, colorectal, lung, or prostate cancer in 2010-2012 at the University of North Carolina Comprehensive Cancer Center was conducted. Questionnaires were sent to 1794 patients. Phone calls were made to nonrespondents. The authors described type of DS use before, during, and after initial cancer treatment, source of advice on DS use, and used logistic regression to investigate the association of DS use during or after cancer treatment with clinical/sociodemographic characteristics and source of advice. RESULTS: Six hundred and three (34%) patients completed the questionnaires. Nonvitamin nonmineral DS use during initial cancer treatments was common: any cancer treatment (49%), chemotherapy (52%), and radiation therapy (51%). Among patients seeking advice on DS use, 75% reported professional sources, 44% reported media sources, and 47% reported lay sources. DS use during cancer treatment was strongly predicted by prior DS use, followed by prior complementary therapies' use, receiving DS advice from a cancer care provider, being female, and higher education level. CONCLUSION: DS use is common and persists during cancer treatment. Among DS users during treatment, 18% used an herbal supplement, which are likely to carry greater risk of interaction with chemotherapy agents compared with vitamin, mineral, and other supplements. Although many respondents sought DS advice from professional sources, the use of nonprofessional sources remains high.

DOI: 10.1089/acm.2018.0183
PMID: 30247972 [Indexed for MEDLINE]

15. Energy Drink and Nutritional Supplement Beliefs Among Naval Aviation Candidates. Sather TE, Woolsey CL, Delorey DR, Williams RD Jr.

Aerosp Med Hum Perform. 2018 Aug 1;89(8):731-736. doi: 10.3357/AMHP.5055.2018.

INTRODUCTION: The National Academy of Medicine called for increased research on nutritional supplement use among military members. Current research has suggested potential health risks posed by energy drink consumption. The purpose of this study was to examine the relationship of energy drink consumption and beliefs about nutritional supplements in a U.S. military population. METHODS: Data were collected by means of an anonymous 44-item survey that was administered to and completed by 302 naval aviation candidates (100% response rate) enrolled in aviation preflight indoctrination (API) at Naval Air Station Pensacola, FL. RESULTS: Bivariate correlations indicated a statistically significant relationship between beliefs regarding the safety of energy drinks, energy drink consumption frequency, and personal beliefs regarding supplements [r(202) = -0.23]. The negative correlational coefficient indicated an inverse relationship between favorable perceptions on supplements and energy drink consumption. DISCUSSION: This study assessed beliefs about the safety of nutritional supplements among API candidates and to examine if a relationship between nutritional supplement beliefs and energy drink consumption exists. Results indicated a significant inverse relationship between API candidates' beliefs regarding consumption frequency and safety of energy drinks as well as beliefs regarding supplement use. Results also suggested that the more positively an API candidate perceived nutritional supplements, the less frequently energy drinks were consumed. The findings of this study indicated a weak inverse relationship between the beliefs/use of energy drinks and beliefs regarding the effectiveness of nutritional supplement use among naval aviation candidates.

DOI: 10.3357/AMHP.5055.2018
PMID: 30020058 [Indexed for MEDLINE]

16. Assessment of research waste part 2: wrong study populations- an exemplar of baseline vitamin D status of participants in trials of vitamin D supplementation. Bolland MJ, Grey A, Avenell A.

BMC Med Res Methodol. 2018 Oct 3;18(1):101. doi: 10.1186/s12874-018-0555-1.

BACKGROUND: Research waste can occur when trials are conducted in the wrong populations. Vitamin D deficient populations are most likely to benefit from vitamin D supplementation. We investigated waste attributable to randomised controlled trials (RCTs) of supplementation in populations that were not vitamin D deficient. METHODS: In December 2015, we searched Pubmed, recent systematic reviews, and three trial registries for RCTs of vitamin D with clinical endpoints in adults, and 25-hydroxvitamin D (25OHD) survey data relevant to large ($N \geq 1000$) RCTs. We investigated the proportion of RCTs that studied vitamin D deficient populations, temporal trends in baseline 25OHD, and whether investigators in large RCTs considered relevant 25OHD survey data or systematic reviews in their trial justifications. RESULTS: Of 137 RCTs of vitamin D with clinical endpoints, 118 (86%) reported baseline mean/median 25OHD, which was < 25, 25-49, 50-74, and ≥ 75 nmol/L in 12 (10%), 62 (53%), 36 (31%), and 8 (7%) RCTs, respectively. In 70% of RCTs, baseline 25OHD was > 40 nmol/L. Baseline 25OHD increased over time. Before 2006, 38%, 62%, 0% and 0% of RCTs had baseline 25OHD < 25, 25-49, 50-74, and ≥ 75 nmol/L respectively; in 2011-15, the respective proportions were 9%, 49%, 37%, and 6%. Of 12 RCTs with baseline 25OHD < 25 nmol/L, 8 had neutral findings. Of 25 large RCTs (18 completed, 7 ongoing), 1 was undertaken in a vitamin D deficient population, 3 in vitamin D insufficient populations, and 17 had, or probably will have, baseline 25OHD > 40 nmol/L. 44% (8/18) of large completed RCTs cited relevant prior population 25OHD data, and only 3/10 (30%) relevant prior systematic reviews. CONCLUSIONS: Up to 70% of RCTs of vitamin D with clinical endpoints, 71% of large completed RCTs, and 100% of ongoing large RCTs could be considered research waste because they studied cohorts that were not vitamin D deficient.

DOI: 10.1186/s12874-018-0555-1
PMCID: PMC6171194
PMID: 30285729

17. Trends in and correlates of medical marijuana use among adults in the United States.
Han B, Compton WM, Blanco C, Jones CM.

Drug Alcohol Depend. 2018 May 1;186:120-129. doi: 10.1016/j.drugalcdep.2018.01.022. Epub 2018 Mar 14.

BACKGROUND: Trends in and correlates of medical marijuana use are important to inform ongoing clinical, research, policy, and programmatic efforts. This study assessed trends in and correlates of medical

marijuana use among U.S. adults. METHODS: We analyzed data from approximately 147,200 U.S. civilians aged 18 or older who participated in the 2013-2015 National Surveys on Drug Use and Health. Descriptive analyses, multivariable logistic regressions, and zero-truncated native binomial regressions were applied. RESULTS: Among U.S. adults, the prevalence of medical marijuana use increased from 1.2% in 2013 to 1.6% in 2015 ($p = 0.0007$). After adjusting for covariates, adults residing in medical marijuana states (states with legalized medical marijuana use) were 1.3 times more likely to use marijuana medically in 2015 than in 2013 (adjusted odds ratio (AOR) = 1.3, 95% confidence interval (CI) = 1.03-1.61), and adults in nonmedical marijuana states were 1.4 times more likely to report medical marijuana use in 2015 than in 2013 (AOR = 1.4, 95% CI = 1.05-1.90). Among adults who used marijuana exclusively for medical purposes in the past 12 months, trends in 12-month cannabis use disorders, daily or near daily use, and the number of days of marijuana use remained unchanged during 2013-2015. We identified how correlates of medical marijuana use among adults in medical marijuana states differed from their counterparts in nonmedical marijuana states. CONCLUSIONS: Adults were more likely to use marijuana medically in 2015 than in 2013 in both medical and nonmedical marijuana states. Clinicians need to learn about and address evolving patterns of medical marijuana use in patients.

DOI: 10.1016/j.drugalcdep.2018.01.022
PMID: 29567626 [Indexed for MEDLINE]

18. Investigation of drug products received for analysis in the Swedish STRIDA project on new psychoactive substances. Bäckberg M, Jönsson KH, Beck O, Helander A.

Drug Test Anal. 2018 Feb;10(2):340-349. doi: 10.1002/dta.2226. Epub 2017 Aug 16.

The web-based open sale of unregulated new psychoactive substances (NPS) has shown a steady increase in recent years. Analysis of drug products sold as NPS is useful to confirm the true chemical contents, for comparison with the substances detected in corresponding body fluids, but also to study drug trends. This work describes the examination of 251 drug products that were randomly submitted for analysis in 173 cases of suspected NPS-related intoxications in the Swedish STRIDA project in 2010-2015. Of the products, 39% were powders/crystals, 32% tablets/capsules, 16% herbal materials, 8% liquids, 1% blotters, and 4% others. The analysis involved tandem mass spectrometry and nuclear magnetic resonance spectroscopy. In 88 products (35%), classic psychoactive substances, prescription pharmaceuticals, dietary supplements, or doping agents were found; however, in none of these cases had an NPS-related intoxication been indicated from product markings or patient self-reports. Another 12 products tested negative for psychoactive substances. The remaining 151 products contained 86 different NPS (30% contained ≥2 substances). In 104 drug products, a specific NPS ingredient was indicated based on labelling (69%) or patient self-report; in 92 cases this was also analytically confirmed to be correct. Overall, the NPS products submitted for analysis in the STRIDA project showed a high degree of consistency between suspected and actual content (88%). The results of related urine and/or blood analysis further demonstrated that the patients commonly (89%) tested positive for the indicated NPS, but also revealed that polysubstance intoxication
was common (83%), indicating use of additional drug products.

DOI: 10.1002/dta.2226
PMID: 28600832 [Indexed for MEDLINE]