Where there is smoke, there are furans

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Polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated furans (PCDFs) and polychlorinated biphenyls (PCBs) are environmental contaminants, which find their way at very low concentrations in food sources. The major source of these compounds in humans is through food and in particular fatty foods such as fish, meat and milk. Regular diet surveys carried out in the UK, Europe and America have shown that the levels in the diet have fallen substantially in the last ten years due to measures taken to reduce emissions of these compounds into the environment. In 1998 the World Health Organisation (WHO) established the tolerable daily intake levels of dioxins, furans and non-ortho PCBs, at 1-4 pg WHO TEQ/kg bw. The estimated daily intake of the European population is 1.2-3.0 pg/bw/day.

PCDDs, PCDFs and dioxin like PCBs are analysed using isotope dilution techniques on a high resolution mass spectrometer. For food samples, the lipid is extracted and spiked with labelled surrogates followed by extensive clean up and fractionation. A labelled recovery standard is added prior to analysis by HRMS at 10000 resolution.

In this study, we analysed a variety of meat samples purchased in Australia for PCDDs, PCDFs and PCBs using the above technique. The levels detected were extremely low, in fact only a few samples had any analytes above detectable levels. The upper bound WHO TEQ ranged from 0.15-0.5 pg/g lipid for dioxins and furans and 0.04-0.15 pg/g lipid for PCBs.

Interestingly several bacon samples showed very low profiles of PCDFs from what appears to be a non-accumulative source. One potential source, which distinguishes bacon from the other meats in this study, is the smoking/curing process.

Further investigations were carried out on smoked samples of other meat and fish types in order to find out if the furans detected were due to the smoking processes.