

Complaint	Tactic designed in the 2016 Oxidation Plan	Output	What we learned
Oxidation reduces EPA/DHA levels	Study demonstrating changes in EPA and DHA levels over time vs. oxidation	Two publications: - Bannenberg et al, <i>Scientific Reports</i> , 7, 1488, 2017 ( <a href="#">Link</a> )  - Phung et al, <i>Foods</i> , 2020 ( <a href="#">Link</a> )	- Products that exceeded shelf life and had surpassed oxidative quality limits had no decrease in EPA and DHA content  - Fish oil had to be massively over-oxidized to show only a tiny decrease in EPA and DHA content
Retail products are oxidized	Multi-lab study of most-consumed products in the US	Publication: Bannenberg et al, <i>J Food Composition Analysis</i> , 88, 103435, 2018 ( <a href="#">Link</a> ).	- Most of the 48 most consumed EPA/DHA retail products in the US had an EPA and DHA content consistent with the label declaration, and had oxidative quality that complied with the GOED monograph and pharmacopeial quality requirements. - Acceptable to high compliance was also confirmed in New Zealand ( <a href="#">Link</a> ), and confirmed in recent studies by other groups for other countries (Australia, UK).
	Reactionary multi-lab tests of oxidation when concerns are raised	Publication: - Bannenberg et al, <i>Scientific Reports</i> , 7, 1488, 2017 ( <a href="#">Link</a> )  - Letter to the editor: Bannenberg and Rice. <i>Adv. Ther.</i> 37, 9, 2020 ( <a href="#">Link</a> )	- GOED replicated a study by a group from Auckland University ( <a href="#">Link</a> ) alleging that many omega-3 supplements in New Zealand were oxidized and did not contain the omega-3s they were supposed to contain. The replication study showed that, using GOED-recommended methods executed by several laboratories for each sample, the reverse was true – most products were not oxidized and were compliant with the label claim.  - GOED reacted to a narrative review ( <a href="#">Link</a> ) on fish oil supplement quality in comparison to prescription omega-3 fatty acids, pointing out some of the biases and mistakes.
	Data-mining commercial analytical labs' test results	Publication: - De Boer et al, <i>Food Chemistry</i> , 254, 2018 ( <a href="#">Link</a> ).	- The evaluation of a large multi-year database of nearly 2000 batches of EPA/DHA ingredient oils and supplements revealed that the predominant majority have high oxidative quality.
	Guidelines for encapsulating oils to reduce oxidation	White paper: Oxidation in Omega-3 Oils: An Overview. GOED member website, November 2015 ( <a href="#">Link</a> ).  Guidance Documents: GOED Best-Practice Guidelines for Oxidation Control, GOED member website, 2017 ( <a href="#">Link</a> ).	- An overview of topics related to oxidation and oxidative quality of oils rich in omega-3 polyunsaturated fatty acids  - Helpful guidance for GOED members to identify points of improvement of oxidative quality of their products
Harmful compounds are created in oxidation	Study analyzing the specific oxidative compounds and products produced during oxidation	Publication: Phung et al, <i>Foods</i> , 2020 ( <a href="#">Link</a> ).	This study provided insight into which types of oxidation products are actually formed in highly oxidized fish oils.
	Assessment of oxidative products in retail supplements	Not performed	

Oxidized lipids are unsafe	Hazard characterization of aldehydes, ketones and other oxidative lipid products	Letter: Rice et al. <i>Am. J. Physiol.</i> 2017 ( <a href="#">Link</a> )  Discussed in Phung et al, <i>Foods</i> , 2020 ( <a href="#">Link</a> ).	- GOED reacted with a letter to the editor to point out the flawed experimental nature and conclusions of a study in <i>Am. J. Physiol</i> 2016 ( <a href="#">Link</a> )  - New understanding obtained about which specific oxidation products are actually formed in highly oxidized fish oil now allows a better focus on the most likely substances that may induce perinatal toxicity.
	Systematic review or epidemiological study of exposure to oxidized lipids	Not performed	
Oxidized fish oil is specifically harmful	Dose response study of oxidized fish oils compared to placebo and oxidized control oils in pregnancy	Not performed	