

80/05

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SURVEY OF MERCURY IN FISH OIL SUPPLEMENTS

Summary

The Food Standards Agency (FSA) has conducted a survey to establish the concentrations of mercury in a range of commercial fish oil dietary supplements. This work follows a previous survey by the FSA of in imported fish and shellfish, UK farmed fish and their products, which highlighted that some larger predatory fish accumulate higher levels of mercury.

Key Facts

- Total mercury was measured in 100 samples of fish oil dietary supplements, including cod liver oil, halibut oil, tuna oil, salmon oil and shark oil.
- Only nine samples in the survey contained detectable levels of mercury. There is no regulatory limit for mercury in dietary supplements or fish oils.
- Dietary exposure estimates based on the levels found showed over 500 capsules would need to be consumed per adult per day, in addition to the rest of the diet, before the safety guideline for mercury intake is exceeded.
- The levels of mercury found in this survey do not pose a risk to consumer safety.

Brand names

In accordance with the FSA policy for the release of brand names when reporting the results of food chemical surveillance, details about the individual samples are given in full in Table 1. It should be noted that the absence of any particular brand from this survey means only that the brand was not included in the survey. No further meaning should be read into the absence of any brand from this Food Survey Information Sheet.

Method

Sampling

Ventress Technical Services Ltd collected one hundred dietary supplements from a variety of stores in England, Scotland, Wales and Northern Ireland, mail order and internet companies. These ranged from large national supermarkets to independent pharmacies and health stores. Some products were obtained from non-UK websites. Samples included general fish oil (8) and omega 3 oil products (17), cod liver oil (26), high strength cod liver oil (19), halibut oil (10), tuna oil (8), salmon oil (6) and shark oil (6). The choice of samples aimed to reflect both market share as well as the range of products available.

Analysis

The Laboratory of the Government Chemist (LGC) is UKAS accredited for the analysis of mercury in food matrices.

Samples were digested (both contents and casings if in capsule form) using concentrated nitric acid with the addition of hydrogen peroxide. Oxidation was carried out in heavy-duty vessels (High-density polymer - XP1500 plus) using a high-pressure microwave digestion unit. The sample digests were then made up to 100g using distilled water. The resultant solutions were used for elemental determination of mercury by ICP – MS. Quantification of the concentrations of elements in the sample digest solutions were made by direct comparison against matrix matched external National Institute of Standards and Technology traceable standard solution calibrants.

Quality control

Samples were digested in batches of ten. A sample blank and certified reference material were included in every batch of samples for quality control purposes. In addition, approximately 10 percent of the samples were digested in duplicate and a number of blank spike recoveries were performed. ICP-MS check standards and Aquacheck solutions were also analysed simultaneously with the sample digests. The limit of detection for mercury was 0.0014 milligrams/kilogram.

Results

Only nine of the 100 samples were found to contain mercury above the limit of detection of 0.0014 milligrams/kilogram.

Over 500 of the tablets with the highest concentration of mercury would need to be consumed per person per day, in addition to the rest of the diet, to exceed the Provisional Tolerable Weekly Intake (PTWI) for methylmercury (equivalent to 0.23 micrograms per kilogram bodyweight per day), set by the Joint FAO/WHO Expert Committee on Food Additives (JECFA)⁴.

Dosage

The dosage specified by the manufacturers for each product varied widely between the samples. The highest dosage found was up to 6 tablets a day, recommended for adults. It was concluded that dosage does not pose any risk to consumers, if manufacturers instructions are followed.

Conclusion

This survey showed that, provided specified dosage instructions are followed, the mercury levels identified in this survey do not pose a risk to consumer safety.

References

1. WHO (2003). Summary and conclusions of the 61st meeting, Methylmercury.
Available at: www.fao.org/es/esn/jecfa/whatisnew_en.stm

Further Information

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Table 1: Sample details and results – Survey of Mercury in Fish Oil Supplements

Cod Liver Oils¹							
Sample Code	Product Description	Brand	Name of retail outlet	Postcode	Strength	Form	Mercury² mg/kg
E3008314	Cod Liver Oil	Asda	Asda Stores Ltd	CF14 7EW	550mg	Capsules	<0.0014
E3008324	Cod Liver Oil	Co-op	Co-op	CV11 5BU	550mg	Capsules	<0.0014
E3008372	Cod Liver Oil	Galens's Choice	Maple Leaf Pharmacy	TW2 5AB	Not specified	Capsules	0.0017
E3008362	Cod Liver Oil	Health Aid	ABC Pharmacy	TW1 3SD	550mg	Capsules	<0.0014
E3008336	Cod Liver Oil	Healthpoint Ltd	Wilkinson	CV11 4AH	Not specified	Liquid	<0.0014
E3008378	Cod Liver Oil	Healthspan	Healthspan Mail order	GY1 3BT	570mg	Capsules	<0.0014
E3008374	Cod Liver Oil	Kordel's	Maple Leaf Pharmacy	TW2 5AB	100mg	Capsules	0.0014
E3008371	Cod Liver Oil	Lamberts	Maple Leaf Pharmacy	TW2 5AB	1000mg	Capsules	<0.0014
E3008354	Cod Liver Oil	Lloyds Pharmacy	Lloyds Pharmacy	EH12 7SL	550mg	Capsules	<0.0014
E3008347	Cod Liver Oil	Morrisons	Morrisons	NR1 1WU	Not specified	Liquid	<0.0014
E3008360	Cod Liver Oil	Moss Pharmacy	Moss Pharmacy	EH4 1BH	550mg	Capsules	<0.0014
E3008355	Cod Liver Oil	Nutrisave	Semi-Chem	EH12 7SL	550mg	Capsules	<0.0014
E3008363	Cod Liver Oil	Pharmacy ABC	ABC Pharmacy	TW1 3SD	400mg	Capsules	<0.0014
E3008398	Cod Liver Oil	Power Health	Williams Dispensing Chemist	RM13 9TR	263mg cod liver oil 42mg halibut liver oil	Capsules	0.0024
E3008353	Cod Liver Oil	Principle Healthcare	Waitrose	NR4 6NU	400mg	Capsules	<0.0014
E3008304	Cod Liver Oil	Sainsbury's	Sainsbury's	BN9 0AG	4600mg per 5ml	Liquid	<0.0014
E3008328	Cod Liver Oil	ValueVits	Superdrug	CV11 4EE	325mg	Capsules	<0.0014
E3008332	Cod Liver Oil	Valupak	Savers	CV11 4EX	1000mg	Capsules	<0.0014
E3008345	Cod Liver Oil	UniChem	Moss Pharmacy	NR4 6NU	1000mg	Capsules	<0.0014
E3008384	Cod Liver Oil 1,000mg	HealthyDirect	Healthy Direct	GY1 3TT	1000mg	Capsules	<0.0014
E3008310	Cod Liver Oil Capsules	Somerfield Bodycare	Somerfield	BN9 9PQ	550mg	Capsules	<0.0014
E3008382	Cod Liver Oil Hi Strength	Goldshield Natural Care Gold	Kleeneze Europe Ltd	BS15 3DY	1000mg	Capsules	<0.0014
E3008305	Cod Liver Oil High Strength	Tesco	Tesco Extra	BN23 6QD	1000mg	Capsules	<0.0014

¹ To assist with product identification, samples have been grouped into oil types according to product name.

² Mercury concentration in milligrams per kilogram. < = less than the limit of detection.

Table 1 (cont.): Sample details and results – Mercury in Fish Oil Supplements

Cod Liver Oils¹							
Sample Code	Product Description	Brand	Name of retail outlet	Postcode	Strength	Form	Mercury² mg/kg
E3008335	Cod Liver Oil High Strength	Wilko	Wilkinson	CV11 4AH	1000mg	Capsules	<0.0014
E3008352	Cod Liver Oil High Strength	Waitrose	Waitrose	NR4 6NU	1000mg	Capsules	<0.0014
E3008344	Cod Liver Oil High Strength Plus Glucosamine	Vega	Moss Pharmacy	NR4 6NU	400mg	Capsules	<0.0014
E3008322	Cod Liver Oil plus Vitamins A and D	S R Bailey	S R Bailey Ltd	CF11 9PP	550mg	Capsules	<0.0014
E3008395	Enriched Cod Liver Oil With Vitamins A, D & E	Numark	Waterman Pharmacy	E17 6JG	550mg	Capsules	<0.0014
E3008373	Extra Strength Pure Cod Liver Oil	Seven Seas	Ripple Pharmacy	IG11 9PN	2800mg	Liquid	<0.0014
E3008348	Hi Potency Cod Liver Oil	GNC	GNC	NR1 3RU	1000mg	Capsules	<0.0014
E3008342	High Potency Cod Liver Oil	FSC - Food Supplement Company	The Health Shop	CV11 5SZ	1000mg	Capsules	<0.0014
E3008346	High Strength 550mg Cod Liver Oil	Vitamin Store	Morrisons	NR1 1WU	550mg	Capsules	<0.0014
E3008330	High Strength Cod Liver Oil	Bodycare	Bodycare	CV11 5EA	1000mg	Capsules	<0.0014
E3008385	High Strength Cod Liver Oil	Boots	Boots	SW1E 5NL	1000mg	Capsules	<0.0014
E3008356	High Strength Cod Liver Oil	Healthlife	Semi-Chem	EH12 7SL	1000mg	Capsules	<0.0014
E3008386	High Strength Cod Liver Oil	Holland & Barrett	Holland & Barrett	W1C 2JS	1000mg	Capsules	<0.0014
E3008338	High Strength Cod Liver Oil	Lifeplan	The Health Shop	CV11 5SZ	1000mg	Capsules	<0.0014
E3008303	High Strength Cod Liver Oil	Safeway	Safeway	BN25 1DL	1000mg	Capsules	<0.0014
E3008317	High Strength Cod Liver Oil - Gelatin Free	Vertese	Health With Herbs	CF11 9DX	1000mg	Capsules	<0.0014
E3008388	High Strength Cod Liver Oil With Vitamins A, D & E	Crest Health	Cavendish Pharmacy	E17 6SD	1000mg	Capsules	<0.0014
E3008306	High Strength Pure Cod Liver Oil	Seven Seas	Cameron & Son Ltd	BN25 1ND	525mg	Capsules	<0.0014
E3008333	Hi-Strength One a Day Cod Liver Oil	Healthy Weigh	Weigh and Save	CV11 4DX	1140mg	Capsules	<0.0014
E3008326	NeutraTaste Taste-Free Cod Liver Oil	Seven Seas	Superdrug	CV11 4EE	1000mg	Capsules	<0.0014

¹ To assist with product identification, samples have been grouped into oil types according to product name.

² Mercury concentration in milligrams per kilogram. < = less than the limit of detection.

Table 1 (cont.): Sample details and results – Mercury in Fish Oil Supplements

Cod Liver Oils¹							
Sample Code	Product Description	Brand	Name of retail outlet	Postcode	Strength	Form	Mercury² mg/kg
E3008393	Norwegian Cod Liver Oil	Fresh & Wild Natural Living	Fresh & Wild	W1R 3FL	None declared	Capsules	<0.0014
E3008337	Pure Cod Liver Oil	Natures Aid	The Health Shop	CV11 5SZ	Not specified	Liquid	<0.0014
E3008329	Pure Cod Liver Oil	Superdrug	Superdrug	CV11 4EE	9200mg /10ml	Liquid	0.0026
E3008366	Pure Cod Liver Oil	Vita Fit	Lidl	BT67 9BD	550mg	Capsules	0.0030
E3008318	Pure Enriched Cod Liver Oil	Health With Herbs	Health With Herbs	CF11 9DX	550mg	Capsules	<0.0014
E3008387	Super Cod Liver Oil	Health Aid	Cavendish Pharmacy	E17 6SD	550mg	Capsules	<0.0014

Fish Oils/Omega-3 Oils¹							
Sample Code	Product Description	Brand	Name of retail outlet³	Postcode³	Strength	Form	Mercury² mg/kg
E3008370	High Potency Fish Oil	Lamberts	Maple Leaf Pharmacy	TW2 5AB	1100mg	Capsules	<0.0014
E3008349	Bio-Fish Oil	Pharma Nord	GNC	NR1 3RU	1000mg	Capsules	<0.0014
E3008389	EPA 1000 - Selected Fish Lipid Concentrate	Health Aid	Cavendish Pharmacy	E17 6SD	1000mg	Capsules	<0.0014
E3008358	Eskimo-3 with Vitamin E	Eskimo-3	Hanover Health Foods	EH2 2DR	1500mg	Liquid	<0.0014
E3008327	eye-q	Equazen	Superdrug	CV11 4EE	500mg	Capsules	<0.0014
E3008350	eye-Q Liquid	Equazen	Boots	NR1 3SA	Not specified	Liquid	<0.0014
E3008391	Fish Oil	Zuppon	Bowling Chemist	W1D 6PE	1000mg	Capsules	<0.0014
E3008359	High Strength Fish Oil	Safeway	Safeway	EH4 1AW	1000mg	Capsules	<0.0014
E3008364	High Strength Omega 1000 (Omega-3 Fish Oil)	Kordel's	Baird's Chemist	BT67 0LQ	1000mg	Capsules	<0.0014
E3008340	Junior Fish Oil	Natures Aid	The Health Shop	CV11 5SZ	500mg	Capsules	<0.0014
E3008309	Marine EPA Fish Oil Concentrate	Quest	Seaford Health Store	BN25 1LD	1000mg	Capsules	<0.0014
E3008376	Omega - 3 - Supplement	Ascenta	Feel Good Natural Health Store & Clinic www.feelgoodnatural.com	L1H 1C2 (US)	Not specified	Liquid	<0.0014

¹ To assist with product identification, samples have been grouped into oil types according to product name.

² Mercury concentration in milligrams per kilogram. < = less than the limit of detection.

³ Samples purchased from retail outlets with postcodes followed by (US) were purchased from the websites indicated in the United States.

Table 1 (cont.): Sample details and results – Mercury in Fish Oil Supplements

Fish Oils/Omega-3 Oils¹							
Sample Code	Product Description	Brand	Name of retail outlet	Postcode	Strength	Form	Mercury² mg/kg
E3008392	Omega 3 - Fatty Acids EPA	Fresh & Wild Natural Living	Fresh & Wild	W1R 3FL	300mg	Capsules	0.0026
E3008357	Omega 3 - Fatty Acids EPA	Hanover Health Foods	Hanover Health Foods	EH2 2DR	300mg	Capsules	<0.0014
E3008334	Omega 3 Fish Oil	Healthy Weigh	Weigh and Save	CV11 4DX	1000mg	Capsules	<0.0014
E3008365	Omega 3 Fish Oil	NatraVits	Gordon's Chemist	BT66 6AQ	477mg	Capsules	<0.0014
E3008315	Omega 3 Fish Oil	Principle Health Care	Asda Stores Ltd	CF14 7EW	1000mg	Capsules	<0.0014
E3008383	Omega 3 Fish Oil 1,000mg	HealthyDirect	Healthy Direct	GY1 3TT	1000mg	Capsules	<0.0014
E3008339	Omega 3 Liquid	Power Health	The Health Shop	CV11 5SZ	Not specified	Liquid	<0.0014
E3008307	Omega 3 Natural Fish Oils with Vitamin E	Day Lewis	Day Lewis Chemist	BN25 1NF	1000mg	Capsules	<0.0014
E3008325	Omega 3 Pure Fish Oil	Superdrug	Superdrug	CV11 4EE	550mg	Capsules	<0.0014
E3008313	Omega 3 Pure Fish Oils	Tesco	Tesco Extra	CF14 3AT	1000mg	Capsules	<0.0014
E3008320	Omega-3 "700"	Solgar	Cardiff Health Foods	CF5 1GX	1200mg	Capsules	<0.0014
E3008381	Omega-3 Fish Oil	Goldshield Natural Care	Kleeneze Europe Ltd	BS15 3DY	500mg	Capsules	<0.0014
E3008351	Smart Omega 3's	Boots	Boots	NR1 3SA	Not specified	Liquid	<0.0014
E3008331	Smart Omega 3's	Valupak	Savers	CV11 4EX	Not specified	Liquid	<0.0014
E3008308	Super Strength Concentrated Fish Oils	Boots	Boots	BN25 1LS	1000mg	Capsules	<0.0014
E3008390	Ultra Omega's DHA/EPA	Country Life	Fresh & Wild	W1R 3FL	500mg	Capsules	0.0160
E3008361	High Strength Concentrated Pure Fish Oil	Seven Seas	Teddington Pharmacy	TW11 8UB	600mg	Capsules	<0.0014

¹ To assist with product identification, samples have been grouped into oil types according to product name.

² Mercury concentration in milligrams per kilogram. < = less than the limit of detection.

Table 1 (cont.): Sample details and results – Mercury in Fish Oil Supplements

Halibut Liver Oil¹							
Sample Code	Product Description	Brand	Name of retail outlet	Postcode	Strength	Form	Mercury² mg/kg
E3008400	Halibut Liver Oil	Allsports	Auravita Limited www.auravita.com	NW2 2DT	None declared	Capsules	<0.0014
E3008397	Halibut Liver Oil	Boots	Boots.com Direct Limited	NG2 3AA	45mg	Capsules	<0.0014
E3008394	Halibut Liver Oil	Citidrug	Citidrug www.citidrug.co.uk	EH9 0BR	125mg	Capsules	<0.0014
E3008369	Halibut Liver Oil	Healthwise	Framer Health	BT9 7TS	125mg	Capsules	<0.0014
E3008311	Halibut Liver Oil	Holland & Barrett	Holland & Barrett	BN21 3NW	66mg	Capsules	<0.0014
E3008321	Halibut Liver Oil	S R Bailey	S R Bailey Ltd	CF11 9PP	88mg	Capsules	<0.0014
E3008343	Halibut Liver Oil	The Health Shop	The Health Shop	CV11 5SZ	Not specified	Capsules	<0.0014
E3008401	Super Halibut Liver Oil in Soya Oil	HealthAid	Auravita Limited www.auravita.com	NW2 2DT	10mg	Capsules	<0.0014

Salmon Oil¹							
Sample Code	Product Description	Brand	Name of retail outlet³	Postcode³	Strength	Form	Mercury² mg/kg
E3008316	Pure Fish Oil (Salmon Oil)	Natures Aid	Health With Herbs	CF11 9DX	500mg	Capsules	<0.0014
E3008312	Salmon Oil	Holland & Barrett	Holland & Barrett	BN21 3NW	1000mg	Capsules	<0.0014
E3008367	Salmon Oil	Power Health	Framer Health	BT9 7TS	297mg	Capsules	<0.0014
E3008375	Salmon Oil	Puritan's Pride	Puritan's Pride www.puritan.com	NY 11716-2599 (US)	1000mg	Capsules	<0.0014
E3008402	Salmon Oil	Solaray	Smartbomb.com	NJ 07960 (US)	1000mg	Capsules	<0.0014

¹ To assist with product identification, samples have been grouped into oil types according to product name.

² Mercury concentration in milligrams per kilogram. < = less than the limit of detection.

³ Samples purchased from retail outlets with postcodes followed by (US) were purchased from the websites indicated in the United States.

Table 1 (cont.): Sample details and results – Mercury in Fish Oil Supplements

Shark Liver Oil¹							
Sample Code	Product Description	Brand	Name of retail outlet³	Postcode³	Strength	Form	Mercury² mg/kg
E3008323	100% Pure Norwegian Shark Liver Oil Complex	Solgar	Ritz Pharmacy	NW3 6UA	500mg	Capsules	<0.0014
E3008341	Greenland Shark Liver Oil	HealthAid	The Health Shop	CV11 5SZ	1000mg	Capsules	<0.0014
E3008319	Shark Liver Oil	Nulife	Nulife UK www.nulife.co.uk	BB5 1GD	500 mg	Capsules	0.0029
E3008377	Shark Liver Oil	Si Su	Feel Good Natural Health Store & Clinic www.feelgoodnatural.com	L1H 1C2	250mg	Capsules	<0.0014
E3008396	Shark Liver Oil	Hwize.com	Healthwize LLC	DE11 9ZQ	1000mg	Capsules	<0.0014
E3008399	Shark Liver Oil	Swiss Natural Sources	Zooscape.com	NY 14150 (US)	500mg+	Capsules	0.0029

Tuna Oil¹							
Sample Code	Product Description	Brand	Name of retail outlet³	Postcode³	Strength	Form	Mercury² (mg/kg)
E3008380	Concentrated Tuna Oil	Nature's Life Sea Smarts	Affordable Nature's Life www.affordablenatureslife.com	NJ 08723 (US)	1000mg	Capsules	<0.0014
E3008379	Omega-3 Essential Fatty Acids - DHA rich, EPA low, 100% from Deep-Sea Tuna	Pristine DHA	Senior Centers of America Discount Drugstore www.senior-centers.com	CA 90505	300mg	Capsules	<0.0014
E3008368	Tuna Cap	Wellbeing Gold	Framer Health	BT9 7TS	500mg	Capsules	<0.0014

¹ To assist with product identification, samples have been grouped into oil types according to product name.

² Mercury concentration in milligrams per kilogram. < = less than the limit of detection.

³ Samples purchased from retail outlets with postcodes followed by (US) were purchased from the websites indicated in the United States.