Module 1768
Iron deficiency anaemia

From this module you will learn:

- How iron deficiency anaemia differs from other anaemias
- Specific and non-specific symptoms
- Treatments such as elemental iron and the potential side effects
- Typical iron levels and the causes of fluctuations

November

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Niamah Callachand
Locum pharmacist

Iron is an essential mineral because it is an integral component of haemoglobin (Hb), which enables oxygen to be bound, stored and carried around the body in the blood. Reduced iron in the body therefore results in less oxygen being delivered to tissues and organs.

Iron deficiency anaemia occurs when a lack of iron in the body results in a reduced number of red blood cells. This lack of iron can be caused by either reduced iron intake or an increased loss of iron from the body.

Non-anaemic iron deficiency or latent iron deficiency is a condition in which there is iron deficiency but Hb levels are normal and symptoms often include fatigue, hair loss, lack of concentration and irritability.

Symptoms

Many common symptoms of iron deficiency anaemia are non-specific but may include:

- tiredness and lethargy
- shortness of breath
- heart palpitations
- pale complexion
- pale inner eyelids.

Less common symptoms include:

- headache
- tinnitus
- taste disturbance
- pruritus
- pica (abnormal dietary cravings)
- soreness of the tongue
- dysphagia
- body temperature regulation impairment (especially in pregnant women).

In severe cases, patients may suffer from symptoms such as angina, marked ankle oedema or dyspnoea. However, it should be remembered that symptoms may not necessarily be present, even in severe anaemia. It is often the case that anaemic sufferers are asymptomatic and iron deficiency anaemia may be picked up in routine lab tests.

If a pharmacist suspects that a patient is suffering from iron deficiency anaemia, they should be referred to their GP for a test to measure their full blood count.

Pale inner eyelids and complexion are common symptoms of iron deficiency anaemia

Causes

Iron deficiency anaemia is often multifactorial. Blood loss is a cause of iron deficiency anaemia and may have several origins:

- **Menstruation** The most common cause of iron deficiency anaemia in premenopausal women (20-30% of cases), particularly in women who experience menorrhagia
- **Stomach ulcers** These can cause bleeding of the stomach lining
- **Gastrointestinal cancers** Gastrointestinal bleeding can also be caused by cancers such as those of the stomach or colon, which may result in significant blood loss
- **Chronic kidney disease (CKD)** CKD can cause blood to be lost in the urine
- **Medication** Blood loss can be precipitated by certain medication, for example, it is a

Other types of anaemia include:

- **Pernicious anaemia** An autoimmune condition that causes a lack of vitamin B12 or folate, which means the body produces abnormally large red blood cells that cannot function effectively
- **Aplastic anaemia** A rare condition caused by a deficiency in all types of blood cells due to a failure of bone marrow development
- **Haemolytic anaemia** Caused by the abnormal and premature breakdown of red blood cells
- **Sickle cell anaemia** A serious inherited disorder in which red blood cells develop abnormally (sickle-shaped) and carry defective Hb *(this topic will be covered in next week's Update Module 1769)*

common side effect of non-steroidal anti-inflammatory drugs (NSAIDs).

Iron demand in the body during pregnancy is three times higher than in menstruating women. Iron deficiency anaemia is therefore commonly seen in pregnant women because this demand increases as pregnancy advances.

Certain medical conditions may also lead to iron deficiency anaemia due to malabsorption. For example, coeliac disease, gastrectomy and *H pylori* infection can prevent iron from being absorbed correctly.

Iron deficiency anaemia caused solely by inadequate dietary intake of iron is rare in the UK, except in pregnant women. It has also been suggested that vegans and vegetarians are more susceptible, due to lack of red meat in their diet. Other less common causes include blood donation, inflammatory bowel disease, schistomiasis, haematuria and oesophagitis.

When a pharmacist suspects anaemia there are several questions they can ask to assess whether it is iron deficiency anaemia:

- Have you been feeling abnormally tired or lethargic?
- Are you taking any medication?
- Could you be pregnant?
- Do you eat a varied, well-balanced diet?

These questions do not form the basis of a diagnosis but can help indicate whether a patient warrants referral.

Diagnosis

A blood sample is usually taken to analyse the full blood count. Normal results for adults vary, but fall within the range of 13.8-17.2g/100ml for men and 12.1-15.1g/100ml for women.

The World Health Organisation (WHO) defines anaemia as:

- Hb < 13g/100ml in men over 15 years of age
- Hb < 12g/100ml in non-pregnant women over 15 years of age
- Hb < 12g/100ml in children aged 12 to 14 years.

Severe cases are defined as patients with an Hb level of less than 7g/100ml.

Levels of ferritin – an intracellular protein that stores iron and releases it in a controlled fashion – should also be checked; this will evaluate how much iron is being stored in the body. Low levels of serum ferritin indicate that body iron stores are low. A serum ferritin level of less than 15µg/l confirms the diagnosis of iron deficiency anaemia.

Treatment

The main aim of treatment is to restore haemoglobin levels to normal and replenish iron stores. Treatment of iron deficiency anaemia is typically in the form of iron supplements combined with an increased dietary intake of iron.

The recommended dose of elemental iron to treat iron deficiency anaemia is 100-200mg daily. The most common supplement prescribed is ferrous sulfate 200mg, which contains 65mg of elemental iron (see *Iron supplements and elemental iron content*, above). Ferrous sulfate is usually prescribed as one tablet, two to three times a day.

Dose-related side effects are commonly experienced with iron supplements. However, these often subside with time, so patients should be reassured and encouraged to continue with therapy. Side effects include:

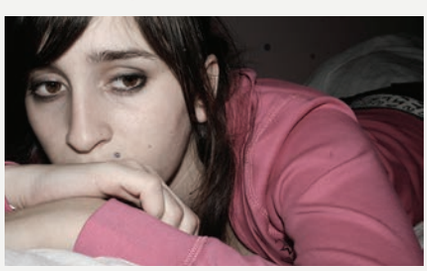
- abdominal pain
- constipation or diarrhoea
- heartburn
- nausea
- black stools.

Iron supplements and elemental iron content

Elemental iron is the total amount of iron in the supplement available for absorption by the body. Each type of iron contains a different amount of elemental iron.

Iron salt	Dose	Elemental iron content
Ferrous fumarate	200mg	65mg
Ferrous gluconate	300mg	35mg
Ferrous sulfate	300mg	60mg
Ferrous sulfate, dried	200mg	65mg

Case study



Louise is a 19-year-old student who has recently started university. She comes into the pharmacy with general fatigue and occasional dizziness. She thinks that it may just be freshers' flu.

The pharmacist discovers that Louise has not cooked any fresh food since starting university and has mainly been eating microwave ready-meals and less than two portions of fruit or vegetables per day. Louise is not on any medication and is not aware of any family history of iron deficiency anaemia, nor has she suffered from it previously.

Louise explains she suffers from heavy menstrual bleeding that can last for five to seven days and mentions that a few friends have commented that she has looked quite pale recently.

The pharmacist suspects Louise may be suffering from iron deficiency anaemia and refers her for a blood test. The pharmacist also gives Louise dietary advice on iron-rich foods that she should incorporate into her diet and emphasises the importance of a well-balanced and healthy diet.

Oral iron, particularly modified-release preparations, can exacerbate diarrhoea in inflammatory bowel disease and patients should be counselled appropriately. In elderly patients, iron supplements can be particularly constipating, which could result in faecal impaction.

Patients can be advised to take iron supplements after food, which may reduce the incidence of gastrointestinal side effects. They should also be warned that iron supplements may affect the colour of stools.

If side effects are severe, it may be appropriate to decrease the dose to one or two daily or prescribe an alternative; these options must be discussed with the GP. However, a lower dose does mean that it will take longer to restore iron levels.

Iron salts that may be prescribed as an alternative to ferrous sulfate include ferrous gluconate and ferrous fumarate. Ferrous gluconate may be better tolerated by patients because there is less elemental iron content per tablet compared with ferrous sulfate. Ferrous fumarate tablets contain more elemental iron per tablet than ferrous sulfate and therefore there may be tolerance issues.

Pharmacists should stress the importance of a well-balanced diet, including iron-rich foods. Patients should note that dietary changes alone are not sufficient to replenish iron stores. Iron-rich foods include:

- dark-green leafy vegetables, such as watercress and curly kale
- iron-fortified cereals or bread
- brown rice
- pulses and beans
- nuts and seeds
- white and red meat
- fish
- tofu
- eggs
- dried fruit, such as dried apricots, prunes and raisins.

Vitamin C-rich food should also be recommended because it can help with the body's absorption of iron.

Some food substances and medication may reduce the absorption of iron. Increased consumption of foods containing phytic acid (found in wholegrain cereals), polyphenols (found in tea and coffee) and calcium may ▶

reduce absorption, as can medication that raises gastric pH, such as antacids and proton pump inhibitors.

Treatment of the underlying causes in iron deficiency anaemia are key in preventing the condition from recurring. For example, if iron deficiency anaemia is caused by NSAIDs, the patient should be referred to the GP. In the case of menorrhagia, this can be treated with medication such a tranexamic acid or particularly severe cases may require surgery.

Follow-up monitoring

Hb levels should be checked two to four weeks after start of treatment to assess the patient's response; they should rise by about 2g/100ml over three to four weeks. If an adequate response is not observed at three to four weeks, non-adherence should be addressed with appropriate counselling. Other factors that should be considered as contributing to an inadequate response include continued blood loss with inadequate replacement of iron, malabsorption and misdiagnosis.

If there is a response, full blood count should be assessed at two to four months to ensure Hb levels have returned to normal. Once normal levels have been achieved, it is usually recommended that treatment with iron supplements is continued for a further three months to ensure iron stores are fully replenished. The patient's full blood count should then be monitored every three months for a year following the end of treatment with oral iron supplements.

If Hb indices drop below normal, additional iron can be prescribed and an ongoing prophylactic dose of ferrous sulfate 200mg once daily should be considered for those at particular risk of iron deficiency anaemia.

Long-term complications

It is rare for iron deficiency anaemia to cause long-term complications but some people may find that it affects their daily lives and can pose serious problems if left untreated:

- Feeling tired and lethargic, with a severe lack of energy and reduced ability to concentrate
- Increased predisposition to infection
- Heart and lung problems: anaemia can cause a rapid heartbeat (tachycardia) or heart failure as a response to the lack of oxygen in the blood
- Increased risk of complications in pregnant women. The condition has been associated with premature birth and low birthweight and, following delivery, mothers may be more likely to develop postnatal depression
- Iron deficiency anaemia is thought to contribute to some cases of restless leg syndrome
- Delayed growth and development in infants and children.References

- NHS Choices: Iron Deficiency Anaemia www.nhs.uk/Conditions/Anaemia-iron-deficiency-/Pages/Introduction.aspx
- Nice CKS Iron Deficiency Anaemia http://cks.nice.org.uk/anaemia-iron-deficiency#!topicsummary
- Iron deficiency anaemia www.mayoclinic.org/diseases-conditions/iron-deficiency-anemia/basics/symptoms/con-20019327
- British National Formulary Edition 70 September 2015
- patient.info/doctor/iron-deficiency-anaemia-pro iron deficiency anaemia
- Anaemia http://www.mims.co.uk/anaemia/cardiovascular-system/article/882400

5-Minute Test

1. Some of the more uncommon symptoms of iron deficiency anaemia include headache, tinnitus and tongue soreness.
True/False

2. Menstruation is the most common cause of iron deficiency anaemia in premenopausal women.
True/False

3. Iron demand in the body during pregnancy is four times higher than in menstruating women.
True/False

4. A serum ferritin level of less than 18µg/l confirms a diagnosis of iron deficiency anaemia.
True/False

5. Normal haemoglobin levels for adult women are 13.8-17.2g/100ml.
True/False

6. The recommended dose of elemental iron for iron deficiency anaemia is 100-200mg daily.
True/False

7. 300mg of ferrous gluconate contains 65mg of elemental iron.
True/False

8. In elderly patients, iron supplements are more likely to cause diarrhoea.
True/False

9. Iron-rich foods include brown rice, nuts, pulses, fish, tofu and eggs.
True/False

10. Increased consumption of wholegrain cereals, tea, coffee and calcium supplements may reduce iron absorption.
True/False

Tips for your CPD entry on iron deficiency anaemia

Reflect **What is the most common cause of iron deficiency anaemia in premenopausal women? What are the side effects of iron supplements? Which foods contain high levels of iron?**

Plan **This article describes iron deficiency anaemia and includes information about symptoms, causes, diagnosis and treatment. Dietary advice, monitoring and complications are also discussed along with a case study.**

Act **Read the article and suggested reading (below) and take the 5-Minute Test. Update Plus subscribers can access answers and a CPD logsheet at chemistanddruggist.co.uk/mycpd.**

Read more about iron deficiency anaemia on the NHS Choices website
tinyurl.com/anaemia5

Find out more about iron deficiency in pregnancy on the Patient website
tinyurl.com/anaemia6

Find out more about dietary advice for people with anaemia on the Patient website
tinyurl.com/anaemia7

Revise your knowledge of the medicines to treat iron deficiency anaemia using the *BNF*

Identify any patients who may be at risk of anaemia and might benefit from an MUR

Evaluate **Do you now have a good knowledge of the symptoms, causes and treatment of iron deficiency anaemia? Could you give advice to patients who are suffering from side effects of iron supplements?**

Expert Q&A

Want to know more? Our iron deficiency anaemia expert is on hand to answer any further questions you may have. Email: **asktheexpert@updateplus.co.uk**