

King's

King's College Hospital   
NHS Foundation Trust

## Automated Red Blood Cell Exchange for Sickle Cell Disease

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Apheresis CNS

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## The principle of RBCX

- \* Remove the red blood cell because they are defective, infected or in excess
- \* Replace with Sickle cell negative Donor's RBC.
- \* To increase or maintain the HCT
- \* To reduce the Sickle cell percentage
- \* Maintain the 100% fluid balance

# Indications for Red Cell exchange

- \* **Chronic red cell exchange 4-6 weekly:**
  - \* Primary , secondary Stroke prevention
  - \* Iron overload due to regular blood transfusion
  - \* Frequent hospitalisation for Sickle cell crisis
  - \* Painful crisis during pregnancy
  - \* Priapism
  - \* Neurology symptom, post liver transplant, post renal transplant
- \* **Emergency RCX**
  - \* Acute Chest syndrome,
  - \* Acute stroke, severely malaria
- \* **Prior to surgery procedure**



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## Spectra Optia Apheresis system

- \* Automated red blood cell exchange
- \* The system comprises 3 components:
  - \* The apheresis machine
  - \* Embedded software: Red Cell Exchange
  - \* A single-use blood tubing set: Terumo BCT kit 10220
  - \* Separates and removes red cell of the blood from the patient using continuous flow and centrifugation



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## Patient preparation pre procedure

- \* Medical assessment, obtain written consent, and ERP referral.
- \* Blood test including FBC, Sickle cell percentage, biochemistry, and antibody screen and cross match for 8-10 units.
- \* Nurse consultation including to assess patient's peripheral access.

## What Happens During A Procedure?

- \* Dual needle procedure to allow continuous flow
- \* Whole blood drawn from patient through access line
- \* Mixed with anti-coagulant (Acid-Citrate Dextrose ACDA).  
Centrifuge speed linked to PCV
- \* Separated blood components leave centrifuge
- \* Patient's red blood cell collected to the collection bag.
- \* Health donor's blood mixed with Patient's plasma returned to patient via return line

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## Management of complications

- \* Generally well tolerated and safe
- \* Citrate related hypocalcaemia
  - \* tingling sensation, nausea and vomiting, hypotension. Prophylactic Oral /IV Calcium, reduce the speed of the procedure.
- \* Venous access problems
  - \* Ultrasound guidance cannulation
  - \* Central Vascath access( Femoral line) –short term
  - \* A/V fistula –long term
  - \* Dual lumen Port-a-Cath™—long term
- \* Vasovagal syncope
  - \* Stop the ACE inhibitors 24-72 hrs before the procedure.
  - \* Iv fluids.



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## Management of complications

- \* Allergic reaction
  - \* Check patient medical history.
  - \* Stop transfusion
  - \* Administer the antihistamines, hydrocortisone
  - \* Manage anaphylaxis as per hospital policy.
- \* Anxiety
- \* Fatigue
- \* Boredom
- \* **Medical team review:** The medications required for the apheresis treatment shall be prescribed by the medical staff

## Patient management

- \* **Regular red cell meeting :**
  - \* Discuss the current issue with regular patient, if the treatment plan needs to change
- \* **New patient referral**
  - \* Discuss in the Red cell meeting
    - \* EPR referral—indication, length, target of the S%, the type of exchange.
    - \* Consent for long term red cell exchange,
    - \* Nurse consultation—assess peripheral access
- \* **Emergency referral**
  - \* Telephone Apheresis unit
  - \* EPR referral and consent
  - \* Ensure group screen and S% specimen taken
  - \* Order blood from blood bank, arrange urgent vascath insertion if it is required.

## Red cell depletion /Exchange

- \* Aim to achieve a better Fraction cell remaining (FCR rate—patient's original RBC remaining at end of the procedure, and possible use less blood).
- \* Combination of red cell depletion and exchange.
- \* **Depletion phase**— Optia machine removes patient red cells with Saline/Albumin replacement.
- \* The HCT is decreased to the prescribed level, then start to exchange with healthy donor RBC.
- \* Medical decision to consider for this procedure.

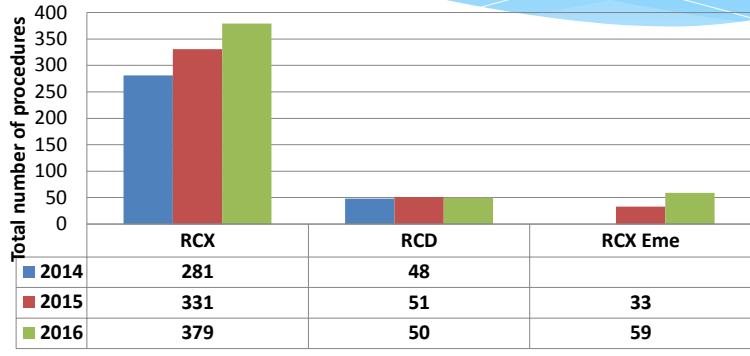
## Challenges

- \* Patient non compliance
- \* Increasing red cell exchange actives
- \* Apheresis unit capacity
- \* IV access, USS guidance
- \* Radiology femoral line slots are limited
- \* Late stay for the emergency procedure

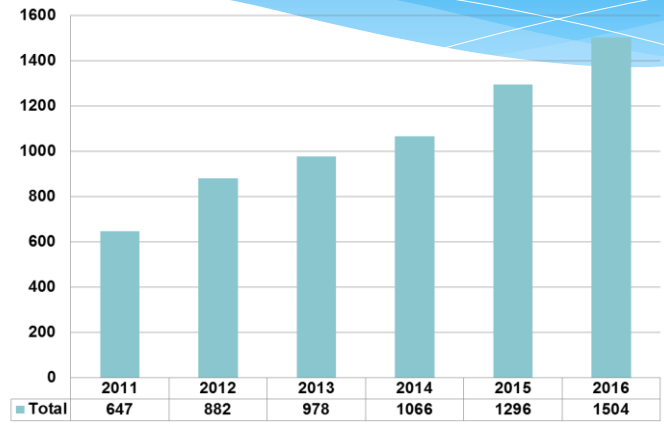
## Apheresis unit

- \* TerumoBCT Optia x 6
- \* x5 Apheresis Chairs
- \* Band 7 , Band 6 x7 Apheresis.
- \* Perform emergency procedure in the ward (not A/E).
- \* Opening time 08:00-19:00
- \* Open Saturday alternative
- \* Bank Holiday on call service

## Red Cell Procedures 2014 - 2016



## Total Number of the Apheresis procedures





## Reference

- \* KCH Sop : OPTIA - Procedure for an Automated Red Cell Depletion and – Exchange Q pulse no: CP-HAE-COL-1127
- \* NICE guidance (2016) Spectra Optia for automatic red blood cell exchange in patients with sickle cell disease
- \* Howell, C., Douglas, K., Cho, G., El-Ghariani, K., Taylor, P., Potok, D., Rintala, T. and Watkins, S., 2015. Guideline on the clinical use of apheresis procedures for the treatment of patients and collection of cellular therapy products. *Transfusion Medicine*, 25(2), pp.57-78.

## Thank you

