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NZ Study Questions Fish Oil Quality and EPA/DHA Content

January 21: Because of negative media coverage in Australia and New Zealand, GOED wants to make its members aware of today's publication of "Fish oil supplements in New Zealand are highly oxidised and do not meet label content of n-3 PUFA" in the journal Scientific Reports. Media reports indicate that the results may trigger an investigation by regulatory authorities in both New Zealand and Australia.

In the study, 32 fish oil supplements were analyzed for EPA+DHA content and levels of oxidation. According to the study authors, "…there was a marked disparity between the label claimed content of EPA+DHA and the actual capsule content of these fatty acids, with supplements containing on average 68% (SD=23%) of the claimed content. Only three of the 32 oils tested contained a quantity of EPA+DHA that was equal to or higher than that claimed by the label, with more than two-thirds of supplements (22; 69%) containing less than 67%. Two supplements contained approximately one third of the label concentrations of EPA+DHA."

In addition, 36 fish oil supplements were analyzed for oxidation against limits that are in the GOED Voluntary Monograph. According to the authors, "30/36 (83%) products exceeded the recommended Peroxide Value (PV) limit, 9/36 (25%) exceeded the p-Anisidine Value (pAV), and 18/36 (50%) exceeded recommended Totox thresholds. Only 3 of 36 oils tested (8%) met all the international recommendations, not exceeding any of these indices."

The results are surprising, given that fish oil supplements are tightly regulated in Australia and New Zealand, with quality standards in place to which the industry must adhere. These include meeting label claims about EPA+DHA content and long-term stability testing relative to oxidation. The results seem suspect to GOED and may indicate issues in methods or handling of oils.

GOED consulted with fatty acid experts about this article and some of their concerns follow:

- None of the 30% products tested actually contained 30% EPA+DHA. All but one were in the 17-19% range, which seems strange. Because of the consistency of the results, it seems likely that the authors were using a method that yields incomplete results. The authors did disclose their method and did not follow the accepted AOCS, European Pharmacopeia, or GOED Voluntary Monograph methods, although it is unclear whether the authors' method was validated.
- The authors' statement that "oxidation may at least in part account for the low n-3 PUFA levels" suggests a lack of general knowledge of lipid analysis. The amount of n-3 PUFA lost to the oxidation implied by high pAV and PV is too low to be picked up by FAME analysis.
- If flavored oils were analyzed, this would have been problematic because many flavors contain aldehydes that interfere with pAV testing.
- There is no industry standard for reporting EPA+DHA content on labels and it wasn't clear from the article if the different reporting methods were considered. It is also very important to realize that triglyceride (TAG) oils may be reported as a TAG form or as a free fatty acid (FFA) form, and ethyl ester (EE) oil may be reported as an EE form or a FFA form. The oils reported in the article were not differentiated.
- According to the authors, "A 12 ml sample of oil was produced by combining the contents of 8–24 capsules (depending on capsule size). From this pooled oil sample, PV, AV, Totox, and fatty acid concentration were measured in triplicate." It's important to know that the analyses must be done immediately before the oils oxidize. The data reported in Table 1 in the study appears to have been generated by someone with limited experience handling n-3 PUFA oils. Typically, you see much higher AVs than PVs, but in the case of the oils reported in line 15 (Canada), 25 (Australia) and 32 (New Zealand), this is reversed, which suggests poor handling of the oil. Generally, high PVs suggest the oils were oxidized upon opening the capsule.

Due to the suspicious nature of the results, GOED has decided that its next round of randomized testing of currently marketed products will be selected exclusively from the New Zealand market. Once GOED has the results, it intends to share them with the Therapeutic Goods Administration (TGA) in Australia and Medsafe in New Zealand. In addition, The Omega-3 Centre in Australia has been leading a media outreach effort to ensure that some balance is included in the reporting on the issue.

It should be noted that Australia's TGA lays out specific methods to be used for measuring compliance with its compositional guidelines. The authors of this paper did not use the TGA-approved European Pharmacopeia methods for measuring EPA and DHA content and appear to have modified the approved methods for measuring oxidation.