



## Nutra Manufacturing Relies on PerkinElmer Analytical Instrumentation to Ensure High-Quality Nutraceuticals

**Robert Thomas, Scientific Solutions Inc.**

It is estimated that nearly two-thirds of the American population takes at least one type of nutraceutical health product. For those of you who don't, or have never heard of nutraceuticals, they are classified as food products such as nutrients, vitamins, dietary supplements and herbal products,

which may provide possible health benefits. The word "nutraceutical" is in fact derived from a combination of the words "nutrition" and "pharmaceutical". The nutraceutical industry in the United States represents almost \$100 billion annually, and according to many business reports, the market is continually growing as the population gets older.<sup>1</sup>

### **Nutra Manufacturing Inc.**

One of the leading producers of nutraceutical health products in the U.S. is the Nutra Manufacturing Company, headquartered in Greenville, South Carolina (SC). In business since 1976, it has quickly risen to become one of the leading manufacturers of high-quality nutraceuticals worldwide. Such was the demand

for its products, that in 1999 they built a second manufacturing plant in Anderson, SC. A major reason for Nutra's success is its reputation for producing nutraceuticals of the highest quality. It is well recognized that its standards meet and exceed the needs of the industry in delivering the highest-quality health products on the market. Its products are certified by agencies across the globe, allowing it to produce, package and ship to over 40 countries worldwide. Some of its certifications include:

- **FDA** – U.S. Food and Drug Administration Licensed Plant for Dietary Supplements and OTC Drugs
- **USP** – U.S. Pharmacopeia Certified Manufacturing Facility for Tablets and Softgels
- **NSF** – National Sanitation Foundation Certified Manufacturing Facility
- **TGA** – Therapeutic Goods Administration, Australia's FDA Certification for Dietary Supplements
- **HALAL** – Certified as Permissible According to Islamic Law as a Halal Manufacturing Facility
- **KOSHER** – Certified as Permissible According to Jewish Law as a Kosher Manufacturing Facility

### Investing in the ELAN ICP-MS

A critical component of Nutra's mission to produce high-quality nutraceuticals is the company's two PerkinElmer® ELAN® ICP-MS systems to carry out mainly heavy-metal determinations. The first one was an ELAN 9000 purchased in 1999 – this was a bold step for a manufacturer of nutraceuticals, because most of the industry was still using the old USP method for the determination of the heavy metals Pb, As, Cd and Hg, a colorimetric method using hydrogen sulfide gas. As a result, it was one of the very first nutraceutical manufacturers to adopt ICP-MS as a routine QC tool. They used the ELAN 9000 for about eight years, and then to keep up with an increasing number of samples,

an ELAN DRC™-e was added in 2007. They currently run up to 50 samples per day on each instrument. Russell Brown, their Quality Control Manager, sums up their dependence on the two ELANs:

*"ICP-MS has become an integral part of the testing of raw materials and finished products at our company. Before we invested in the technique, we used to use the old USP method, which was very complicated and time-consuming. Using our two ELANs, we are able to analyze 6-8 times as many samples per day as we used to. In my opinion, these instruments are the most important equipment we own, particularly to conform to California Proposition 65 compliance for the determination of Pb."*

### Support

This kind of high sample workload was one of the major reasons they chose PerkinElmer instrumentation, as explained by Mr. Brown.

*"We are accustomed to same-day/next-day service with all our PerkinElmer equipment. Being a high-volume laboratory, it is critical that we minimize downtime. The quality of PerkinElmer's service was one of the major reasons we chose both of our ELAN ICP-MS systems."*

This kind of endorsement is confirmation that PerkinElmer's level of support is second to none in the industry, and this not only relates to service support, but also extends to application support. This is exemplified by the installation of their ELAN DRC-e in 2007. Once Nutra had carried out all the pre-installation work (power supply ventilation, gas supplies, etc.), their instrument was installed by the local PerkinElmer service engineer in less than a day. And with the help of their local product specialist, they developed a method and were running samples already the next day. Some of their more complex matrices took a little longer, but even for samples that required the unique capabilities of the Dynamic Reaction Cell™ (DRC), they were carrying out QC testing of many of their products and raw materials within 2-3 days after installation.



PerkinElmer ELAN DRC-e ICP-MS in Nutra's QA/QC laboratory.



Raw material warehouse at Nutra's Anderson, South Carolina plant.

## Unique Capabilities

The ELAN DRC-e ICP-MS, in particular, has eliminated an analytical problem they couldn't previously resolve with their ELAN 9000. One of their formulations contains high levels of molybdenum. Unfortunately, when ionized in the ICP, it forms the molybdenum oxide ( $^{98}\text{Mo}^{16}\text{O}^+$ ) polyatomic spectral interference, which interferes with the major isotope of Cd at mass 114 amu. Less sensitive Cd isotopes can be used, but most of them still have oxide interferences from one of the other seven isotopes of molybdenum. With the ELAN DRC-e ICP-MS, they developed a method using oxygen as a reaction gas in the Dynamic Reaction Cell. By reacting oxygen with the  $^{98}\text{Mo}^{16}\text{O}^+$  interference, they were able to generate the  $^{98}\text{Mo}^{16}\text{O}^{16}\text{O}^+$  complex at mass 130 and move it away from  $^{114}\text{Cd}^+$ , the major isotope of Cd. As a result, they were able to achieve extremely low detection limits for Cd in the molybdenum/nutraceutical formulation, something they weren't able to do on their ELAN 9000 ICP-MS. And we can also say without hesitation that this would not have been achievable on instruments that rely on collisional mechanisms using kinetic energy discrimination (KED).

## Chromatography

Having a high-profile customer like Nutra Manufacturing Inc. using PerkinElmer equipment, demonstrates that the instruments can perform in a tough, real-life situation, in the rapidly expanding nutraceuticals marketplace. The ELAN DRC ICP-MS, in particular, has become the dominant collision/reaction cell ICP-MS system in a variety of markets, since the technology was introduced over ten years ago. However, it is also encouraging that in addition to the two ELAN ICP-MS systems, Nutra has invested in three PerkinElmer Clarus® GC systems for the determination of fatty acids and cholesterol in fish oils. They also have 27 PerkinElmer HPLC systems for the analysis of vitamins and active components in herbal materials.

PerkinElmer, Inc.  
940 Winter Street  
Waltham, MA 02451 USA  
P: (800) 762-4000 or  
(+1) 203-925-4602  
[www.perkinelmer.com](http://www.perkinelmer.com)

## Manufacturing

Clearly the instruments have to perform in an extremely high-throughput environment. Nutra's manufacturing plant has 11 bottle lines, which can fill up to 200 bottles per minute and 3 carton lines that can fill up to 450 packs per minute – making a very diverse range of nutraceuticals, including a full array of vitamins, fish body oils, cod liver oil, beta carotene, garlic capsules, lecithin and many more nutrients and herbal formulations. When the bottle lines are working at full capacity, 150 million bottles are produced every year.<sup>2</sup>

We'll leave the last words to Russell Brown.

*"My QC department has to support not only the quality of the final products, but also all the incoming raw materials. As a result, we are a very, very high-volume lab. There is no question – we would not be able to do this without our PerkinElmer equipment and the extremely high level of support we have come to expect."*

Thank you, Russell, for giving PerkinElmer the opportunity to help Nutra Manufacturing become one of the leading global producers of high-quality nutraceuticals. We look forward to supporting you in the future as you continue to grow.

## References

1. Wikipedia – Nutraceuticals: <http://en.wikipedia.org/wiki/Nutraceutical>
2. Nutra Manufacturing Website – <http://nutramfg.com/>



For a complete listing of our global offices, visit [www.perkinelmer.com/ContactUs](http://www.perkinelmer.com/ContactUs)

Copyright ©2010, PerkinElmer, Inc. All rights reserved. PerkinElmer® is a registered trademark of PerkinElmer, Inc. All other trademarks are the property of their respective owners.

009320\_01