



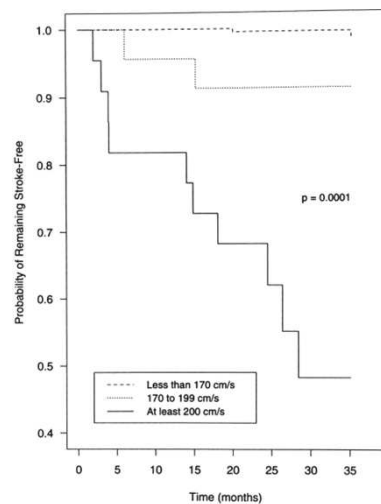
Clinical benefit and cost evaluation of erythrocytapheresis compared to manual exchange transfusion for children with sickle cell disease: a single center experience

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Introduction

- Chronic transfusion in Sickle Cell Disease
 - Primary and secondary stroke prevention



Adams et al, Control Clin Trials 1998

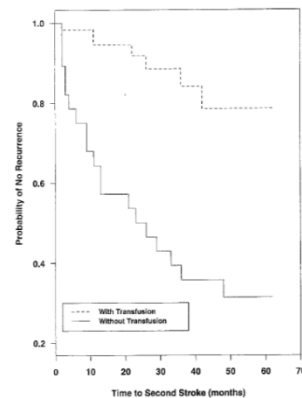


Figure. Comparison of stroke recurrence with time for study population with transfusion and historical control subjects without transfusion.^{1,2} Probability of recurrence is significantly different at 71 months ($p < 0.001$). Follow-up was censored at 62 months.

Pegelow et al, J Pediatr 1995

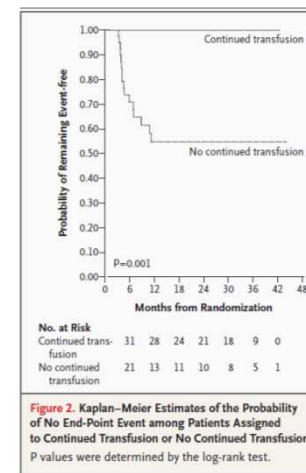


Figure 2. Kaplan-Meier Estimates of the Probability of No End-Point Event among Patients Assigned to Continued Transfusion or No Continued Transfusion. P values were determined by the log-rank test.

STOP 2, NEJM 2005

- Recurrent vaso-occlusive crisis or acute chest syndrome despite hydroxyurea
- Prevention of progressive organ damage

Simple transfusion vs. exchange transfusion?

TOP-UP		EXCHANGE	
+	-	+	-
HbS dilution	Increased viscosity	Rapid decrease in HbS	Venous access
Restoration of blood volume and hematocrit	Iron overload	No increase in the viscosity	Large amount of RBC, Higher risk of alloimmunization
Venous access		↓ Iron overload	Equipment, expertise, cost, time-consuming
Few RBC			

Aim of the study

- To assess the safety and efficacy of erythrocytapheresis (ECP) in SCD patients previously treated with manual exchange transfusion (MET)
- To evaluate the changes of the cost over the years

Material & Methods

- Erythrocytapheresis (ECP)
 - From January 2012
 - 10 patients shifted from MET to ECP
 - $\geq 30\text{kg}$ and sufficient peripheral venous access
- Spectra Optia® Apheresis System
- Peripheral venous access
- Standardized prescriptions
 - 1.5 x red cell volumes
 - IV calcium supplements

- Data were recorded for the last 6 months on MET and compared to the data of the 1st and 2nd year on ECP
- Cost evaluation
 - The overall cost of last year on MET, 1st year and 2nd year on ECP were analyzed (packed RBCs, one-day care facility and chelation)
- Friedman test was used to compare the treatment over the years and Dunn's Multiple Comparison Test used to compare yearly treatment
- Target HbS was < 30% in case of stroke and < 50% for other indications

Results

Characteristics of the patients

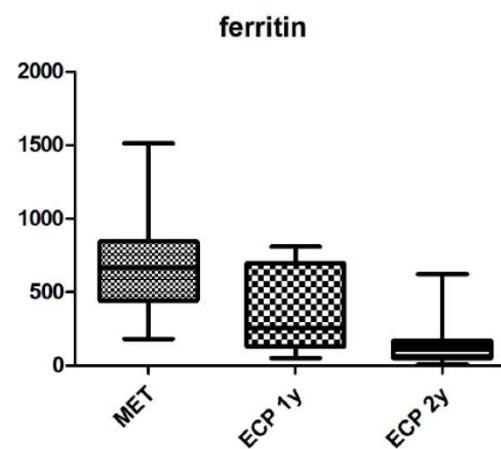
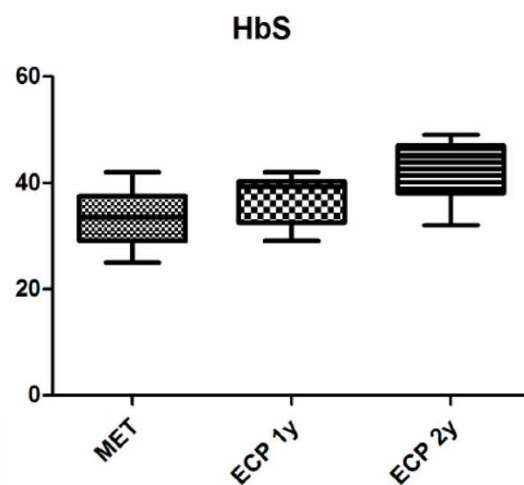
Number of patients	10
Sex (M)	8
Age at switch (median, range)	11.8y (9.6-16.8)
Duration of MET before ECP (median, range)	1.9y (0.5-4.4)
Duration of ECP after switch	2y
Number of ECP (median, range)	21 (19-27)

Indications of Chronic Transfusion Program

Number of patients	10
Primary stroke prevention	0
Secondary stroke prevention	2
Recurrent VOC-ACS	5
Pulmonary hypertension	2
Untolerated severe anemia*	1

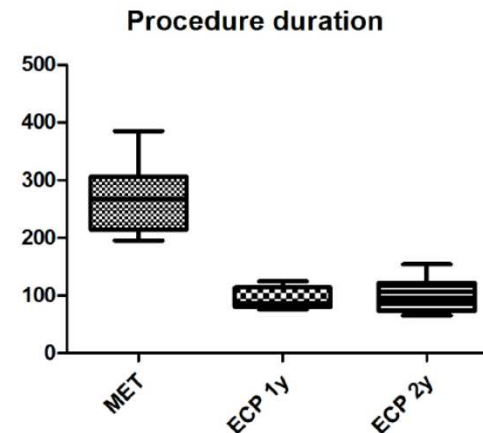
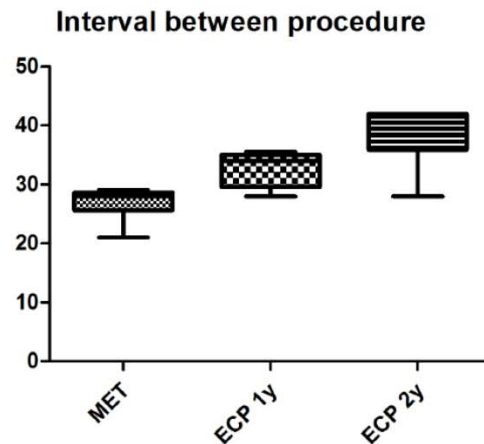
Biological data

N = 10	On MET		On ECP				P
			1st Year		2nd Year		
	Median	Range	Median	Range	Median	Range	
Hb (g/l)	9,95	8,6-10,8	9,93	8,85-10,6	9,7	9,1-11,7	NS
Hb S (%)	33,5	25-42	39,3	29-42	45	32-49	***
Ferritin (µg/l)	663,3	182-1512	257	52,5-811	126,8	8-622	***



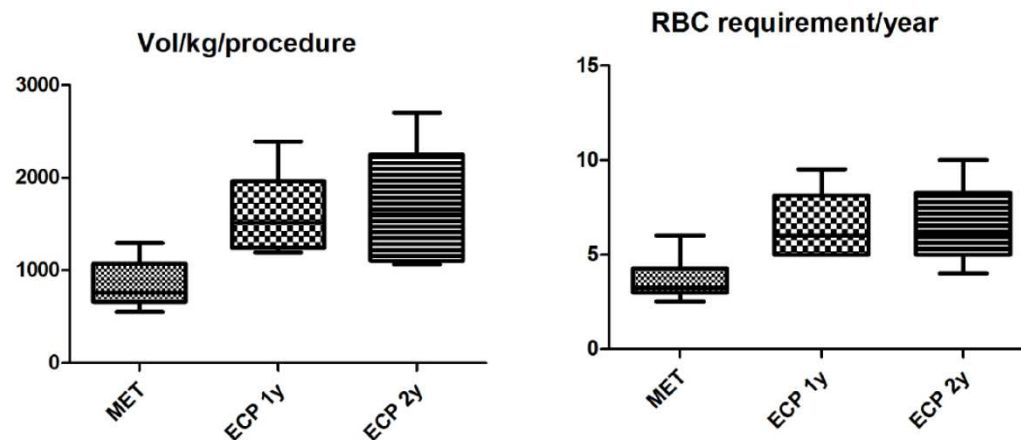
Time saving

N = 10	On MET		On ECP				P value
			1 st year		2 nd year		
	Median	Range	Median	Range	Median	Range	
Procedure duration (min)	266.3	195.0-385.0	86.0	76.0-124.5	90.0	65.0-154.0	**
Interval between procedures (d)	28	21-29	34	28-36	42	28-42	***



RBC requirement

N = 10	On MET		On ECP				P value
			1 st year		2 nd year		
	Median	Range	Median	Range	Median	Range	
RBC volume requirement (ml/kg/procedure)	18.3	15.0-20.0	32.7	26.6-36.1	29.8	23.1-35.3	***
Packed RBC requirement (units/year)	39.5	15.0-64.0	74.0	50.0-130.0	60.5	38.0-135.0	**



Cost evaluation

	On MET	On ECP		P value
		1 st year	2 nd year	
Total cost for packed RBC	50804.04€	88263.24€	78079.02€	NS
One day clinic cost	24094.98€	29473.47€	25191.00€	NS
Chelation cost	32193€	22448€	0€	(NS)
TOTAL COST PER YEAR	107092.02€	140184.71€	103270.02€	NS

Conclusion

- ECP is a safe and a useful procedure for children with sickle cell disease requiring exchange transfusion program
- ECP is less time consuming and therefore decreases the burden of the disease
- ECP improves iron overload
- Despite the higher cost related to the increased packed RBC requirement, the cost of ECP and MET are equal in the Belgian Health Care System

Next step

- To follow the rate of allo-immunization
- To develop new protocol for children with < 30kg

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 - H. El Kenz



1

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