Here are a series of diagnostic case studies comparing normal neonate and adult haematology results to that of someone with sickle cell. These cases can be used as a discussion point for students studying medical or biomedical sciences.

These resources have been provided by the Leicester Royal Infirmary Department of Pathology, with special thanks going to Keith Chambers.

**Normal Neonate Blood Smear**

**Blood Cell Counts**

**IEF** (Isoelectric focusing)

**HPLC** (High performance liquid chromatography)

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http://www.sicklecellanaemia.org/teaching-resources/resources/scooter44-63/scooter44.html

NORMAL NEONATE BLOOD SMEAR

TOP

Typical neonate blood morphology (left panel) compared to normal adult (right panel).

Crenated red cells (holly leaf shaped). Nucleated red cell (left bottom) due to birth trauma whereas nuclei are usually stripped out before the RBC enter the circulation.

Polychromasia – cells are unequally stained with blue and pink. Bluer cells are reticulocytes – slightly larger than mature RBC. Typical of a neonate blood film. Anisocytosis – variable size of RBC typical of neonate.
The IEF (Iso-electric focusing) strip confirms the presence of both HbA and HbF in the unknown sample (on the left) versus the control sample which displays Hb A, F, S and C (on the right). The origin is at the bottom, i.e. where the samples are placed in the gel, and the bands migrate and separate over a 75 minute time period.

In a normal neonate (cord blood sample) - haemoglobins A and F should feature.
This baby was screened because both parents were carriers of sickle cell i.e. were AS x AS genotype.

In the neonate there is a large HbF peak (P00) and “shoulder” (P01). The POO is acetylated HbF, but both are forms of HbF, hence this sample is 88% HbF.

During infancy the HbF should reduce and HbA increase, and in this sample HbA (indicated at peak A0) is only around 10% at this moment in time.

A2 is low and will remain low in adult hood reaching around 3.7% maximum.

RESULT:
Normal HbF and emerging presence of HbA. The absence of HbS indicates the infant clearly is not SS or SA trait.

*Note of caution. Some traits such as β-thalassaemia cannot be diagnosed in the neonate and screening is suggested after 6-9 months of age.