

# Sickle cell anaemia

## Key facts

- Sickle cell anaemia (SCA) is an autosomal recessive condition.
- 'Sickle cell disease' describes a group of disorders of haemoglobin, which are caused by an inherited genetic alteration (mutation) in the beta-globin gene.
- SCA is the most common of the sickle cell diseases and is defined by the presence of the abnormal haemoglobin HbS. This is caused by having two copies of the beta-globin gene containing the genetic alteration for HbS. The other forms of sickle cell disease result from inheriting a genetic alteration for HbS in one gene and another abnormal beta-globin chain variant in the second beta-globin gene.
- SCA is characterised by episodes of pain, chronic haemolytic anaemia and severe infections, usually beginning in early childhood.
- Sickle cell disease is common in people of African, Mediterranean, Middle Eastern, and Indian ancestry, and in people from the Caribbean and parts of Central and South America.
- Being a carrier for sickle cell disease is thought to convey some protection against malaria, and as such there is an increased prevalence of people with sickle cell trait where malaria is common.
- The highest incidence worldwide is in West Africa, where 1 in 4 of the population are carriers.

## Clinical features

- SCA is characterised by episodes of pain owing to vaso-occlusive events, chronic haemolytic anaemia and severe infections, usually beginning in early childhood.
- Any organ of the body may be affected, but most commonly the bones, lungs, liver, kidneys, brain, eyes and joints.
- Clinical manifestations are extremely variable.

## Diagnosis

- Most individuals with SCA are healthy at birth.
- The diagnosis is suspected in infants or young children with painful swelling of the hands and feet, pallor, jaundice, pneumococcal sepsis or meningitis, or severe anaemia with splenic enlargement.
- The SCA diagnosis is established by demonstrating the presence of significant quantities of HbS by haemoglobin electrophoresis.

## Genetic basis

- SCA is an autosomal recessive condition, which means that the affected individual has two altered copies of the beta-globin gene. Both parents have one altered copy of the gene and are said to be carriers (also being described as having sickle cell trait). They may have a mild anaemia. Each child they have has a 1-in-4 (25%) chance of inheriting both gene alterations and is then at risk of developing complications of the disorder.
- One particular genetic alteration (mutation) causes HbS and everyone with sickle cell anaemia has two copies of this alteration. Many different alterations in the beta-globin gene cause the other sickle cell diseases (and beta-thalassaemia).

## Clinical management

- The diagnosis is often anticipated from antenatal screening and established by prenatal diagnosis when requested, or by neonatal testing. The family can then be seen before the development of symptoms, and arrangements for care discussed.
- Management guidelines recommend that all patients should receive an optimal level of care delivered close to home, as well as access to clinical experts in specialist centres. In addition, services should support 'expert' patients, parents and carers to manage the condition at home when appropriate.
- Multidisciplinary management should aim to prevent and treat infections, pain and complications, and include social and psycho-educational support.
- The mainstay of primary prevention is to avoid dehydration, extremes of temperature, physical exhaustion, and extremely high altitude.

## Genetic testing

Molecular genetic testing can be used to:

- identify the alterations in the beta-globin genes of someone with sickle cell disease;
- provide information about the genetic status of relatives through carrier testing;
- offer prenatal and pre-implantation genetic diagnosis. Prenatal diagnosis is usually possible, by chorionic villus sampling (CVS) or amniocentesis. If a couple are considering prenatal diagnosis, referral should be made to the local clinical genetics service prior to a pregnancy. This ensures that appropriate advice and investigations are undertaken and confirms whether or not prenatal diagnosis is possible. All couples considering pre-implantation genetic diagnosis must be referred to their local clinical genetics service.

Genetic testing is available in the UK and usually provided through specialist clinics or regional genetic centres.

*This information is intended for educational use and was current in March 2015. For clinical management, it is recommended that local guidelines and protocols are used.*

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