

Preliminary studies of phytoestrogens in Australian foods

LS Hutabarat¹, H Greenfield¹, M. Mulholland²

¹Dept of Food Science and Technology, University of New South Wales, NSW, 2052

²Dept of Chemistry, University of Technology, Sydney, NSW, 2007

Plant foods contain a large number of compounds such as phytoestrogens, which appear to have bioactive roles. Phytoestrogens due to similarities in structure to the natural hormone, estrogen, may have a role in protection against certain hormone-dependent cancers.

There is only very limited published information on phytoestrogens in Australian foods (1). The present study determined the isoflavones (daidzein, genistein, formononetin and biochanin A) and a coumestan (coumestrol) in Australian plant foods using isocratic HPLC techniques (2) developed by the authors.

Dried legumes and canned legume products were collected from retail outlets in Sydney and extracted with ethanol and hydrochloric acid. Assay portions were neutralised before injection into a Waters liquid chromatograph connected to photodiode array detector. The optimised mobile phase was 30% acetonitrile and 70% water at flow rate of 0.8 ml/min. Analytes were identified by comparison with pure standards and quantified by computer integration.

The separation of all five analytes was achieved in under 24 minutes. The isocratic methods also exhibited good repeatability and high linearity (0.999) under safer conditions less detrimental to column life than other methods described in the literature. This method was also suitable for automation and treatment of large numbers of legume samples.

Preliminary results for phytoestrogens in legumes available in Sydney are as follows: Daidzein was found in dried soybean seed and dried berlotti beans, within the range 6 to 20 mg per 100 g wet weight. Genistein was found in dried soybeans, canned and freeze-dried peas, canned and dried red kidney beans, dried berlotti beans, dried haricot beans and canned butter bean, within the range 1 to 30 mg/100 g wet weight. Formononetin was detected in black eye beans and butter beans within the range 1 to 9 mg/100 g wet weight. Biochanin A was detected in canned and freeze-dried peas and dried chick peas within the range 3 to 13 mg. Coumestrol was also detected in some foods at low levels. Confirmation of identity of all analytes is being carried by mass spectroscopy studies. Further studies are being carried out to compare results using different HPLC methods in order to ascertain comparability of results with studies carried out elsewhere. The studies will be extended to include other legume products as well as other plant foods available in Australia, including the forms as prepared for consumption.

1. Knight, DS, Eden, JA, Huang, JL, Waring M. Isoflavone content of infant foods and formulas. *J Paed Child Health*, in press.
2. Hutabarat, LS, Mulholland, M, Greenfield, H. Development and validation of a new isocratic high-performance liquid chromatographic method for quantitative determination of phytoestrogens in soybean. *J Chromatogr.* in press.