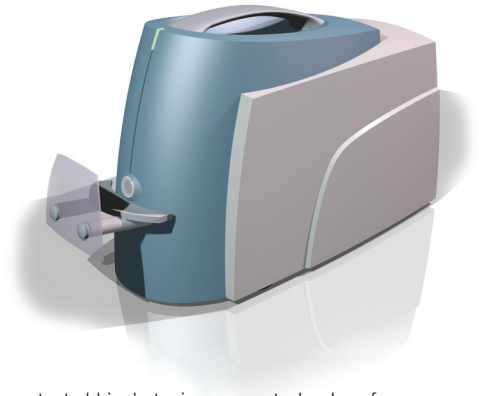


# Pharmanex® BioPhotonic Scanner



## Positioning Statement

The patented Pharmanex® BioPhotonic Scanner is a new, cutting-edge testing tool that safely measures carotenoid levels, providing immediate evidence of a person's carotenoid antioxidant levels.

## Concept

Our bodies are under attack. Each day we are exposed to free radicals—unstable molecules that steal or “scavenge” electrons from other molecules. Many physical effects we call “aging” are the result of free radicals that weaken tissue such as skin, blood vessels, and the brain. Antioxidants are your first defense against free radical attacks because they freely share their electrons and stop the degenerative chain reaction of free radicals. Our bodies naturally generate some antioxidants, and certain foods also contain antioxidants, but new research shows these sources may not provide sufficient antioxidant protection against a growing onslaught of free radical invaders.

The Pharmanex® BioPhotonic Scanner is the world's first measuring tool that gives you a Skin Carotenoid Score (SCS)—immediate evidence of carotenoid antioxidant activity in your body. By simply placing your hand in front of a low-energy blue light laser, you receive a score that will empower you to make improvements to your antioxidant health through nutrition testing and supplementation with LifePak®.

The technology of the Pharmanex® BioPhotonic Scanner is based on an optical method known as Resonance Raman Spectroscopy. This technology has been used for many years in research laboratories and more recently for carotenoid investigations in biological systems. The scanner measures carotenoid levels in human tissue at the skin surface using optical signals. These signals identify the unique molecular structure of carotenoids, allowing their measurement without interference by other molecular substances providing the person being measured with an SCS. Pharmanex® is the exclusive

owner of the patented biophotonic scanner technology for measurement of skin carotenoids in a non-medical environment.

## Primary Benefits

- A quick and convenient way to obtain a biomarker of your antioxidant defense network
- Ability to track your antioxidant defense level (Skin Carotenoid Score) over time as you supplement with antioxidants
- LifePak® dietary supplement provides a comprehensive array of powerful antioxidants for optimal free radical defense\*

## What Makes This Product Unique?

- World's first immediate, non-invasive method of measuring antioxidant activity (skin carotenoids)
- Patented technology owned exclusively by Pharmanex®
- Solid-state scanner design uses a safe, low-energy blue light laser
- LifePak® dietary supplement has been clinically demonstrated to provide comprehensive antioxidant protection\*

## 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?

- The DNA in each cell of your body receives 70,000 free radical hits per day
- There are  $10^{16}$  free radicals in just one cigarette
- The scanner technology was first used to detect macular carotenoids
- Pharmanex® holds license rights to two patents on the BioPhotonic Scanner
- Skin Carotenoid Score can be influenced by diet, supplementation regimen, body fat percentage, lifestyle, and genetics

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## Frequently Asked Questions

### *What does the Pharmanex® BioPhotonic Scanner measure?*

The BioPhotonic Scanner 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.

### *How did the Pharmanex® BioPhotonic Scanner come about?*

The scanner was developed by Dr. Werner Gellermann from the University of Utah, Department of Physics, and several collaborators from the university's School of Medicine. Initially Dr. Gellermann and his research group set out to find a way to measure the level of carotenoids in people's eyes. Using Raman technology, Dr. Gellermann and his team developed an instrument that projected laser light on the back of the eye and reflected back to a detector measuring carotenoid content in the retina. They then applied the same Raman technology to measure carotenoid antioxidant levels in skin tissues.

### *What are carotenoids?*

Carotenoids are red, yellow, and orange pigments distributed throughout nature, particularly in the fruits and vegetables we eat. They are among the most beneficial antioxidants that work to balance out the destructive effects of free radicals. Recent research indicates a strong link between free radicals and the risk of disease. LifePak® contains the most important carotenoids including lycopene, alpha-carotene, beta-carotene and lutein.

### *Why is it important to know the level of carotenoids in your body?*

There are many different kinds of antioxidants, but carotenoids are important because they are some of the more potent antioxidants that protect our cells from the damaging effects of free radicals. Higher levels of antioxidants in the body may indicate a higher level of cellular protection. The carotenoids are an important part of the body's antioxidant network, and their tissue (skin) levels are an important indicator of the overall strength of the body's antioxidant defense system.

### *What is the antioxidant defense system?*

In the body, a comprehensive network of antioxidants works together in synergy to afford effective protection from free radical damage. This is known as the antioxidant defense system. The antioxidant defense system consists of both intrinsic and extrinsic antioxidants. Intrinsic antioxidants are made in the body, often from nutrients we obtain in our diet, whereas extrinsic antioxidants can not be made by our body and so must be obtained from our diet. To promote an optimal antioxidant defense system, it is important to include all of these nutrients in the diet. LifePak® is a comprehensive dietary supplement to help you achieve an optimal antioxidant defense system.\*

### *How does the Pharmanex® BioPhotonic Scanner work?*

BioPhotonic technology is a new advancement in laser technology and is made possible by applying optics concepts to the investigation

of living human tissues. In the BioPhotonic Scanner, we use the fact that essentially each species of molecules in the body can generate a different set of colors of light when stimulated with a laser beam. Therefore this color spectrum is a unique optical fingerprint of a particular molecule species. The instrument uses a blue laser with a wavelength of 473 nm. When this laser hits a carotenoid molecule, a unique fingerprint spectrum with a prominent peak at 510 nm is generated by the carotenoid molecules. A green light is emitted out of the skin and captured by a highly sensitive light detector. A computer analyzes the amount of this green light and produces a numeric reading called 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 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 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

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of Nutrition in Long Beach, California. The 372-subject clinical study reconfirmed the excellent correlation between skin Scanner scores and blood carotenoids, the currently accepted gold standard in research. 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.

## **How else are carotenoids measured?**

Carotenoids are typically measured by invasive techniques requiring blood samples or urine tests. These tests are expensive and may take weeks to receive results. Also, these tests may only reflect what was recently consumed, i.e. the previous meal. The BioPhotonic Scanner is a great way to measure your carotenoid level safely and non-invasively.

## **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 or reactive oxygen species. 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).

Two recent studies conducted by Pharmanex showed a highly significant correlation between serum total carotenoids and skin carotenoids as assessed by Raman Spectroscopy ( $r = 0.78$ ,  $p < 0.001$ ). 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.

## **Is Pharmanex sure that the carotenoids being measured are only those found in the stratum corneum? Isn't it possible that carotenoids in other tissues and/or the interstitial fluid are adding to the result?**

As a matter of fact it is one of the reasons we chose the palm of the hand as the site of measurement. At other locations on the body, these other tissue types as well as the interstitial fluid, would most likely influence the result. However, in the palm of our hands, the stratum corneum is unusually thick, with the average thickness approximately 400 micrometers. Since the laser penetration depth of this technique is only 50 micrometers, we are quite confident that the measurement is specific to carotenoids found in the stratum corneum.

## **Is there a point that the Skin Carotenoid Score can become too high, where having too many antioxidants can cause a pro-oxidative effect?**

Studies showing pro-oxidative effects have only been conducted on isolated antioxidants in extremely high amounts. While LifePak® provides numerous antioxidants, its formula contains significant, yet safe amounts (all below the NOAEL) of a variety of antioxidants (as would be found in a diet of varied fruits and vegetables). The practice of taking extremely high amounts of isolated antioxidants (especially those studied for pro-oxidative effects) is not advisable. As with many things in nature, a balance of nutrients is the best approach. LifePak® has been formulated with balance in mind. The purpose of the scanner is not to encourage the pursuit of extremely high scanner scores, but to help individuals become aware of their dietary habits, to encourage increased consumption of fruits and vegetables, and to provide an empirical measure of the effect of LifePak®. Individuals who follow a regular LifePak® regimen should have a satisfactory SCS while avoiding any concern of pro-oxidation.

## **Key Scientific Studies**

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