



Slimquick

Updated: May 22, 2016.

OVERVIEW

Introduction

SLIMQUICK is a popular, proprietary line of multi-ingredient nutritional supplements (MINS) marketed as weight loss products and sold widely in pharmacies and grocery stores as well on the internet. The major ingredients in the products include green tea extract, caffeine and various herbal, fruit and vegetable extracts. There have been rare reports of clinically apparent liver injury in patients taking SLIMQUICK products, the majority of which had clinical features suggestive of green tea hepatotoxicity.

Background

SLIMQUICK is a proprietary product name for an array of multi-ingredient herbal and nutritional supplements (MINS) marketed as aids in weight loss. The SLIMQUICK brand is currently produced by SLIMQUICK Laboratories (Wilmington, DE). The constituents of the various SLIMQUICK products vary, but the main ingredients are green tea, caffeine and extracts of various botanical agents (Rhodoia rosea, Capsicum annum, Chaste tree, turmeric and ginger) as well as several fruit and vegetable extracts (pomegranate, grape, cocoa, pepper). The ingredients and their concentrations in some of the products have been modified over time.

A selection of common SLIMQUICK products that are currently marketed are given in the Table below with a listing of their ingredients as provided in the product labels. Because the products are considered nutritional supplements they are not subject to the usual evaluation of efficacy and safety given to medications. However, all nutritional supplements are subject to rules regarding purity and good manufacturing practices. Nutritional supplements are not recommended for specific medical conditions, but can be advertised as being supportive of general health or a specific tissue or organ health. These multi-ingredient products appear to be generally safe and well tolerated, but prospective studies of their efficacy, tolerance and safety have not been published. Thus, it is not clear whether use of SLIMQUICK products leads to more weight loss than would occur with diet and exercise and if weight loss occurs, what component of the product is responsible.

Selected SLIMQUICK Products (February 2016)

Product Name	Condition	Major Listed Ingredients
SLIMQUICK Pure Regular Strength	Weight loss	Vitamin D [200 IU], Vitamin K [40 mg], Vitamin B6 [4 mcg] Folate [200 mcg], Vitamin B12 [12 mg], Calcium [150 mg] and SLIMQUICK Pure 6 Ways Complex [712 mg]: Green tea leaf extract (Camellia sinensis), caffeine, phosphatidylcholine (soy), Rhodiola rosea root extract, Chaste Tree fruit extract [Vitex agnus-castus]

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Product Name	Condition	Major Listed Ingredients
SLIMQUICK Pure Extra Strength	Weight loss	Niacinamide [20 mg], iodine [75 mcg] and SLIMQUICK Pure Extra Strength 6 Ways Complex [803 mg] which contains: Green tea extract (Camellia sinensis leaf), Caffeine, Rhodiola rosea root extract, Capsicum annum fruit extract, Chaste Tree (Vitex agnus-castus) fruit extract, L-tyrosine, Bacopa monnieri plant extract, Turmeric (Curcuma longa, root), Pomegranate fruit and seed (Punica granatum), Grape root extract (Vitex vinifera), Cocoa seed extract (Theobroma cacao), Brown seaweed plant extract (Undaria pinna), Ginger, Pepper, Gugglesterones
SLIMQUICK Pure Caffeine Free	Weight loss (women)	Vitamins D (200 IU), K (40 mcg), B6 [4 mg] and B12 [12 mcg], Folate [200 mcg], Calcium [150 mg] and SLIMQUICK Caffeine Free 6 Ways Complex [634 mg]
SLIMQUICK Pure Protein	Weight loss	Whey Protein [10 g], Calcium [52 mg], Iron [1 mg], and SLIMQUICK Pure weight Loss Complex [150 mg]: Green tea extract and phosphatidylcholine (from soy).
SLIMQUICK Pure Men	Weight loss (men)	Vitamin D3 [200 IU], Vitamin B6 [1 mg], Magnesium [50 MG], Zinc [15 mg], Selenium [18 mcg] and SLIMQUICK Pure Men Extra Strength 6 Ways Complex [942 mg] with Boron [5 mg]

Hepatotoxicity

The initial reports of liver injury attributed to SLIMQUICK were published in 2012, with subsequent reports in 2014 and 2016, all from the United States. These publications described an acute hepatocellular injury arising within 3 to 12 weeks of starting a SLIMQUICK product that contained green tea extract and caffeine along with several botanical extracts the concentrations of which were not provided. The injury was moderate in severity and resolved within 1 to 2 months of stopping the dietary supplement. At least one case resulted in need for emergency liver transplantation. Immunoallergic features were not present, but several patients had autoantibodies. Liver histology suggested drug induced liver injury rather than autoimmune hepatitis. The injury resolved once the nutritional supplement was stopped, but in some cases corticosteroids were used. Chronic or recurrent injury without reexposure did not occur.

Mechanism of Injury

The liver injury attributed to SLIMQUICK products has been attributed usually to green tea extract, but the mechanism by which this herb might cause liver injury is unexplained. Contamination or misidentification of the herbal components is always a possibility in explaining the appearance of liver injury.

Outcome and Management

The liver injury that has been attributed to SLIMQUICK products has usually been mild-to-moderate in severity and self-limited in course, resolving in 1 to 2 months of stopping the preparations. However, at least one case of acute liver failure requiring liver transplantation has been published. SLIMQUICK products have not been linked to instances of chronic hepatitis or vanishing bile duct syndrome. In patients presenting with acute, unexplained liver injury, all HDS products should be discontinued and the case reported to federal registries. It is also helpful to carefully define what products were being taken and at what doses and for how long. Retrieval of the actual product or products can also be helpful as progress is being made in the identification of ingredients by advanced chemical and biochemical methods. Patients with clinically apparent liver injury attributed to SLIMQUICK products should avoid other dietary supplements with green tea extract.

Drug Class: [Herbal and Dietary Supplements](#), Nutritional Supplements, Multi-Ingredient

CASE REPORTS

Case 1. Acute hepatitis attributed to use of a SLIMQUICK weight loss product.(1)

A 42 year old woman started a weight loss regimen using "Slim Quick Weight Loss 6 Ways Powder" and developed nausea, anorexia, dark urine and jaundice 3 to 4 weeks later, leading her to stop the supplement. She had been in general good health and had no history of liver disease, alcohol use, drug allergies or risk factors for viral hepatitis. Her other medical problems (and medications) included hypertension (labetalol, hydrochlorothiazide and felodipine), hayfever and asthma (fexofenadine with pseudoephedrine), gastroesophageal reflux disease (esomeprazole) and depression (nortriptyline). She had taken these medications chronically and she continued them during the episode of jaundice. When first seen 5 days after stopping the weight loss powder, she was jaundiced. The BMI was 30.9 kg/m². Laboratory tests showed a total bilirubin of 9.5 mg/dL (5.7 direct), ALT 1020 U/L, AST 923 U/L and alkaline phosphatase 190 U/L (R ratio=12.5). The serum albumin was 3.6 g/dL and INR 1.1. Tests for hepatitis A, B, C and E were negative. The ANA was strongly positive at 1: 1:1280, but SMA and AMA were negative. An abdominal ultrasound was normal except for slight hepatomegaly. She did not undergo liver biopsy and did not receive corticosteroids. She was hospitalized but for one day only. She began to improve soon after the weight loss product was stopped. Jaundice cleared within a month as did clinical symptoms. While serum ALT levels remained moderately elevated for 3 to 4 months, all liver tests were normal when she was seen 6 and 12 months after onset. [Modified from Case #6 in Cited Reference 1.]

Key Points

Medication:	SLIMQUICK
Pattern:	Hepatocellular (R=12.5)
Severity:	3+ (jaundice, hospitalization)
Latency:	1 month
Recovery:	Within 6 months
Other medications:	Labetalol, hydrochlorothiazide, felodipine, fexofenadine with pseudoephedrine, esomeprazole and nortriptyline, all taken chronically and continued

Laboratory Values

Time After Starting	Time After Stopping	ALT (U/L)	Alk P (U/L)	Bilirubin (mg/dL)	Other
34 days	5	1020	190	9.5	Admission
35 days	6	872	167	9.1	
7 weeks	2 weeks	596	201	10.2	INR 1.1
2 months	1 month	299	204	3.2	
3 months	2 months	446	210	1.7	
4 months	3 months	364	265	1.2	
5 months	4 months	207	153	1.0	
7 months	6 months	40	90	1.0	Normal
1 year	1 year	33	76	1.0	Normal
Normal Values		<55	<125	<1.2	

Comment

Green tea hepatotoxicity typically presents with jaundice and an acute viral hepatitis-like syndrome, and a markedly hepatocellular pattern of serum enzyme elevations and rapid improvement upon stopping. SLIMQUICK contains high concentrations of green tea extract, although formulations frequently change. Because SLIMQUICK, like many dietary supplements, is a brand of many products with many ingredients, it is difficult to implicate a specific ingredient of the product as the cause for liver injury. Other listed components of SLIMQUICK included calcium, chromium, potassium Garcinia cambogia, Gymnema sylvestre leaf extract, glucomannan, alpha-lipoic acid, willow bark extract, L-carnitine, caffeine, guarana extract, gelatin, silica and cellulose.

PRODUCT INFORMATION

REPRESENTATIVE TRADE NAMES

SLIMQUICK®

DRUG CLASS

Herbal and Dietary Supplements

COMPLETE LABELING

Product labeling at DailyMed, National Library of Medicine, NIH

CHEMICAL FORMULAS AND STRUCTURES

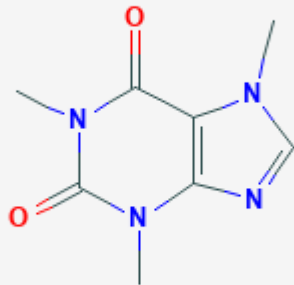
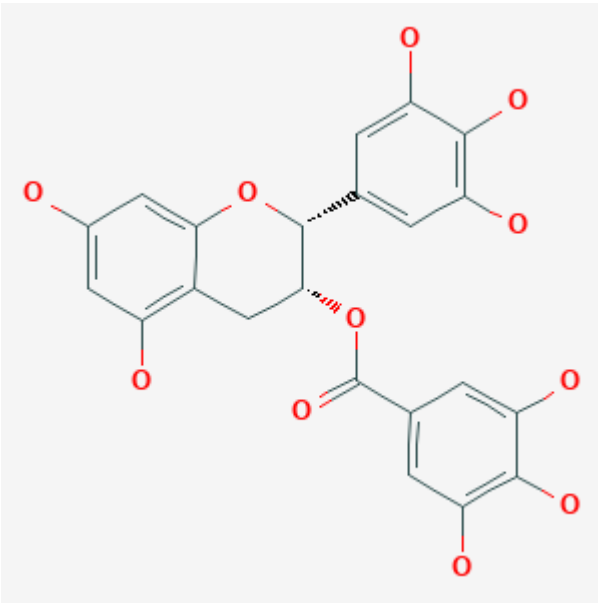
DRUG	CAS REGISTRY NUMBER	MOLECULAR FORMULA	STRUCTURE
Caffeine	58-08-2	C ₈ -H ₁₀ -N ₄ -O ₂	 The image shows the chemical structure of caffeine, a purine alkaloid. It consists of a fused bicyclic ring system: a six-membered pyrimidine ring fused to a five-membered imidazole ring. The pyrimidine ring has two carbonyl groups (C=O) at the 2 and 6 positions. The imidazole ring has two methyl groups (CH ₃) attached to the nitrogen atoms at the 1 and 3 positions. The structure is drawn with blue lines for the carbon and nitrogen atoms, and red lines for the oxygen atoms. The methyl groups are shown as simple lines.

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DRUG	CAS REGISTRY NUMBER	MOLECULAR FORMULA	STRUCTURE
Epigallocatechin Gallate (EGCG) (Green tea extract; Camellia sinensis)	989-51-5	C ₂₂ -H ₁₈ -O ₁₁	

CITED REFERENCE

- Zheng EX, Rossi S, Fontana RJ, Vuppalanchi R, Hoofnagle JH, Khan I, Navarro VJ. Risk of liver injury associated with green tea extract in SLIMQUICK(®) weight loss products: results from the DILIN Prospective study. *Drug Saf.* 2016;39:749–54. PubMed PMID: 27189593.

ANNOTATED BIBLIOGRAPHY

References updated: 22 May 2016

Zimmerman HJ. Unconventional drugs. Miscellaneous drugs and diagnostic chemicals. In, Zimmerman, HJ. *Hepatotoxicity: the adverse effects of drugs and other chemicals on the liver.* 2nd ed. Philadelphia: Lippincott 1999; pp. 731-4.

(Expert review of hepatotoxicity published in 1999; green tea and SLIMQUICK products are not discussed).

Seeff L, Stickel F, Navarro VJ. Hepatotoxicity of herbals and dietary supplements. In, Kaplowitz N, DeLeve LD, eds. *Drug-induced liver disease.* 3rd ed. Amsterdam: Elsevier, 2013, pp. 631-58.

(Review of hepatotoxicity of herbal and dietary supplements [HDS]).

Russo MW, Galanko JA, Shrestha R, Fried MW, Watkins P. Liver transplantation for acute liver failure from drug-induced liver injury in the United States. *Liver Transpl.* 2004;10:1018–23. PubMed PMID: 15390328.

(Among ~50,000 liver transplants reported to UNOS between 1990 and 2002, 270 [0.5%] were done for drug induced acute liver failure, including 7 [5%] for herbal medications, but the specific herbals implicated were not listed).

García-Cortés M, Borraz Y, Lucena MI, Peláez G, Salmerón J, Diago M, Martínez-Sierra MC, et al. Liver injury induced by “natural remedies”: an analysis of cases submitted to the Spanish Liver Toxicity Registry. *Rev Esp Enferm Dig.* 2008;100:688–95. PubMed PMID: 19159172.

(Among 521 cases of drug induced liver injury submitted to Spanish registry, 13 [2%] were due to herbals, but SLIMQUICK products were not mentioned).

Jacobsson I, Jönsson AK, Gerdén B, Hägg S. Spontaneously reported adverse reactions in association with complementary and alternative medicine substances in Sweden. *Pharmacoepidemiol Drug Saf.* 2009;18:1039–47. PubMed PMID: 19650152.

(Review of 778 spontaneous reports of adverse reactions to HDS to a Swedish Registry found 31 with increased liver enzymes, 26 with elevated aminotransferase levels, 22 with mixed liver reaction and 12 with hepatitis; agents implicated in causing liver injury included valerian, ginseng, green tea, and aloe vera, but SLIMQUICK products were not specifically mentioned).

Reuben A, Koch DG, Lee WM; Acute Liver Failure Study Group. Drug-induced acute liver failure: results of a U.S. multicenter, prospective study. *Hepatology.* 2010;52:2065–76. PubMed PMID: 20949552.

(Among 1198 patients with acute liver failure enrolled in a US prospective study between 1998 and 2007, 133 [11%] were attributed to drug induced liver injury, of which 12 [9%] were due to herbals, including several herbal mixtures, usnic acid, Ma Huang, black cohosh, and Hydroxycut; green tea was not specifically mentioned).

Stickel F, Kessebohm K, Weimann R, Seitz HK. Review of liver injury associated with dietary supplements. *Liver Int.* 2011;31:595–605. PubMed PMID: 21457433.

(Review of current understanding of liver injury from herbal and dietary supplements focusing upon Herbalife and Hydroxycut products, green tea, usnic acid, noni juice, Chinese herbs, vitamin A and anabolic steroids).

Weinstein DH, Twaddell WS, Raufman JP, Philosophe B, Mindikoglu AL. SlimQuick™ associated hepatotoxicity in a woman with alpha-1 antitrypsin heterozygosity. *World J Hepatol.* 2012;4:154–7. PubMed PMID: 22567188.

(24 year old woman developed fatigue and jaundice 3 months after starting SLIMQUICK [bilirubin 4.0 mg/dL, ALT 2615, Alk P 200 U/L, INR 1.2], with no improvement for 4 weeks after stopping, enzymes decreasing to normal within one month of starting prednisone which she was later able to stop and had normal liver tests in follow up; testing showed heterozygosity [MZ] of alpha-1-antitrypsin).

Bunchorntavakul C, Reddy KR. Review article: herbal and dietary supplement hepatotoxicity. *Aliment Pharmacol Ther.* 2013;37:3–17. PubMed PMID: 23121117.

(Systematic review of literature on HDS associated liver injury discusses green tea hepatotoxicity, but does not specifically mention SLIMQUICK products).

Teschke R, Schulze J, Schwarzenboeck A, Eickhoff A, Frenzel C. Herbal hepatotoxicity: suspected cases assessed for alternative causes. *Eur J Gastroenterol Hepatol.* 2013;25:1093–8. PubMed PMID: 23510966.

(Review of the literature of case series of suspected HDS related liver injury found evidence of other explanations for the liver injury in 19 of 23 publications involving 278 of 573 patients [49%], and that these other diagnoses weakened the causality assessment in most instances).

Björnsson ES, Bergmann OM, Björnsson HK, Kvaran RB, Olafsson S. Incidence, presentation and outcomes in patients with drug-induced liver injury in the general population of Iceland. *Gastroenterology.* 2013;144:1419–25. PubMed PMID: 23419359.

(In a population based study of drug induced liver injury from Iceland, 96 cases were identified over a 2 year period, including 15 [16%] due to herbal and dietary supplements, but none were attributed to green tea or a SLIMQUICK product).

Licata A, Macaluso FS, Craxì A. Herbal hepatotoxicity: a hidden epidemic. *Intern Emerg Med.* 2013;8:13–22. PubMed PMID: 22477279.

(Review and commentary on herbal hepatotoxicity discusses pyrrolizidine alkaloids, green tea, Echinacea, kava, usnic acid, ephedra and products made by Herbalife, Hydroxycut and LipoKinetix, but not SLIMQUICK).

Navarro VJ, Seeff LB. Liver injury induced by herbal complementary and alternative medicine. *Clin Liver Dis.* 2013;17:715–35. PubMed PMID: 24099027.

(Review of HDS induced liver injury including regulatory problems, difficulties in diagnosis and assessing causality; discusses cases of liver injury attributed to green tea, but does not specifically mention SLIMQUICK).

Navarro VJ, Barnhart H, Bonkovsky HL, Davern T, Fontana RJ, Grant L, Reddy KR, et al. Liver injury from herbals and dietary supplements in the U.S. Drug-Induced Liver Injury Network. *Hepatology.* 2014;60:1399–408. PubMed PMID: 25043597.

(Among 85 cases of HDS associated liver injury [not due to anabolic steroids] enrolled in a US prospective study between 2004 and 2013, 24 were attributed to green tea extracts and 6 implicated SLIMQUICK products).

Rossi S, Navarro VJ. Herbs and liver injury: a clinical perspective. *Clin Gastroenterol Hepatol.* 2014;12:1069–76. PubMed PMID: 23924877.

(Review of HDS induced liver injury including regulatory problems, difficulties in diagnosis and assessing causality; discusses green tea hepatotoxicity but not specifically SLIMQUICK).

Navarro VJ, Lucena MI. Hepatotoxicity induced by herbal and dietary supplements. *Semin Liver Dis.* 2014;34:172–93. PubMed PMID: 24879982.

(Review of HDS induced liver injury including regulatory problems, difficulties in diagnosis and assessing causality; mentions green tea, but does not specifically discuss SLIMQUICK products).

Whitsett M, Marzio DH, Rossi S. SlimQuick™-Associated hepatotoxicity resulting in fulminant liver failure and orthotopic liver transplantation. *ACG Case Rep J.* 2014;1:220–2. PubMed PMID: 26157882.

(52 year old woman developed acute liver failure 3 weeks after taking SLIMQUICK for 2 days [bilirubin 16.5 mg/dL, ALT 945 U/L, Alk P 210 U/L, INR 2.82] and underwent successful liver transplantation shortly thereafter, the explant showing confluent necrosis).

Seeff LB, Bonkovsky HL, Navarro VJ, Wang G. Herbal products and the liver: a review of adverse effects and mechanisms. *Gastroenterology.* 2015;148:517–532. PubMed PMID: 25500423.

(Extensive review of possible beneficial as well as harmful effects of herbal products on the liver mentions that multi-ingredient supplements for weight loss have been implicated in many cases of liver injury).

Stickel F, Shouval D. Hepatotoxicity of herbal and dietary supplements: an update. *Arch Toxicol.* 2015;89:851–65. PubMed PMID: 25680499.

(Extensive review of liver injury due to HDS, discusses green tea hepatotoxicity, but does not specifically mention SLIMQUICK).

Chalasani N, Bonkovsky HL, Fontana R, Lee W, Stolz A, Talwalkar J, Reddy KR, et al; United States Drug Induced Liver Injury Network. Features and outcomes of 899 patients with drug-induced liver injury: The DILIN Prospective Study. *Gastroenterology.* 2015;148:1340–52. PubMed PMID: 25754159.

(Among 899 cases of drug induced liver injury enrolled in a prospective database between 2004 and 2012, HDS were implicated in 145 [16%], of which 6 were attributed to SLIMQUICK products: see Navarro [2014] and Zheng [2016]).

Zheng EX, Rossi S, Fontana RJ, Vuppalanchi R, Hoofnagle JH, Khan I, Navarro VJ. Risk of liver injury associated with green tea extract in SLIMQUICK(®) weight loss products: results from the DILIN Prospective study. *Drug Saf.* 2016;39:749–54. PubMed PMID: 27189593.

(Among 899 cases of drug induced liver injury enrolled in a prospective study between 2004 and 2013, 6 [~1%] were attributed to a SLIMQUICK weight loss product, all were adult women, ages 22 to 58 who presented with hepatitis 12-66 days after starting SLIMQUICK [bilirubin 0.4 to 9.5 mg/dL, ALT 446 to 1732 U/L, Alk P 81-239 U/L], 5 were jaundiced, 3 hospitalized, 1 required liver transplantation, the remaining recovering after stopping).

García-Cortés M, Robles-Díaz M, Ortega-Alonso A, Medina-Caliz I, Andrade RJ. Hepatotoxicity by Dietary Supplements: A tabular listing and clinical characteristics. *Int J Mol Sci.* 2016;17:E537. pii. PubMed PMID: 27070596.

(Listing of published cases of liver injury from HDS products including more than 50 attributed to green tea which is a constituent of many commercial weight loss supplements including SLIMQUICK [Weinstein 2012, Whislett 2014]).