

Pharmanex® BioPhotonic Scanner S2



Positioning Statement

The patented Pharmanex BioPhotonic Scanner is a cutting-edge testing tool that noninvasively measures carotenoid levels in living tissue, providing an immediate indication of a person's overall carotenoid antioxidant levels. The Pharmanex S2 offers several advantages over the previous S1 model, including quicker calibration and faster scan times. Now Distributors have the option to upgrade to the most recent innovation in scanner technology. The optional Everest Edition upgrade makes the S2 faster to set up—and its self-calibrating technology eliminates the need for p-Cal. Now new software is also included with the Everest Edition upgrade. This new Everest Edition v.6 software streamlines your business activities with innovative tools designed to facilitate business building and product sales.

Concept

The Pharmanex S2 is extraordinary science...personalized, revolutionized, simplified. By simply placing your hand in front of the S2's blue light, you receive a score that will empower you to make improvements to your overall antioxidant levels through nutrition and supplementation with LifePak® and g3*.

Personalized. The S2 brings cutting-edge nutritional science out of the laboratory and into your home. Every friend and family member can instantly know their own status, making the supplementation decision more urgent. Their motivation grows as they watch their scores rise while taking their Pharmanex® supplements and making important diet and lifestyle changes. As a Distributor you can help your customers develop a personal nutrition regimen fitted to their needs, and you can attract individuals who clearly see the business implications of this revolutionary tool.

Revolutionized. In 2002, the hardware required to provide an accurate scan occupied an entire 10x10 room. Creating a tabletop

model was an engineering feat resulting in the patented, proprietary technology in the original S1 scanner. The advancements released with the S2 made the scanner 50 percent lighter, 60 percent smaller, and less temperature sensitive and provided a faster warm-up time. Clinically proven in multiple studies, this revolutionary technology is quickly becoming the gold standard for carotenoid antioxidant indication in human tissue.

Simplified. The Pharmanex S2 technology means you can take extraordinary science anywhere. With its self-calibrating technology, the optional S2 Everest Edition upgrade simplifies scanning by reducing set-up time and eliminating calibration steps and the need for p-Cal. The Everest Edition v.6 software is designed for your Scanner laptop and helps streamline your business activities with business-building tools and the ability to order product right from the laptop. Now your business is not constrained by the limits of technology.

Everest Edition Technology

Pharmanex scientists were aware that the p-Cal method of calibration introduced potential interruptions to a smooth scanner setup, even in typical settings. When Pharmanex entered into a collaboration with university researchers who were studying the effects of free radicals during extreme altitude mountain climbing, it became clear that p-Cal calibration would not be possible in such extreme environments. Faced with the challenge of modifying a single Pharmanex BioPhotonic Scanner S2 for use during a study on Mount Everest, Pharmanex scientists were pushed to the cutting-edge—to develop a self-calibrating technology.

After releasing the Everest Edition upgrade in 2007, Nu Skin surveyed Scan Operators to assess the Scanner's impact on business building and to identify opportunities for improvement. This survey led to the Everest Edition v.6 software, which empowers

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distributors with more effective business tools that are available right on their Scanner laptop.

Primary Benefits

- A quick and convenient way to obtain a biomarker of your overall antioxidant network.
- Ability to track your Skin Carotenoid Score over time as you make important diet and lifestyle changes.
- Consumers can verify improvements in status from taking Pharmanex® products.
- Reduced set-up time for the Pharmanex Scanner S2 and self-calibrating technology with the optional S2 Everest Edition upgrade.
- Everest Edition v.6 software includes access to videos, presentations, sign-up tools, the Internet, product ordering, and more.
- We believe it's a business opportunity like no other in the world.

What Makes This Product Unique?

- World's first immediate, noninvasive method of measuring overall antioxidant activity (skin carotenoids).
- Patented technology exclusive to Pharmanex.
- 60% smaller, 50% lighter, and 30% faster scans.
- More versatile so you can scan virtually anywhere in hot or cold conditions.

Who Should Use This Product?

Anyone who is mindful of his or her current and future health should take the opportunity to get scanned.

Did You Know?

- According to the National Academy of Sciences, carotenoids are the best biological markers for consumption of fruits and vegetables.
- Two clinical studies show that carotenoid levels correlate to levels of many other non-carotenoid antioxidants.
- Your Skin Carotenoid Score can be influenced by diet, a supplementation regimen, body fat percentage, lifestyle, and genetics.

Frequently Asked Questions

How can I upgrade to the S2 Everest Edition?

The S2 Everest Edition upgrade is optional and should be initiated through your local office. To initiate the upgrade process, you will need to fill out and return the S2 Everest Edition Upgrade Interest form. You will need to return your current S2 and laptop for hardware and software upgrades; a new Everest Edition unit will arrive to you soon after you return your current unit. Operation of your new S2 Everest Edition will remain the same as your previous S2 with the exception that you will no longer have to use p-Cal or calibrate. Your Scanner laptop will also be updated with the Everest Edition v.6 software, which contains enhanced business-building capabilities. You will not need additional training.

What if I already upgraded to the S2 Everest Edition and I want the Everest Edition v.6 software?

If you previously upgraded to the Everest Edition, you can add the Everest Edition v.6 software to your laptop through a free CD upgrade kit. Contact your local market for information on how to receive the CD kit.

What does the optional S2 Everest Edition upgrade include?

The optional S2 Everest Edition upgrade includes the installation of new hardware and software that eliminates the need for the p-Cal method of calibration and also includes the installations of the Everest Edition v.6 software. The new additional hardware allows the scanner to retain its factory calibration throughout its life. This eliminates the need to calibrate each time you set up and the need to recalibrate every five hours. The S2 Everest Edition is not a new scanner unit or new model. After you ship your S2 to your local office, a Pharmanex scanner technician will install newly developed technology into your existing unit. Upgraded units can be identified by an external "Everest Edition" sticker.

What does the Everest Edition v.6 software include?

The Everest Edition v.6 software includes the ability to perform a variety of business-building activities right from your Scanner laptop: view videos and presentations, view marketing and educational materials, order Nu Skin and Pharmanex products, enroll new customers and distributors, sign up for ADR/ADP, access the Internet through high-speed Broadband connection, and access online tools, including My Office, volumes, genealogy, and much more.

What was Pharmanex's interest in collaborating with the Mount Everest study?

In the spring of 2007, Pharmanex collaborated with university researchers to investigate oxidative stress at high altitudes on Mount Everest. Among other noninvasive technologies used during the expedition, a Pharmanex BioPhotonic Scanner (Raman Spectroscopy) unit was specially adapted for high altitude conditions, with the intention to be used to measure changes in skin carotenoids status throughout the climb. This study was the first to use Raman Spectroscopy at high altitude. Not only did the performance of the specially adapted BioPhotonic Scanner unit establish its functionality in extreme conditions, but the adaptations pioneered for this study also led to advancements in the calibration of Raman Spectroscopy. Due to the extreme conditions of Mount Everest, one of the principle researchers suffered altitude sickness and was evacuated for medical care. This unexpected misfortune inhibited the Mount Everest research team's ability to gather sufficient data from which to draw skin carotenoid related conclusions. Certainly the safety of individuals supersedes the importance of scientific findings, yet Pharmanex's involvement in the Mount Everest study has led to landmark scientific advancements in calibration never before achieved in the field of Raman Spectroscopy.

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How does calibration differ from S1 scanner units to S2 units with and without the optional Everest Edition upgrade?

The S2 (non-upgrade option) only requires a two color calibration (white and blue), while the S1 requires a four color calibration (white, blue, red, yellow). Although the S2 Everest Edition units are self-calibrating and do not use p-Cal, all variations of the Pharmanex BioPhotonic Scanner (S1, S2, and S2 Everest Edition) require a dark scan.

What does the Pharmanex BioPhotonic Scanner measure?

The S2 measures the level of carotenoid antioxidants in the skin. The level of skin carotenoids is a good reflection of carotenoids in the body, which is an important indicator of the strength of your body's overall antioxidant defense system. Recent clinical studies show that carotenoids are the most reliable predictor of other antioxidants (Svilaas, 2004).

How does the Pharmanex BioPhotonic Scanner S2 work?

The S2 scanner takes a quantum leap forward in Raman Spectroscopy. Now LEDs provide a light source that is less susceptible to the effects of heat and humidity than laser technology. As with the S1 scanner, the S2 functions on the principle of reflected and scattered light discovered by C.V. Raman in 1930, and adapted for the assessment of carotenoids in living tissues by Gellermann et al. in 2000. Raman Spectroscopy is based on the fact that essentially each species of molecules in the body can reflect a different set of colors when stimulated with a light source of a known frequency. Therefore, this color spectrum is a unique optical fingerprint of a particular molecule species. There are three LEDs in the S2 unit; two are used for the skin carotenoid measurement and one for internal calibration. The two that perform the measurement are tuned to 471.3 nm and 473.0 nm. Only one of the LEDs is on at any given time. When these two frequencies of blue light hit a carotenoid molecule in the palm of the hand the carotenoids reflect back green light at 507.8 nm and 509.8 nm, which is detected by PMTs. A computer converts these two reflected frequencies into two peaks; each peak is used in the quantification of the tissue carotenoid levels used to generate the Skin Carotenoid Score.

What does my Skin Carotenoid Score mean?

Your Skin Carotenoid Score is an immediate numeric reading of your own skin carotenoid content and an important indicator of the overall strength of your body's antioxidant defense system. As you continue to participate in the LifePak® supplementation program, you can track your Skin Carotenoid Score for evidence of improved antioxidant activity and protection.* Based on our studies, your Skin Carotenoid Score can increase after only four weeks of LifePak supplementation and may continue to increase after eight and 12 weeks. Knowing your Skin Carotenoid Score empowers you with

a personalized assessment that can be used to develop an antioxidant defense strategy.

Is the Pharmanex BioPhotonic Scanner backed by science?

The use of Raman Spectroscopy for biological measurements is an established scientific discipline backed by years of research. The Pharmanex BioPhotonic Scanner S1 and S2 are patented applications of Raman Spectroscopy for the measurement of carotenoid antioxidant nutrients in living tissue for the improvement of nutrition. The use of biophotonics to assess biological molecules in living tissue is a distinct scientific discipline, and the Pharmanex BioPhotonic Scanner is an instrument that is based on the same principles. The use of Raman Spectroscopy for the assessment of human tissue carotenoids has been validated by at least eight peer-reviewed studies conducted by third party entities unrelated to Pharmanex or the supplementation industry (Bernstein, 1998, 2002; Ermakov, 2004a, 2004b; Gellermann, 2004, 2002; Hata, 2000; Zhao, 2003).

In addition, Pharmanex has validated the use of Raman Spectroscopy for the measurement of carotenoids in several studies including a large scale clinical screening study with 1,375 subjects that confirmed a correlation between antioxidant status and lifestyle parameters (Smidt, 2003). A second study established efficacy of LifePak to improve the antioxidant status of subjects over a 12 week period (Smidt, 2002), and a third study established a highly significant correlation ($r=0.78$, $p < 0.001$) between blood carotenoid levels and skin carotenoid levels as assessed by the Pharmanex BioPhotonic Scanner (Smidt, 2004a). A fourth study was presented at the 45th Annual Meeting of the American College of Nutrition in Long Beach, California (Zidichouski, 2004). The study demonstrated that the Pharmanex BioPhotonic Scanner measurement has less variability than blood carotenoids (measured by the conventional HPLC method). A fifth study was presented by Dr. James Rippe at the National Meeting of the American College of Sports Medicine in June 2004 (Indianapolis, IN). This study confirmed that in overweight and obese individuals the level of adipose tissue accumulation negatively influenced skin carotenoid levels, and thus antioxidant status.

A sixth study was recently completed to establish skin carotenoid levels as an indicator of overall antioxidant status. The researchers investigated correlations between skin carotenoid levels (Pharmanex BioPhotonic Scanner) and blood serum antioxidants (vitamins C and E and carotenoids by HPLC), as well as urinary isoprostanes, which are widely regarded as the best measure of oxidative stress in the body. Together these results confirm that the Pharmanex BioPhotonic Scanner is a very good noninvasive indicator of overall antioxidant status in the body, as well as a good indicator of overall oxidative stress.

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How do skin carotenoids correlate to overall antioxidant status?

A recent study conducted by Svilaas et al. established carotenoids as a reliable indicator of other dietary antioxidants. Svilaas and his colleagues assessed antioxidant intake from diets of more than 2,670 adults, and evaluated blood serum antioxidants of 61 individuals for seven consecutive days. Svilaas et al. reported that carotenoids are a better predictor of serum antioxidant concentrations than alpha, beta, delta, and gamma-tocopherols or glutathione (Svilaas, 2004). In agreement with Svilaas' findings, Pharmanex research shows a highly significant inverse correlation between skin carotenoids and oxidative stress (urinary isoprostanes as a measure of actual free radical damage). Together these results confirm that the Pharmanex BioPhotonic Scanner is the best non-invasive indicator of overall antioxidant status in the body, as well as a good indicator of overall oxidative stress.

Two recent studies conducted by Pharmanex showed a highly significant correlation between serum total carotenoids and skin carotenoids as assessed by Raman Spectroscopy. The first of these two studies (n=104) showed a correlation of $r=0.78$ ($p < 0.001$), and the second (n=372) produced three separate correlation plots (range 0.78–0.82, $p < .0001$), all highly significant (Smidt 2004; Zidichouski 2004). These data bridge the findings of Svilaas to validate Raman Spectroscopy as a method to assess skin carotenoid status as an indication of broad-spectrum antioxidant status, without the inconvenience of skin and blood samples.

Key Scientific Studies

Bernstein, P.S. Raman detection of macular carotenoid pigments in intact human retina. *Invest Ophthalmol Vis Sci.* 1998 Oct;39(11):2003–11.

Bernstein, P.S., et al. *Ophthalmology* 2002. 109(10):1780–7.

Bernstein, P.S., Gellermann, W. Measurement of carotenoids in the living primate eye using resonance Raman spectroscopy. *Methods Mol Biol.* 2002;196:321–9.

Carlson, J., Stavens, S., Holubkav, R., Zidichouski, J., Mastaloudis, A., Smidt, C., Askew, E. Associations of antioxidant status, oxidative stress, with skin carotenoids assessed by Raman spectroscopy (RS); *FASEB J* (2006;20:A824.3).

Ermakov, I.V., et al. Noninvasive selective detection of lycopene and beta-carotene in human skin using Raman spectroscopy. *J Biomed Opt.* 2004. 9(2):332–8.

Ermakov, I.V., et al. Macular pigment Raman detector for clinical applications. *J Biomed Opt.* 2004, 9(1):139–48.

Gellermann, W., Bernstein, P.S. Noninvasive detection of macular pigments in the human eye. *J Biomed Opt.* 2004. 9(1):75–85.

Gellermann, W., et al. In vivo resonant Raman measurement of macular carotenoid pigments in the young and the aging human retina. *J Opt Soc Am A Opt Image Sci Vis.* 2002. 19(6):1172–86.

Gellermann, W., Zidichouski, J.A., Smidt, C.R., Bernstein, P.S. Raman Detection of Carotenoids in Human Tissue. In: Packer, L., Obermueller-Jevic, U., Kraemer, K., and Sies, H. eds. *Carotenoids and Retinoids—Molecular Aspects and Health Issues.* Champaign, IL: AOCS Press, 2005: Ch. 6, 86–114.

Hata, T.R., et al. Noninvasive raman spectroscopic detection of carotenoids in human skin. *J Invest Dermatol.* 2000 Sep;115(3):441–8.

Mayne, S.T. NIH funded study in progress: Novel, Noninvasive Biomarker of Fruit & Vegetable Intake, Computer Retrieval of Information on Scientific Projects. Grant Number 1R01CA096838–01A1.

Smidt, C.R., Burke, D.S. Nutritional Significance and Measurement of Carotenoids. *Curr Topics Nutraceut. Res.* 2(2):79–91, 2004.

Smidt, C.R. Clinical Screening Study: Use of the Pharmanex BioPhotonic Scanner to assess skin carotenoids as a marker of antioxidant status. Pharmanex Internal Study Report, 2003.

Smidt, C.R., Gellermann, W.R., Zidichouski, J.A. Noninvasive Raman spectroscopy measurement of human carotenoid status; *FASEB J.* 2004 18(4): A480. <http://www.faseb.org/eb2004/cite/>

Smidt, C.R. Effect of LifePak® Supplementation on Antioxidant Status Using BioPhotonic Raman Spectroscopy. Pharmanex in-house Study, 2002.

Stavens, S., Carlson, J., Holubkav, R., Zidichouski, J., Mastaloudis, A., Smidt, C., Askew, E. Associations of Fruit and Vegetable Intake with Serum Carotenoids and Skin Carotenoids Measured with Raman Spectroscopy (RS); *FASEB J* (submitted 2005).

Svilaas, A., Sakhi, A.K., Andersen, L.F., Svilaas, T., Strom, E.C., Jacobs, D.R. Jr., Ose, L., Blomhoff, R. Intakes of antioxidants in coffee, wine, and vegetables are correlated with plasma carotenoids in humans. *J Nutr.* 2004 Mar;134(3):562–7.

Zidichouski, J.A., Poole, S.J., Gellermann, W., and Smidt, C.R. Clinical Validation of a Novel Raman Spectroscopic Technology to Noninvasively Assess Carotenoid Status in Humans. *J. Am. Coll. Nutr.* 23(5): 468, 2004.

Zukley, L.M., Nguyen, V., Lowndes, J., Smidt, C.R., Angelopoulos, T.J., Rippe, J.M. Effects of Antioxidant Supplementation on Skin and Serum Antioxidants; *FASEB J.* (submitted 2005).