What you should know about

Coeliac Disease

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Guidelines for patients

• Symptoms • Diagnosis • Treatment

Like an iceberg, many coeliac patients are
"under the waterline" with an undetected disorder

What you should know about

Coeliac Disease

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The purpose of this booklet is to help you develop an understanding of **coeliac disease**. It is written specifically for people who do not have a medical background.

A series of frequently-asked questions about coeliac disease are answered. The basic features of the disease and the history of its discovery are described. Then the symptoms, how it is diagnosed and what the treatment involves are discussed. Finally, the mechanisms that cause coeliac disease are considered.

A short glossary is included at the end of the booklet, because some of the medical or scientific terms used may be unfamiliar to readers.

Contents

1 What is Coeliac Disease?

Coeliac disease is a medical condition, in which damage develops in the gut when food containing **gluten** is eaten.

Gluten is an important food protein found in several types of cereals; in particular, wheat.

Gluten plays a central role in the 'stickiness' of bread dough and helps the dough to rise and retain its shape on baking.

What happens when a person with coeliac disease eats gluten?

When we eat food, nutrients are absorbed in the upper part of the gut, called the small intestine.

In someone with coeliac disease, when foods containing gluten are eaten and they reach the small intestine, the immune system reacts with the gluten and this causes damage to the inside lining of the gut.

Absorbtion of nutrients normally takes place through this lining tissue and, when it is damaged, absorbtion is reduced. Important food elements such as iron and certain vitamins are not properly absorbed and the person can develop anaemia and other ailments.

How was coeliac disease discovered?

The central role of gluten in causing coeliac disease is a relatively recent finding. It was established only in the 1950s and it is an interesting story.

A Dutch doctor, **Willem Dicke** (*pictured left*) had suspected wheat as a cause of coeliac disease in the years before World War II and, during the years of rationing after the war, he became convinced that cereal-based foods were involved.

Through careful study doctor Dicke observed that, when cereals were absent from their diet, the condition of children with coeliac disease improved.

He was able to attribute the damaging substance to wheat in particular, since after foods containing wheat were re-introduced, a patient's symptoms would return. Shortly afterwards it was discovered that it was the gluten in wheat that stimulated the injurious reaction.

Interestingly, like many major discoveries in science or medicine, the veracity of Dicke's finding was questioned initially!

Have there been any further major discoveries about coeliac disease?

Yes. The nature of coeliac disease has been studied intensively for the past 60 years and many important discoveries have been made.

These discoveries help us to understand why certain people are more prone to develop this condition, help improve our ability to diagnose coeliac disease and describe factors in the body that are responsible for damage to the intestine.

How common is coeliac disease?

Coeliac disease is now known to be quite common, with as many as 1% of the population affected in various parts of the world.

A huge increase in the number of people found to have coeliac disease has taken place. This increase in diagnosis is largely due to very accurate diagnostic blood tests and the widespread employment of these tests.

In addition, recent research suggests that the actual incidence of coeliac disease is increasing and an explanation for this has yet to be found.

Who gets coeliac disease?

Anyone, at any age, can develop coeliac disease.

For many years it was thought to be mostly a childhood condition. This was because children with the condition are often more severely affected, with failure to grow and gain weight and frequently they have severe diarrhoea.

However, nowadays the diagnosis is made in people of all ages and quite commonly in people in their 60s, 70s and even 80s!

Some of these older patients have had mild symptoms for several years but the diagnosis was overlooked. It was realised only recently that coeliac disease could affect people in this age group.

Interestingly, a reduction in childhood coeliac disease is now reported and this may relate to the delayed introduction of cereal foods to the diet of infants and to an increase in breastfeeding.

Are males and females equally affected?

No. Females are more likely to develop coeliac disease and females outnumber males by 2 to 1.

Females are particularly prone to develop coeliac disease during their fertile years and this may be due to the influence of hormones, although the full explanation is unknown.

Interestingly, a similar female tendency is found in many other so-called auto-immune inflammatory conditions, for example diseases affecting the thyroid gland.

What about genes? Is coeliac disease an hereditary condition?

Genes play a very important role in the development of coeliac disease. However, coeliac disease is not directly inherited; instead, certain genes increase the risk of developing it.

So, for example, if a family member (a parent, brother or sister) has coeliac disease, there is a 1 in 10 (or a 10%) chance that another family member will also develop the condition.

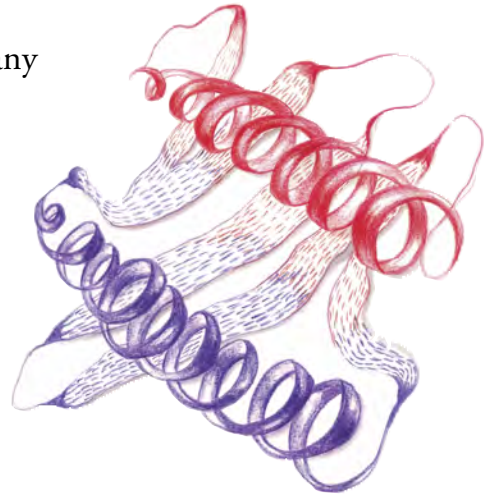
However we know that genes are not the only factors that are involved in developing the condition and it is thought that other events in the environment play a role.

What do we know about the genes linked to coeliac disease?

Some genes have been specifically identified as playing a role in the development of coeliac disease. One of these is a gene called **HLA-DQ2** which codes for a key component of the immune system.

In north European countries as many as 95% of coeliac patients possess this gene. The majority of the remaining 5% possess a closely-related gene, **HLA-DQ8**.

An active search for other genes is underway and additional genes involved in the immune response have been identified.



Model of the HLA-DQ protein

Do we know what environmental factors are linked to coeliac disease?

Gluten is the single environmental factor that directly causes coeliac disease. In the absence of gluten, coeliac disease does not develop. We know virtually nothing else about other environmental factors.

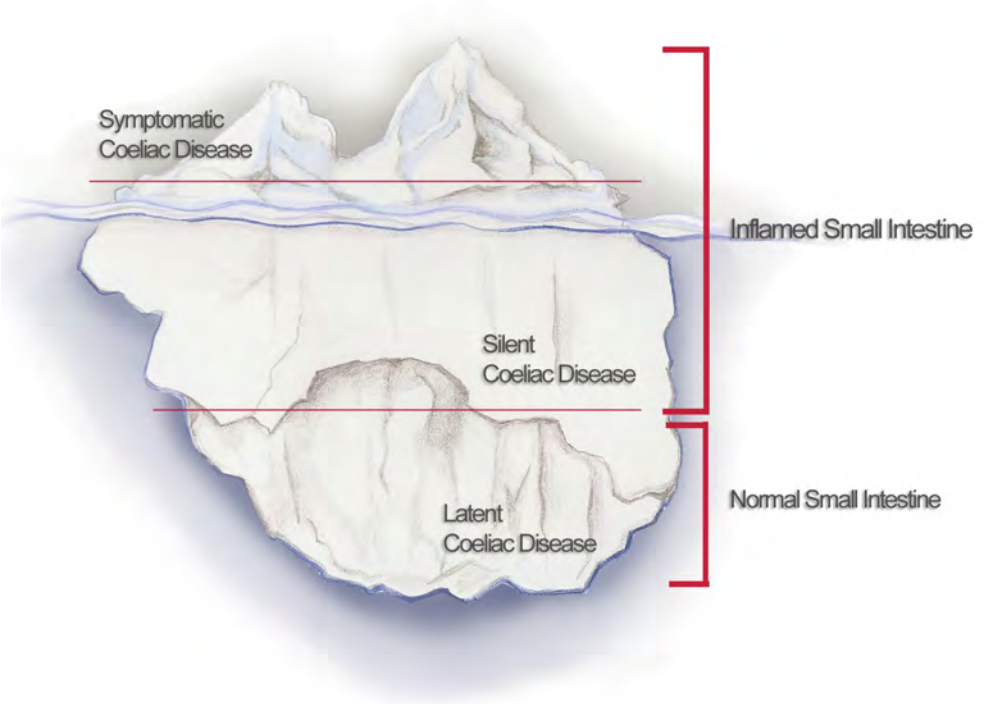
However it is likely that additional trigger events are involved; these may include the possibility of infection, such as a viral infection of the bowel.

2 Symptoms of coeliac disease

What are the common symptoms in a person with coeliac disease?

The symptoms in patients with coeliac disease tend to vary, depending on the age of the person.

In very young infants, bowel symptoms may be prominent, whereas in older people symptoms can be mild and may not particularly suggest a bowel disorder. Older patients may have non-specific symptoms such as lack of energy or even appear to have no symptoms at all. The term "silent coeliac disease" is sometimes used to describe such patients.



The coeliac iceberg

Since individuals with silent coeliac disease make up the majority of patients, the image of an iceberg is often used to illustrate the condition: a large number have an undetected disorder (like an iceberg, beneath the waterline) and only a minority have an obvious medical condition.

In infancy, what are the symptoms of coeliac disease?

Infants with coeliac disease can present in a dramatic fashion. Symptoms are often related to the gut: these include foul-smelling diarrhoea, swelling of the stomach and associated tummy pain. Vomiting can occur. The infant may fail to gain weight and to grow normally.

These symptoms develop only after the introduction of foods containing gluten into the diet.

Studies report that coeliac disease in infancy is now quite uncommon and this is probably due to the frequent practice of delaying the introduction of cereal-based foods.

What symptoms are found in older children and in young adults?

Bowel symptoms may also be prominent in these age groups. Diarrhoea is a common complaint and in some patients generalized abdominal pain and weight loss are observed.

Some people may complain of mouth ulcers or indigestion, including heartburn. Others may have none of these symptoms and may have non-specific complaints such as fatigue.

Many other medical conditions may cause similar symptoms and, if coeliac disease is overlooked as a possible diagnosis, the opportunity to offer specific treatment will be missed.

What symptoms are common in older adults?

Older adults often have very non-specific symptoms such as excessive tiredness, but some may have similar bowel symptoms to those described in younger patients.

The fatigue that patients complain of is often due to a low blood count (anaemia). The anaemia is frequently caused by a low iron level in the body, since the intestinal damage in coeliac disease results in an impaired ability to absorb iron and many other important food nutrients. This can lead to deficiency of vitamins, such as folic acid and vitamin D.

Deficiency of folic acid can also cause anaemia and vitamin D deficiency can lead to thinning of the bones (called **osteoporosis**).

Are other medical conditions more common in patients with coeliac disease?

Yes. In addition to anaemia and osteoporosis, which are directly caused by poor absorbtion of nutrients, certain other conditions are more frequent in coeliac patients.

These include thyroid disease and diabetes and it is sometimes recommended that patients with these diseases are screened for coeliac disease, even though they may have no symptoms that are suggestive of this condition.

A rare skin condition called **dermatitis herpetiformis**, in which very itchy skin blisters are found, is also associated with coeliac disease.

3 Diagnosis of coeliac disease

How is the diagnosis of coeliac disease made?

Two important tests are used to diagnose coeliac disease. One is to examine a sample of tissue (called a **biopsy**) taken from the intestine and the second is a test performed on a blood sample.

What does the tissue biopsy test involve?

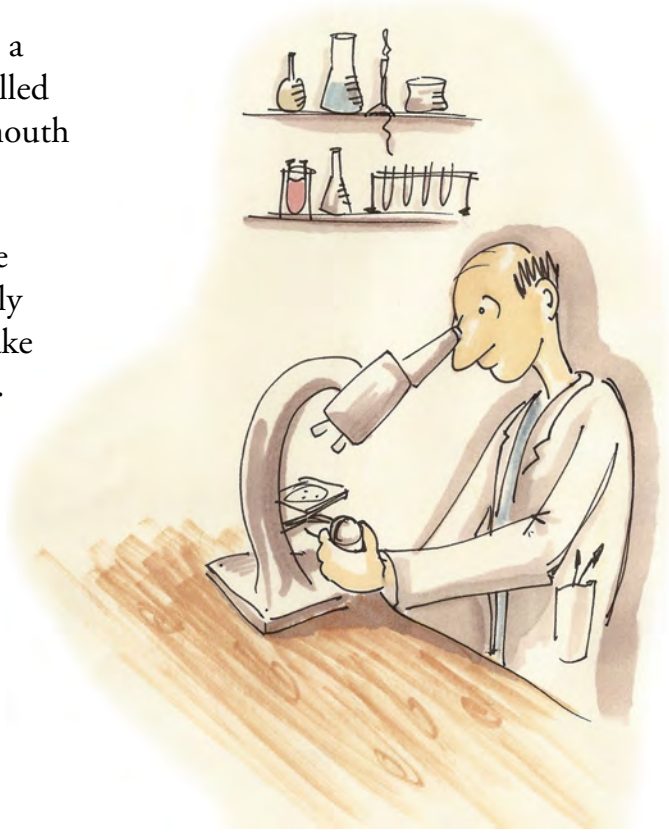
A small piece of tissue is taken from the inside lining of the small (upper) intestine. The medical term for such a sample is a biopsy.

This is taken by passing a narrow, flexible tube, called an endoscope, via the mouth to the small intestine.

When this is being done the doctor can see exactly where the tube is and take samples from the lining.

These samples are then examined using a microscope.

This is a simple procedure and it is carried out routinely.

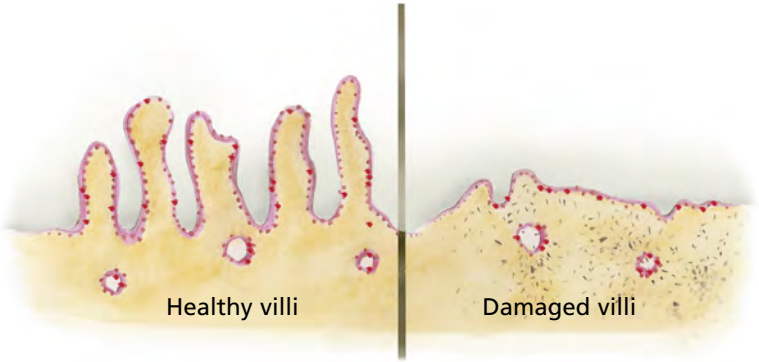


What can be seen with the microscope?

In the normal healthy lining tissue, the intestine has long, slender, finger-like structures called **villi**.

In patients with untreated coeliac disease the villi are shortened – or even absent – and the tissue is filled with various cells of the immune system that cause damage to the intestinal tissue.

When the small intestine is damaged like this, the absorbtion of nutrients is reduced.



Intestinal lining

What about the blood test?

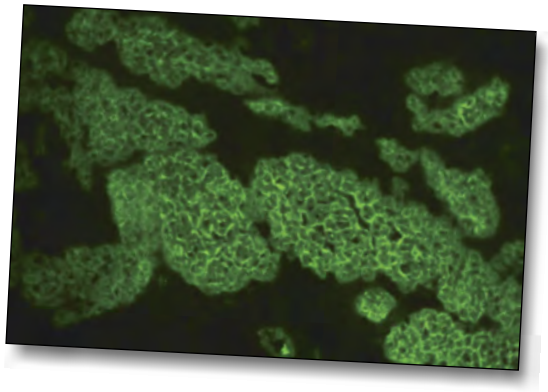
A great advance in blood testing for coeliac disease was made 20 years ago. This test is called the **endomysial antibody (EMA) test**.

When the endomysial antibody test is positive, it is virtually certain that the person has coeliac disease.

This test is performed on a small blood sample taken from the patient. The sample is then examined in a laboratory to see if it contains antibody to a tissue substance called endomysium.

Another way of performing this test is to measure antibody against a particular component of endomysium, called **tissue transglutaminase**. The identification of tissue transglutaminase in 1997 was one of the most important recent advances in coeliac research; this enzyme is now thought to play a central role in the development of coeliac disease.

A positive EMA test



Is it necessary to perform both a biopsy and a blood test?

This is a highly-relevant question and it is frequently discussed by medical experts.

However, many agree that it is a good policy to have all the appropriate evidence before making a firm diagnosis of coeliac disease, since the medical outcome is to place the patient on a restrictive diet for the rest of their life.

Are there other tests which help suspect a diagnosis of coeliac disease?

Yes. Many other tests can lead to a suspicion that coeliac disease is present. Tests for anaemia are a classical example, since anaemia may be due to low iron or folic acid levels.

In some patients the first clue is when liver tests are abnormal. In others, evidence of osteoporosis may be found.

4 Treatment of coeliac disease

How is coeliac disease treated?

Now that we know that gluten is the cause of coeliac disease, the treatment is relatively straightforward – remove gluten from the diet! When this is done, the patient will often notice an immediate benefit.

For example, a person with stomach complaints such as diarrhoea, crampy pain or indigestion will often notice an improvement in their symptoms within days of starting the diet. The improvement can be quite dramatic, particularly in infants.

In patients with milder symptoms, evidence of improvement may be less obvious; for example, in a patient with fatigue caused by anaemia, it may be weeks before any change is noted.

How long does it take for damage in the lining of the intestine to improve?

Although symptoms frequently improve rapidly, full healing of the intestine takes longer, particularly in adult patients in whom it can take a year or two for the intestine to heal. In some patients evidence of damage remains indefinitely.

Nonetheless, even when there is some residual damage, the majority of such patients have no associated health problems.

What is meant by a gluten-free diet?

Gluten is one of the principal proteins found in wheat. A similar protein is found in the related cereals, barley and rye. In a gluten-free diet, foods which contain any of these cereal proteins are excluded.

For example, foods such as bread or pastry are not allowed. Likewise beer, which is manufactured from barley, is not permitted.

In contrast, many foods are naturally gluten-free; these include all vegetables, fruits, meats and fish; these are not restricted in the diet.

It sounds quite complicated – how does a person learn what is permitted in their diet?

In some ways it **is** complicated, in other ways it is quite straightforward!

A patient with coeliac disease needs to spend some time learning about their diet. A trained dietician is a very important source of expert advice and patients with newly-diagnosed coeliac disease are routinely advised to attend a dietician.

The patient will be supplied with a booklet giving detailed lists of gluten-free foods. Thereafter, they should attend a dietician on an intermittent basis, perhaps annually.

In many countries a national patients' organization exists and this is also an important source of helpful information. **The Coeliac Society of Ireland** is the organization in this country.

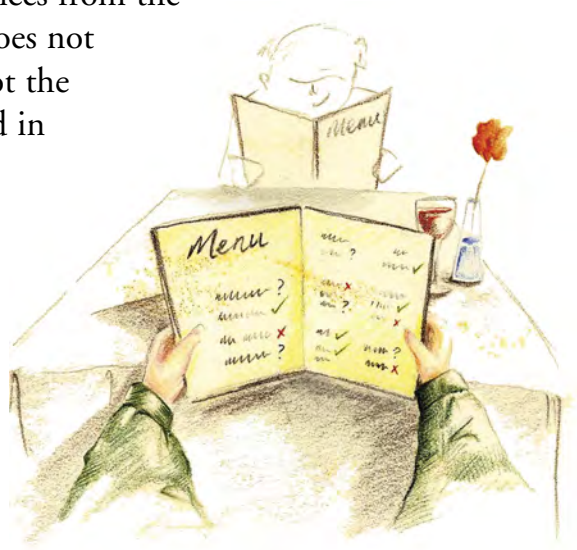
What about manufactured foods?

Any manufactured food has the possibility of containing gluten. This is because gluten is commonly used in the food industry – to help stabilise, to add protein or to enhance the flavour of food. Hence, food labeling is very important and the manufacturers of foods are obliged by law to list the ingredients on a label and, if gluten is present, to display this information.

Aware of the importance of a gluten-free diet, many food companies now voluntarily label foods as "gluten free". Nonetheless, constant vigilance is very important before consuming manufactured foods, since the unsuspected introduction of gluten to these foods is not uncommon. Dieticians and national patient associations play a key role in keeping patients informed about suitable foods.

What about eating outside the home?

Ensuring that food prepared in a restaurant or at a social function is gluten-free is a constant challenge for patients with coeliac disease. Despite assurances from the chef or caterer that the food does not contain gluten, this is often not the case. Frequently those involved in providing the food are not sufficiently educated about potential sources of gluten.



So it always advisable for a coeliac patient to make detailed inquiries about food preparation and avoid potentially-unsafe foods.

How strict does the diet need to be?

The common advice is that a very strict gluten free-diet should be adhered to. Although total absence of gluten is the aim, it is accepted that this is very difficult to achieve and small amounts of gluten may unintentionally enter the diet.

A strict system of food labeling, regulated by an organization called the **Codex Alimentarius**, is in place to help guide patients.

Do small amounts of gluten cause damage to the intestine?

There is no clear-cut answer to this question. It is likely that the majority of coeliac patients can tolerate tiny amounts of gluten in food, such as 20mg per kilogram of food.

Most patients do not develop symptoms when they eat this quantity of gluten and it is unlikely that any harm is caused to their intestine. But a minority of coeliac patients may be highly sensitive to very small amounts of gluten and should maintain a diet totally free of gluten.

Are oats allowed in the gluten-free diet?

Until recently, food prepared from the cereal oats was not permitted in the coeliac diet. However, several studies in the past decade have found that the majority of coeliac patients experience no ill-effects even when they have eaten oats daily for many months and they develop neither symptoms nor evidence of intestinal damage.

This issue is still being investigated. It is important to note that if oats are eaten, the oat product should not be contaminated by other cereal grains. It is not uncommon for oats supplied in supermarkets to contain grains from other cereals, because various crops may be cultivated and harvested together.

Is there any need for coeliac patients to take food supplements?

Once treatment has been established with a gluten-free diet, there is normally no need for a coeliac patient to take additional supplements. The gluten-free diet is well-balanced in all required nutrients.

However, at the time of diagnosis, some patients may be deficient in iron, calcium and various vitamins such as vitamin D, vitamin K or folic acid. This is caused by failure properly to absorb these nutrients when the intestine is damaged.

Consequently it may be necessary for the patient to take supplements on a temporary basis until the deficiency has been corrected.

The gluten-free diet contains the full range of normal foods, even bakery products that have been certified as gluten-free

5 Long-term care of patients with coeliac disease

Is it necessary to monitor the treatment of a patient with coeliac disease?

Yes. Patients should continue to attend their doctor and dietician to ensure that their coeliac disease is responding to treatment.

The doctor may carry out further blood tests; in the case of some patients a repeat biopsy sample is taken from the small intestine, to ensure that any damage there is healing.

The dietician will discuss any gluten-free diet issues and will advise on recent information about the diet.

What blood tests help to monitor the gluten-free diet?

Some of the tests are routine checks to ensure that anaemia, if initially present, has corrected and that nutrients such as iron and calcium are now at normal levels.

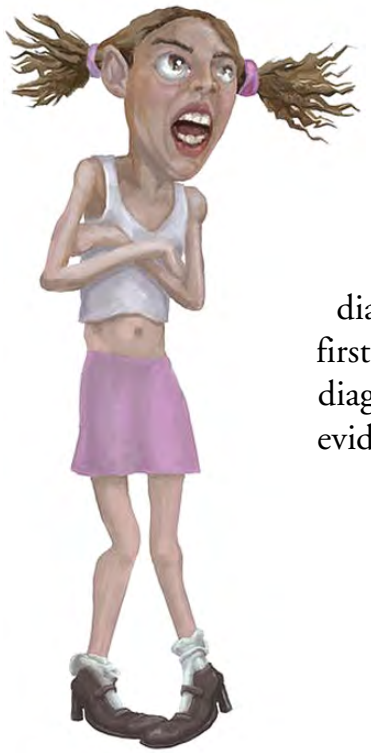
In addition, the antibody tests described on page 14 and page 15 are particularly helpful: when the diet is truly gluten-free these tests become completely normal.

If a patient is continuing to consume gluten, the test will remain positive. If the test remains positive, it will help guide the dietician to consider how gluten is still being consumed.

Does coeliac disease ever 'go away' on a permanent basis?

No. Coeliac disease is a permanent medical condition.

Some years ago there was a lot of debate about this issue. The question arose because some children with coeliac disease appear to tolerate gluten in their diet when they reach adolescence. This appears to be a genuine phenomenon and it remains unexplained.



During teenage years a predictable rebellion against dietary restriction is frequent. Surprisingly these patients often experience few or no symptoms and even their biopsy test may remain normal.

The question may then arise: was the diagnosis of coeliac disease correct in the first instance? However – assuming the diagnosis was accurate – in all patients evidence of coeliac disease eventually returns.

6 Complications of coeliac disease

Do patients always respond to a gluten-free diet?

The majority of coeliac patients have an excellent response to their gluten-free diet: symptoms disappear, blood tests become normal and the damage to the intestine improves or heals entirely.

In a small number of patients – probably less than 5% – the response to the diet is poor. Some of these patients do respond initially to the diet, but later the response is not maintained.

The term **refractory coeliac disease** is used to describe this situation.

What treatment is available for patients with refractory coeliac disease?

In a patient thought to have refractory coeliac disease, it is important to be sure that the original diagnosis of coeliac disease is correct; sometimes the original diagnosis turns out to be incorrect.

A second consideration is to be sure that the patient is definitely on a strict gluten-free diet – it is quite common for coeliac patients to continue to eat gluten-containing food despite their belief that they are taking a strict diet!

If the doctor is satisfied about these two points, patients may be treated with drugs in addition to their gluten-free diet.

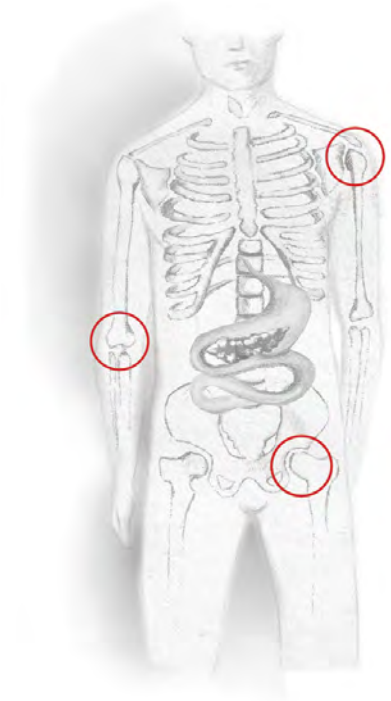
The most commonly employed drug is a steroid medication called **prednisolone**, a drug which is very commonly used in many other inflammatory disorders.

A variety of other drugs which suppress the immune system may also be used in this situation.

What other conditions can complicate coeliac disease?

Bone thinning, called osteoporosis, may also develop in patients with coeliac disease. Osteoporosis may be present at the time of diagnosis. However, proper adherence to the gluten-free diet normally corrects this problem.

If a patient does not adhere to the diet, the osteoporosis will not reverse and may even progress. Severe osteoporosis weakens the strength of bones and can occasionally result in bone fractures.



Bone thinning, called osteoporosis

Are there other severe complications?

Yes. Very rarely, patients can develop cancer, most commonly in the intestine.

Patients who adhere to a strict diet do not develop this complication and this is an additional reason for their maintaining a gluten-free diet.

Patients who have developed refractory coeliac disease are prone to get an unusual type of cancer in the intestine, called **lymphoma**. This may prove to be very difficult to treat successfully.

7 Disease mechanisms in coeliac disease

What causes coeliac disease – what are the disease mechanisms?

In the past 20 years great advances have been made in understanding how coeliac disease develops. Indeed, it is probably one of the best understood of any human inflammatory disease.

However many gaps in our knowledge still remain.

Whereas most people can eat gluten-containing foods without having ill-effects, coeliac patients react against gluten. The reaction is caused by cells of the immune system. After eating food containing gluten the digested food reaches the small intestine and this is where most of the immune reaction takes place.

When a marked immune reaction takes place, some damage to that area results. We call that damage inflammation. So, in coeliac disease, cells of the immune system cause inflammation in the small intestine.

Why do only some people develop this immune reaction to gluten and get coeliac disease?

Again, we do not know all the answers to this question. However we do know that the influence of genes is very important.

Almost all the people who develop coeliac disease possess genes for a particular structure on immune cells called HLA-DQ2 or HLA-DQ8.

Recent studies have shown that gluten can bind strongly to HLA-DQ. This results in the development of a much-stronger immune reaction against gluten and hence inflammation in the intestine.

Without these genes it is virtually impossible to develop coeliac disease.

What other big research advances have been made?

Another major advance was made in 1997, with the discovery that an enzyme called **tissue transglutaminase** contributes to the development of coeliac disease.

There is good evidence that transglutaminase can modify gluten and this results in gluten binding even more avidly to HLA-DQ.

This in turn promotes the development of inflammation in the intestine of a person with coeliac disease.

An international symposium takes place biannually and was held in Dublin in 1992

Summary

Coeliac disease is a common, very treatable condition caused by gluten in the diet of affected individuals.

The diagnosis is sometimes delayed because the possibility of coeliac disease has not been considered.

Once gluten is removed from the diet, a rapid recovery is observed in the majority of patients.

Helpful advice about coeliac disease and diet can be obtained from the national patients' organisation:

Coeliac Society of Ireland

Improving the quality of life for Coeliacs

Glossary of some important terms

- **Anaemia**: a low blood count, often causing fatigue in patients
- **Biopsy**: a small sample of tissue which can be examined with a microscope
- **Coeliac disease**: a medical condition in which damage to the small intestine is caused by gluten in the diet
- **Endomysial antibody**: antibodies are proteins found in the blood; antibodies which bind to a substance called endomysium are found frequently in patients with coeliac disease and can be used as a test to diagnose this condition
- **Gluten**: a major protein found in wheat, barley and rye cereals
- **Gluten-free diet**: a diet which excludes all cereals containing gluten
- **HLA-DQ2**: a structure found on certain cells of the immune system; gluten can bind strongly to this structure
- **Osteoporosis**: thinning of bones, making it easier for bone fractures to occur
- **Small intestine**: the first part of the bowel, after the stomach; food is digested in the stomach initially and then enters into the small intestine
- **Symptoms**: the complaints which a patient has associated with a disease
- **Transglutaminase**: an enzyme found in the intestine that can react with gluten
- **Villus**, **villi**: minute finger-like structures found in the inner lining of the small intestine; they play an important role in the absorbtion of food nutrients.

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