Omega-3 Forms & Delivery Systems

NORDIC® NATURALS

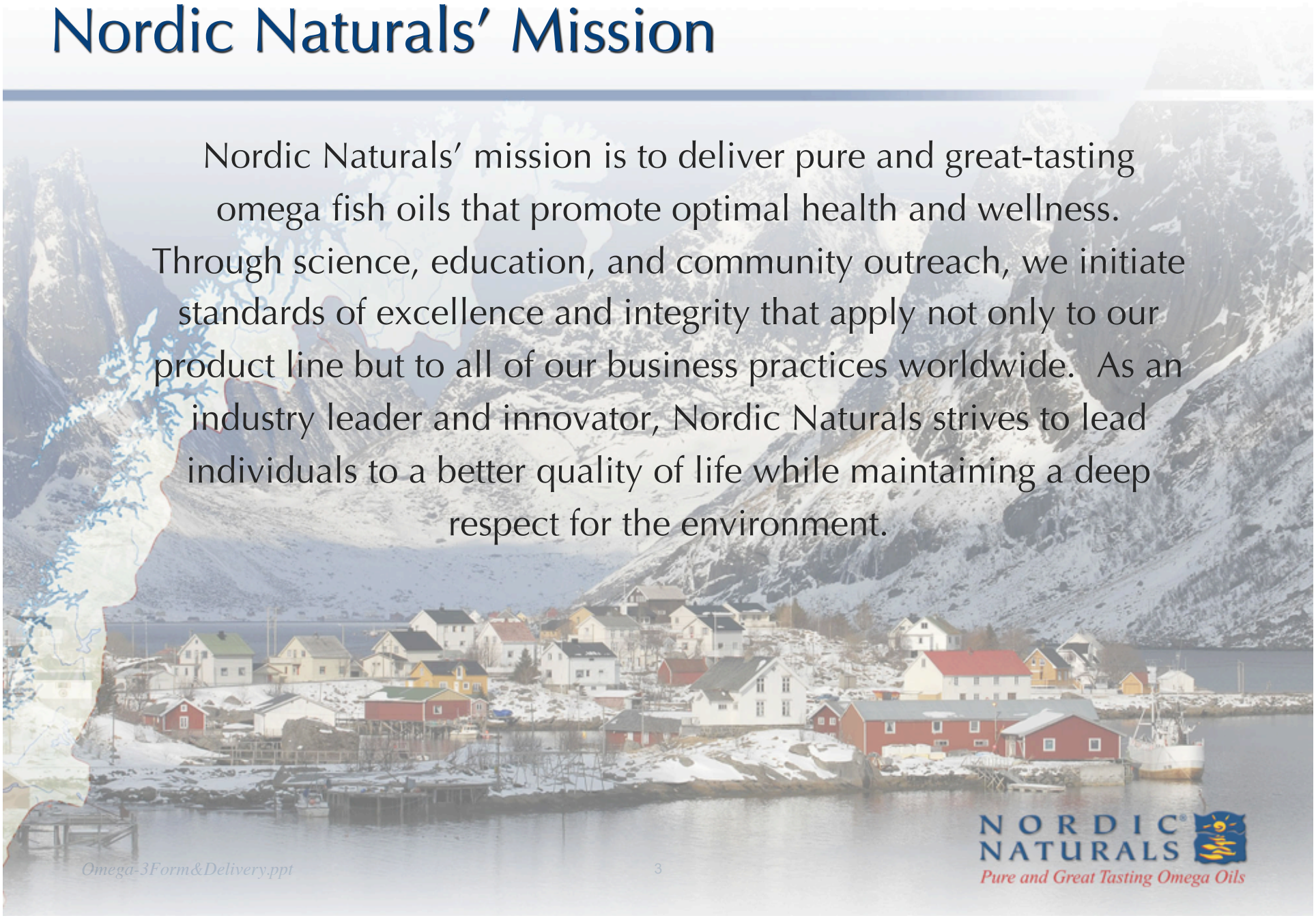
Pure and Great Tasting Omega Oils

What we will cover…

- Nordic Naturals Mission Statement
- Omega-3 Forms & Delivery Systems
  - Which form is best? Natural Triglycerides & Re-esterified TGs or Ethyl Esters?
  - Which delivery is best? Emulsified, enteric coated, standard capsules, or liquids?
- Third party analysis summary
- Reading a COA

Nordic Naturals' Mission

Nordic Naturals' mission is to deliver pure and great-tasting omega fish oils that promote optimal health and wellness. Through science, education, and community outreach, we initiate standards of excellence and integrity that apply not only to our product line but to all of our business practices worldwide. As an industry leader and innovator, Nordic Naturals strives to lead individuals to a better quality of life while maintaining a deep respect for the environment.

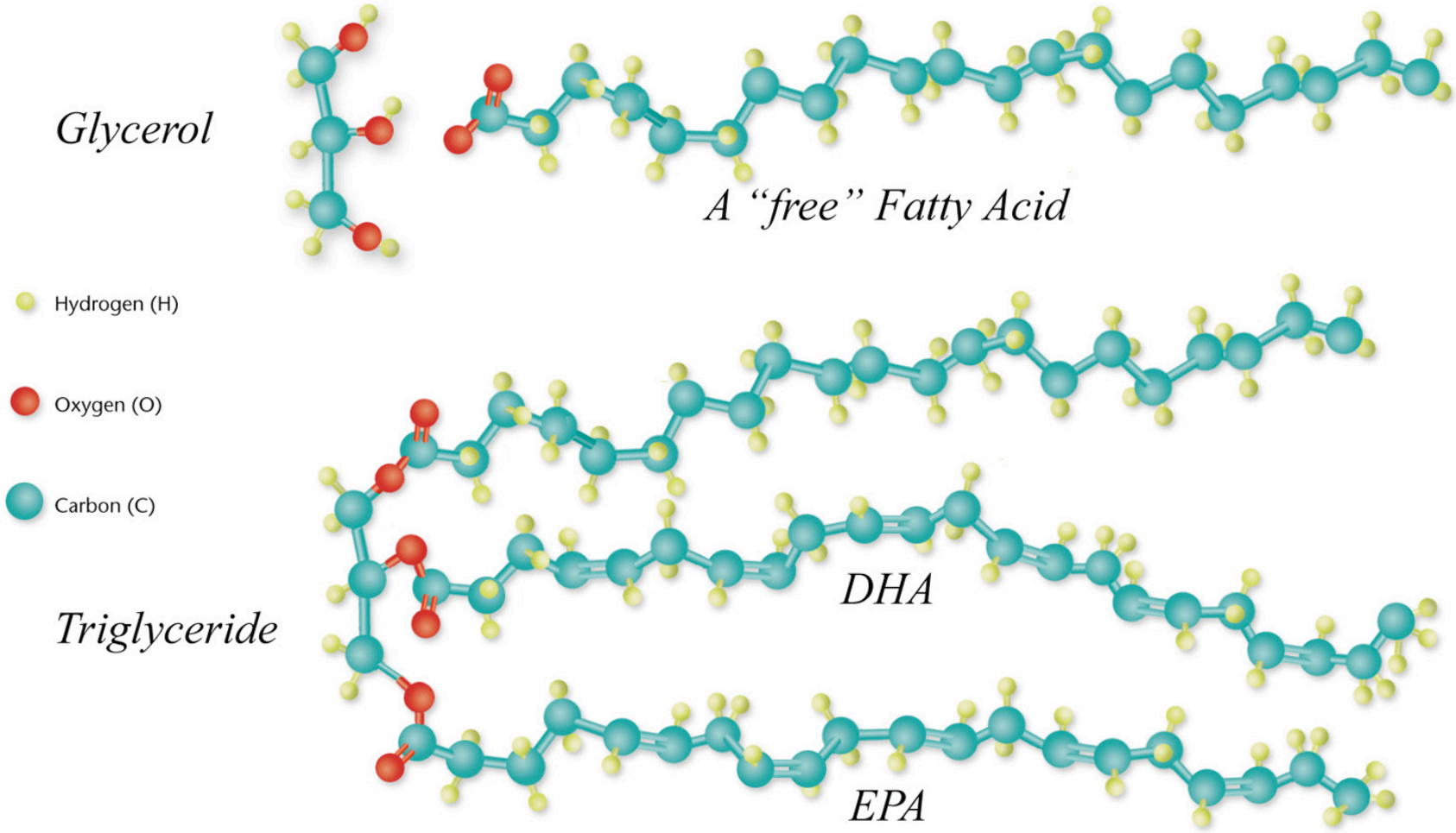


NORDIC NATURALS
Pure and Great Tasting Omega Oils

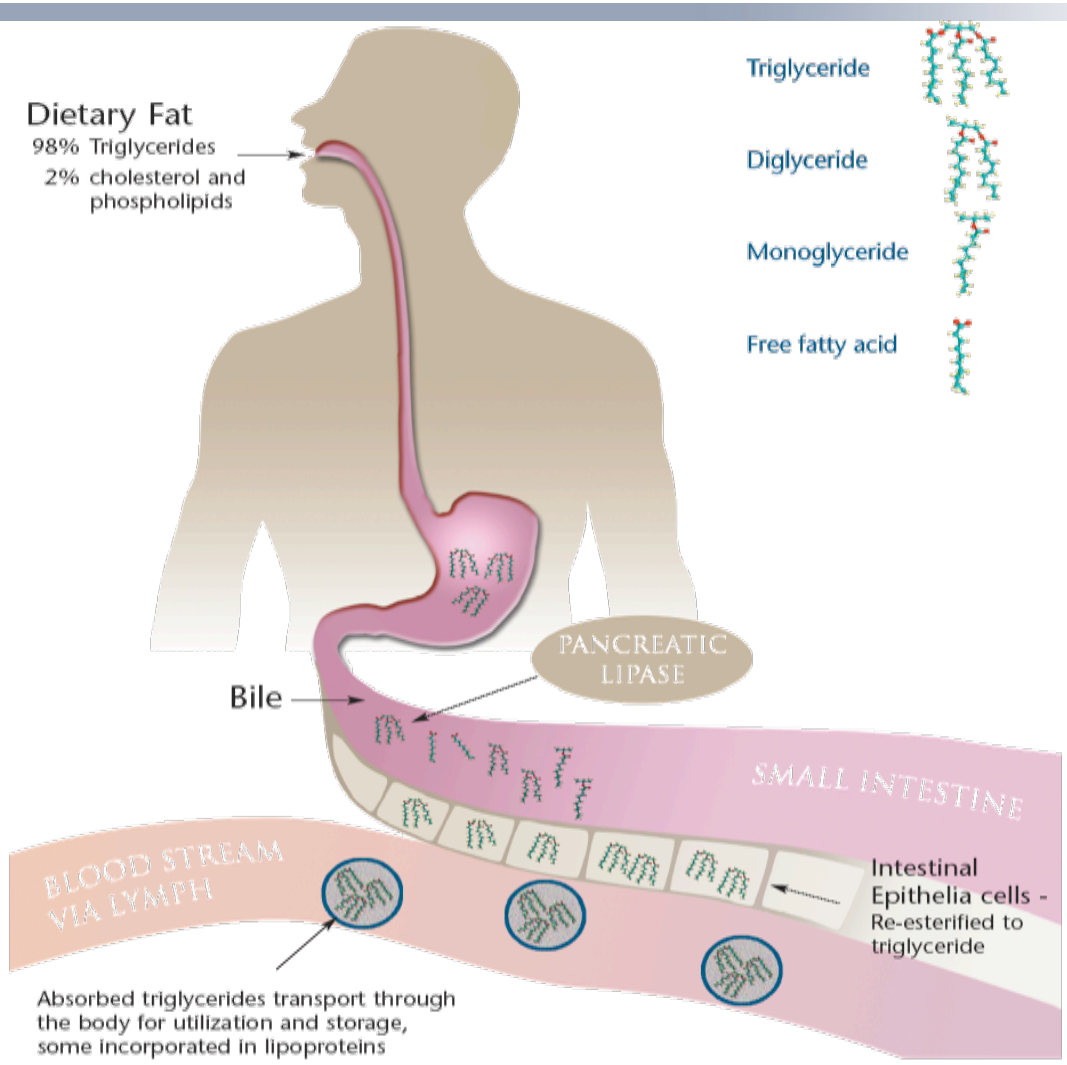
Omega-3 Forms

Which form is best?

Essential Omega-3 Fatty Acids



Absorption - designed to digest triglycerides



Contents lists available at ScienceDirect

Prostaglandins, Leukotrienes and Essential Fatty Acids

journal homepage: www.elsevier.com/locate/plefa

Bioavailability of marine n-3 fatty acid formulations ☆

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ARTICLE INFO

Article history:
Received 3 March 2010
Received in revised form
28 June 2010
Accepted 29 June 2010

Keywords:
Bioavailability
n-3 Fatty acids
Ethyl esters
Re-esterified triglycerides
Free fatty acids
Fish oil
Stereoisomery

ABSTRACT

The use of marine n-3 polyunsaturated fatty acids (n-3 PUFA) as supplements has prompted the development of concentrated formulations to overcome compliance problems. The present study compares three concentrated preparations — ethyl esters, free fatty acids and re-esterified triglycerides — with placebo oil in a double-blinded design, and with fish body oil and cod liver oil in single-blinded arms. Seventy-two volunteers were given approximately 3.3 g of eicosapentaenoic acid (EPA) plus docosahexaenoic acid (DHA) daily for 2 weeks. Increases in absolute amounts of EPA and DHA in fasting serum triglycerides, cholesterol esters and phospholipids were examined. Bioavailability of EPA+DHA from re-esterified triglycerides was superior (124%) compared with natural fish oil, whereas the bioavailability from ethyl esters was inferior (73%). Free fatty acid bioavailability (91%) did not differ significantly from natural triglycerides. The stereochemistry of fatty acid in acylglycerols did not influence the bioavailability of EPA and DHA.

Omega-3 Bioavailability: EE vs. TG/rTG

- CONCLUSION: Omega-3 fatty acids in the re-esterified triglyceride (RTG) and concentrated form may be the most bioavailable, compared to free fatty acids (FFA) or ethyl ester (EE) forms.
- SIMPLIFIED TAKE AWAY:
  - rTG form is 70% more absorbable than EE form
  - rTG form is 25% more absorbable than FFA form
  - Natural TG form absorbability did not differ greatly from FFA form
- WHAT DOES THIS MEAN?
  - Concentrated & re-esterified omega-3s from fish oils (e.g. Ultimate Omega, DHA, EPA, EPA Xtra*) may be* more bio-available than a non-concentrated omega-3s. (e.g. Omega-3, Arctic Cod Liver Oil, Complete Omega, Children's products)

    BUT – it could be something else entirely…
  - The rTG concentrate *could have* greater Omega-3 absorption simply because it has a greater concentration of Omega-3 and therefore less competition for absorption with other fatty acids like Omegas-5, 6, 7, 9, and 11.

JANUARY 8, 2008

Fish-Oil Doses Can Be Hard To Swallow

By DAVID STIPP | SPECIAL TO THE WSJ

It's no wonder that more Americans are gulping fish oil. Hardly a month goes by without a study suggesting that the omega-3 fatty acids in fish oil can fend off disease -- including heart attacks, strokes, Alzheimer's disease, depression, rheumatoid arthritis, asthma, psoriasis and even attention-deficit hyperactivity disorder.

Then, it goes on to say….

There's no evidence Lovaza works better or is purer than high-end omega-3 dietary supplements -- such as those made by Nordic Naturals Inc., of Watsonville, Calif. -- which cost less than half as much as Lovaza does per gram of EPA and DHA.

A 2004 analysis of 44 kinds of omega-3 supplements by ConsumerLab.com, based in Scarsdale, N.Y., found that none had unsafe levels of mercury or PCBs. And Lovaza wasn't used in most of the promising clinical trials with omega-3.

Omega-3 Delivery Systems

Which delivery is best?

Delivery Systems – Is Faster Better?

- Any fish oil with a greater surface area has increased exposure to lipase and faster bio-availability therefore. BOTH emulsified AND water soluble delivery systems achieve this result.
  - SLOW: Enteric Coated Capsules
  - MODERATE: Capsules, Consuming Fish
  - FAST: Liquid Fish Oil
  - FASTER: Emulsified Fish Oil
  - FASTEST: Water Soluble Fish Oil
- SIMPIFIED TAKE AWAY:
  - Regardless of the speed of absorption, one of the major benefits of Omega-3 EPA and DHA is the down regulation of pro-inflammatory arachidonic acid (ARA).
  - When comparing liquid deliveries to capsules, the reduction in arachidonic acid is not statistically significant.
  - A faster rate of absorption does not mean enhanced benefit or greater anti-inflammatory protection.
  - **What matters is dose and compliance – which leads to results!**

Which Factors are the Actors?

- Taste is King! The consumer/patient must enjoy the entire experience or they will not comply and take the product – regardless of the many health benefits.
- The product must supply enough Omega-3 EPA & DHA
  - Minimum: 500mg EPA+DHA for daily maintenance
  - 1000mg or more EPA+DHA for increased support, to treat deficiency or mitigate potential health concerns.
  - 2000mg – 4,000mg EPA+DHA for specific health concerns. Typically these doses are consumed with the guidance of a healthcare professional.
- SIMPLIFIED TAKE AWAY:
  Compliance and dose are the two most important factors. Period.
  - The fresher a fish oil the cleaner the taste.
  - The cleaner the taste, the higher the compliance.
  - The higher the compliance, the greater the benefit.
  - Results matter! Look up your fish oil's rancidity report card: www.ifosprogram.com – or – ask for a certificate of analysis (COA) with 3rd party test results

Studies to Support Omega-3s

- **Diet and Reinfarction Trial (DART)**
  - Examined the effects of dietary changes related to increased fatty fish intake in 2033 men followed for 2 years:
    - *Risk Reduction of 29%*
- **The GISSI-Prevenzione Trial**
  - For 3.5 years, a total of 11,323 patients taking **850 mg** of EPA & DHA omega-3 PUFA showed:
    - *Risk Reduction of 45%*
- **Japan EPA Lipid Intervention Study (JELIS)**
  - A total of 18, 645 Japanese patients randomly assigned to receive **1800mg** of highly purified EPA in addition to statin therapy and followed up for 4.6 years.
    This demonstrated a:
    - *Risk reduction of 19%*

Patel P, et al 2009 Sept.
Burr ML, Fehily AM, Gilbert JF, et al.. Lancet. 1989;2:757–761.

So – Which omega-3 delivery & form is best?

LONG ANSWER: Consumer/Patient compliance, getting enough Omega-3s EPA +DHA in the natural triglyceride or re-esterified triglyceride form is what matters. There is not enough research on different systems of delivery to support greater efficacy. There is however, evidence of faster absorption.

SHORT ANSWER: Delivery form relates to speed, not which is best. TG/rTG may be more bio-available and therefore offer greater benefit.

SUGGESTION: Take the fish oil you trust the most in the form you like best. Make certain you get at least 500mg EPA + DHA daily as a part of a healthy diet and exercise regime. The positive results you see are bound to please you.

Third-Party Test Results

For Purity and Freshness: TEST NUMBERS

Nordic Naturals **Retail Line**

Product	Peroxide Value[1]	Totox[2]	Heavy Metals[3]	Dioxins[4] & Furans	Dioxin-like PCBs[5] Non- & Mono-ortho
Arctic Cod Liver Oil	0.60 mEq/kg	6.3 mEq/kg	<0.01 ppm	0.418 ppt	0.050 ppt
Children's DHA	0.60 mEq/kg	6.3 mEq/kg	<0.01 ppm	0.418 ppt	0.050 ppt
DHA	0.60 mEq/kg	11.2 mEq/kg	<0.01 ppm	0.681 ppt	0.243 ppt
EPA	0.50 mEq/kg	6.0 mEq/kg	<0.01 ppm	0.340 ppt	0.065 ppt
Omega-3	0.90 mEq/kg	12.0 mEq/kg	<0.01 ppm	0.461 ppt	0.890 ppt
Ultimate Omega	0.40 mEq/kg	4.8 mEq/kg	<0.01 ppm	0.340 ppt	0.471 ppt
Complete Omega-3.6.9	0.60 mEq/kg	11.3 mEq/kg	<0.01 ppm	0.340 ppt	0.790 ppt
Omega Woman	0.50 mEq/kg	12.8 mEq/kg	<0.01 ppm	0.465 ppt	0.750 ppt

1 **Peroxide**—Not detectable at 5.0 mEq/kg. CRN & GOED limit: 5.0 mEq/kg

2 **Totox** (Total Oxidation)—Not detectable at 26 mEq/kg. CRN (Council for Responsible Nutrition) limit: 26 mEq/kg

3 **Heavy Metals**—Not detectable at 0.1 ppm (particles per million). CRN & GOED limit: 0.1 ppm

4 **Dioxins & Furans**—Not detectable at 2.0 ppt (particles per trillion). CRN & GOED limit: 2.0 ppt

5 **Dioxin-like PCBs**—Not detectable at 1.0 ppt (particles per trillion). CRN & GOED limit: 3.0 ppt

All Nordic Naturals fish oil products pass Proposition 65's standards for total PCBs.

All tests are performed by Third-Party Laboratories in the United States, Canada, and Norway.
Certificates of Analysis available upon request.

Certificate of Analysis

Product: **Arctic Cod Liver Oil, Orange Liquid**	**Bulk Batch Nr: N/A**	**Bottle Lot Nr: 3017**
Manufacture Date: June, 2009	**Product Storage: Cool dry place, away from sunlight**	**Shelf Life: Three years from manufacture date**

American Oil Chemists Society — Section of AOCS method book — Not More Than — Potassium Hydroxide

Freshness

The smaller the number, the fresher the oil.

Oxidation	Test Method	Limits	Assay Result*
ACID	AOCS Cd 3d-63	NMT 1.0 KOH/g	0.6 KOH/g
PEROXIDE	AOCS Cd 8b-90	NMT 5.0 meq/kg	1.0 meq/kg
TOTOX (TOTAL OXIDATION)	Calculation	NMT 26.0 meq/kg	5.4 meq/kg

Milliequivalents

United States Environmental Protection Agency

Purity

These are toxins and pathogens, so the smaller the number, the purer the oil.

Heavy Metals	Test Method	Limits	Assay Result*
ARSENIC	USEPA 305.1, 200.7, 200.8	NMT 0.1 mg/kg (ppm)	< 0.1 mg/kg (ppm)
CADMIUM	USEPA 305.1, 200.7, 200.8	NMT 0.1 mg/kg (ppm)	< 0.01 mg/kg (ppm)
LEAD	USEPA 305.1, 200.7, 200.8	NMT 0.1 mg/kg (ppm)	< 0.01 mg/kg (ppm)
MERCURY	USEPA 245.6 (Cold Vapour AAS)	NMT 0.1 mg/kg (ppm)	< 0.01 mg/kg (ppm)

Parts Per Trillion — Parts Per Million

Environmental Toxins	Test Method	Limits	Assay Result*
POLYCHLORINATED BIPHENYLS (PCBs)	USEPA 1668 Revision A	NMT 0.09 mg/kg (ppm)	0.0004 mg/kg (ppm)
DIOXIN-LIKE PCBs (non-ortho & mono-ortho)	USEPA 1668 Revision A	NMT 1.0 pcg/g (ppt)	0.038 pcg/g (ppt)
DIOXINS & FURANS (WHO TEQ)	USEPA 1613	NMT 2.0 pcg/g (ppt)	0.444 pcg/g (ppt)

United States Pharmacopeia — Colony Forming Units

Microbial Analysis	Test Method	Limits	Assay Result*
PLATE COUNT	USP 31 (2021)	Negative in <1000 cfu/g	Pass
STAPHYLOCOCCUS AUREUS	USP 31 (2022)	Absent	Absent
ESCHERICHIA COLI	USP 31 (2022)	Absent	Absent
SALMONELLA	USP 31 (2022)	Absent	Absent
PSEUDOMONAS AERUGINOSA	USP 31 (2022)	Absent	Absent
YEAST & MOLD	USP 31 (2021)	Negative in <100 cfu/g	Pass

Section of AOCS method book

Potency

Fatty Acid Profile	Test Method	Label Claim (Vol. %)	Assay Result*
EICOSAPENTAENOIC ACID (EPA)	AOCS CE 1b-89 (modified)	9% (7.2-10.8%)	8.7%
DOCOSAHEXAENOIC ACID (DHA)	AOCS CE 1b-89 (modified)	14% (11.2-16.8%)	13.3%
TOTAL OMEGA-3	AOCS CE 1b-89 (modified)	28% (22.4-33.6%)	27.3%

**Third party test results by Nutrasource Diagnostics, Inc. Visit www.ifosprogram.com to view IFOS postings.*

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Thank You!

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