

## **Clinical Study: Validation of Non-Invasive Raman Spectroscopy to Measure Carotenoid Nutritional Status in Humans<sup>1</sup>**

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Measurement of blood serum carotenoids is widely accepted as the gold standard method to determine carotenoid nutritional status in human research studies. This method often involves invasive blood sampling, extraction and analysis by high performance liquid chromatography (HPLC). Serum carotenoid analysis is not practical for use outside the clinic since it is invasive and the serum levels are affected by multiple factors.

Pharmanex Scientists recently completed a clinical study establishing a statistically significant correlation between serum and skin carotenoid levels using Raman Spectroscopy. The study was conducted using the Pharmanex BioPhotonic Scanner, a non-invasive method using Raman Spectroscopy to measure skin carotenoid levels. Based on data obtained from 104 subjects, Pharmanex found a strong and highly significant correlation between serum total carotenoid levels versus the Raman intensity counts obtained using the BioPhotonic scanner. The results of this study further validate the BioPhotonic Scanner as a non-invasive tool to determine carotenoid status in humans.

The data obtained from the present study also showed the ability of the BioPhotonic Scanner to make measurements over a broad dynamic range and to readily detect and differentiate significant differences in skin carotenoid levels from subject to subject. Pharmanex Scientists will be submitting this study for publication in a peer-reviewed journal. Upon publication, additional data observed in this study will be made available.

Pharmanex also looks forward to conducting additional studies both in-house and in conjunction with researchers at major universities to further validate the utility of the Pharmanex BioPhotonic Scanner as a non-invasive means to determine healthful interventions and nutritional status.

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<sup>1</sup> Study performed by Zidichouski J, Smidt C, Poole S. Pharmanex, LLC, Provo, Utah