

Counselling Mothers of Babies with the Sickle Cell Trait

To Be or Not to Be

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Sickle cell disease remains incurable but the ability to prevent early, serious, life-threatening complications of the disease with pneumococcal prophylaxis and other effective interventions has justified the use of early diagnosis. Sickle cell disease, the most common genetic condition in the world, has therefore been added to the spectrum of other much less common conditions detected by newborn screening in the United States of America (USA), the United Kingdom and increasingly in other societies at high risk of affected births. Confirmation of babies with sickle cell disease and their incorporation into specialised clinics for follow-up is therefore routine in these areas. This newborn screening inevitably detects babies with the sickle cell trait and other heterozygous conditions such as the HbC trait and it is unclear whether this information should also be conveyed to the mother. For sickle cell disease, there are clear benefits to early diagnosis but does this apply to babies with the sickle cell trait?

There is much contemporary debate on the possible pathological significance of the sickle cell trait in which the levels of sickle haemoglobin (HbS) may vary from 20–45%. Under conditions such as cyanotic congenital heart disease and environmental hypoxia, the sickle cell trait may manifest some of the symptoms of sickle cell disease such as haemolysis and splenic infarction but most persons with the sickle cell trait are not exposed to conditions of severe hypoxia. Under normal physiological conditions, the renal medulla manifests an acid pH, hypertonicity and relative hypoxia, all conducive to sickling and the resulting damage to the *vasa rectae* system disrupts the countercurrent mechanism limiting the ability to concentrate urine, to excrete an acid load, and rendering subjects prone to painless haematuria. There is also some evidence that persons with the sickle cell trait are more prone to end stage renal impairment (1, 2), display a relative resistance to the effects of erythropoietin in stimulating haemoglobin levels (3) and to a rare syndrome of renal medullary carcinoma (4).

Persons with the sickle cell trait have also been reported to be more prone to sudden death, especially with severe physical stress in individuals who are relatively unfit

and at high altitude. Under these conditions, a 27-fold increase (32.2 per 100 000 individuals compared with 1.2 in those without the HbS gene) in sudden death has been reported (5) but this has fallen following modification of drills and improved hydration among US Army recruits during 'boot camp' (6). Other recent work has suggested that persons with the sickle cell trait may have different capillary structure in skeletal muscle (7) with a decreased capillary density but some larger capillaries (8, 9), changes which might assume physiological relevance during intense exercise.

Pulmonary embolism occurred in 2.2% of Veterans with the trait compared with 1.5% with an AA genotype in a study of 65 154 black males in 13 Veterans Administration Hospitals (10), a statistically significant increase but this study showed that persons with the trait had a similar average age of hospitalisation or death, overall mortality, and length of hospitalisation for any diagnosis other than haematuria and pulmonary embolism. More recent studies have shown a two-fold increase in venous thromboembolism and a four-fold increase in pulmonary embolism in the trait compared with the AA genotype (11) and a possibly increased risk with the use of hormonal contraception (12).

Against this background, what should be the attitude to informing mothers that their baby has the sickle cell trait? The above brief review indicates that some pathology may result from the sickle cell trait but none of this is currently preventable so the arguments for informing the mother are less compelling than with sickle cell disease. The greatest significance of the sickle cell trait is that they can pass the HbS gene onto their offspring and so may be at risk of having a child with sickle cell disease, information unlikely to be relevant until the child reaches reproductive age. Arguments in the past have suggested that a baby with the sickle cell trait is a way of identifying parents with the trait who may be at risk of having a child with sickle cell disease but this approach raises other difficult dilemmas such as neither parent having the trait implying possible impaternity. Perhaps the worst option is telling the mother that her baby has the sickle cell trait without opportunities for counselling and education which may result in confusion and a tendency to attribute to the trait symptoms common to normal children. In the United Kingdom, mothers of babies with the sickle cell trait receive postal notification along with an explanatory leaflet and an invitation to call the local Sickle Cell and

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Thalassaemia Centre if more information is required. This education is also conducted against the background of antenatal screening so that mothers with the sickle cell trait will already have been detected and counselled. In the USA, the policies on notification of the sickle cell and other abnormal haemoglobin traits are decentralised and are the responsibility of the individual states but performance has been very variable between states and a recent review found that only 37% of families received notification (13).

What then should be our attitude in the Caribbean? In the newborn screening programmes operated in the corporate area by the Sickle Cell Unit at The University of the West Indies and in south central Jamaica by the Sickle Cell Trust (Jamaica), decisions have been made that the available resources do not allow adequate counselling and education of mothers whose babies have the sickle cell trait especially as this information only becomes relevant as these subjects approach reproductive age. Similar arguments apply to the less common abnormal haemoglobins which may result in a child with sickle cell disease such as the HbC trait and the beta thalassaemia trait which occur in 3.5% and 1% of Jamaicans respectively. So should the entire population be offered new blood tests for genotype identification at school or could the information available from newborn screening be utilised? Identification of the sickle cell trait and the HbC trait at birth is relatively accurate; the beta thalassaemia trait cannot readily be diagnosed until the child is older and even then may present diagnostic difficulties, but fortunately these genes are generally mild and infrequent in the Caribbean. Data regarding HbS and HbC traits are already recorded on databases at the institutions mentioned above and access to these databases could save enormous resources and even now, could be incorporated into 'child care passports'. Clearly additional information and counselling must be provided but this would be a cheaper option than having to repeat the genotype identification at a later age.

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