Meeting the Demand for Quality Dietary Supplements
The promise of improved physical and mental health has helped drive interest in dietary supplement products here in the U.S. as well as in other established and emerging economies around the world. From food additives to vitamins and minerals, dietary supplements are becoming an essential component in the daily diet of many health-conscious consumers, providing important nutritional balance and helping them to better deal with age-related physical and mental conditions. As healthcare costs continue to escalate, some consumers are even relying on dietary supplements as an alternative to traditional medical treatments.

In the U.S., most dietary supplements are classified as food by the U.S. Food and Drug Administration (FDA), and are beyond the same rigorous oversight as prescription drugs and over the counter medications. Unfortunately, the FDA has received more than 10,000 reports of adverse reactions to dietary supplements during the period between 2008 and 2013. In addition, the FDA estimates that about 70% of nutritional supplement manufacturers have failed to follow FDA-mandated good manufacturing practices during that same period. These and other concerns have raised the level of scrutiny of dietary supplements by regulators and consumers alike.

This UL white paper discusses how manufacturers can meet consumer demand for quality dietary supplements while reducing the risks associated with unexpected adverse reactions and product recalls. The paper begins with a brief overview of the dietary supplement marketplace and a summary of the regulations applicable to dietary supplements in the U.S. The paper then discusses the primary health and safety concerns about dietary supplements among consumers, and the potential risks to manufacturers and retailers whose products fail to meet regulatory requirements or consumer expectations. The white paper proposes a multi-step preventative action plan for dietary supplement manufacturers and retailers, and identifies the potential benefits of such an approach.
What Are Dietary Supplements?

The term dietary supplement is generally used to describe any product taken by mouth that contains an ingredient or ingredients specifically intended to supplement a diet. Dietary supplement products come in a variety of forms, such as vitamin and mineral products, herbal supplements, and specialized nutritional products like protein powders. Dietary ingredients in supplement products can include vitamins and minerals, herbs and other botanical ingredients, and substances such as amino acids, enzymes and metabolites in concentrated or extract form.

Research by McKinsey & Company places the global value of the market for dietary supplements, including vitamins, minerals and nutritional supplements, at $82 billion (USD) annually. Equally important, the future growth in the market for dietary supplements is expected remain strong, growing between 5-6% per year through 2017. These growth prospects reportedly reflect the increase in health-conscious consumers as well as aging populations in the U.S., the European Union and Japan.

By most accounts, the U.S. market for dietary supplements is the largest in total size and in the number of dietary supplement product offerings. According to a separate report by Euromonitor International, the sale of vitamins, minerals and supplements reached nearly $23 billion (USD) in the U.S. in 2012, with future annual growth projected at approximately 4%. More than 85,000 dietary supplement products are currently available in the U.S. and more than half of the U.S. population regularly takes one or more dietary supplements, primarily in the form of multivitamin and multimineral products.

Health and Safety-Related Concerns about Dietary Supplements

Despite consumers’ general acceptance of their potential health and nutritional benefits, dietary supplement products sold in the U.S. are not required to be independently tested for safety or efficacy prior to being placed on the market. Instead, manufacturers are solely responsible for evaluating the safety and proper labeling of their products for compliance with FDA regulations.

Although the vast majority of dietary supplements on the market are safe, the FDA receives thousands of consumer complaints and adverse reaction reports every year in connection with dietary supplements. In addition, there have been multiple independent reports and studies pointing to potentially significant health and safety issues related to dietary supplements on the market. Most of these issues can be categorized as follows:

- **Product composition**—The actual ingredient composition of dietary supplements often deviates from the composition stated on a product’s label. For example, Canadian researchers evaluating 44 different herbal products commercially available in the U.S. and Canada found that 32% of samples subject to DNA evaluation contained none of the herbal ingredient listed on the label, while 59% of samples contained plant species that were completely omitted from the label.

- **Quantity of ingredients**—In addition, quantities of listed ingredients can vary widely from the amounts stated on a product’s label, exposing consumers to unsafe levels of certain ingredients. In one study, researchers linked cases of acute selenium toxicity in over 200 patients to a liquid dietary supplement that contained 200 times the selenium concentration listed on the supplement’s label.

- **Safety of ingredients**—In some cases, dietary supplements contain toxic metals and other potentially harmful ingredients. In a widely publicized study, researchers determined that more than 20% of ayurvedic medicines sold in the U.S. via the Internet included detectable levels of lead, mercury or arsenic in excess of daily intake standards. In a separate instance, an FDA laboratory analysis determined that a product marketed as a vitamin B dietary supplement...
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actually contained two potentially harmful anabolic steroids that were omitted from the label. One of the two steroids, methasterone, is a Schedule III controlled substance in the U.S.¹¹

- Product-related health claims—Finally, some manufacturers promote dietary supplements by making false or exaggerated claims regarding health-related benefits associated with the use of their products. For example, an Arizona-based company marketed liquid homeopathic drops as a weight-loss dietary supplement that the company falsely claimed would help consumers achieve rapid and significant weight loss.¹²

These and other quality and safety issues related to dietary supplements have raised legitimate concerns among consumers, and have prompted many retailers to establish quality and safety requirements within their existing procurement practices. This practice can be especially important when a retailer is sourcing dietary supplement products to be labeled and sold under the retailer’s proprietary brand, since the retailer would be directly implicated in cases of quality and safety issues related to their products.

Regulatory Oversight of Dietary Supplements, Dietary Supplement Manufacturers

In the U.S., the FDA regulates both finished dietary supplement products and ingredients found in dietary supplements. As previously noted, dietary supplements are outside of the strict oversight accorded drugs and pharmaceutical products. Instead, they are categorized as a type of food product, and must comply with regulations promulgated under the federal Dietary Supplement Health and Education Act (DSHEA) of 1994 and other more recent legislation.

Under current FDA regulations, manufacturers and distributors are directly responsible for evaluating the safety and labeling of their products prior to marketing them for sale, and are prohibited from marketing products that are adulterated or misbranded. The regulations also place with the FDA the responsibility for proving that a dietary supplement presents a significant or unreasonable risk of illness or injury, or contains an ingredient or other substance that could be injurious to human health.

Although dietary supplement products themselves are subject to relatively limited regulatory oversight, manufacturers, importers and distributors of dietary supplements are still responsible for meeting a number of FDA requirements. These requirements are described in the sections that follow.

Registration of Food Facilities

Regardless of where they are located, manufacturers of dietary supplement products must register their production facilities with the FDA. This requirement applies to any facility that manufacturers, processes, packs or holds food for human or animal consumption in the U.S.

Registered food facilities are subject to periodic inspection by FDA personnel, and registration can be suspended in cases where the FDA determines that a given facility is responsible for a food product with a reasonable probability of causing serious adverse health consequences or death to humans or animals. Food facility registration must be renewed every other year.¹³

Adoption of Good Manufacturing Practices

As of June 2010, all companies that manufacturer, package, hold or distribute finished dietary supplement products must comply with the FDA’s requirements regarding good manufacturing practices (GMPs) specifically for dietary supplements. In brief, compliance with GMP provisions involves the following requirements and/or activities:

- Establishing and following written procedures for physical plant sanitation, manufacturing operations, quality control functions, laboratory testing, packaging and labeling, and product complaints
- Establishing and maintaining written master manufacturing records and batch production records
- Establishing production and process control system specifications
- Establishing and maintaining quality control systems and procedures
• Conducting identity testing of dietary ingredients as well as a sample of finished products to assess whether they meet product specifications

The GMP requirement for dietary supplement products applies to all domestic and foreign countries that manufacture, package, label or hold dietary supplements, and is also applicable to those entities involved in testing, quality control, packaging, labeling and distribution activities.¹⁴

Labeling Requirements
The FDA also regulates dietary supplement labels, package inserts and other product literature that may accompany a dietary supplement. Regarding labeling, the FDA requires that dietary supplement product labels include, at a minimum, the following information:

• A “statement of identity,” that is, the name of the dietary supplement

• The “net quantity of contents,” that is, the amount of the supplement contained in the package

• Nutrition labeling, also referred to as “Supplement Facts”

• A list of all ingredients contained in the supplement

• A U.S. phone number or complete U.S. mailing address that allows consumers to notify the company in case of a serious adverse event.

In meeting the above minimum information requirements, manufacturers and distributors must make sure that any and all information and/or product claims that appear on the product label are truthful and not misleading.¹⁵ It is also important to note that, in addition to FDA labeling requirements for dietary supplements, the U.S. Federal Trade Commission (FTC) has oversight over the advertising of dietary supplements. FTC regulations address the truthfulness of claims made in advertising and other promotional materials for dietary supplements, and are in addition to FDA regulations.

Recording and Reporting of Adverse Events
Under FDA regulations, manufacturers, distributors and retailers of dietary supplements are required to maintain records and reports of all adverse events related to their products. These records are subject to inspection by FDA officials upon request. In addition, companies distributing or offering for sale dietary supplements are required to report to the FDA any information they receive regarding all serious adverse events. To facilitate this required reporting process, the FDA has recently initiated a new Internet-based reporting mechanism that allows companies to file adverse event reports online. Finally, as previously noted, FDA regulations require that labels on dietary supplement products include information that can facilitate the prompt and efficient reporting of serious adverse events associated with a specific dietary supplement.

Notification Process for New Dietary Ingredients
“New dietary ingredients” are ingredients that were used in any dietary supplement marketed in the U.S. in 1994 or later. Manufacturers and distributors who wish to market dietary supplement products with any such ingredient must first provide the FDA with a premarket notification at least 75 days before the product is introduced into interstate commerce in the U.S.

The premarket notification for a product containing a new dietary ingredient must contain information about the ingredient, along with evidence or other information demonstrating that the supplement containing the new ingredient will generally be safe when used in a manner consistent with the information accompanying the dietary supplement. Although the FDA does not currently prescribe the specific information required, it recommends that manufacturers conduct a thorough search of available scientific literature for evidence of safety and for any adverse effects associated with the use of the ingredient.¹⁶

The Cost of Noncompliance
Given the dramatic increase in adverse events reported to the agency, the FDA has recently stepped up inspection activities in connection with dietary supplement manufacturers and distributors. According to one independent analysis of FDA records, 444 of 626 inspections of GMPs at
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dietary supplement manufacturing or distribution facilities conducted from 2010 through 2012 produced a finding of possible violations of FDA regulations. The same analysis indicated that, during 2012, 116 dietary supplement firms received a warning letter, citing anywhere from two to 58 separate violations. In recent years, the FDA has also initiated legal action against several dietary supplement makers for violations of GMP regulations and for the misbranding of products. In one case, the FDA issued a permanent injunction against a Pennsylvania-based dietary supplement manufacturer for its failure to comply with GMP requirements, and for failing to report serious adverse events connected with the company’s products. The injunction required the producer to cease production and distribution of more than 400 dietary supplements. In a separate case, U.S. marshals seized dietary supplements produced by a Wisconsin manufacturer that made false claims regarding the safety and effectiveness of its dietary supplements in treating a number of diseases. The action followed multiple inspections of the company’s facilities by FDA inspectors that uncovered numerous violations of the FDA regulations.

Aside from the consequences for noncompliance with FDA requirements, manufacturers may also be subject to private legal action and more. For example, in a civil enforcement case settled in early 2014, an Ohio company agreed to pay nearly $1.8 million (USD) for promoting its line of dietary supplements based on health claims that were unsubstantiated, false or misleading. The company is now bound by a permanent injunction that will prevent it from marketing or selling dietary supplements in the future.

As the above cases illustrate, the cost of noncompliance can lead to dire regulatory and legal consequences for manufacturers of dietary supplements. Of course, even for those manufacturers who eventually prevail in such cases, unwanted publicity can adversely impact the public image of a company and its products with consumers. This can result in reduced demand for otherwise legitimate and helpful products, and place a company at risk.

Action Plan for Dietary Supplement Manufacturers

The most successful programs for compliance with FDA’s regulations for dietary supplements usually involve a multi-step approach involving every aspect of a producer’s operation, from raw material sourcing to final product validation. Here are some of the key aspects of an effective compliance plan for dietary supplement manufacturers and distributors:

• Sourcing of quality materials—Quality dietary supplement products start with quality ingredients and materials. Manufacturers should establish a responsible sourcing program that assures the quality and purity of the raw materials used, regardless of their source. Such a program can include random factory audits, batch checks to assure product quality and periodic independent testing of ingredients.

• Good manufacturing practices—FDA regulations requires all manufacturers, distributors, packagers or holders of dietary supplements to implement and maintain GMPs. But more than a regulatory requirement, a good GMP program can help a producer to achieve production efficiencies that can improve overall product quality and even reduce production costs.

• Product testing—Production processes should incorporate raw material and finished product testing to assess whether product specifications are being achieved and to quickly identify potential production challenges. Such testing can assess microbiological, analytical or physical qualities of raw materials and finished products as well as possible contamination.

• Information management—A robust information management system is a critical tool to assure the retention of important data and other records and to facilitate the creation of meaningful reports. It also provides evidence of compliance with FDA GMP requirements related to documentation. Detailed and well-organized data may also address retailer requirements for

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evidence of quality and safety in product production.

- **Independent validation testing**—The best compliance programs rely on the use of independent third parties to periodically confirm product content and to verify the absence of any harmful substances. In addition, product packaging that displays the validation mark of a qualified third party can provide consumers with assurances regarding the quality and integrity of a dietary supplement.

- **Employee training**—Finally, an effective regulatory compliance program requires an ongoing commitment to employee education and training. A commitment to training means that employees are more likely to understand the reasons for specific policies and activities and to have a greater appreciation for their role in producing safe, quality products.

Manufacturers of dietary supplements who proactively implement these and other initiatives are not only better positioned to achieve compliance with FDA requirements. They are also more likely to reduce the incidence of adverse events and product recalls associated with their products. In doing so, manufacturers can strengthen their position in a highly competitive marketplace, providing retailers and consumers alike with assurances regarding the quality, purity and safety of their dietary products.

### Conclusion

The U.S. market for dietary supplement products is highly competitive with more than 85,000 different products currently available to consumers. Unfortunately, quality and safety issues are a significant concern, with a growing number of adverse events and product recalls resulting in increased negative publicity for the industry and greater scrutiny by the FDA and other regulators. Manufacturers can reduce their risk and strengthen their market position with retailers and consumers by taking specific steps to assure the quality and safety of their dietary supplement products.

With over 50 years of in-depth dietary supplement knowledge and expertise, UL helps manufacturers and retailers meet the demand for high-quality, safe and effective products. UL uses recognized test methods to determine the quality and integrity of dietary supplements. In addition, UL can help clients implement and maintain effective quality assurance programs, including independent audits to maintain supply chain integrity.

For additional information about UL’s testing, verification and auditing services for dietary supplements, contact QAInfo@ul.com or visit www.ul.com/consumer-products.
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Works Cited


