The Taurine Story

Taurine is an amino acid first found in bulls’ blood. It is a simple molecule but is different to other amino acids in that it has a sulphonic acid group rather than a carboxylic acid group at the end. Some chemistry purists, therefore, don’t accept that it is an amino acid but mainstream chemists do accept it as such.

Taurine and human health

Taurine is associated with many aspects of maintaining good human health including osmoregulation, membrane stabilisation and detoxification; it also acts as an anti-inflammatory agent (SEAFOODplus, 2006). Osmoregulation is particularly important as it plays a part in controlling blood pressure, blood clotting, neuronal activity and in maintaining a healthy heart rhythm. The positive effects of taurine on cardiovascular health have been demonstrated by researchers in the USA and China and particularly by Fennessy et al. (2003) in Beaumont hospital in Dublin. Fennessy showed that taurine (1g/day) helped to restore normal blood flow-mediated elasticity to the brachial artery of young smokers; the degree of dilation of this artery was measured by ultra-sound. Elvevoll and Østerud in Norway showed that taurine exhibited a synergistic effect with omega-3 fatty acids resulting in a raising of HDL cholesterol (‘good’ fraction) and a lowering of LDL cholesterol (‘bad’ fraction) in 110 healthy human subjects (SEAFOODplus, 2006); they also showed that increased urinary excretion of taurine was associated with a reduced rate of heart disease. This suggests that those with high levels of taurine circulating in the bloodstream were protected to a degree against heart disease.

Taurine content of fish

The above potential benefits of taurine for human health prompted a study in Ireland on the taurine content of a number of fish species. The study was conducted as part of the SEAFOODplus EU research project (Gormley et al., 2007). Raw portions (three of each on each occasion) of plaice, cod, mackerel and farmed salmon were obtained from the ice counter of a Dublin supermarket on eight occasions (bi-monthly) and were tested for taurine content. This design gave 96 samples in total. The mean values were 120 (plaice), 88 (cod), 63 (mackerel) and 48mg/100g (farmed salmon).
on a fresh weight basis. Values varied over the eight test dates but the order of taurine content was always the same, i.e. plaice > cod > mackerel > farmed salmon. This was unexpected, i.e. white fish had more taurine than oily fish among these four species. The taurine content of plaice remained remarkably constant at circa 217mg/100g in modified atmosphere pre-packs stored for 10 days at 2-4°C; this indicates its good stability in stored fish. Both total volatile base nitrogen (TVBN) and total viable micro-organism count (TVC) increased significantly during this period. Further tests were conducted on single samples of other species and taurine contents were 155 (albacore tuna), 128 (ray wing), 82 (megrim), 61 (cardinal fish), 53 (wild salmon), 45 (blue ling), 44 (siki shark), 28 (Greenland halibut), 24 (deepwater redfish), 14 (black scabbard), 6 (roundnose grenadier) and 5mg/100g (Baird’s smoothhead) on a fresh weight basis. These results indicate that many fish species are a good source of taurine. However, most of the deep water species above had very little. It is important to stress that taurine is only one of a family of potentially important bio-active amino acids/peptides found in fish. Other muscle foods also contain taurine, e.g. 63 (lamb chop), 53 (round steak), 51 (chicken fillet) and 21mg/100g (pork chop) on a fresh weight basis.

**Enriching fish flesh with taurine**

Taurine contents of circa 800mg/100g were achieved by tumbling tuna cubes in a solution containing sodium tripolyphosphate (5%) and taurine (7.5%) (Gormley et al., 2007). This was close to the target of 1g/100g in the flesh. A consumer eating 150g of these tuna cubes would obtain 1.2g of taurine which is similar to the amount used by Fennessy et al. (2003) in the trial described above with young smokers. Grilling or steaming the infused fish gave a cook loss less than 2% whereas microwaving resulted in a 7% cook loss. Tumbling, therefore, is a good technique for enriching fish fillets/portions with water-soluble bioactive compounds. However, only some species are suited to the vigorous tumbling process. Tuna cubes are excellent in this regard due to their firm texture. Taste panel tests on taurine-enriched and non-enriched tuna cubes showed no differences between them for flavour or for texture.

**References**