Resistant starch in the Australian diet

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Abstract

We set out to estimate resistant starch (RS) intakes using the 24-hour food intake data from the 1995 National Nutrition Survey (NNS) database of 13 858 Australians. As there are often significant differences in the RS content of foods reported by various authors, we calculated intakes based on both published maximum and minimum values for individual foods. RS intakes (mean and SEM) for all persons were in the range 3.4 ± 0.03 g/d (minimum estimate) to 9.4 ± 0.07 g/d (maximum estimate). Adult males (19+ years) consumed more RS (10.7 ± 0.11 g/day maximum estimate) than adult females (19+ years) (8.2 g ± 0.08 g/day maximum estimate). RS comprised a greater proportion of the total starch intake in the very young and in the older age groups. Across the population, foods contributing most to RS intake were potatoes, bananas and white bread.

Key words: resistant starch, dietary intake, Australian population, food

Introduction

Starch is a major source of energy in the Australian food supply. It is now widely accepted that not all starch is digested and absorbed by healthy individuals, but that some, now termed resistant starch (RS), passes undigested through the small intestine into the large intestine, where it can be fermented by bacteria that reside there (1). Resistant starch has been a topic of considerable scientific interest for approximately 20 years, with purported health benefits spanning glucose and insulin control as well as improved colonic health via fermentation-related mechanisms including short chain fatty acid production, altered colonic bacterial composition or activity and enhanced mucosal integrity (2).

Resistant starch is a naturally occurring component of the diet, and can be found in foods such as legumes and cooked, cooled potato (3). Different forms of RS are recognised and these have been called RS1 (starch granules physically entrapped in plant tissues found in wholegrain cereal foods), RS2 (particularly insoluble granules of starch found in foods such as legumes), RS3 (crystalline starch formed when hot starchy foods are cooled) and RS4 (chemically modified starches used as thickening agents in processed foods). In addition, a commercial source of resistant starch (called Hi-maize™) has been available to Australian food product manufacturers since 1993, and has been included in a range of commonly consumed foods including baked goods and breakfast cereals (4). Given the scientific interest in resistant starch and its increasing use in the Australian food supply, it is timely to evaluate the resistant starch content of the Australian diet.

Currently there is no internationally agreed and validated in vitro method for measuring resistant starch in food. One recent method (5) was approved by AOAC International, but is supported by only limited in vivo data. Other methods have also been published (3,6–8), however Champ (9) demonstrated that considerable differences can occur between methodologies. In vivo methodologies such as intubation and ileostomy have also been used to measure resistant starch (10,11), however these methods are not useful for screening large numbers of foods for dietary intake assessment. Cassidy et al. (12) approximated resistant starch intake to be 5% of total starch consumption, however it is known that the relative portion of starch that escapes digestion in vivo is dependent on starch type and amount consumed (13,14). Some types of resistant starch are resistant to amylolytic enzymes included in the AOAC Total Dietary Fibre methodologies, so indigestible portions are reported as dietary fibre for labelling purposes. Although this meets the needs of food labelling regulators, it does not accurately measure the resistant starch content of foods, or allow for an accurate measurement of resistant starch in the food supply.