

Biogenic amines in fish and fish products

CA den Brinker¹, CJ Rayne¹, MG Kerr¹, WL Bryden²

¹State Chemistry Laboratory, Agriculture Victoria, DNRE, Werribee, Victoria, 3030

²Department of Animal Science, University of Sydney, Camden, NSW, 2570

Biogenic amines are found at low concentrations in all cells and are normally produced by decarboxylation of free amino acids. In fish and fish products, meat, wine, cheese and fermented foods much higher concentrations may occur due to the action of microorganisms and is an indication of food spoilage (1). The concentrations of amines produced is dependent upon the availability of free amino acids, the presence of decarboxylase enzymes and conditions favouring bacterial growth (1). Ingestion of food containing high concentrations of biogenic amines, especially histamine can cause poisoning (2). Putrescine and cadaverine, two biogenic amines, may potentiate the toxicity of histamine (3). Human poisoning with histamine usually has been associated with the consumption of fish (3). A limit of 100mg/histamine has been set in Australia for food destined for human consumption (4). Nevertheless, there is no information on the levels of biogenic amines in Australian retail foods.

In this study, commissioned by the Department of Human Services, Vic, 53 samples of canned fish and fish products and 37 samples of fermented fish and fish products, purchased from retail outlets in Melbourne, were analysed to determine the levels of histamine, putrescine and cadaverine. The amines were determined by HPLC using C18 reverse phase column and an UV detector. Eight of the 53 samples (15%) contained levels of histamine greater than 100mg/kg and high levels of putrescine and cadaverine. Concentrations of 300 mg/kg, 1200mg/kg and 2900mg/kg were the highest concentrations determined for the three biogenic amines, respectively. These samples consisted of sauces and pastes and one canned fish sample. In the survey of fermented fish and fish products, 35% of samples analysed exceeded the maximum permitted level of 100mg/kg histamine, and also had high levels of putrescine and cadaverine.

The finding that fermented fish and fish products can contain excessive levels of histamine, indicates that the fish may have been mishandled during the storage and processing. If consumed in large enough quantities toxic effects may be experienced. As putrescine and cadaverine may potentiate the toxicity of histamine, safe levels of these and other biogenic amines need to be determined. Continued monitoring of biogenic levels in fish and fish products would appear warranted.

1. Halasz A, Barath A, Simon-Sarkadi L. Biogenic amines and their production by microorganisms in food – Review. *Trends Food Sci Tech* 1994;5:42-49.
2. Taylor S. Histamine food poisoning: toxicity and clinical aspects – review *CRC. Crit Rev Toxicol* 1986;17:91-128.
3. Eitenmeller R, Orr J, Wallis W. Histamine formation in fish: Microbiological and biochemical conditions. In: Martin R, ed. *Chemistry and Biochemistry in Marine Food Products*. Connecticut: AVI, 1980; 39-50.
4. Australian Food Standards Code. (1995). National Foods Authority, Standard D1.