



### **A164 Available Without a Prescription - The Presence of Pharmaceuticals in Dietary Supplements**

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After attending this presentation, attendees will have an overview of cases encountered by the FDA's Forensic Chemistry Center (FCC) involving dietary supplements and the methodology used to detect pharmaceuticals found in the products.

This presentation will impact the forensic community by providing an overview of pharmaceuticals being found in dietary supplements readily available to the public.

A dietary supplement, as defined by the Food and Drug Administration, is a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet. The dietary ingredients in these products may include: vitamins, minerals, herbs or other botanicals. The Dietary Supplement Health and Education Act of 1994 (DSHEA) places dietary supplements in a special category under the general umbrella of foods, however it regulates supplements under a different set

of regulations than conventional food. Under these regulations, dietary supplement manufacturers are responsible for ensuring the safety of their product before it is marketed. The FDA is responsible for taking action against any unsafe dietary supplement only after it reaches the market. This, combined with the fact that manufacturers are generally not required to register their products with the FDA and the vast availability of products on the internet, provides an open invitation for many dietary supplement formulations to contain unlawful ingredients.

The Forensic Chemistry Center (FCC) has a history of analyzing a wide variety of nutritional supplements with weight loss supplements receiving more attention recently. The Chinese Journal of Public Health published a 2002 inspection of herbal weight-reducing dietary supplements on the market in a province in China which stated that approximately one-third of "natural" dietary supplements were found to contain prohibited drugs. Products for weight-loss commonly encountered by the FCC have contained compounds such as ephedrine alkaloids, 2,4-dinitrophenol, synephrine, and phentermine. According to a recent inspection and investigation, the adulteration of supplements marketed to and exported from China showed that the principal illegal adulterants were fenfluramine, phenolphthalein, sibutramine, and orlistat. Press Releases urging members of the public to not consume or buy certain weight-loss products containing these types of compounds have been emerging from areas such as Hong Kong and Canada for the past several years. In addition, analogs of these compounds are becoming more prevalent in these products. Some believe that manufacturers are adulterating their products with drug analogs to avoid being detected by ordinary laboratory methods. Regardless of the intention behind using drug analogs in dietary supplements, or more specifically in weight-loss products, the presence of these compounds is increasing and the occurrence of these products domestically continues to rise. Over the last year, the FCC has seen products containing desmethylsibutramine, di-desmethylsibutramine, and the N-formamide derivative of didesmethylsibutramine.

A recent survey of dietary supplements indicated for weight loss was conducted at the FCC. The samples were prepared using a MeOH extraction and analyzed using GC-MS. To broaden the scope of compounds detected by GC, the MeOH extracts are also derivatized with bis(trimethylsilyl)trifluoroacetamide. In addition, the samples were prepared for quantitative analysis by HPLC-UV using a 0.1N HCl extraction. Most products analyzed using GC-MS were found to contain sibutramine and/or sibutramine analogs. Moreover, based on the quantitative results some of the pharmaceuticals were present at therapeutic levels. In addition, other unrelated drugs were observed at trace levels in the GC-MS screen. It is suspected that poor manufacturing practices may have resulted in cross contamination adding to the problems observed with some of these products.

#### **Dietary Supplements, Prescription Drugs, Sibutramine**