

Pharmanex® BioPhotonic Scanner S2



Positioning Statement

The patented Pharmanex® BioPhotonic Scanner is a cutting-edge testing tool that safely measures carotenoid levels in living tissue, providing an immediate indication of a person's antioxidant levels. The Pharmanex® BioPhotonic Scanner now takes a quantum leap forward with the new S2. Now distributors can scan more people in more places in no time at all. The latest Pharmanex innovation, combined with new lower lease rates can deliver a “measurable difference” to our distributor's businesses today.

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 antioxidant health through nutrition and supplementation with LifePak®

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 antioxidant status, making the supplementation decision more urgent. Their motivation grows as they watch their score 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 table-top model was an engineering feat resulting in the patented, proprietary technology in the original Scanner. Now the new S2 takes the miniaturization of the Scanner a step further: 50% lighter, 60% smaller, from power-up to scanning in under 10 minutes, and less temperature sensitivity. Even more ground breaking, new research shows that the Scanner technology is clinically proven to be the best indicator of the body's complete

antioxidant network. This revolutionary technology is quickly becoming the gold standard for antioxidant indication in human tissue.

Simplified. The Pharmanex® S2 technology means your business just got a lot easier. Now you can scan more people, in more places in no time at all. Scan people at the beach, at a restaurant or a family reunion. Your business is not constrained by the limits of technology—only by the limits of your imagination.

Primary Benefits

- A quick and convenient way to obtain a biomarker of your antioxidant defense network
- Ability to track your antioxidant defense level over time as you make important diet and lifestyle changes
- Consumers can verify improvements in antioxidant status of taking Pharmanex® products
- Go from power-up to scanning in under 10 minutes, allowing you to scan more people
- A business opportunity like no other in the world

What Makes This Product Unique?

- World's first immediate, non-invasive method of measuring antioxidant activity (skin carotenoids)
- Patented technology owned exclusively by Pharmanex®
- 60% smaller, 50% lighter, and 30% faster scans
- More versatile so you can scan virtually anywhere in hot or cold conditions

	S1	S2
Warm up time	30 min	5 min
Calibration time	17 min	4 min
Calibration steps	9 scans	3 scans
Weight of Scanner	10 lbs	~5 lbs
Scan time	3 min	~2 min
Temperature range	70 – 75 °F	50 – 95 °F
	21 – 24 °C	10 – 35 °C

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Who Should Use This Product?

Biophotonic measurement is destined to become the dietary assessment of the future. 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
- The DNA in each cell of your body receives 70,000 free radical hits per day
- Two clinical studies show that carotenoid levels correlate to levels of many other non-carotenoid antioxidants
- There are 10^{16} free radicals in just one cigarette
- Your Skin Carotenoid Score can be influenced by diet, supplementation regimen, body fat percentage, lifestyle, and genetics

Frequently Asked Questions

What are the differences between the S1 and the S2 scanners?

The advantages of the new S2 relate primarily to the scan operator experience. Compared to the S1, the S2 is 50% lighter, 60% smaller, has a reduced warm-up and calibration time, and less temperature sensitivity. The S1 and S2 have the same accuracy and precision, therefore producing the same Skin Carotenoid Scores (SCS) under normal operating conditions. Both the S1 and S2 are based on Raman spectroscopy with the same light intensity, light wavelength, and skin penetration of the light.

Do the patents which apply to the S1 Scanner apply to the S2 Scanner?

Yes. The patents associated with the S1 Scanner specified the use of “any light source” to measure carotenoids using Raman spectroscopy. Because the S2 Scanner is also based on Raman spectroscopy, the patents apply to both the S1 and S2 Scanners.

What patents apply exclusively to the S2?

We have recently applied for a device patent which covers the use of photomultiplier tubes (PMTs) and light emitting diodes (LEDs) to perform this measurement.

Why is there not a protective guard on the hand rest of the S2?

The S1 Scanner uses a low-energy light source which is classified as safe for skin contact, but not recommended for eye contact. The S2 uses light emitting diodes (L.E.D.s) in place of a laser to create blue light. This L.E.D. light source is similar to light from a flash light and does not require a protective guard or special precaution.

Why does the S2 require only two color p-Cal calibration, while the S1 required four colors?

S2 only requires a two color calibration (white and blue), while the S1 requires a four color calibration (White, Blue, Red, Yellow). Because the S2 utilizes an LED light source, it is capable of gathering more information during calibration than is possible using a laser (as with

the S1). During the white scan on S2 we can gather the same information that was generated by the white, red and yellow p-Cals using the S1 scanner. This eliminates the need to scan the red and yellow p-Cals on S2. As with the S1, the S2 requires a dark scan during calibration.

How often am I required to re-calibrate the S2?

The S2 only requires calibration at startup, or if the unit is continuously plugged in the S2 requires a calibration every 24 hours. If you unplug the S2 or restart the laptop you will need to recalibrate the unit.

Is there a thermometer inside the S2 scanner?

Yes, there is a built-in thermometer which is not visible to the scanner operator. The temperature range for the S2 (50–95 F°; 10–35 C°) is so wide that it is unnecessary to require scanner operators to assess temperature. The internal thermometer is included to allow Pharmanex scientists to monitor the performance of each unit.

What does the Pharmanex® S2 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 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 light emitting diodes provide a light source that is not as susceptible to the effects of heat and humidity. 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 LED's is on at any given time. When these two frequencies of blue light hit a carotenoid molecule in the palm of the hand they produce green light at 507.8 nm and 509.8 nm which is detected by photomultiplier tubes. A computer converts these two reflected frequencies into two peaks; each peak is used in the quantization of the tissue carotenoid level to generate a 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

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and protection. Based on our study, your Skin Carotenoid Score can increase after only four weeks of LifePak® supplementation, and 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 and S2 is a patented application 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 this scientific discipline. 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. In addition, 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, E, and carotenoids by HPLC), as well as urinary isoprostanes, which are widely regarded as the best measure of oxidative stress in the body.

Results showed highly significant correlations between skin carotenoids (BioPhotonic Scanner) and other blood antioxidants. In addition, a highly significant inverse correlation between skin carotenoids and oxidative stress (urinary isoprostanes) was observed. Together these

results confirm that the 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.

How do skin carotenoids correlate to overall antioxidant status?

Carotenoid molecules are not regenerated like other antioxidants, and are degraded in the process of neutralizing free radicals. A typical carotenoid molecule like lycopene or, beta-carotene is able to sustain more than 20 free radical hits by lipid radicals before it becomes completely destroyed (Tsuchiya, 1994). Lycopene and, carotene are just two examples of antioxidants among hundreds of antioxidants that make up the antioxidant network. Carotenoids act sacrificially to protect other members of the antioxidant network (such as vitamins E and C) from having to sustain free radical hits; in this way carotenoids will support the entire antioxidant network consequently reducing the danger from oxidative stress. Conversely, high levels of oxidative stress (e.g. with smoking) adversely affect the antioxidant network, and the resulting increased free radical activity leads to a depletion or reduction in tissue carotenoids. 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. found the ability of carotenoids to predict serum levels of other antioxidants was stronger than the predictive ability of alpha, beta, delta, and gamma-tocopherols as well as glutathione (Svilaas, 2004). Subsequent to Svilaas's findings, Pharmanex research shows a highly significant inverse correlation between skin carotenoids and oxidative stress (urinary isoprostanes a measure of actual free radical damage). Together these results confirm that the 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 .78 – .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

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