

Foods for patients with celiac disease

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As a general rule patients with celiac disease must avoid five cereals — wheat, rye, triticale, barley and oats. Very sensitive individuals must also avoid two products of these cereals — malt and hydrolyzed vegetable protein. Some less sensitive individuals may be able to tolerate barley and oats in small quantities. All other foods are acceptable, including the cereals corn, rice, buckwheat, millet and sorghum, as well as malt-flavoured breakfast cereals. Wine, spirits, beer and ale are also acceptable unless otherwise contraindicated. Monosodium glutamate, other food additives and pharmaceutical preparations are also acceptable. The ingredients of prepackaged processed foods are listed on the labels. Patients with celiac disease must examine labels to ensure that they avoid the harmful cereals. With appropriate precautions they need not be concerned about eating away from home.

Règle générale, les patients qui souffrent de maladie coeliaque doivent éviter cinq céréales, soit le blé, le seigle, le triticale, l'orge et l'avoine. Les individus très sensibles doivent aussi éviter deux dérivés de ces céréales, soit le malt et les protéines végétales hydrolysées. Certains individus moins sensibles peuvent tolérer l'orge et l'avoine en petites quantités. Tous les autres aliments sont acceptables, y compris des céréales telles que le maïs, le riz, le sarrasin, le millet et le sorgho, ainsi que les céréales à saveur de malt pour le petit déjeuner. Le vin, les alcools, la bière et l'ale sont aussi acceptables à moins d'être contre-indiqués pour d'autres raisons. Le glutamate monosodique, d'autres additifs alimentaires et les préparations pharmaceutiques sont également acceptables. Les ingrédients des aliments préparés et préconditionnés apparaissent sur l'étiquette. Le patient qui souffre de maladie coeliaque doit lire attentivement les étiquettes afin de s'assurer qu'il ne consommera pas de céréales dommageables. En prenant les précautions appropriées, il n'a pas à craindre de manger à l'extérieur.

Although it has been recognized for about 30 years that ingestion of wheat is responsible for the diarrhea, pale bulky stools, abdominal cramps, flatulence and failure to thrive of patients with celiac disease,¹ there is still considerable difference of opinion about what foods such patients can eat.² For example, in Ontario patients are advised to avoid buckwheat³ but in Sweden they are not (B. Isaksson, Sahlgren's Hospital, University of Göteborg: personal communication, 1981), beer is proscribed in Ontario³ but not in Scotland,⁴ and triticale, a

wheat/rye hybrid that obviously should not be eaten, is not on any list of prohibited foods.

When the proteins of cereals are fractionated the toxic factor is extracted into the alcohol-soluble prolamine fraction, called gliadin in the case of wheat. Prolamines are complex mixtures of proteins that are insoluble in water but soluble in dilute alcohol. They make up a large and variable part⁵ of the protein of cereals, both those that cause celiac disease and those that do not. The gliadin of wheat has been fractionated still further, so that we now know that the toxicity lies largely,⁶ but not entirely,⁷ in the α -gliadin fraction. The grain's toxicity does not appear to be related to the amount of prolamine, as suggested by Bell and associates,⁸ because rye, which is toxic, has about the same prolamine content as corn, which is not toxic. Gliadin's toxicity may be due to unique combinations of amino acids in the polypeptide chain.⁹ The exact nature of these complexes is unknown, but when the toxic proteins are hydrolyzed to their constituent amino acids they lose their toxicity.

It has been suggested that patients with celiac disease lack an intestinal peptidase essential for the ultimate detoxification of gliadin.^{9,10} It has also been suggested that they are prone to the development of localized immune reactions when exposed to dietary gluten. There is some evidence that the latter theory may be the sounder one, but the exact mechanism is not known.

Diagnosis

Patients with celiac disease usually present with a variety of intestinal complaints, including diarrhea, flatulence and bulky stools, or with breathlessness and fatigue. Children have a lack of appetite and retarded growth. Steatorrhea has generally been accepted as the most constant finding,¹¹ but decreased fat absorption and reduced d-xylose excretion have been considered diagnostic. The final diagnosis¹² is now made by histologic and enzymatic study of a jejunal biopsy specimen, which includes subjective assessment, determination of the activity of disaccharidase and other enzymes, and measurement of surface-to-volume ratios. Removing wheat from the patient's diet usually reduces the symptoms and signs, sometimes in days, and the intestinal villi usually return to normal within a few months.

Testing of foods

Techniques to test the acceptability of foods are also based on studies of fat absorption, d-xylose excretion and jejunal biopsy specimens in treated patients with celiac disease who have been given challenge doses of the food. Jejunal biopsy is now considered the most reliable method of diagnosing the disease and testing foods; symptoms alone are a poor guide to the damaging effects of cereals in these patients.¹²

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This study was undertaken at the request of the Ottawa chapter of the Canadian Celiac Sprue Association.

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Guidelines

Foods to be avoided

Wheat: The toxic properties of wheat appear to reside largely in the gliadin fraction of the protein.^{13,14} Thus, all wheat products must be avoided except wheat starch flour,⁸ which lacks the protein of the wheat endosperm.

Rye: A few years after the discovery of wheat intolerance in celiac disease rye was also found to be harmful¹⁴ and is now generally considered toxic.^{8,12}

Triticale: Triticale is a genetic hybrid of wheat (triticum) and rye (secale).¹⁵ Its amino acid content is similar to that of these grains. Although triticale has not been tested clinically one might expect it to cause a similar toxic reaction.⁸

Barley: A study of 14 centres in Great Britain found that 7 allowed barley but advised its exclusion if the response to wheat and rye was poor.¹⁶ More recently it was concluded from histologic and enzymatic study of biopsy specimens that barley is harmful even if it does not produce symptoms.¹² Certain groups in Great Britain recommend avoidance of barley (C.C. Booth and P.J. Bereton, Clinical Research Centre, Northwick Park Hospital, Harrow, England and M.R. Ward, The Coeliac Society of the United Kingdom, London: personal communications, 1981). It would seem wise, as Bell and associates⁸ recommended, to consider barley unacceptable, except possibly for patients who are less sensitive to wheat.

Oats: A group of investigators working in the Netherlands in the 1950s found that oats produce symptoms similar to those caused by wheat and rye in patients with celiac disease.^{13,14} Studies done more recently have concurred with these findings (C.C. Booth, P.J. Bereton and M.R. Ward: personal communications, 1981). Baker and Read,¹⁶ using the d-xylose test, concluded that both oats and barley are harmful. On the other hand, Watson¹⁷ stated that in his experience large doses of oats do not seem to be harmful. Dissanayake and colleagues¹⁸ concluded from mucosal examination that oats are acceptable although others have questioned this conclusion.^{19,20} Bell and associates⁸ recommended that once the full health of a patient with celiac disease is restored (in 3 to 6 months) oats may be allowed in small amounts, although the authors were mindful of the possible subclinical assault resulting from the continued ingestion of small amounts of toxic prolamine (gluten).

Foods and food products that are acceptable

Corn: Although the prolamine content of corn is almost as high as that of wheat it is generally agreed that corn causes no toxic effects. Studies have shown that it does not affect fat absorption¹⁴ or alter the jejunal lining.¹²

Rice: Early work also showed that rice did not affect fat absorption in patients with celiac disease.¹⁴ Since then it has been generally accepted that rice is not toxic. More recent work has confirmed this view using the jejunal biopsy technique.¹²

Buckwheat: Buckwheat is a member of the family Polygonaceae, which is quite distinct from the grass family Gramineae, in which wheat, rye, triticale, barley and oats belong. For this reason we have no reason to

suspect that buckwheat is toxic. In an unpublished paper cited by Bell and associates⁸ buckwheat was reported to be nontoxic in two patients. It has been stated without supporting data that buckwheat can be used for gluten-free diets,²¹ and this grain is recommended without question by several groups in Great Britain. It is fairly widely used in Sweden (B. Isaksson: personal communication, 1981) and in other parts of Europe.

Millet and sorghum: In cereal grain evolution these grains are more closely related to corn and rice than to wheat, rye, barley and oats.⁸ It has been suggested, therefore, that the prolamines of millet and sorghum may not be toxic. Millet is used in some gluten-free recipes, and experience in Great Britain indicates that it is acceptable. It is also claimed that sorghum has no gluten.⁸ Nevertheless, Bell and associates⁸ recommended that millet and sorghum be avoided until more information is available.

Gluten-free foods: Foods that contain gluten (or gluten-like substances) in their natural form but have had the gluten removed may be labelled "gluten-free".²² In such products the nitrogen content must not exceed 0.05 g/100 g of grain, the equivalent of 0.3% protein.

Alcoholic beverages: Since gluten (a protein) cannot pass through an alcohol still, distilled alcoholic beverages are gluten-free. Rye whisky, scotch whisky and other spirits made from gluten-containing cereals need not be excluded. Most authorities (C.C. Booth, P.J. Bereton and M.R. Ward: personal communications, 1981) agree with this position, although some concern has been expressed recently.⁸ There is even less reason for excluding brandy and wine made from grapes, which contain no gluten.⁴

Because beer and ale are produced from barley there is concern that they may be toxic. Some workers recommend that beer and ale be avoided even in the absence of clinical data to justify that position.^{3,8,12} On the other hand, the enzymatic breakdown products of barley have not been shown to be harmful to patients with celiac disease (M.R. Ward: personal communication, 1981). Gluten-containing material is insoluble in water and is largely if not entirely removed in clarification and filtration. Beer and ale are permitted by most authorities,⁴ including groups in Great Britain (C.C. Booth, P.J. Bereton: personal communication, 1981).

Flavourings and additives: Malt is prepared from sprouted barley and is therefore suspected of being toxic even though barley does not seem to be as toxic as wheat and rye.⁸ The levels of barley in malted foods are probably low enough that only very sensitive individuals need avoid such food. Malt extract and malt flavourings, used in some breakfast cereals, are safe for patients with celiac disease since the toxic proteins are removed in processing (A.B. French, University of Michigan Medical School, Ann Arbor: personal communication, 1981).

Monosodium glutamate (MSG), an amino acid widely present in foods, has been used without ill effects (A.B. French: personal communication, 1981). It is acceptable for patients with celiac disease.⁸

Hydrolyzed vegetable protein (HVP), a flavour enhancer in many commercially prepared soups and foods, may be made from soy, wheat or other cereal proteins.

It is not required that the source of HVP be given on food labels. Some authorities recommend that foods containing HVP be avoided;⁸ others allow them (C.C. Booth and P.J. Bereton: personal communication, 1981). The amount of HVP used in soups and other foods is small, and even if the HVP is made from wheat it probably need be avoided only by very sensitive individuals.

All other foods: Since toxic prolamines apparently occur naturally only in wheat, rye, triticale, barley and oats, all other foods are safe for patients with celiac disease. These include legumes (e.g., peas, beans, soybeans and chickpeas), starchy roots (e.g., potatoes, sweet potatoes, arrowroot, sago and tapioca), all nuts and seeds, and all fruits, vegetables, meats, poultry, fish, eggs, milk, cheese and related products, provided that toxic cereals have not been added in their processing or preparation.

Product labels

Probably the most difficult decision faced by patients with celiac disease is whether to eat certain prepackaged processed foods. However, all prepackaged foods now carry a list of ingredients on the label,²³ and the consumer must check for the five harmful cereals and possibly malt and HVP. If there is doubt about a label or a particular product, information must be obtained from the vendor or manufacturer, who is usually aware of the problem and very willing to assist.

Some recommendations in Great Britain for gluten-free foods contain warnings about certain drugs (C.C. Booth and P.J. Bereton: personal communication, 1981). Advice from the health protection branch of the Department of National Health and Welfare in Canada indicates that flour and gluten are almost never used in pharmaceutical preparations in this country.

Individual concerns

Authorities in the field of celiac disease differ in their opinions about the acceptability of several foods. The recommendations I have listed are general ones applicable to most patients with celiac disease. A few patients, however, may find it necessary to modify the recommendations to meet their individual needs or problems.

Individuals differ in their response to doses of foods such as barley and oats,^{12,16} probably because of differing sensitivity to various types and amounts of prolamines (gluten). The effects of deviating from a strict diet are not known.²⁴ Patients with celiac disease have a slightly increased risk of certain types of malignant disease²⁵ and intestinal ulcers.²⁶ There are no data, however, to indicate that this risk is lowered by complete avoidance of gluten. A patient with celiac disease therefore has the choice of following a strict diet with its disadvantages or of consuming an occasional serving of a food that does not cause serious symptoms but may increase the risk of cancer.

Long-term dietary therapy is generally recommended for children,^{27,28} although Bell and associates⁸ have suggested that once full health is restored the patient can consume oats in reasonable amounts.

The patient's attitude

The well-being of a patient with celiac disease

depends not only on the effectiveness of dietary modification but also on the patient's physiologic and mental reactions to these modifications. Patients have the most difficulty in adhering to the diet when away from home,²⁹ but some helpful suggestions in this area have been given by the Coeliac Society.³⁰ Wheat flour, as either flour or bread, must be avoided when eating out. Other toxic cereals may be largely disregarded, for they are seldom encountered. Soups, gravies and sauces should be avoided unless they are known to contain no flour.³⁰ Certainly the best attitude for a patient with celiac disease is a positive one. An interest in new and different foods will also help.

I thank Dr. W. Strober, National Cancer Institute, Bethesda, Maryland, and Dr. D.D. Kasarda, Western Regional Research Center, Berkeley, California for reviewing the manuscript and providing many helpful suggestions.

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