Arsenic-containing hydrocarbons are natural constituents of sashimi tuna

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Arsenic occurs naturally in many types of seafood as water-soluble and fat-soluble organoarsenic compounds. Although water-soluble compounds have been well characterised, the fat-soluble compounds, so-called arsenolipids, have until recently remained unknown. We report that sashimi grade tuna fish, with a total arsenic content of 5.9 µg As/g dry mass, contains approximately equal quantities of water-soluble and fat-soluble arsenic. The water-soluble arsenic was predominantly arsenobetaine. Two fat-soluble compounds were isolated and characterised. The first was identified as 1-dimethylarsinylpentadecane [$(CH_3)_2As(O)(CH_2)_{14}CH_3$] by comparison of HPLC/mass spectrometric data and accurate mass data with those of an authenticated synthesised standard. The second arsenolipid was postulated as 1-dimethylarsinyl *all-cis*-4,7,10,13,16,19-docosahexane from mass spectrometric data and analogy with non arsenic-containing lipids found in fish. These two arsenolipids constituted about 50% of the total fat-soluble arsenic; the other 50% consisted of less polar arsenolipids of currently unknown structure. This is the first identification of an arsenolipid in commonly consumed seafood.