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Therapeutic Apheresis Treatments – Transfusion and Transplantation

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Caring Expert Quality

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Aims and objectives

- Background of Therapeutic Apheresis Services (TAS)
- Overview of Apheresis
- Treatment outlines
- Apheresis Challenges
- Questions

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Therapeutic Apheresis Services (TAS)

- NHSBT has a long history of providing life-saving and life-enhancing services to patients
- Services evolved based on local clinical interest rather than as part of a clear strategic direction
- In 2012, TAS was established as an independent national function with an agreed strategic plan
- TAS provide a wide portfolio of therapies across a broad range of clinical specialties, using technologies that exchange, remove, or collect certain components within the blood

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TAS locations

- Eight units & 1 spoke ECP service across England
- Services delivered from NHS Acute Trusts
- Units managed as regional and national networks
- Range of different treatment options in each unit
- Approx 8,000 treatments each year (approx 1,500 patients)

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What is apheresis?

“Apheresis” is derived from the Greek word “Aphairesis” which means “to separate,” “to take away by force,” or “to remove.”

- Involves removal of components from the blood with or without replacement to directly or indirectly treat many different conditions from a number of clinical specialties
- Sometimes involving secondary treatment of the removed component
- Using a number of different types of apheresis machines and principles

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Technology Used

Terumo Optia
(Multi-purpose platform)

Therakos Cellex
(Photopheresis)

Fresenius DALI
(Lipid removal)

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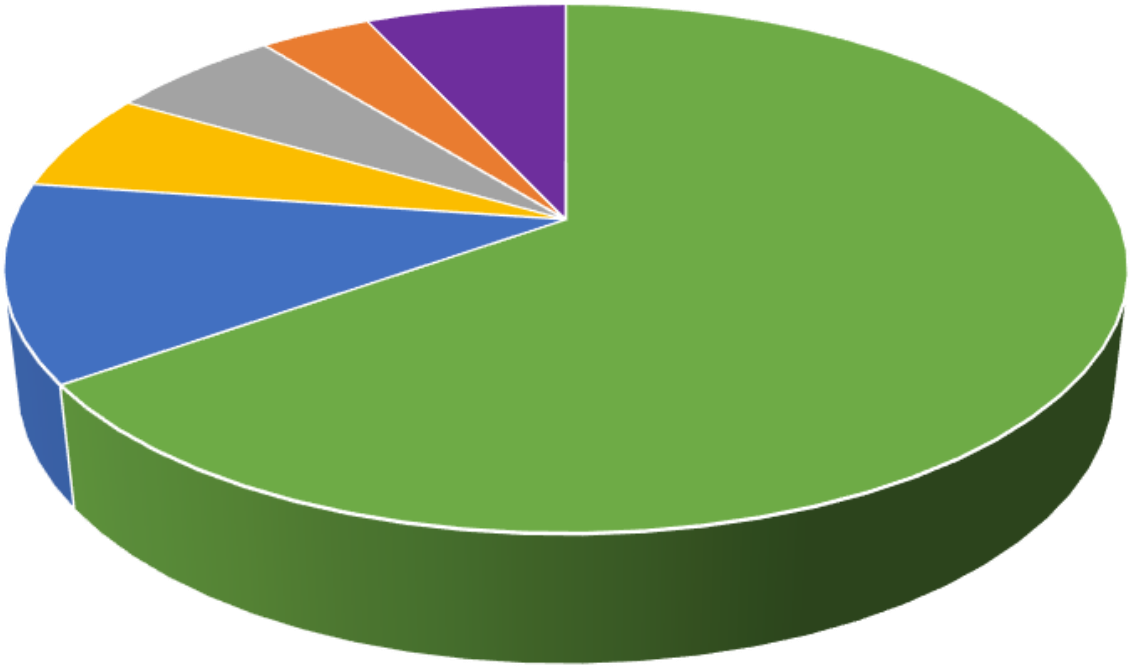
Specialties covered

65%	Haematology
12%	Neurology
6%	Renal
6%	Dermatology
4%	Oncology
7%	Other



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Apheresis Procedures Performed by TAS……..

- Plasma Exchange
- Red cell exchange
- Stem cell collection
- Lymphocyte collection
- Platelet depletion
- Red cell depletion
- Lipid reduction
- White cell depletion
- Granulocyte collection
- White cell collection
- Extra Corporeal Photopheresis (ECP)
- Immuno adsorption

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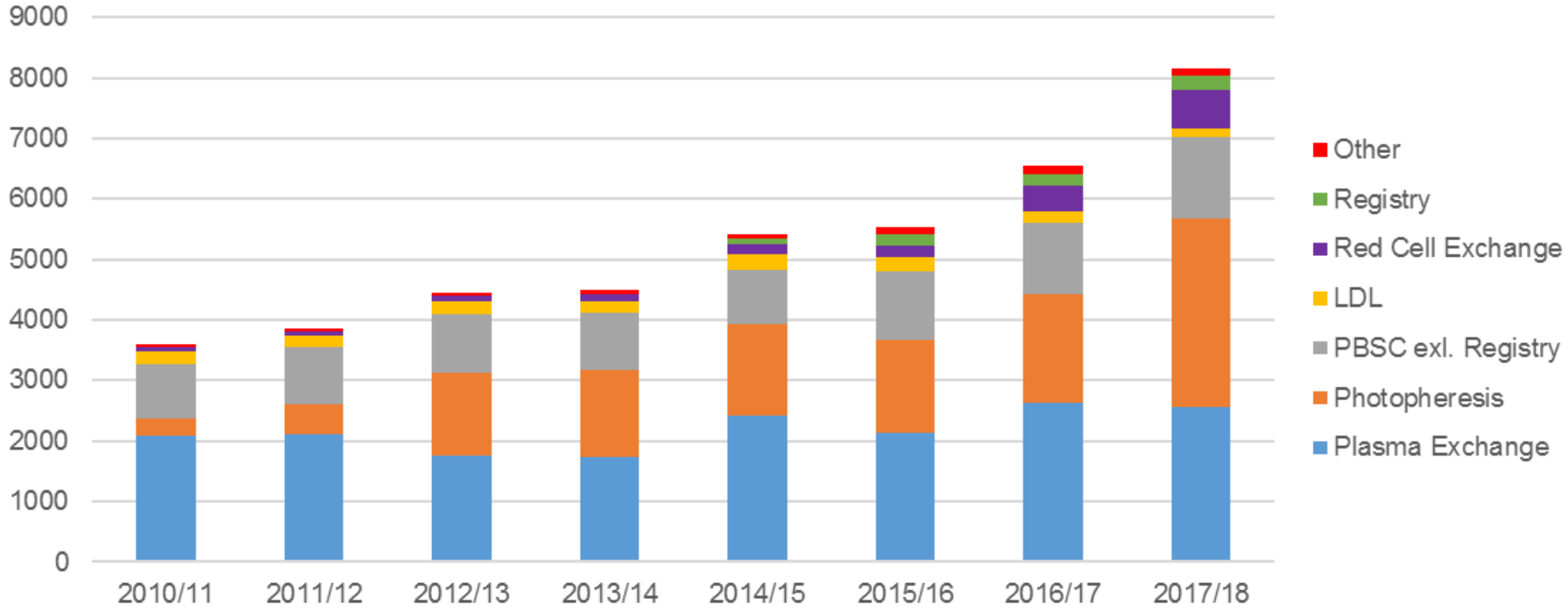
Demand for our services



- **126%** increase in activity (2010/11 to 2017/18)
- Introduction of new services in London and Birmingham
- Procedures with the highest demand: Plasma Exchange, Stem Cell Harvest, Extracorporeal Photopheresis and Red Cell Exchange

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Plasma Exchange

- large volumes of plasma are removed quickly

- Removed plasma is replaced with replacement fluid of choice

- Through the bulk removal and replacement of plasma, pathologic substances are removed:

  - Pathologic antibodies

  - Immune complexes

  - Cytokines

Replacement fluids

- Albumin/HAS – most common
- Octaplas – used commonly for TTP patients
- Fresh Frozen Plasma (FFP)
- Colloids – saline
- Crystalloids – Gelofusine or Hartmans

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Drugs reportedly removed by PEX

- Basiliximab
- Ceftriaxone
- Chloramphenicol
- Ceftazidime
- Cisplatin
- Diltiazem
- IFN-alpha
- Palivizumab
- Proxyphene
- Propanolol
- Rituximab
- Tobramycin
- Verapamil
- Vincristine

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Red Cell Exchange

- Known as automated exchange or exchange-transfusion
- Defective RBC are removed and normal RBC are simultaneously infused
- Can rapidly adjust the HCT% and HBS% concentration of the patient
- Avoids fluid overload, increased viscosity and iron overload associated with transfusions

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Indications for Red Cell Exchange

- Sickle cell disease
- Thalassemia
- Protozoal infections of red blood cells (RBCs)
- Incompatible transfusion
- Carbon monoxide poisoning

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Stem Cell Harvest

- Autologous/ allogeneic
  - No age/ size limit
- Primed prior to planned collection
  - Need GCSF at least 1 hour prior to harvest
- Harvest when CD34 count high enough in peripheral blood
- Aim to process 2.5 x total blood volume
- End target dependant on diagnosis /Number of transplants/ rescues required
- Procedure time 3.5-5hrs

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Extra Corporeal Photopheresis (ECP)

- First reported use 1987 in cutaneous T-Cell lymphoma (CTCL)
- Subsequently used in other T-cell mediated diseases including Graft versus Host Disease (GVHD)

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Potential Applications of ECP

- Malignancy
  - CTCL – mycosis fungoides, Sezary syndrome
- GVHD
  - Chronic
  - Acute
- Solid organ transplant rejection
- Autoimmune
  - Progressive systemic sclerosis, SLE, RA, psoriatic arthritis
- Other

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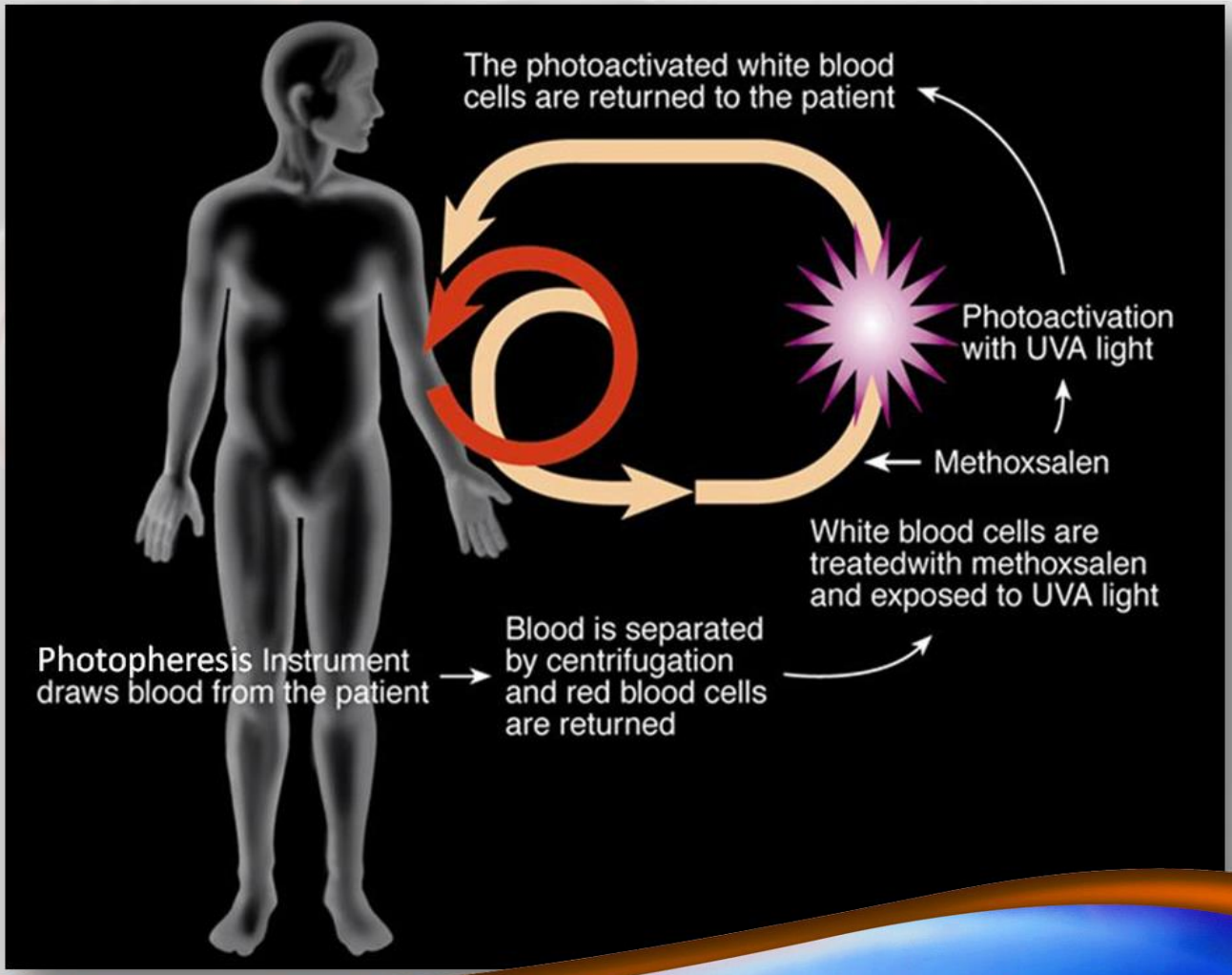
ECP : mode of action

- Not well understood
- Hypotheses include:
  - Apoptosis (death)of ECP-treated lymphocytes
  - Immune system recognises cells as dying
  - Interaction between apoptotic cells and host immune system
  - Leads to immunomodulation
  - Cytokine changes, effective reduction in inflammation
  - Reduced GVHD with preservation of GVD

Photopheresis procedure summary



Therakos™
PHOTOPHERESIS

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ECP Considerations

Exclusion criteria:

- Known sensitivity to psoralen compounds
- Aphakic patients
- Low haematocrit <28(only in pt's not having custom prime), platelets <20, WCC <1
- Weight less than 40kg will require custom prime
- History of heparin induced thrombocytopenia (HIT)
- Uncontrolled infection
- Diarrhoea > 1000 mL daily

Vascular Access

Adults:

Peripheral – 16-18g needle
+ 16-18g cannula
Dual Lumen CVC
Hickman + needle
Femoral Vascath

Paediatrics:

Dual Lumen CVC
Hickman line
Hickman + cannula
Femoral Vascath