

# The Omega-3 Index

## Clinical Information

Omega-3 fatty acids, eicosapentaenoic and docosahexaenoic acids (EPA and DHA) are important nutrients that affect membrane properties, regulate gene expression and serve as precursors to a multitude to oxygenated metabolites (e.g., prostaglandins, leukotrienes, CYP450 products, etc). Via these mechanisms they impact a wide variety of health conditions. Their levels are measured in dried blood spots which strongly correlate with red blood cell (RBC) membrane (and cardiac) EPA and DHA levels. RBC EPA+DHA, a metric called the "Omega-3 Index," is reported as a percent of total RBC fatty acids. The Omega-3 Index is largely determined by the dietary intake of these fatty acids since biosynthesis from the plant omega-3 precursor (alpha-linolenic acid) is very inefficient. The assay utilizes direct methylation followed by quantification by capillary gas chromatography with flame ionization detection. Optimal levels of the Omega-3 Index (8% to 12%) are associated with reduced risk for death, especially from cardiovascular disease; slower cellular aging; smaller brain volume and diminished cognitive function.

## Assay Precision: Within Lab:

Inter-assay CV at an Omega-3 Index of 7.9% is 3.5%; at an Index of 4.6%, the CV is 4.9%.

**Field Conditions:** In an experiment carried out in Mexico, 128 blind duplicate dried blood spot (DBS) samples were collected and mailed to the laboratory for analysis. The average CV for the Omega-3 Index (mean=4.1%) was 4.3%, and the average percent deviation was 3%.

**Accuracy:** Red blood cell EPA+DHA (the Omega-3 Index) is highly correlated with DBS EPA+DHA ( $r=0.98$ ,  $n=147$ ). (Fig. 1)

**Sensitivity:** The Omega-3 Index was measured in high and low omega-3 samples using blood volumes varying between 2 and 50  $\mu$ L (routine volume is 10  $\mu$ L). The Omega-3 Index was unaffected by volume, indicating that the amount of blood placed on the DBS card does not affect the result. (Fig. 2)

**Stability:** The Omega-3 Index measured in DBS cards pre-treated with an antioxidant are stable ( $\pm 5\%$ ) for 21 days at room temperature.

**Validity:** The test is able to detect changes in the Omega-3 Index with increasing intakes of EPA and DHA. (Flock et al. J Am Heart Assn 2013;2:e000513) (Fig. 3)

**Specimen Collection:** Blood samples may be collected at home at any time (fasting or fed state). DBS cards should be mailed to the laboratory in the provided envelop on the day the blood is collected.

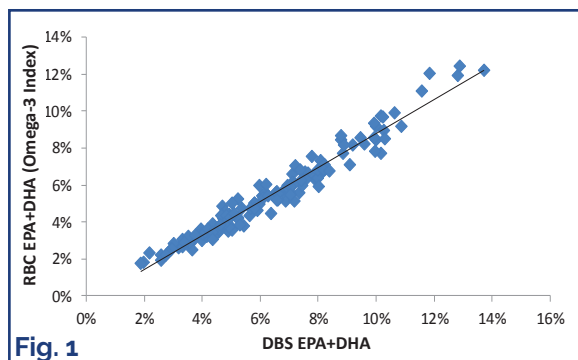


Fig. 1

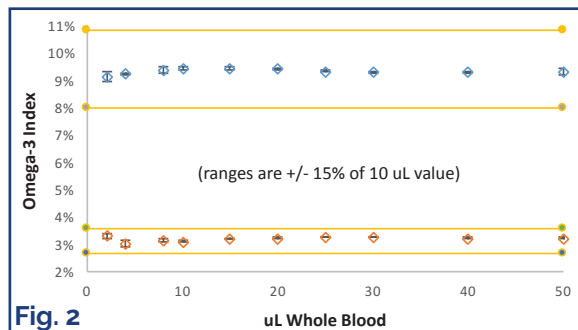


Fig. 2

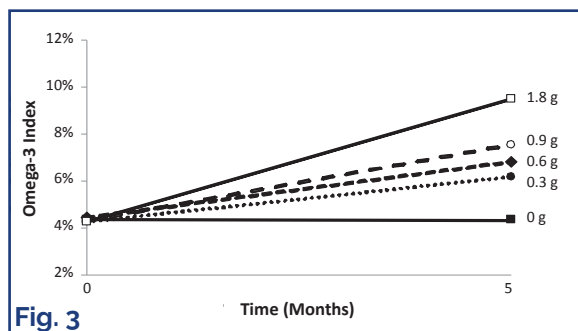


Fig. 3

## References

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