For debate

A salmon farmer holds a young fish at Strondoir Bay fish farm in Scotland

TopFoto

Is salmon good for you?

GCSE key words
Bioaccumulation
Risk analysis

We are often told that we should eat more oily fish because of their health benefits. What do we do when we are told that they may contain harmful chemicals? Do the benefits outweigh the dangers?

At 20 °C (room temperature) a fat is a solid and an oil is a liquid.

We know that there are benefits from eating healthily and getting the correct balance of nutrients. Fats and oils — collectively called lipids — are important components of cell membranes, which contain molecules called phospholipids. But far too many of us eat too much of the wrong sort of fats.

Omega-3 fatty acids

Oily fish such as salmon, tuna, sardines and mackerel contain plenty of protein, vitamins and the right sort of fats — and they are not too pricey for a family on a budget. The oils in these fish are rich in omega-3 fatty acids which are released when fats are digested.

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Salmon fillets on sale at a fish market

- **Find out the UK government's view at www.food.gov.uk by typing *salmon* into the search box.**

We use these fatty acids to make cells, especially the fat-rich cells of the nervous system. Omega-3 fatty acids are thought to reduce the risk of heart disease and stroke. Some people think they help protect against Alzheimer's disease too.

Salmon scare

Recently there was a 'scare' about salmon. A report in the USA showed that salmon from fish farms contained higher levels of chemicals called organochlorines, particularly polychlorinated biphenyls (PCBs) and dioxin, than wild salmon. PCBs and dioxin are known to be a health hazard and they are persistent environmental pollutants.

How do these chemicals get into salmon?

Dioxin is a by-product of several industrial processes. PCBs were used for products such as the paint used to stop marine organisms growing on the hulls of ships. This fouling slows ships down.

These chemicals end up polluting water and are taken in by animals near the beginning of a food chain. They are not broken down inside these organisms but pass up the food chain and **accumulate** at each step in the chain. Because this involves biological processes, you will see it described as **bioaccumulation**. Salmon are top predators and accumulate the poisons most of all. Processed foods fed to salmon in salmon farms include organisms that have accumulated these chemicals.

Is anything being done about these poisons?

The World Health Organization has set a limit to how much of these chemicals we should be eating each month (70 picograms). In some parts of the world people are eating more than this and action is being taken to reduce contamination of the environment.

So is it dangerous to eat salmon?

There is a risk analysis to be made — is the risk from eating farmed salmon greater than the health risk from not eating it? Two 100 g servings a week are thought to reduce the risk of CHD by 30%. Eating one or two portions of fish a week keeps you below the limit for organochlorines set by the World Health Organization — *providing* the chemicals are not in any other food you eat.

Jane Taylor *teaches biology and is an editor of* CATALYST.

PCBs were banned in most countries 20 years ago, but still persist in the environment.

A persistent pollutant is one that is not easily broken down in soil or water.

CHD is short for coronary heart disease.

- **Use an internet search engine to find out more about PCBs and dioxin.**

Puzzle

Chemdoku

Sodoku is one of the latest crazes — but have you tried our version — Chemdoku?

H				He			N	
		He				B	O	
	F				Be			C
He				Li			H	
		Li				C		
	C				He			B
Li				Be			He	
	N	Be				O		
	He							Be

Fill in the grid so that every row, every column and every 3 x 3 box (the smaller inner grids) contains each of the first nine elements of the periodic table (see Improve Your Grade, pages 10–11).

Answers on page 21.