JPAC 12-65

Joint UKBTS / HPA Professional Advisory Committee ([1]) Summary Sheet

1. Paper for the JPAC meeting on:	8 November 2012
2. Date submitted:	12 September 2012
3. Title (including version no.):	Sickle Cell Trait and Apheresis
4. Author(s):	Dr Sue Barnes, SACCSD
5. Brief summary:	Current guidance from the Council of Europe state that sickle cell trait (SCT) donors must not donate by apheresis (Guide to the preparation and quality assurance of blood components, EDQM, 16th Edition, 2010). The current JPAC donor selection guidance also says the same (appendix 1). The Blood Safety and Quality Regulations, 2005, are silent on this matter. There appears to be no clinically significant issues with allowing donors with SCT from donating platelets by apheresis and as such I would recommend that this prohibition be removed from the donor selection guidance (Appendix 3). I would further recommend that data be collected on a prospective basis once this has been done to inform a change of the guidance from the Council of Europe.
6. Action required by the JPAC: (What do you want JPAC to do in response to this paper?) e.g. • endorse a specific recommendation • advise where there is a choice of possible actions • advise on priorities within the work plan • provide a steer on policy	Discuss and approve recommendation
7. Any other relevant information:	

([1]) **Joint U**nited **K**ingdom **B**lood **T**ransfusion **S**ervices and **H**ealth **P**rotection **A**gency **Professional Advisory Committee**

Sickle Cell Trait and Apheresis

Current guidance from the Council of Europe state that sickle cell trait (SCT) donors must not donate by apheresis (Guide to the preparation and quality assurance of blood components, EDQM, 16th Edition, 2010). The current JPAC donor selection guidance also says the same (appendix 1). The Blood Safety and Quality Regulations, 2005, are silent on this matter.

The origin of this advice is not given and is largely lost in the mist of time. Although it is related to concerns that donors with haemoglobin AS might sickle during apheresis due to hypoxia. This probably relates to older apheresis systems or a theoretical concern. Undoubtedly patients with sickle cell disease undergoing stem cell harvest experience pain due to sickling (Richard RE et al. Collection of blood stem cells from patients with sickle cell anemia. Blood Cells Molecules & Diseases. 35(3):384-8, 2005).

There are generally 2 reasons for implementation of donor selection guidance:

1) To protect the patient recipient. Does haemoglobin AS in a donation present a risk for patients?
2) To protect the donor. Does an apheresis procedure present a risk to the donor with SCT?

I will examine these two contentions in turn.

Does haemoglobin AS in a donation present a risk for patients?

People with uncomplicated sickle cell trait have a normal blood examination as assessed by conventional clinical methods, including normal red cell morphology, indices, reticulocyte counts, and red blood cell survival by chromium labelling.

We currently accept donors for whole blood donation who have SCT. Their blood is used for all but interuterine and neonatal transfusions and UK Blood Transfusion Services provide sickle trait negative blood for transfusion of patients with SCD. There should be no significant quantity of red blood cells in an apheresis platelet or plasma donation and as such there should be no risk to the patient recipient as platelets are unaffected by this condition.

Whether donors with SCT should be used for red cell apheresis donation is more difficult and at present this procedure is not undertaken in the UK. It is not a reason for deferral in the US where these donors are used for whole blood donations and apheresis double red cell donations and platelet donations. The American Red Cross does not test or screen every donation for sickle trait. They do provide HbS-negative units if ordered for neonates etc. In the US, sickle trait is not a cause for deferral. Donors must meet haemoglobin and all other requirements. (Dr A Eder personal communication)

Does an apheresis procedure present a risk to the donor?

Undoubtedly hypoxia may invoke sickling in persons with SCT. When blood is drawn with anaerobic technique into a syringe with dilute buffered glutaraldehyde one obtains an accurate picture of circulating erythrocytes in vivo (the Sherman test). No sickled cells are observed at rest, but exercise to exhaustion at sea level regularly induces mild levels of reversible sickling in peripheral venous blood (less than 1%). Exposure to altitude hypoxia will progressively increase the extent of sickling observed with sickle cell trait from 2% at 4,050 ft. to 8.5% at 13,123 ft. Hypobaric chamber exposures used for military aviation training, involving hypoxic exposures simulating 10,000 to 25,000 ft from ninety to six minutes, did not cause haemolysis in subjects with uncomplicated sickle cell trait (Kark JA, Ward FT. Exercise and hemoglobin S. Semin Hematol 1994; 31:181-225). However many individuals with sickle cell trait have participated at professional and international levels of sport, including Olympic competition in Mexico City and high altitude long distance running in the Cameroon.

Is this a clinical significant problem during apheresis? As previously stated SCT is not a reason for deferral in the United States where about three million people in the have this genotype (circa 1% of the population). These people are used as donors for apheresis double red cell donations, plasma and platelet donations. The American Red Cross does not test or screen every donation for sickle trait and as such have no comparative data on the adverse event rates for donors with SCT. However they have had no reported problems (pain, splenic infarction, haemolysis etc) and the overall donor adverse event rate for apheresis donation is similar or lower than that for whole blood donations and mostly due to issues related to venepuncture (Appendix 2).

There is no data available from the UK on adverse advent rates in donors with SCT undergoing regular plateletpheresis. We should have no such donors, however, over the years a number of donors have been discovered (and retired) who have been regular platelet donors without anyone realising that they had SCT. None of these donors (based in London and Birmingham, areas of high prevalence of SCT) reported any side effects of donation.

Recommendation

There appears to be no clinically significant issues with allowing donors with SCT from donating platelets by apheresis and as such I would recommend that this prohibition be removed from the donor selection guidance (Appendix 3). I would further recommend that data be collected on a prospective basis once this has been done to inform a change of the guidance from the Council of Europe.

S M Barnes, 29 May 2012

Appendix 1

Sickle-Cell Trait (current guidance)

Obligatory
1. Component donor:
Must not donate.

2. Whole Blood donor:
Not suitable for intra-uterine or neonatal use.

Discretionary
For adult use only, accept.

Additional Information
The red blood cells from people with sickle cell trait can be safely transfused into most adults. They are however not thought to be suitable for intra-uterine or neonatal use as there is a higher risk of the cells sickling and causing harm to the baby.

For some individuals with sickle cell trait it will not be possible to process their blood. For this reason they may be asked not to donate.

Appendix 2

Rates of Complications after WB, PLT and R2 collections per 10,000 donations (Eder AF et al. The American Red Cross donor hemovigilance program: complications of blood donation reported in 2006. Transfusion; 2008. 48 (9): 1809-19.)

Complications	Whole Blood (6,014,472)	APH Plt (449,594)	APH R2 (228,183)
Systemic (Vasovagal-type) Complications			
Symptomatic (prefaint)	258.3	61.3	195.2
Short LOC	7.9	2.1	6.5
Major			
Long LOC	1.8	0.5	0.9
Prolonged recovery	2.4	0.8	1.0
Injury	1.1	0.3	0.1
Systemic (Other) Complications			
Citrate, minor	--	121.4	112.8
major	--	2.2	0.4
Allergic (minor, major)	0.1	0.4	0.2
Other (minor, major)	0.6	1.0	1.0
All Systemic - Rate **Events**	**272.3** **163,755**	**190.0** **8,542**	**317.9** **7,254**
OR (95% CI)	**1.00**	**0.69 (0.68-0.71)**	**1.17 (1.15 - 1.20)**

Phlebotomy-related			
Small hematoma	74.5	377.0	217.9
Major			
Large Hematoma	0.4	9.4	1.9
Nerve irritation	0.7	0.3	0.1
Arterial puncture	1.1	0.2	0.4
Phlebotomy-related – **Rate** **Events**	 **76.7** **46,152**	 **386.9** **17,420**	 **220.3** **5027**
OR (95% CI)	**1.00**	**5.21 (5.12- 5.31)**	**2.91 (2.83 to 3.00)**
All Reactions - Rate **Events**	**348.9** **209,815**	**577.5** **25,966**	**538.3** **12,282**
OR (95% CI)	**1.00**	**1.70 (1.67-1.72)**	**1.57 (1.54-1.60)**
Major Reactions -Rate[1] **Events**	**7.4** **4,443**	**5.2** **232**	**3.3** **76**
OR (95% CI)	**1.00**	**0.70 (0.61- 0.80)**	**0.45 (0.36-0.57)**
Outside Medical Care – **Rate** **Events**	 **3.2** **1903**	 **2.9** **132**	 **2.9** **66**
OR (95% CI)	**1.00**	**0.93 (0.78 to 1.11)**	**0.91 (0.72 - 1.17)**

[1] Excluding large hematoma

Appendix 3

Sickle-Cell Trait (suggested future guidance)

Obligatory

Whole Blood donor:
Not suitable for intra-uterine or neonatal use.

Discretionary
For adult use only, accept.

Additional Information

The red blood cells from people with sickle cell trait can be safely transfused into most adults. They are however not thought to be suitable for intra-uterine or neonatal use as there is a higher risk of the cells sickling and causing harm to the baby.

For some individuals with sickle cell trait it will not be possible to process their blood. For this reason they may be asked not to donate.