Gluten in "gluten-free" manufactured foods in Australia: a cross-sectional study

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Patients with coeliac disease must strictly adhere to a gluten-free diet. Two potential sources of inadvertent gluten exposure are meals provided when dining out and manufactured "gluten-free" foods. A recent study[1] found that 9% of gluten-free food samples from Melbourne food businesses failed to meet the national standard of "no detectable gluten"[2]. As no data on gluten levels in manufactured "gluten-free" foods in Australia have been published, we measured the gluten content of a broad sample of these foods.

The 300 foods labelled "gluten-free" most commonly purchased in Australia were identified in August 2017 in a consumer activity database (The Nielsen Company, Homescan Online: https://homescan.acnielsen.com.au). Two hundred and fifty-six of the identified food items could be obtained from 16 large retail supermarkets, ten discount or independent supermarkets, and one specialty health food supermarket. The sequence in which we analysed the samples was recorded to allow detection of contamination of samples during preparation and analysis by a preceding positive sample. Foods were homogenised on the day of purchase and analysed at the National Measurement Institute in Melbourne. All samples were assayed in duplicate with the RIDASCREEN R5 gliadin kit (R-Biopharm), which has a limit of quantification for gluten of 5 mg/kg (parts per million, ppm) and a detection limit of 1 ppm gluten. To validate our findings, positive samples were also analysed with the AgraQuant G12 gluten kit (Romer Labs). If gluten was detected in a sample, a fresh sample of the food was purchased and analysed. The manufacturers of products containing detectable gluten were notified. The study was approved by the Melbourne Health Human Research Ethics Committee (reference, 2016/070).

The agreement between results of the R5 and G12 assays was good. Seven samples (2.7%) from six manufacturers contained detectable gluten at levels of up to 49 ppm. Two of these samples were from the same manufacturer and contained the same two ingredients (not named to protect identity of the manufacturer). One of the seven items had already been recalled by its manufacturer; follow-up batches of five of the other six items also contained quantifiable levels of gluten (5–21 ppm) (Box).

The integrity of manufactured foods labelled "gluten-free" is imperative for people with coeliac disease, but in Australia only one formal analysis (of imported foods) has been published.[3] We found that 2.7% of foods labelled "gluten-free" were not compliant with the national standard of no detectable gluten; two contained gluten at levels exceeding the less strict Codex Alimentarius CODEX (Europe) and Food and Drug Administration (United States) thresholds for "gluten-free" labelling (20 ppm). While the gluten content per standard food serve was generally low, the 3 mg gluten per serve of "gluten-free" pasta could be harmful, especially if consumed frequently.[4] Repeat batches of five of seven contaminated foods also contained gluten, indicating that the initial results did not reflect isolated episodes of contamination. As three of the seven items were produced in dedicated gluten-free factories, gluten contamination of ingredients supplied by outside sources should be examined.

Our findings indicate that inadvertent gluten ingestion is more likely when dining out[1] than when consuming manufactured "gluten-free foods". Nevertheless, more frequent gluten testing, feasible for many companies,[5] would reduce the risk for people with coeliac disease.

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Competing interests: Jason Tye-Din is a co-inventor on patents pertaining to applications of gluten peptides in therapeutics, diagnostics, and non-toxic gluten; he is a shareholder in Nexpep and a consultant to ImmusanT (USA).

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Gluten content of "gluten-free" manufactured foods

	Assay			
	RIDASCREEN R5 (gliadin)			AgraQuant G12 (gluten)
Food item	Gluten (ppm): initial test	Gluten in standard serving (mg)*	Gluten (ppm): follow-up test	Gluten (ppm)
Fruit/muesli bar	< 5.0	—	< 1.0	6.4
Noodles	5.0	0.38 (single serving, dry; 75 g)	14	10
Cracker	6.0	0.09 (2.5 crackers; 15 g)	13	6.5
Fruit/muesli bar	10	0.40 (one bar; 40 g)	21	9.0
Cracker	19	0.48 (one cracker; 25 g)	5.0	14
Rice snacks	24	0.48 (single serving; 20 g)	NA	21
Dry pasta	49	3.1 (0.5 cup, dry; 62.5 g)	8.0	51

NA = not applicable (product recalled by manufacturer); ppm = parts per million. * Standard serving size based on nutrition information panel for product. ◆

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