

# Extracorporeal Photopheresis - Treating low body weight and low haematocrit patients

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## Introduction

Rotherham Foundation Trust is the first UK hospital to treat paediatric patients with chronic Graft versus-Host Disease (cGvHD) with Extracorporeal Photopheresis (ECP) using the Therakos Cellex(TM) integrated photopheresis system (fig. 1)

Photopheresis treatment is given on two consecutive days; either monthly or fortnightly depending on the condition being treated. These two days make up one treatment with the second day being a repeat of the first. Response to Photopheresis is monitored by continual assessment throughout treatment. Baseline assessments and steroid dosage are recorded at first treatment visit and subsequently at every following visit in order that an evaluation of treatment response can be made by the Consultant at three months and three monthly thereafter.

ECP consists of drawing anticoagulated venous blood from the patient into the photopheresis machine where it is separated by centrifugation. Red cells are returned and a mononuclear rich leucocyte fraction is collected. These leucocytes are treated with methoxsalen solution, exposed to UVA light and then returned to the patient. In-treatment fluid balance management of a patient is critically important.

A key factor in preventing hypovolaemic faints is to ensure that the extracorporeal volume (ECV) does not exceed 15% of the patients total blood volume. Until recently, ECP in the UK has been limited to patients with a body weight above 40kg, as ECV may exceed 15% in lower body weight patients.

Figure 1  
Cellex device



## Methods

The device manufacturer's guidelines detail the estimated ECV relative to the haematocrit. For example, it identifies that a patient of 19.65kg with a haematocrit of 32% would exceed 15% ECV. A blood prime is therefore indicated to safely treat the patient without extracorporeal loss.

The blood prime procedure is used for a patient with a low haematocrit and / or body weight using cross-matched compatible packed red blood cells to prime the centrifuge bowl of the Cellex (TM) device, before drawing blood from the patient, thus minimising the ECV and maintains a static fluid balance. Once the centrifuge bowl has reached the interface the patient is attached in double needle mode, where blood is drawn and returned simultaneously to keep the patient fluid balance static.

(Figures 2a and b ,3 and 4)



Fig 2a and 2b  
Priming the centrifuge bowl with compatible packed red blood cells

Fig 3.  
Attaching to the patient in double needle mode



Fig 4  
Patient attached to the machine.

All paediatric patients have central line access to facilitate double needle mode.

## VISUAL RESULTS

Figure 5a and 5b, shows a male of 5 years of age at his first visit. Figures 5c and 5d show the same child following 18 months of photopheresis treatment.

Figure 6a and 6b shows a 10 year old male at first visit and then three months later. His jaundice and liver function tests significantly improved. Both patients has their oral steroid intake tapered significantly within in a 12 month period of treatment.

Fig 5a and 5b



Fig 5c and 5d



Fig.6a and 6b



## Results

Our experience of utilising the blood prime procedure for low body weight and low haematocrit patients indicates a low risk profile.

Treatment planning is key to success to ensure compatible blood is available. The blood prime procedure has thus far facilitated ECP treatment of patients as young as 2.8 years and as low as 18.5kg in weight.

Median circulating blood volume processed during 280 low body weight treatments was 900mls which compares favourably to non-blood prime, adult procedures.

Data review demonstrated that 2 blood prime treatments have been performed for low haematocrit adult patients (below 27%) during a 2-year period which have prevented ECP deferral.

## Conclusion

The use of the blood prime procedure has allowed our service to expand to the inclusion of low body weight / paediatric patients and has reduced the incidence of adult treatment deferral due to low patient haematocrit.

There has been an improvement in the majority of patients skin and liver tests and the ability to reduce or stop oral immunosuppressants has been significant.

## RESULTS

Total number of paediatrics treated since March 2010 = 20  
Total number of males = 10 Total number of females = 10

	<u>RANGE</u>	<u>MEDIAN</u>
Weight ( kg)	18.5kg - 40	31.63
Age	2.8 - 16	8
Volume processed ( mls)	504- 1497	900