Should coeliac sufferers be allowed their oats?

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- **Confusion exists over the suitability of oats for coeliac patients.**
- **The majority of oats available in Europe are contaminated with other cereals.**
- **Barley contamination is a particular problem.**
- **One of two commercial gluten test kits is barley-insensitive.**
- **A small minority of coeliacs have oat-sensitive small intestinal T cells.**
- **Inclusion of oats in the diet should be carefully monitored and backed by robust assay systems.**

The suitability of oats as part of a gluten-free diet is controversial. Contamination of many oats products with wheat, rye and particularly barley, together with inadequacy of available gluten-testing systems may account, at least in part, for the confusion. Some clear evidence has, however, emerged in the past few years that a small number of gluten-sensitive patients display a specific small intestinal T cell response to oat peptides that cannot be explained by contamination with other cereals. Oats could form a potentially useful part of a gluten-free diet, but patients require careful advice and monitoring, backed by robust gluten-assay techniques. *Eur J Gastroenterol Hepatol* **20:492–493 © 2008 Wolters Kluwer Health | Lippincott Williams & Wilkins.**

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Coeliac sufferers and their carers will appreciate the difficulties and restrictions of a gluten-free diet. Patients will often complain that breakfast is the most difficult meal to organize while steering clear of this common food allergen. Lack of cereal fibre is a particular problem for those adhering to a strict gluten-free diet. Oats have a low glycaemic index, high fibre content and are known to be useful in helping to lower cholesterol absorption from the gut. Thus, the possibility of including oats as part of a gluten-free diet would be welcomed by all concerned.

The article published by Hernando *et al.* [1] in this issue of European Journal of Gastroenterology and Hepatology shows that 80% of oat products that they analysed and that are sold in Europe, Canada and the United States were contaminated with gluten-containing cereals, predominantly barley. Worryingly, one of the only two commercially available gluten-test kits that is based on the measurement of wheat omega-gliadin detects barley-derived gluten with a cross-reactivity of 4–8% compared with wheat gliadin [2].

Early feeding experiments suggested that oats, like wheat, rye and barley, were coeliac-toxic. On the basis of this, oats have traditionally been excluded from a gluten-free diet. Now it is, however, recognized that the oats used in early studies may have been heavily contaminated with other gluten-containing cereals. A number of long-term feeding studies have suggested that pure oats are safe for the majority of patients with coeliac disease (CD). In several cases, however, a number of patients withdrew from the study, sometimes because of the development of gastrointestinal or skin symptoms associated with dermatitis herpetiformis. In other cases, no reason was given. Taken together, the various studies leave some doubt about the suitability of oats in the diet for a minority of CD sufferers. A study from Finland illustrates how some of the confusion over oats has arisen. In this study, patients with coeliac disease eating oats containing gluten free (GF) products were found to have more abdominal complaints, particularly diarrhoea, than those not eating oats. Indeed three dropped out of the study as a result of these symptoms [3]. A mild mucosal inflammation was also suggested in the oats group. The source and nature of the 'oat-containing products' was not stated, nor was it apparent from the article that there was any attempt to test the products for contamination with wheat, rye or barley. The authors conceded that the oats might have been contaminated with gluten-containing

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cereals. They, however, cited as their reason for thinking that this was probably not the case, the fact that the vast majority of oat products available and tested in Finland contained less than 200 ppm gluten, the suggested legal maximum for such products. As the source of the latter information was an unpublished study, we do not know which method of testing was used. As one of the only two commercially available kits for gluten analysis recognizes barley only very weakly, care should be taken in the interpretation of such studies. Contamination with barley could account for the apparent toxicity of oats seen in some feeding studies, if analysis using an appropriate test had not been performed.

Results published recently suggest that that there may be a small subset of patients with coeliac disease who are genuinely intolerant to oats. These studies are both from Norway, where specially produced oats for patients with coeliac disease are available. The cereal is produced by a small number of dedicated farmers that grow no wheat, rye or barley. The oat grains are processed in a separate production line and repeated testing has shown that the products are free from contamination. In the first study, 19 adult coeliac patients consumed 50 g/day of oats, the nationally recommended level, for 12 weeks [4]. It is of interest to note that the oat products used for these experiments were tested by the barley-insensitive ω-gliadin method. The patients were biopsied before and after the challenge. One patient developed villous atrophy, dermatitis herpertiformis and symptomatic coeliac disease during repeated oat challenges. Two more patients were found to deteriorate after they started eating oats. Is it possible that the minority of patients who developed problems were merely exquisitely sensitive to small amounts of gluten contamination in the form of barley, which was not detected using the ω-gliadin method?

A later study by the same authors sheds more light on the issue [5]. They used the technique of in-vitro organ culture to challenge small intestinal biopsies from five patients from the study cited above with oats. A further four patients with histories of eating oats were recruited from clinics. Using techniques established by the group to isolate and grow wheat gluten-reactive T cells, they were able to grow and test oat avenin-reactive T cells from the oat-intolerant patients. In total five of nine patients,' small intestinal biopsies yielded oat avenin-reactive T cells. These T cells were tested with synthetic avenin peptides, such that contamination with gluten peptide could not be an issue. The peptide epitope specificity was defined as PYPEQEEPY, which is similar, but not identical to the immunodominant wheat gliadin peptide PFPQPELPY [6]. Thus, the intestinal immune responses in these patients correlated well with their clinical intolerance. Another group found that wheat gluten-reactive T cell lines from a minority of patients cross-reacted with an oat-derived peptide [7]. There seem to be at least two distinct oat peptides that can elicit mucosal T cell responses [6]. Recently Silano *et al.* [8] obtained oat flours from four varieties that had been grown and handled so as not to become contaminated with wheat rye or barley. They tested the proliferation and IFN-γ secretion by peripheral blood mononuclear cells from coeliac children in response to the four varieties, compared with rice and wheat gluten. Although all four varieties of avenin elicited significant responses, there was a considerable difference in the response level between the cultivars [8]. It is possible that differences in antigenicity of oat cultivars has led to some of the differences in the results between different feeding studies.

From all of the studies above, it seems that intolerance to oats is infrequent. Oats could be of benefit for patients with coeliac disease, possibly improving their compliance with a gluten-free diet, by providing greater variety and palatability. It is clear from the study described in this issue of European Journal of Gastroenterology and Hepatology that the majority of oat products generally available are contaminated with wheat, rye or barley, and are therefore unsuitable for patients with coeliac disease.

It is our practice to recommend a strict gluten-free diet with the omission of oats until clinical and histological remission had been achieved. Subsequently, up to 50 g/day of oats, obtained from a dedicated supplier, may be added to the diet with careful follow-up to monitor any adverse effects. Such a regime would best serve gluten-sensitive individuals, if appropriate gluten-testing methods are applied to foods labelled as suitable for their needs.

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