Plazmaferez-Plazma Değişimi-İmmünadsorbsiyon Endikasyonları ve Reçeteleme

Dr. İsmail Dursun
Erciyes Üniversitesi Tıp Fakültesi
Çocuk Sağlığı ve Hastalıkları AD
Çocuk Nefroloji

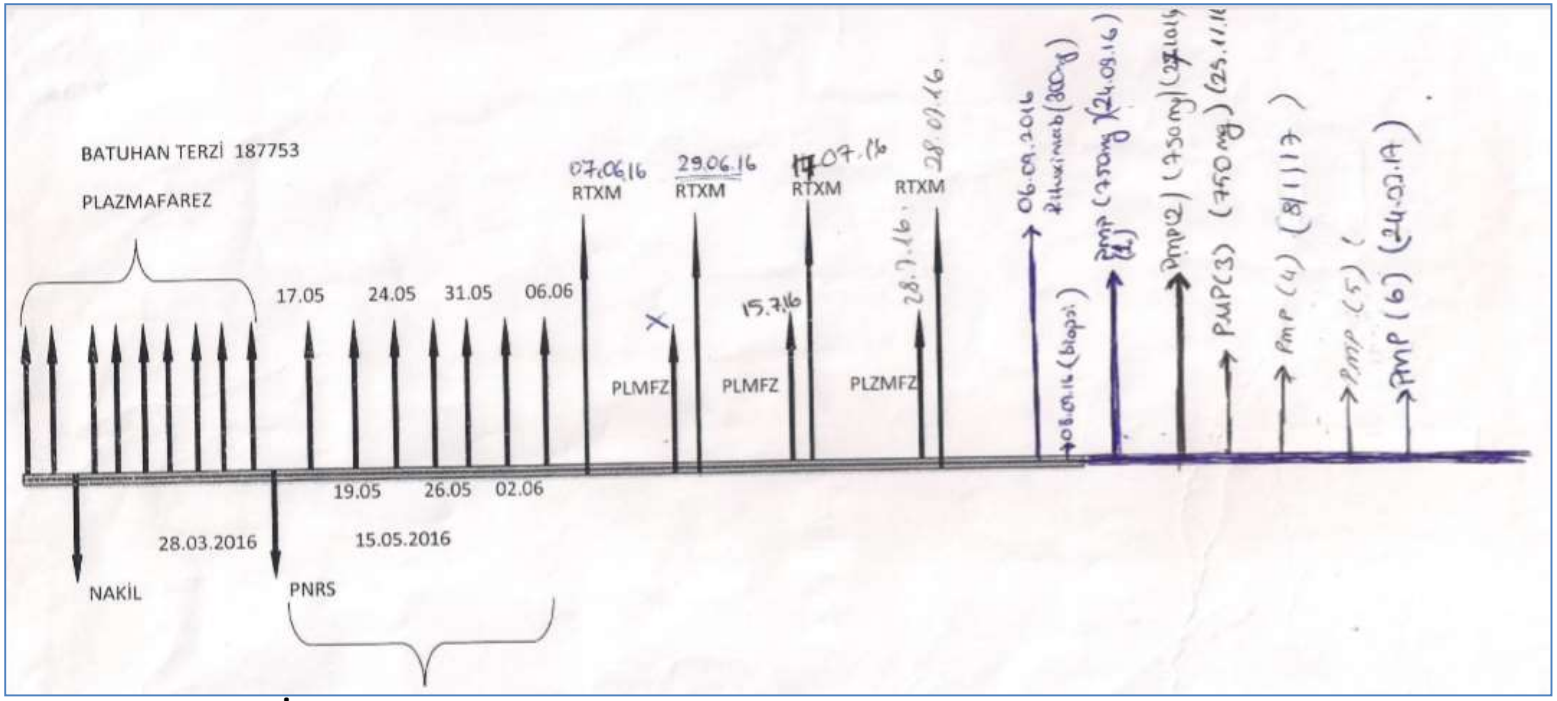
27-28.09.2019 Çocuklarda Uygulamalı Hemodiyaliz Kursu-2 Akdeniz Üniversitesi Tıp Fakültesi

BT, 12 yaş erkek

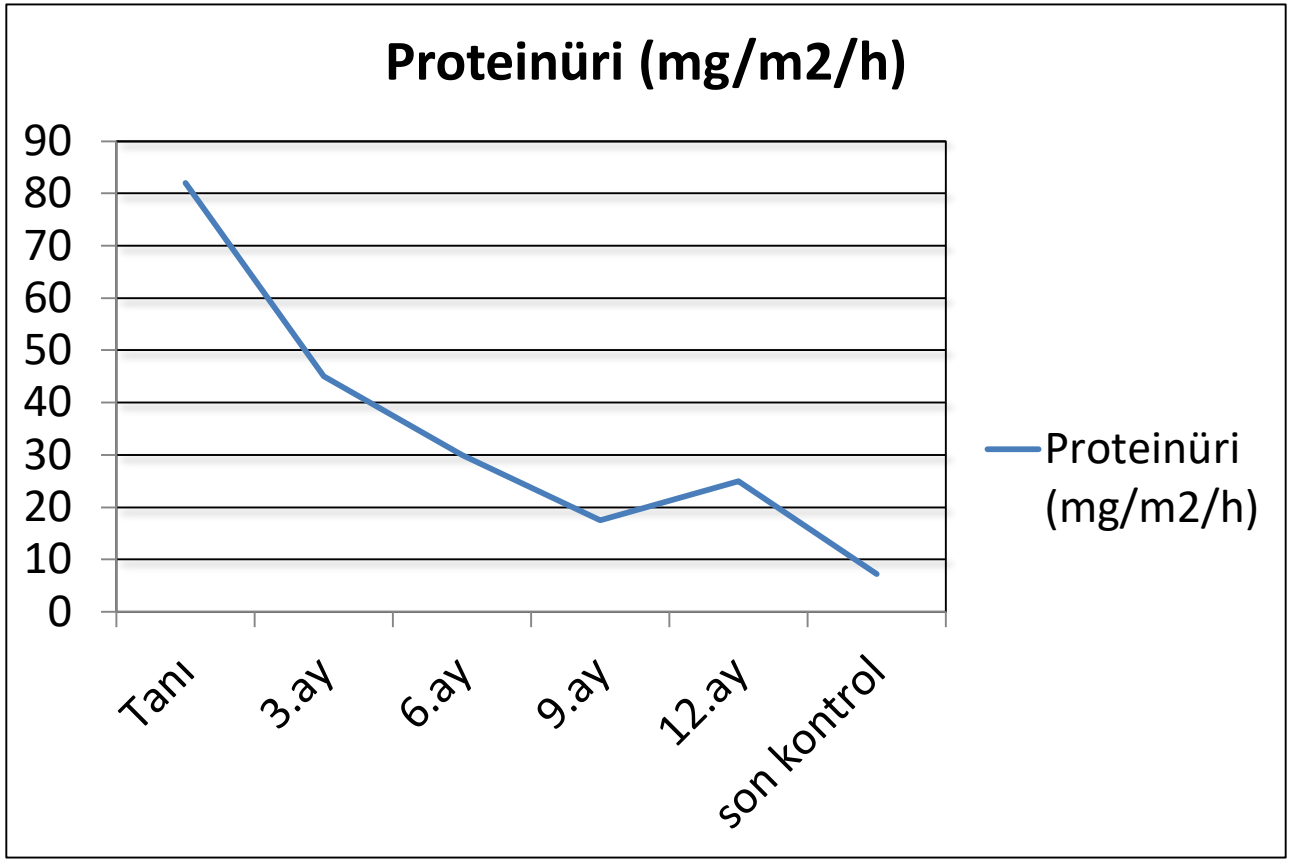
-3 yaşında nefrotik sendrom tanısı alıyor
- Steroid yanıtsız
- Biyopsi: hafif mezengial hücre artışı, IF normal
- Pulse MP, siklofosfamid, MMF, RTX ve abatacept yanıtı yok
- Terapotik plazma değişimine yanıt yok (25 seans)
- Nefrin, podosin, WT1 mutasyonu negatif
- 6 yaşında SDBY…..PD
- 9 yaşında anneden nakil
- Nakil sonrası 3. gün başlayan nefrotik proteinüri, sınırda albumin düşüklüğü, BFT normal
- Biyopsi FSGS?

BT, 12 yaş erkek

-Hasta takrolimus ve MMF almaya devam etti



İmmunadsorbsiyon



-Hasta halen steroid 5 mg/gün, takrolimus, MMF ve enalapril alıyor
- Kreatinin 0.64 mg/dl

- Hastamızda plazmaferez kanıta dayalı olarak mı yapılmıştır?
- Nasıl reçetelendirilmiştir?
- Güvenli bir tedavi midir?

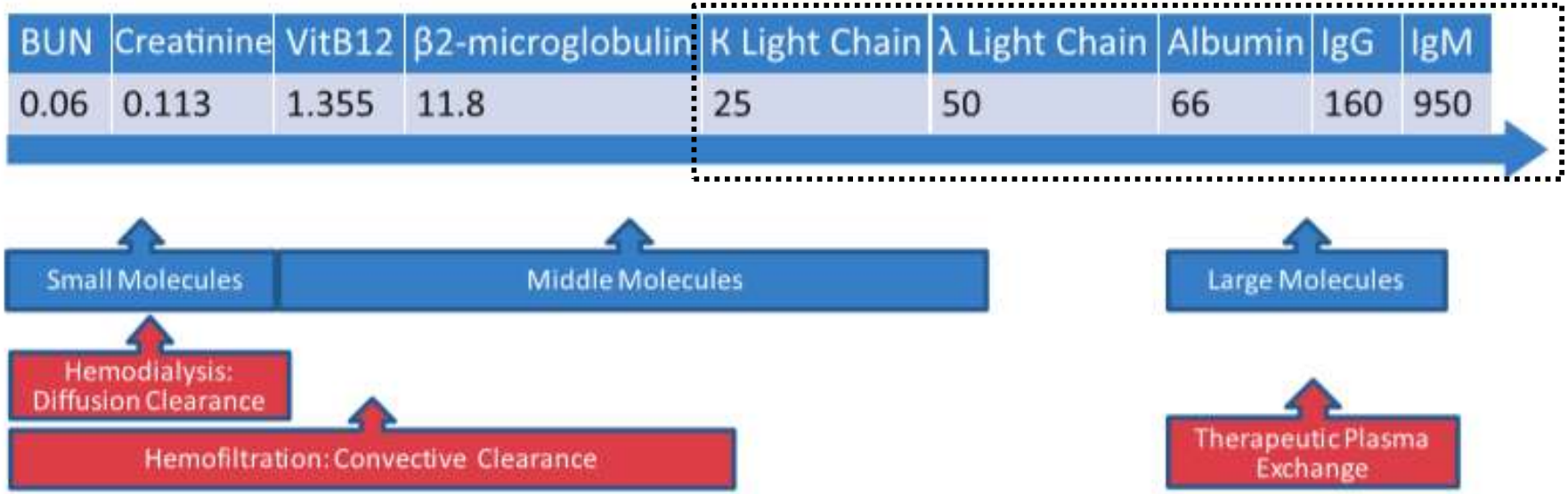
Genel tanımlamalar

- **Plazmaferez:** Plazmayı uzaklaştıran herhangi bir aferez tekniği için kullanılan genel tanımlama
- **Plazma değişimi (exchange):** Replasman sıvısının kullanıldığı plazmaferez yöntemi

Terapotik plazma değişimi (plazmaferez)

- Dolaşımdan hedeflenen anormal maddeleri ve hücreleri uzaklaştıran ekstrakorporeal tedavi
- Plazma diğer kan bileşenlerinden ayrılır, atılır ve fizyolojik sıvılar ile yerine konulur
- >15 kD moleküllerin uzaklaştırılması

Molekül boyutu tedavi planlamasında önemlidir



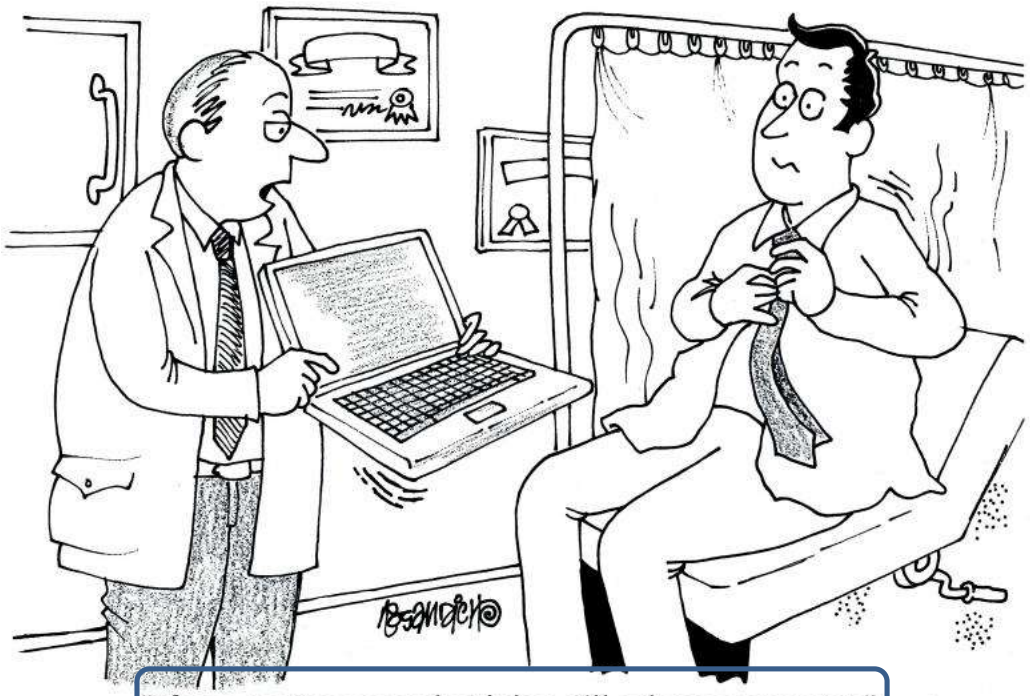
Clin J Am Soc Nephrol 2014; 9: 181–190

TPD hangi maddelerin uzaklaştırılmasında faydalıdır?

- Dolaşımdan klasik tedavilerle uzaklaştırılamayan,
- Hızlı uzaklaştırma gerektiren,
- Uzun yarı ömre sahip,
- Yavaş re-sentez yeteneği olan,
- Damar içi dağılımı olan

Aferez planlaması uzaklaştırılmak istenen molekülün özelliklerine göre değişir

- Çoğunlukla yeniden yükselmeyi engellemek için immunosüpresiflerle beraber yapılmalıdır
- IgM'in %75'i damar içinde olduğundan bir veya iki prosedür hızla uzaklaştırılmasına yol açar
- IgG %45 oranında damar içinde bulunur, prosedürün 48. saatinde aferez öncesi düzeyin %60'ına yeniden ulaşır



"If you want a second opinion, I'll ask my computer."

Journal of Clinical Apheresis 31:149–338 (2016)

Guidelines on the Use of Therapeutic Apheresis in Clinical Practice—Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Seventh Special Issue

Plazmaferez endikasyonları (ASFA kriterleri)

Kategori I

- Standart

Kategori II

- Mevcut verilere göre yararlı

Kategori IIII

- Yeterince test edilmemiş

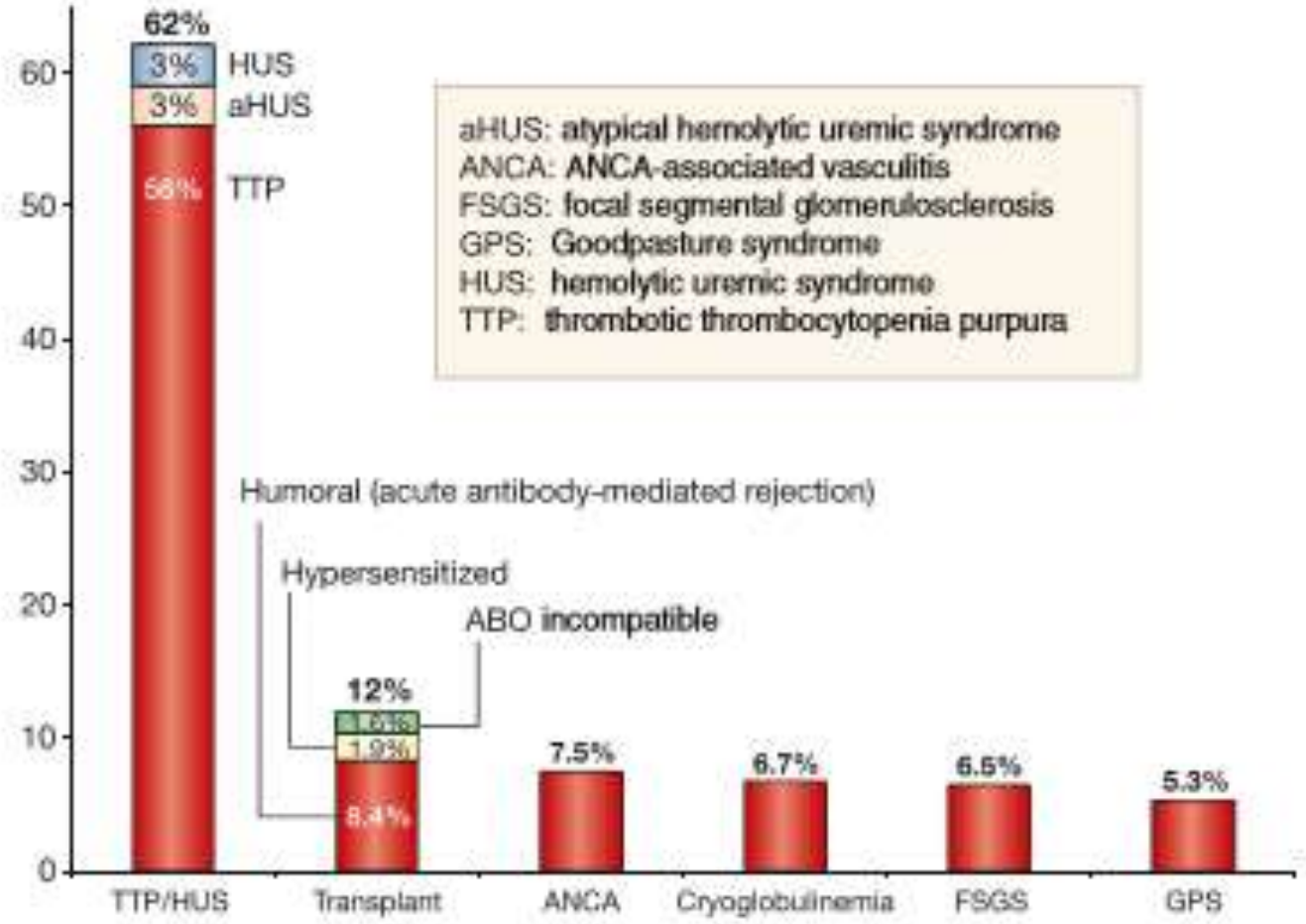
Kategori IV

- Kontrollü çalışmalarda yararı

Renal hastalıklarda plazmaferez endikasyonları

Hastalık	Kategori	Önerilen metod
Goodpasture hastalığı	I	TPD
Trombotik trombositopenik purpura	I	TPD
Kryoglobulinemi	I	TPD
Posttransplant FSGS	I	TPD
ANCA-vaskülit (diyaliz gerektiren)	I	TDP
Renal allograft rejeksiyonu	II	TPD/IA/DFPP
Renal transplant için desensitizasyon	II	TPD/IA/DFPP
Hemolitik üremik sendrom	III	TPD
Primer FSGS	III	LDL aferez
Hızlı ilerleyen glomerülonefrit	III	TPD
ANCA-vaskülit (diyaliz gerektirmeyen)	III	TDP

Plasmapheresis for the treatment of kidney diseases



Kidney Int 2016

Plazmaferez yöntemleri

- Santrifügasyon
- Membran filtrasyonu
- Selektif yöntemler
  - ✓ “Çift” membran filtrasyonu
  - ✓ Plazma adsorbsiyon

    -İmmunadsorbsiyon plazmaferez

    -LDL-aferez

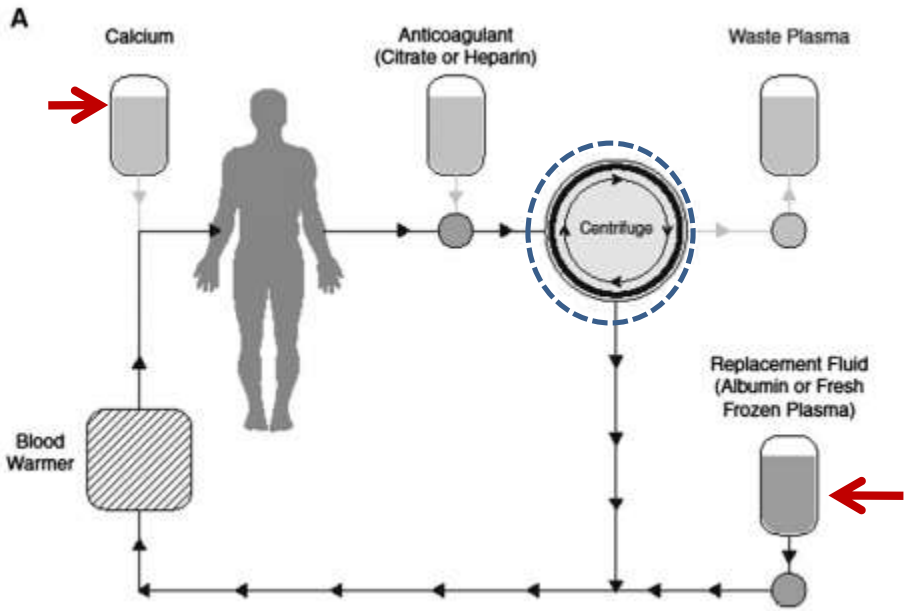
    -Bilurubin aferez

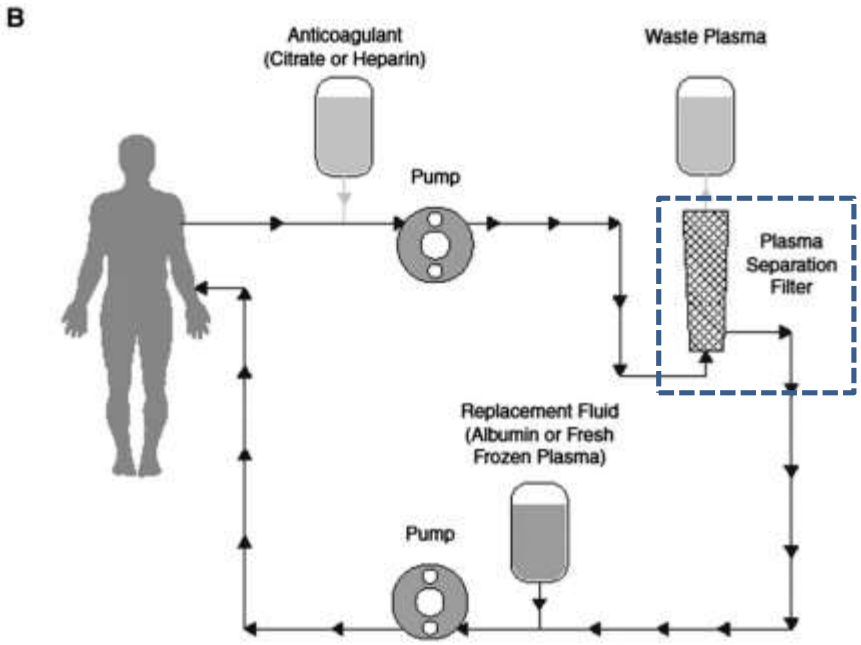
TPD yöntemler arasındaki temel farklar

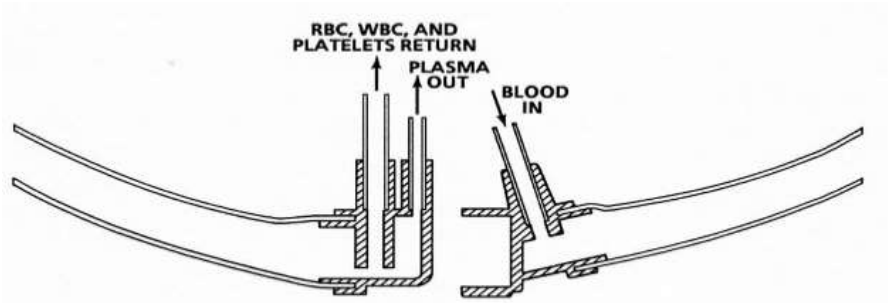
	Santrifüj temelli PE	Membran temelli PE
Mekanizma	Santrifüj	Kapiller membran filtresi
Kan akımı (ml/dk)	10-150	150
Plazma uzaklaştırma (%)	80…..kısa süreli tedavi	30…..uzun süre tedavi
Antikoagulasyon	Sitrat	Heparin
Madde ayırımı	Özgül ağırlık	Boyut
Set kan volümü (ml)	180 ml	125 ml
Sterilizasyon	Gama irridasyon veya etilen oksit	etilen oksit
Replasman	Albumin, TDP	Albumin, TDP
Kanama riski	Düşük	Orta-yüksek
İstenmeyen etki	Hipokalsemi Trombosit kaybı	TMP yüksek ise hemoliz

Clin J Am Soc Nephrol 2014; 9: 181–190, Saudi J Kidney Dis Transpl 2019;30(2):291-298

TPD yöntemleri







Clin J Am Soc Nephrol 2014; 9: 181–190


Optia

TPD reçetelendirme

- **İşlem öncesi yapılacak testler**
  - CBC, BFT, Ca^{++} , PT, aPTT, fibrinojen

TPD reçetelendirme

- **Gereksinimler**
  - Damar yolu erişimi (*periferik yolda kullanılabilir*)

Patient weight	Catheter size*
Neonate	Dual-lumen 7 French
<20 kg	Dual-lumen 8 French
20–30 kg	Dual-lumen 10 French
>30 kg	Dual-lumen 11.5 French Tesio catheter 12 French

*3 French units = 1 mm.

  - Doz hesaplama
    - plazma değişim volümü=hastanın plazma volümünün 1-1.5 katı (bizde 1.2)

      Plazma volümü= TKVX(1-Htc/100)

Body weight and age	
Infant or <2 kg	TBV = 80 cc/kg
Child or 20–50 kg	TBV = 70 cc/kg
Adult or >50 kg	TBV = 60c c/kg

VA: 20 kg, Hct 30
- 20x70 (1-30/100)=980
- 980x1.2 **~ 1200 ml**

TPD reçetelendirme

- **Gereksinimler**
  - Premedikasyon

    -Hidrokortizon+parasetemol+feniramin
  - Ön doldurma

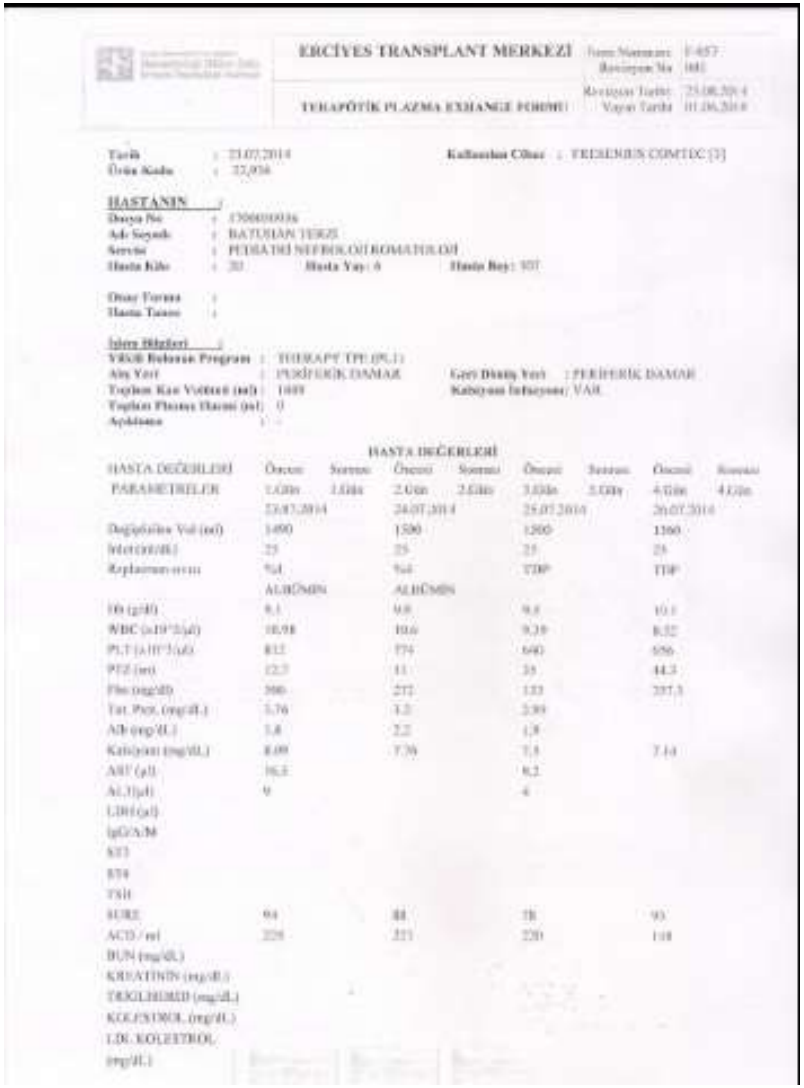
    -SF veya % 5 albumin

    - Ektracoporeal volüm > % 10 TKV ise Eritrosit süspansiyonu (SF/TDP ile seyreltilerek Htc %35'e getirilmeli)

TPD reçetelendirme

- **Gereksinimler**
  - Replasman sıvısı
    - -Albumin
    - - TDP (TTP, HÜS)
      - *Fibrinojen < 100 mg/dl ise TDP ile yapılır
  - Antikoagulasyon
    - - Sitrat/heparin
    - - Sitrat alırken kalsiyum 1 ml/kg/saat

TPD order örneği



ERCİYES TRANSPLANT MERKEZİ

TERAPÖTİK PLAZMA EXHANGE FORMU

Tarih : 23.07.2014 Kullanılan Cihaz : FRESENIUS COMTEC [3]
Ürün Kodu : 22,934

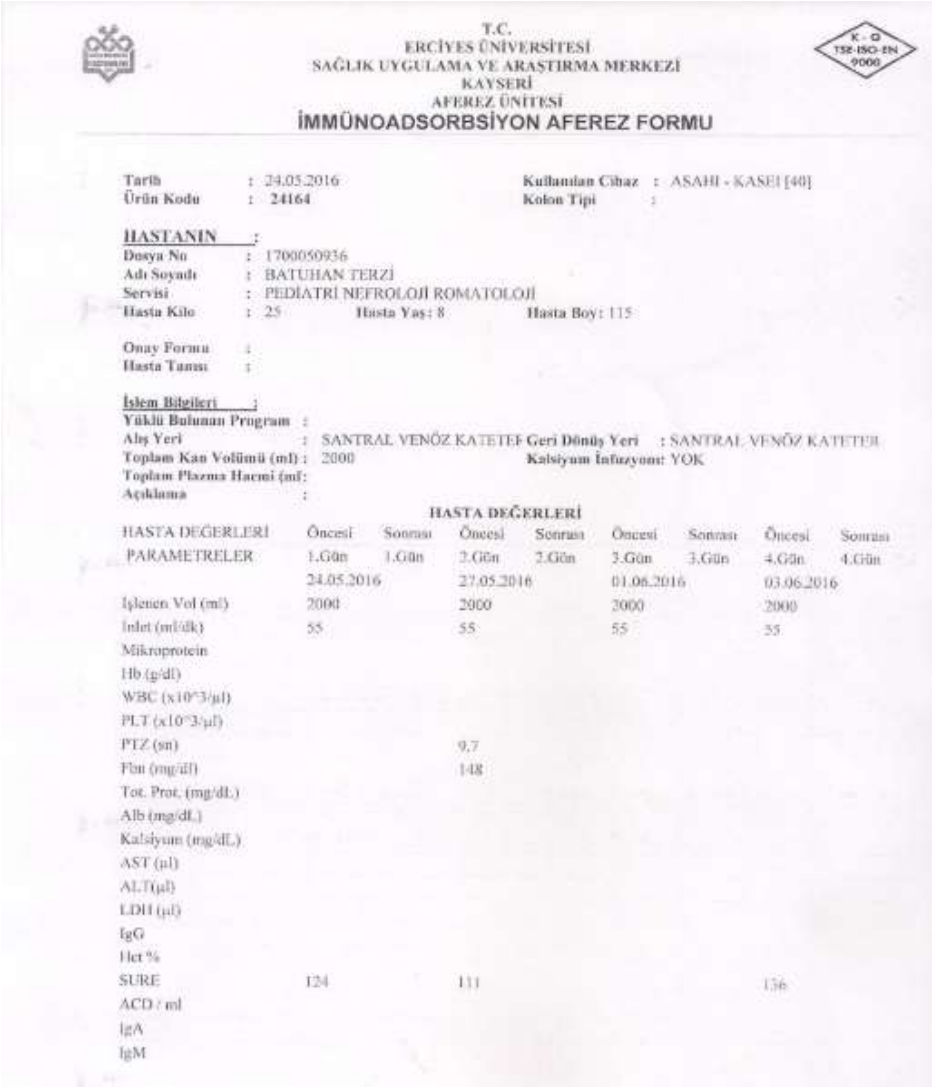
HASTANIN :
Dosya No : 1700050936
Adı Soyadı : BATUHAN TERZİ
Servisi : PEDİATRİ NEFROLOJİ ROMATOLOJİ
Hasta Kilo : 30 Hasta Yaş : 6 Hasta Boy : 107

Onay Formu :
Hasta Tanısı :

İşlem Bilgileri :
Yüklü Bulunan Program : THERAPY TPE (PL1)
Alış Yeri : PERİFERİK DAMAR Geri Dönüş Yeri : PERİFERİK DAMAR
Toplam Kan Volümü (ml) : 1600 Kalsiyum İnfüzyonu: VAR
Toplam Plazma Hacmi (ml): 0
Açıklama :

HASTA DEĞERLERİ

HASTA DEĞERLERİ	Öncesi	Sonrası	Öncesi	Sonrası	Öncesi	Sonrası	Öncesi	Sonrası
PARAMETRELER	1.Gün	1.Gün	2.Gün	2.Gün	3.Gün	3.Gün	4.Gün	4.Gün
	23.07.2014		24.07.2014		25.07.2014		26.07.2014	
Değişilen Vol (ml)	1490		1500		1500		1500	
İnlet (ml/dk)	25		25		25		25	
Replasman sıvısı	%4		%4		TDP		TDP	
	ALBÜMİN		ALBÜMİN					
Hb (g/dl)	8.1		9.0		9.8		10.1	
WBC (x10^3/µl)	10.98		10.6		9.19		8.32	
PLT (x10^3/µl)	832		774		640		556	
PTZ (sn)	12.7		13		35		44.3	
Fbn (mg/dl)	300		272		133		257.3	
Tot. Prot. (mg/dL)	5.76		5.2		2.89			
Alb (mg/dL)	3.8		2.2		1.8			
Kalsiyum (mg/dL)	8.09		7.76		7.5		7.14	
AST (µl)	36.5				8.2			
ALT(µl)	9				4			
LDH (µl)								
IgG/A/M								
ST3								
TSH								
SURE	94		88		78		93	
ACD / ml	229		221		220		118	
BUN (mg/dL)								
KREATİNİN (mg/dL)								
TRİGLİSERİD (mg/dL)								
KOLESTEROL (mg/dL)								
LDL KOLESTEROL (mg/dL)								



T.C.
ERCİYES ÜNİVERSİTESİ
SAĞLIK UYGULAMA VE ARAŞTIRMA MERKEZİ
KAYSERİ
AFEREZ ÜNİTESİ

İMMÜNOADSORBSİYON AFEREZ FORMU

Tarih : 24.05.2016 Kullanılan Cihaz : ASAHI - KASEI [40]
Ürün Kodu : 24164 Kolon Tipi :

HASTANIN :
Dosya No : 1700050936
Adı Soyadı : BATUHAN TERZİ
Servisi : PEDİATRİ NEFROLOJİ ROMATOLOJİ
Hasta Kilo : 25 Hasta Yaş : 8 Hasta Boy : 115

Onay Formu :
Hasta Tanısı :

İşlem Bilgileri :
Yüklü Bulunan Program :
Alış Yeri : SANTRAL VENÖZ KATETER Geri Dönüş Yeri : SANTRAL VENÖZ KATETER
Toplam Kan Volümü (ml) : 2000 Kalsiyum İnfüzyonu: YOK
Toplam Plazma Hacmi (ml):
Açıklama :

HASTA DEĞERLERİ

HASTA DEĞERLERİ	Öncesi	Sonrası	Öncesi	Sonrası	Öncesi	Sonrası	Öncesi	Sonrası
PARAMETRELER	1.Gün	1.Gün	2.Gün	2.Gün	3.Gün	3.Gün	4.Gün	4.Gün
	24.05.2016		27.05.2016		01.06.2016		03.06.2016	
İşlenen Vol (ml)	2000		2000		2000		2000	
İnlet (ml/dk)	55		55		55		55	
Mikroprotein								
Hb (g/dl)								
WBC (x10^3/µl)								
PLT (x10^3/µl)								
PTZ (sn)			9,7					
Fbn (mg/dl)			148					
Tot. Prot. (mg/dL)								
Alb (mg/dL)								
Kalsiyum (mg/dL)								
AST (µl)								
ALT(µl)								
LDH (µl)								
IgG								
Hct %								
SURE	124		111				136	
ACD / ml								
IgA								
IgM								

Pediatr Nephrol (2015) 30:103–111
DOI 10.1007/s00467-014-2907-3

ORIGINAL ARTICLE

Indications, technique, and outcome of therapeutic apheresis in European pediatric nephrology units

Fabio Paglialonga · Claus Peter Schmitt · Rukshana Shroff · Karel Vondrak · Christoph Aufricht · Alan Rees Watson · Gema Ariceta · Michael Fischbach · Gunter Klaus · Tuula Holtta · Sevcan A. Bakkaloglu · Alexandra Zurowska · Augustina Jankauskiene · Johan Vande Walle · Betti Schaefer · Elizabeth Wright · Roy Connell · Alberto Edefonti

Table 5 Indications for plasma exchange (PE), immunoadsorption (IA), and double filtration plasmapheresis (DFPP), and disease category according to the 2013 American Society for Apheresis (ASFA) Guidelines (number of patients and %)

	PE	IA	DFPP	ASFA category
Renal				
NS/FSGS	11 (16.4 %)	1 (10 %)	1 (33.3 %)	
- Recurrent post-rTx FSGS	7	1	1	I
- FSGS on native kidneys	1			NC
- Pre-rTx FSGS	2			NC
- Recurrent post-rTx congenital NS	1			NC
HUS/TTP	12 (17.9 %)			
- Unknown origin	4			II
- Factor H Ab HUS	3			I
- MCP HUS	1			IV
- Pneumococcal HUS	1			III
- Typical HUS	2			IV
- TTP	1			I

Pediatr Nephrol (2015) 30:103–111
DOI 10.1007/s00467-014-2907-3

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Indications, technique, and outcome of therapeutic apheresis in European pediatric nephrology units

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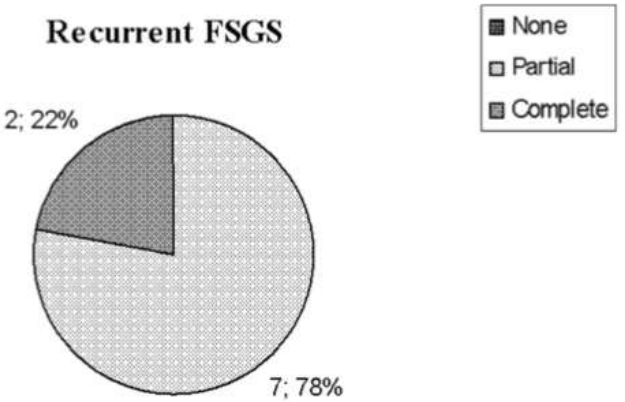
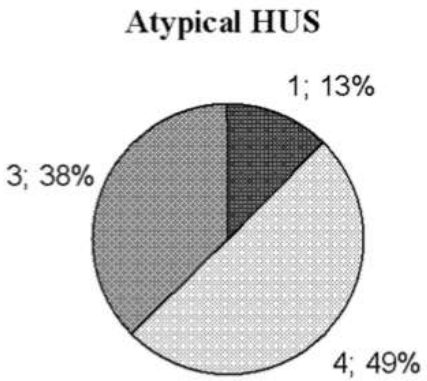
TPD'ne yanıt rekürren FSGS' li çocuklarda %78



TPD'ne yanıt TTP/aHÜS' lü çocuklarda %87

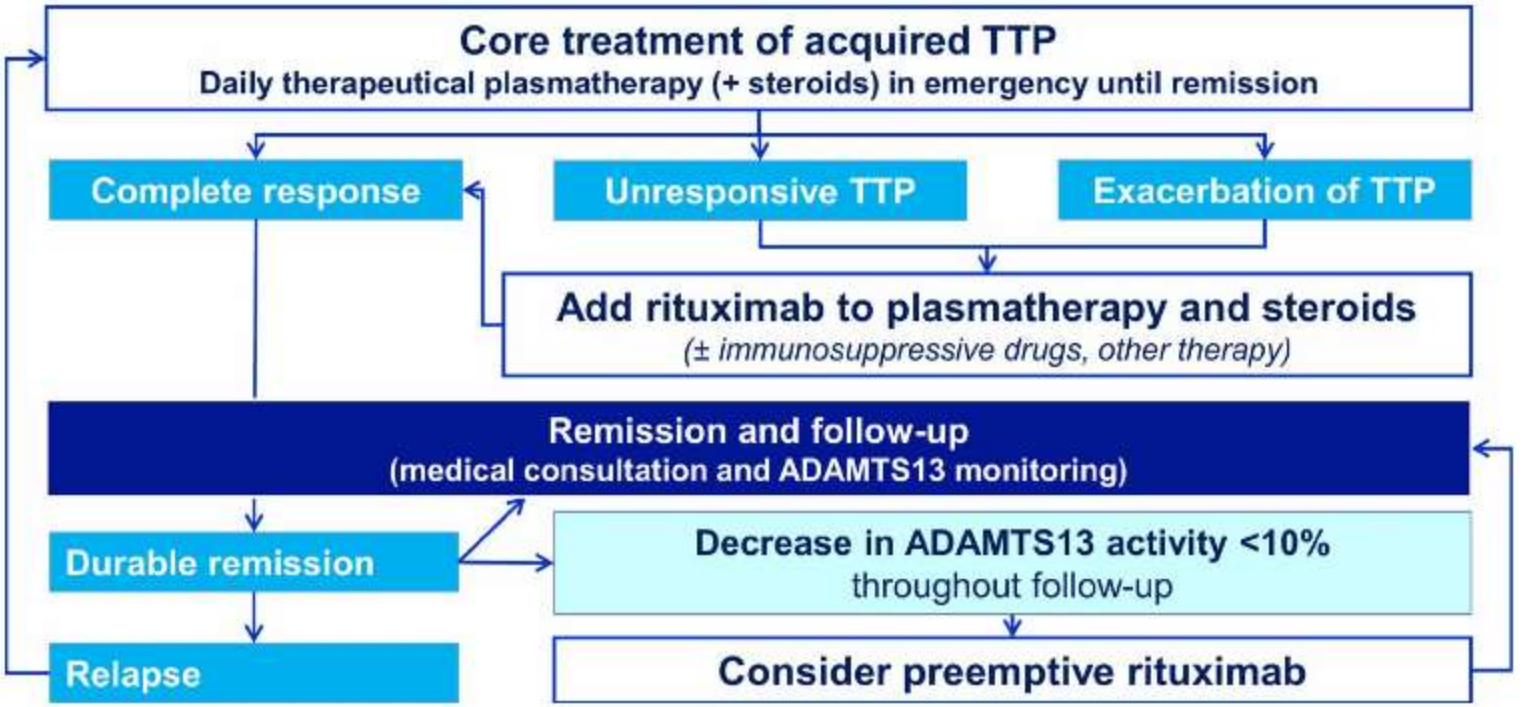


Accepted: 4 June 2018
DOI: 10.1111/ejh.13107

REVIEW ARTICLE

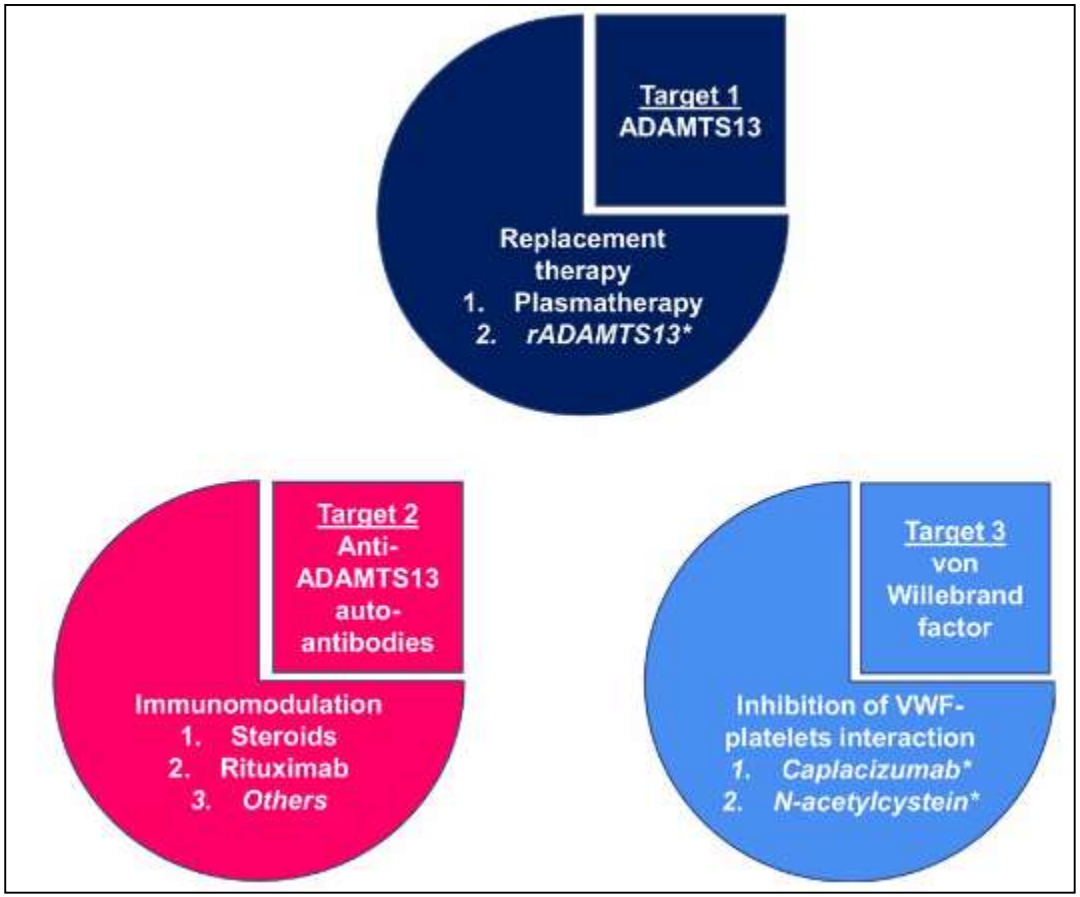
WILEY Haematology

Pediatric thrombotic thrombocytopenic purpura



Eur J Haematol. 2018;101:425–434

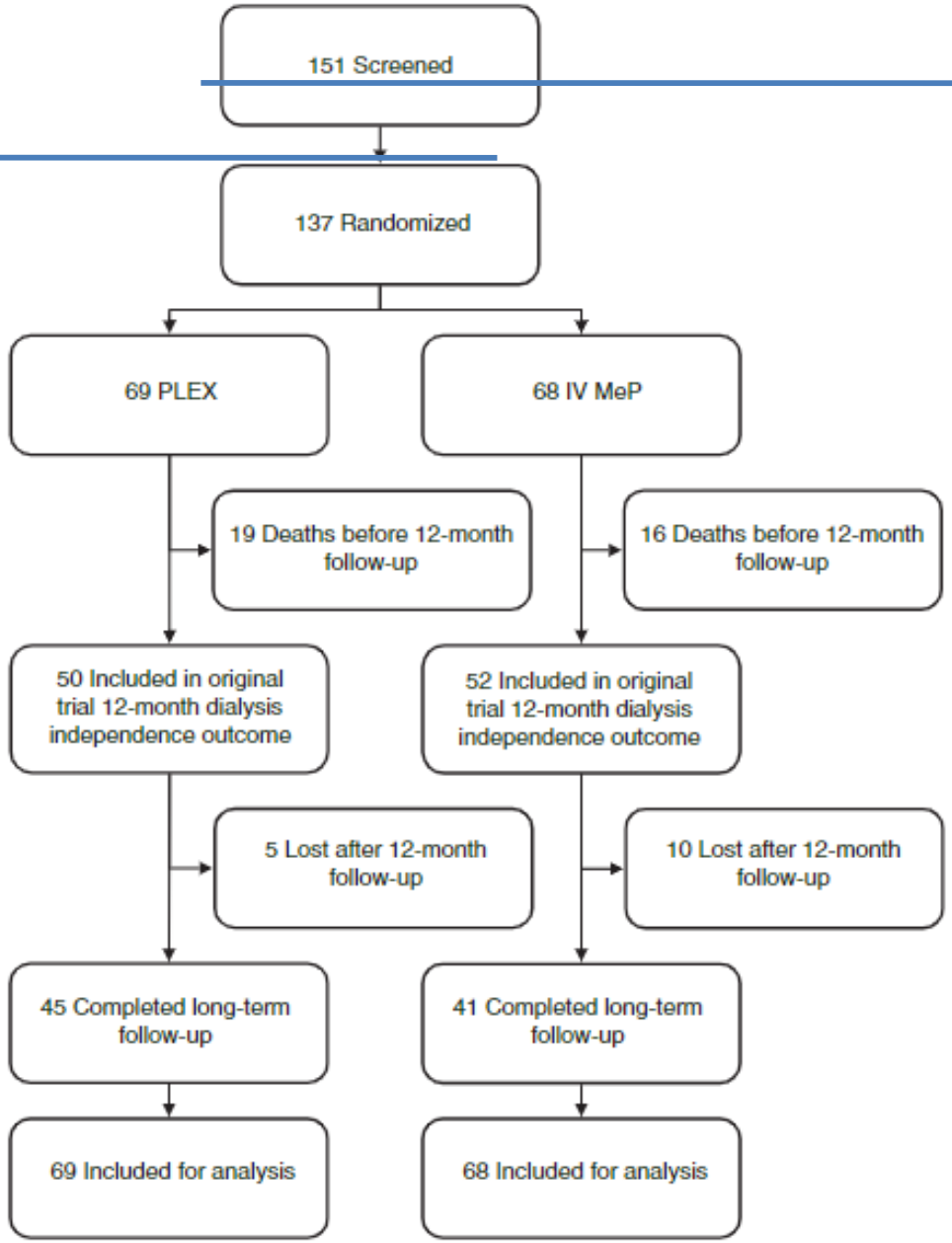
TTP TEDAVİ HEDEFLERİ



Eur J Haematol. 2018;101:425–434.

Long-term follow-up of patients with severe ANCA-associated vas ange to intravenous me unclear

Michael Walsh[1], Alina Casian[2] rles Pusey[6] and David R.W. Jayne[2] on behalf



Long-term follow-up of patients with severe ANCA-associated vasculitis comparing plasma exchange to intravenous methylprednisolone treatment is unclear

Michael Walsh[1], Alina Casian[2], Oliver Flossmann[3], Kerstin Westman[4], Peter Höglund[5], Charles Pusey[6] and David R.W. Jayne[2] on behalf of the European Vasculitis Study Group (EUVAS)

Table 3 | Long-term primary and secondary outcomes by treatment group

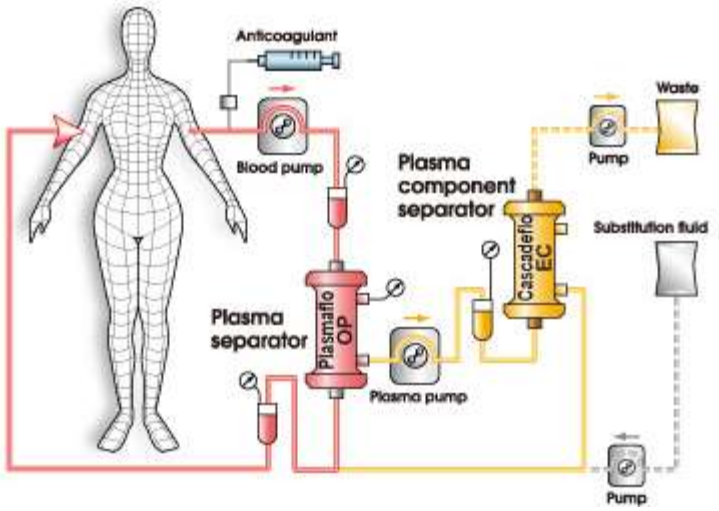
Outcome	IV MeP, *n* = 68 (%)	PLEX, *n* = 69 (%)	HR (95% CI)	*P*-value
Death or ESRD	46 (68)	40 (58)	0.81 (0.53–1.23)	0.32
Death	35 (51)	35 (51)	1.08 (0.67–1.73)	0.75
ESRD[a]	33 (49)	23 (33)	0.64 (0.40–1.05)	0.08
Relapse[a]	16 (21)	10 (14)	0.56 (0.26–1.21)	0.14

Plazmaferez yöntemleri

- Santrifügasyon
- Membran filtrasyonu
- Selektif yöntemler
  - ✓ “Çift” membran filtrasyonu
  - ✓ Plazma adsorbsiyon
    - -İmmunadsorbsiyon plazmaferez
    - -LDL-aferez
    - -Bilurubin aferez

TPD selektif yöntemler
(Çift membran filtrasyonlu plazmaferez)

- Anti-GBM hastalığı ve ANCA-GN
- ABO uyumsuz canlı donör Tx'de desensitizasyon için kullanılır
- Antikor aracılı rejeksiyon
- Replasman sıvı ihtiyacı az
- Selektif protein kaybı olur



Therapeutic Apheresis and Dialysis

Therapeutic Apheresis and Dialysis 2016; 20(2):183–188
doi: 10.1111/1744-9987.12389

Double Filtration Plasmapheresis in the Treatment of Antineutrophil Cytoplasmic Autoantibody Associated Vasculitis With Severe Renal Failure: A Preliminary Study of 15 Patients

- Plazmaferez öncesi 3 gün pulse MP
- Ortalama 3 seans DFPF
- Sonrasında MMF, pulse siklofosfamid

1 yıllık böbrek sağ kalımı % 62.9

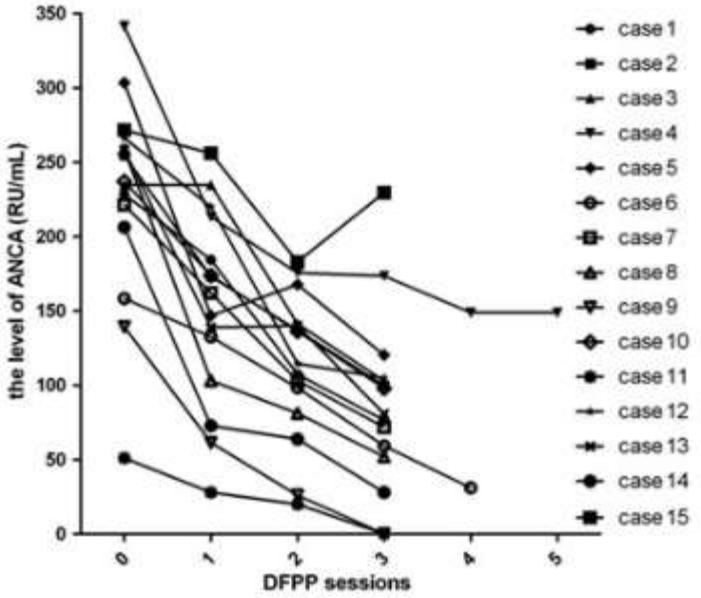


FIG. 1. The change of antineutrophil cytoplasmic autoantibody (ANCA) level with double filtration plasmapheresis (DFPP) treatment.

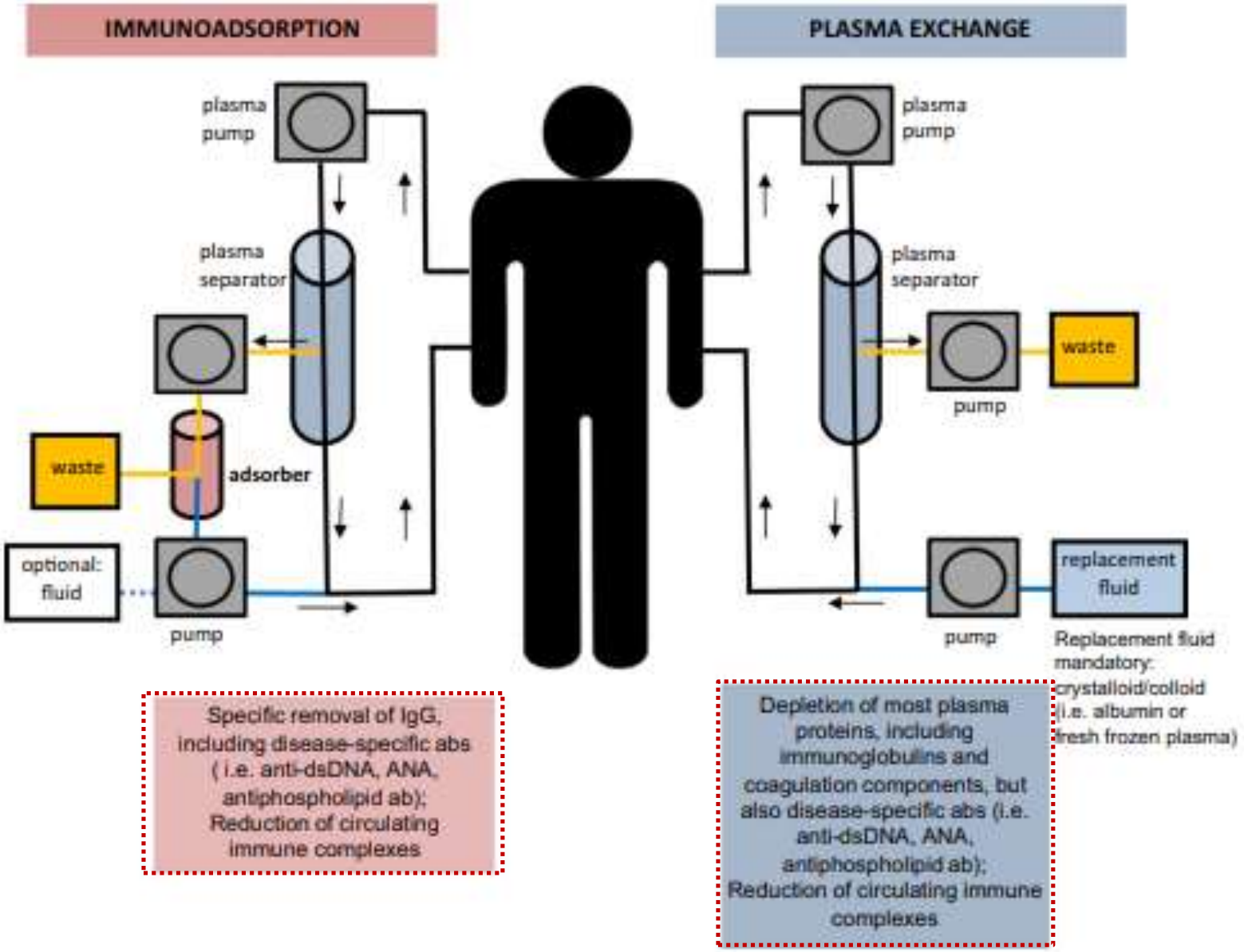
PLAZMAFEREZ YÖNTEMLERİ

- Santrifügasyon
- Membran filtrasyonu
- Selektif yöntemler
  - ✓ “Çift” membran filtrasyonu
  - ✓ Plazma adsorbsiyon
    - -İmmunadsorbsiyon plazmaferez
    - -LDL-aferez
    - -Bilurubin aferez

TPD selektif yöntemler (İmmunoadsorbsiyon)

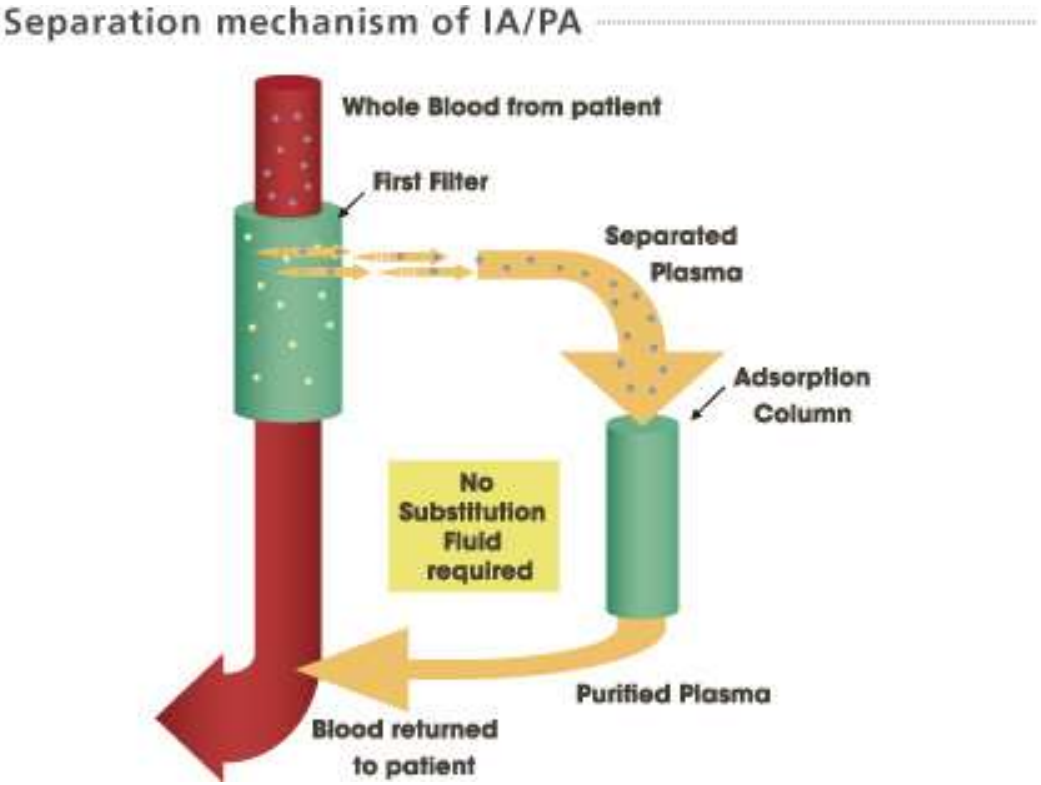
Plazma değişimi	İmmunoadsorbsiyon
• Dolaşımdaki Ig'lere özgül değil • Pıhtılaşma faktörleri dahil tüm protein düzeylerini düşürebilir • Albumin /TDP replasmanı gerekir	• IgG'ye özgüldür • Replasman gereksinimi yok • Daha fazla antikor uzaklaştırılır

Bilinen antikor veya antijenin adsorbe edici kolonlar aracılığı ile uzaklaştırıldığı plazmaferez tekniği



Seminars in Nephrolog 2017; 5: 478–487

İmmunoadsorbsiyon plazmaferez




Plasauto
AsahiKASEI


AsahiKASEI
IMMUSORBA™
PH-350(L)
İmmünoadsorpsiyon Kolonu
Otoimmün hastalıklar için tedavi
ASAHI KASEI KURARAY MEDICAL CO., LTD.

Renal hastalıklarda plazmaferez endikasyonları

Hastalık	Kategori	Önerilen metod
Goodpasture hastalığı	I	TPD
Trombotik trombositopenik purpura	I	TPD
Kryoglobulinemi	I	TPD
Posttransplant FSGS	I	TPD
Renal allograft rejeksiyonu	II	TPD/IA/DFPP
Renal transplant için desensitizasyon	II	TPD/IA/DFPP
Hemolitik üremik sendrom	III	TPD
Primer FSGS	III	LDL aferez
Hızlı ilerleyen glomerülonefrit	III	TPD

YETERLİ KANIT YOK

Nephrol Dial Transplant (1998) 13: 1524–1528

Nephrology
Dialysis
Transplantation

Preliminary Report

Adding plasmapheresis to corticosteroids and alkylating agents: does it benefit patients with focal segmental glomerulosclerosis?

Pediatr Nephrol (2001) 16:898–900

ORIGINAL ARTICLE

**Andreas K.W. Vécsei · Thomas Müller
Edith C. Schratzberger · Karl Kircher · Heinz Regele
Klaus Arbeiter · Brigitte Schroth
Christoph Aufricht**

Plasmapheresis-induced remission in otherwise therapy-resistant FSGS

Pediatr Nephrol (2007) 22:1215–1218
DOI 10.1007/s00467-007-0461-y

BRIEF REPORT

Efficacy of steroid pulse, plasmapheresis, and mizoribine in a patient with focal segmental glomerulosclerosis

**Tomoko Imaizumi · Yukihiko Kawasaki ·
Hiromi Matsuura · Ayumi Matsumoto · Kei Takano ·
Kazuhide Suyama · Koichi Hashimoto ·
Hitoshi Suzuki · Mitsuaki Hosoya**

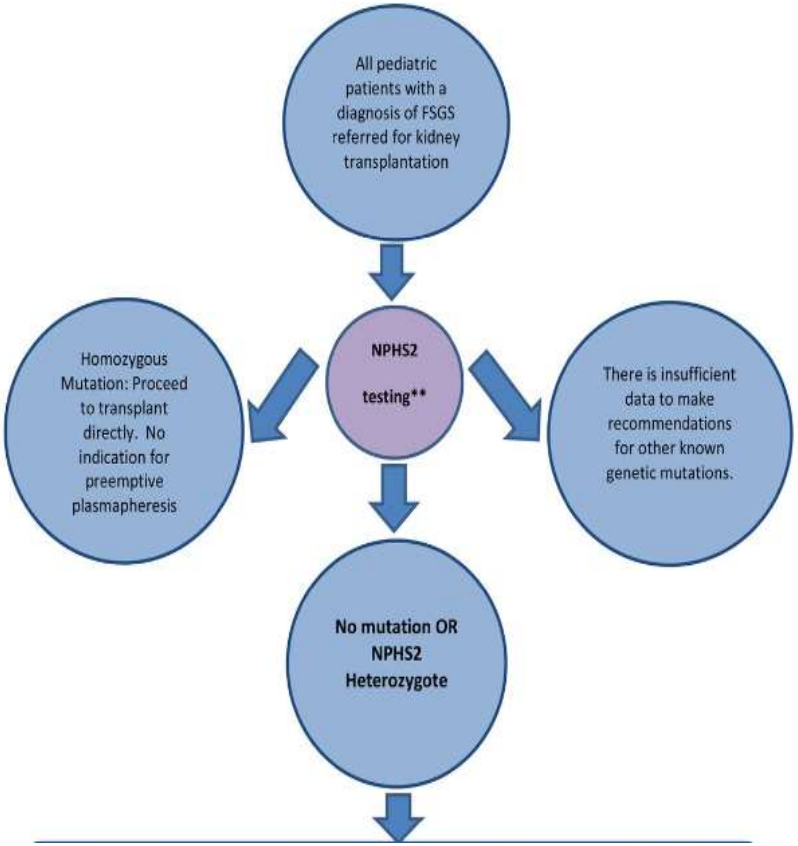
Accepted: 29 December 2017
DOI: 10.1111/petr.13154

ORIGINAL ARTICLE

WILEY

The effect of peri-transplant plasmapheresis in the prevention of recurrent FSGS

Pediatric Transplantation. 2018;22:e13154



Peritransplant Plasmapheresis Protocol for Living Donor Kidney Transplant		
Date	Treatment #	Plasmapheresis (every other day optimally will include day -1 and POD #1
	1	1 plasma volume/exchange: fresh frozen plasma
	2	1 plasma volume/exchange: fresh frozen plasma
	3	1 plasma volume/exchange: fresh frozen plasma
TX		
	4	1 plasma volume/exchange: fresh frozen plasma
	5	1 plasma volume/exchange: fresh frozen plasma
	6	1 plasma volume/exchange: fresh frozen plasma
	7	1 plasma volume/exchange: fresh frozen plasma
	8	1 plasma volume/exchange: fresh frozen plasma

Peritransplant Plasmapheresis Protocol for Deceased Donor Kidney Transplant		
Day	Treatment #	Plasmapheresis (every other day post-transplant starting POD #1
	1	1 plasma volume/exchange: fresh frozen plasma if possible just prior to transplant
TX		
	2	1 plasma volume/exchange: fresh frozen plasma
	3	1 plasma volume/exchange: fresh frozen plasma
	4	1 plasma volume/exchange: fresh frozen plasma
	5	1 plasma volume/exchange: fresh frozen plasma
	6	1 plasma volume/exchange: fresh frozen plasma

Accepted: 29 December 2017
DOI: 10.1111/petr.13154

ORIGINAL ARTICLE

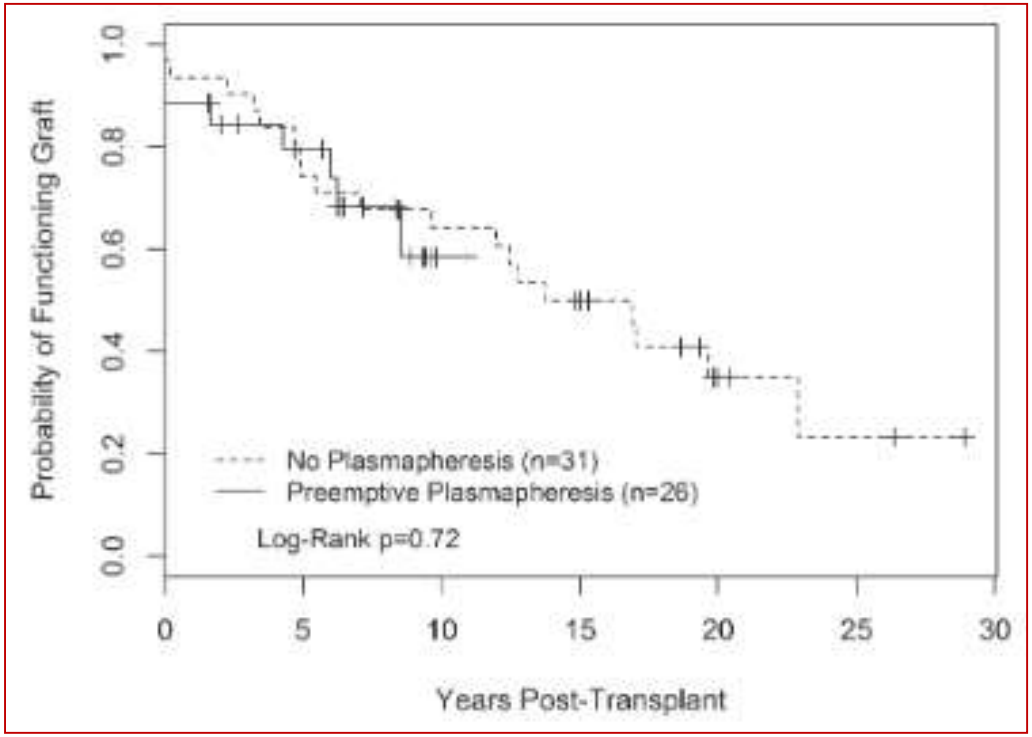
WILEY

The effect of peri-transplant plasmapheresis in the prevention of recurrent FSGS

Pediatric Transplantation. 2018;22:e13154

Characteristic	Prior to 2006 (no preventive plasmapheresis) N = 31	After 2006 (6-8 preventive plasmapheresis) N = 26	*P* value
Recurrent FSGS	8 (26%)	7 (27%)	1

Terapotik plazma değişimi yapmak posttransplant rekürrensi engellemiyor



PLAZMAFEREZ YÖNTEMLERİ

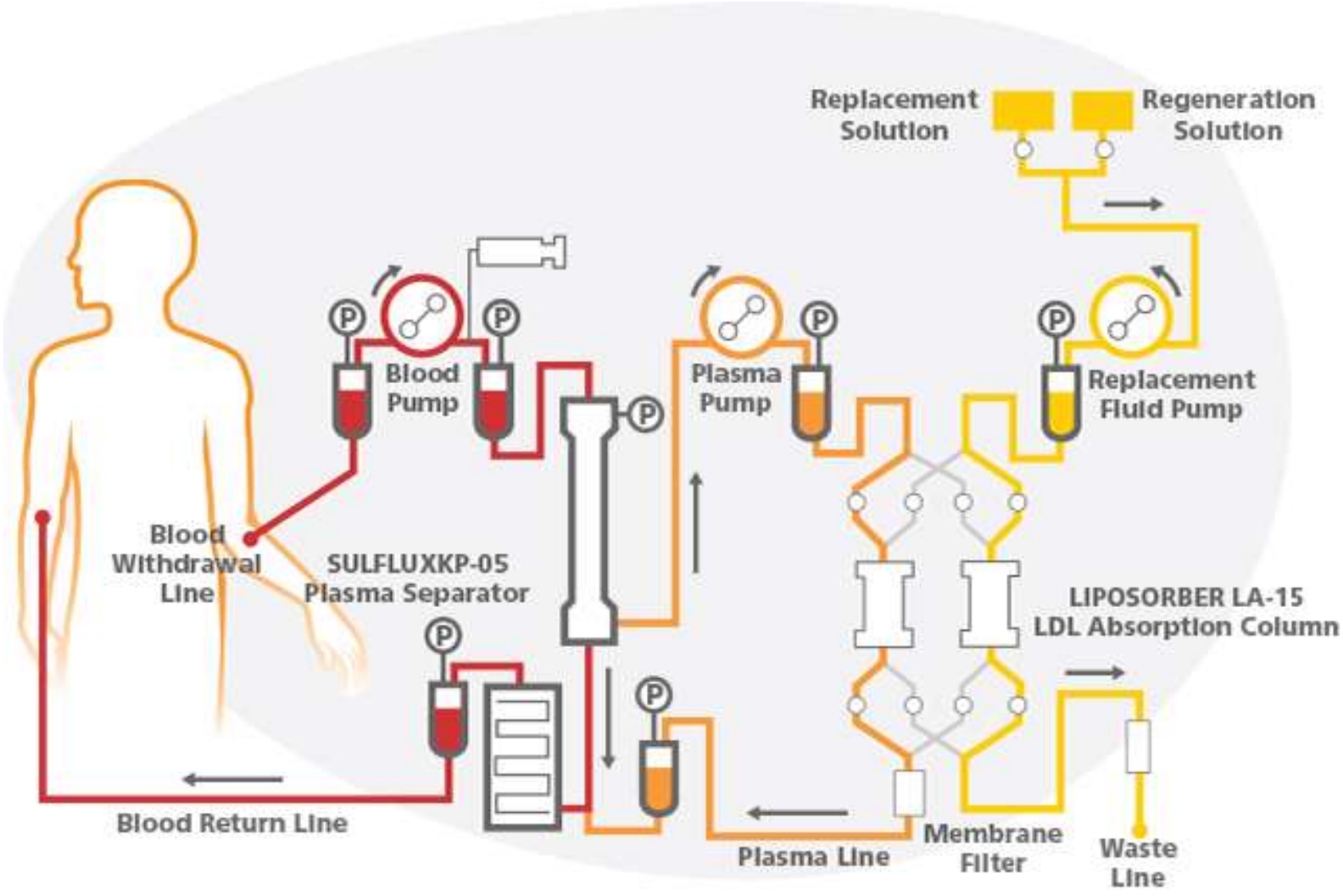
- Santrifügasyon
- Membran filtrasyonu
- Selektif yöntemler
  - ✓ “Çift” membran filtrasyonu
  - ✓ Plazma adsorbsiyon

    -İmmunadsorbsiyon plazmaferez

    -**LDL-aferez**

    -Bilurubin aferez

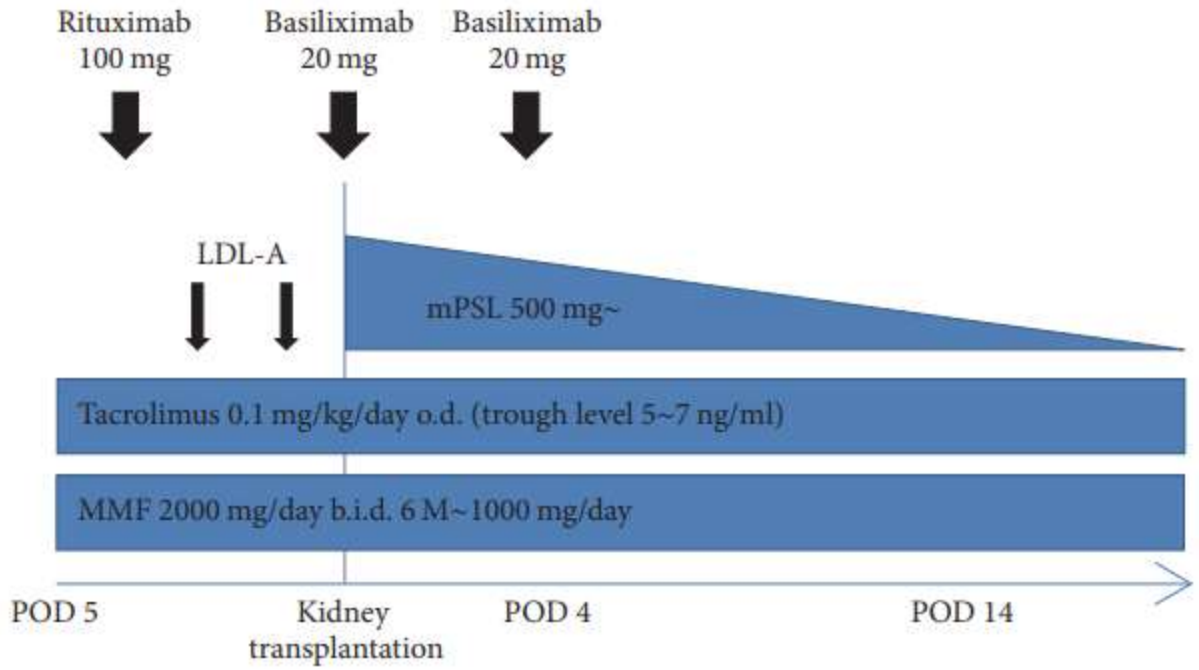
LDL-AFEREZ


Replacement Solution
Regeneration Solution
Blood Pump
Plasma Pump
Replacement Fluid Pump
Blood Withdrawal Line
SULFLUXKP-05 Plasma Separator
LIPOSORBER LA-15 LDL Absorption Column
Blood Return Line
Plasma Line
Membrane Filter
Waste Line

Hindawi
Journal of Transplantation
Volume 2018, Article ID 8926786, 5 pages
https://doi.org/10.1155/2018/8926786

Research Article

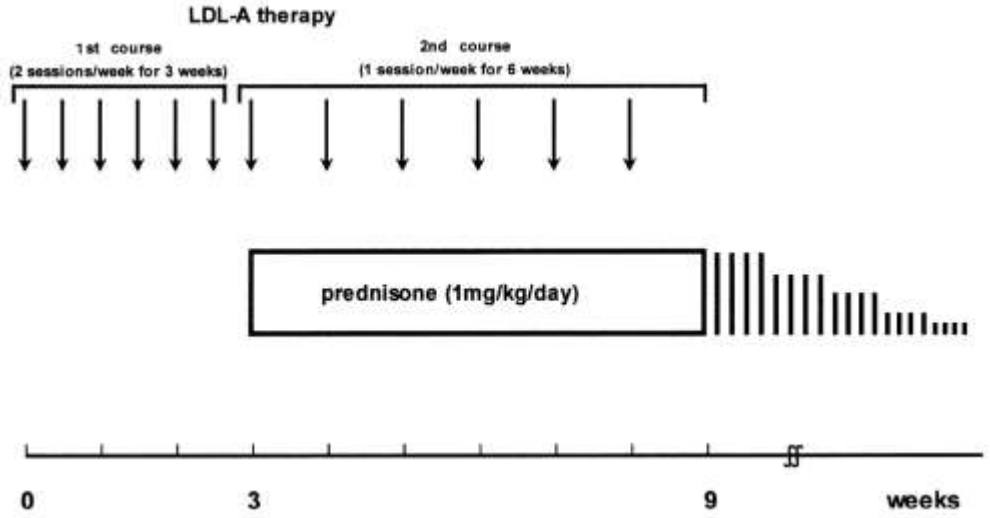
Preoperative Low-Density Lipoprotein Apheresis for Preventing Recurrence of Focal Segmental Glomerulosclerosis after Kidney Transplantation



FSGS rekürrensi yok

LDL-A faydalı olabilir

A Combined Low-Density Lipoprotein Apheresis and Prednisone Therapy for Steroid-Resistant Primary Focal Segmental Glomerulosclerosis in Children

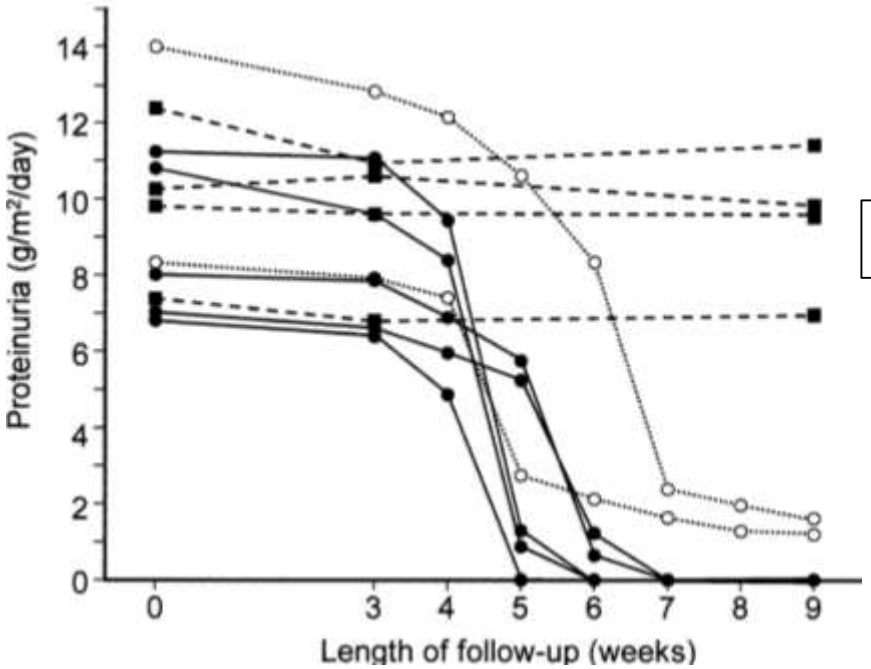


Patient No.	Sex	Age at Onset (y)	Onset to LDL-A Therapy (y)	Steroid Resistance	Prior Treatment	Lipid-Lowering Drugs	Proteinuria* (g/m²/d)	Serum Albumin* (g/dL)	Serum-TCh* (mg/dL)	GFR* (mL/min/1.73 m²)	Response to LDL-A Therapy†	Follow-Up‡ (y)	Outcome at Last Follow-Up
1	M	7.0	0.8	Primary	CsA/MP	P/S	6.8	2.3	508	124.7	CR	11.1	CR
2	F	7.2	1.4	Secondary	CsA/CPM/MP	P/S	12.4	1.4	539	46.2	F	0.6	ESRF
3	M	8.5	3.0	Secondary	CsA/MP	P/S	10.2	2.1	573	104.6	F	1.5	ESRF
4	M	8.9	3.4	Secondary	CsA/CPM/MP	P/S	7.0	2.0	644	128.5	CR	4.1	CR
5	M	10.4	0.7	Primary	CsA/MP	P/S	10.8	1.9	398	126.9	CR	4.0	CR
6	F	12.0	3.8	Secondary	CsA/CPM/MP	P/S	8.0	2.0	594	118.8	CR	4.4	CR
7	F	12.2	2.9	Secondary	CsA/CPM/MP	P	11.2	1.5	452	122.4	CR	10.6	CR
8	F	12.4	1.1	Primary	CsA/CPM	P/S	7.4	2.3	458	108.5	F	1.6	ESRF
9	M	12.5	1.9	Primary	CsA/CPM	P/S	9.8	2.1	362	62.0	F	1.0	ESRF
10	F	14.3	1.0	Secondary	CsA/CPM/MP	P/S	8.3	1.9	576	114.6	PR	4.5	PR
11	M	14.4	2.1	Primary	CsA/CPM/MP	P/S	14.7	1.5	478	66.2	PR	7.8	ESRF

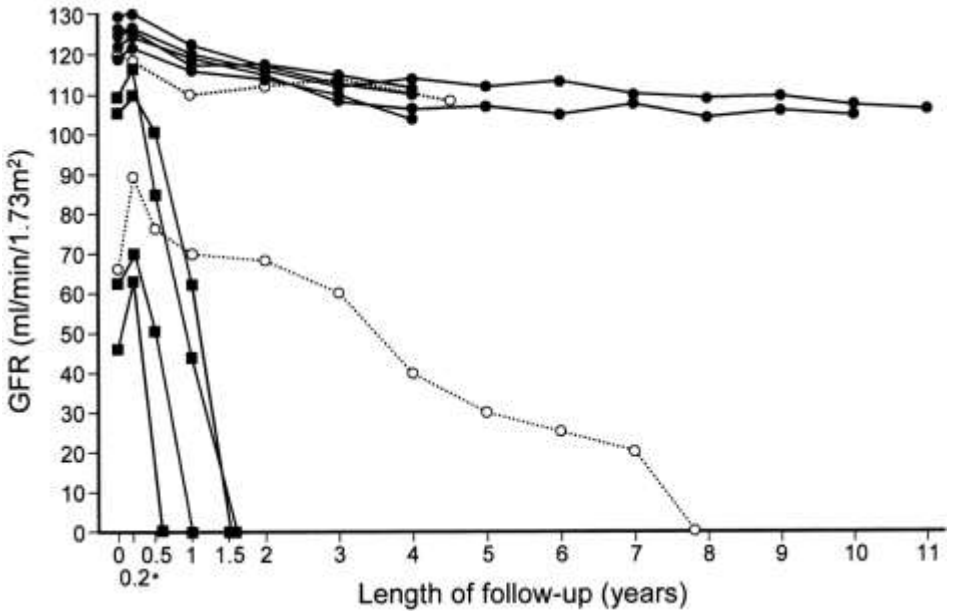
YANIT %64

% 64 yanıt

AJKD 2003:6; 1121-1130



7/11 hastada proteinüride anlamlı düzelme



AJKD 2003:6; 1121-1130

Clin Exp Nephrol (2014) 18:286–290
DOI 10.1007/s10157-013-0930-5

REVIEW ARTICLE

WCN 2013 Satellite Symposium "Kidney and Lipids"

Beneficial effect of LDL-apheresis in refractory nephrotic syndrome

Eri Muso

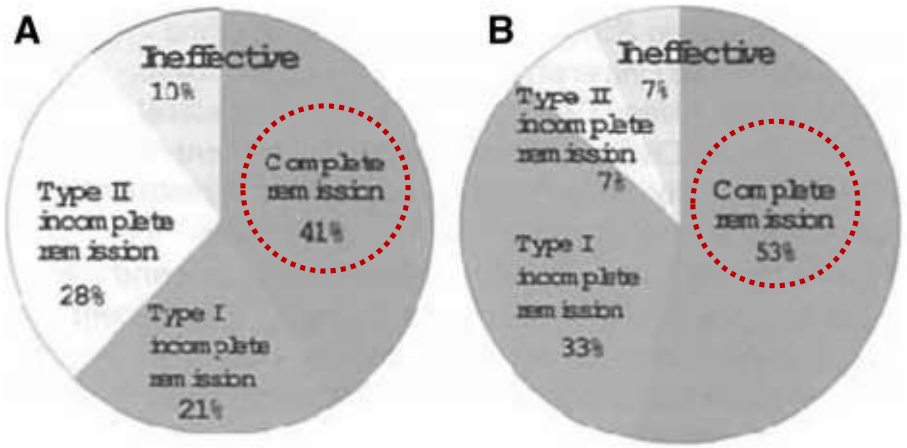
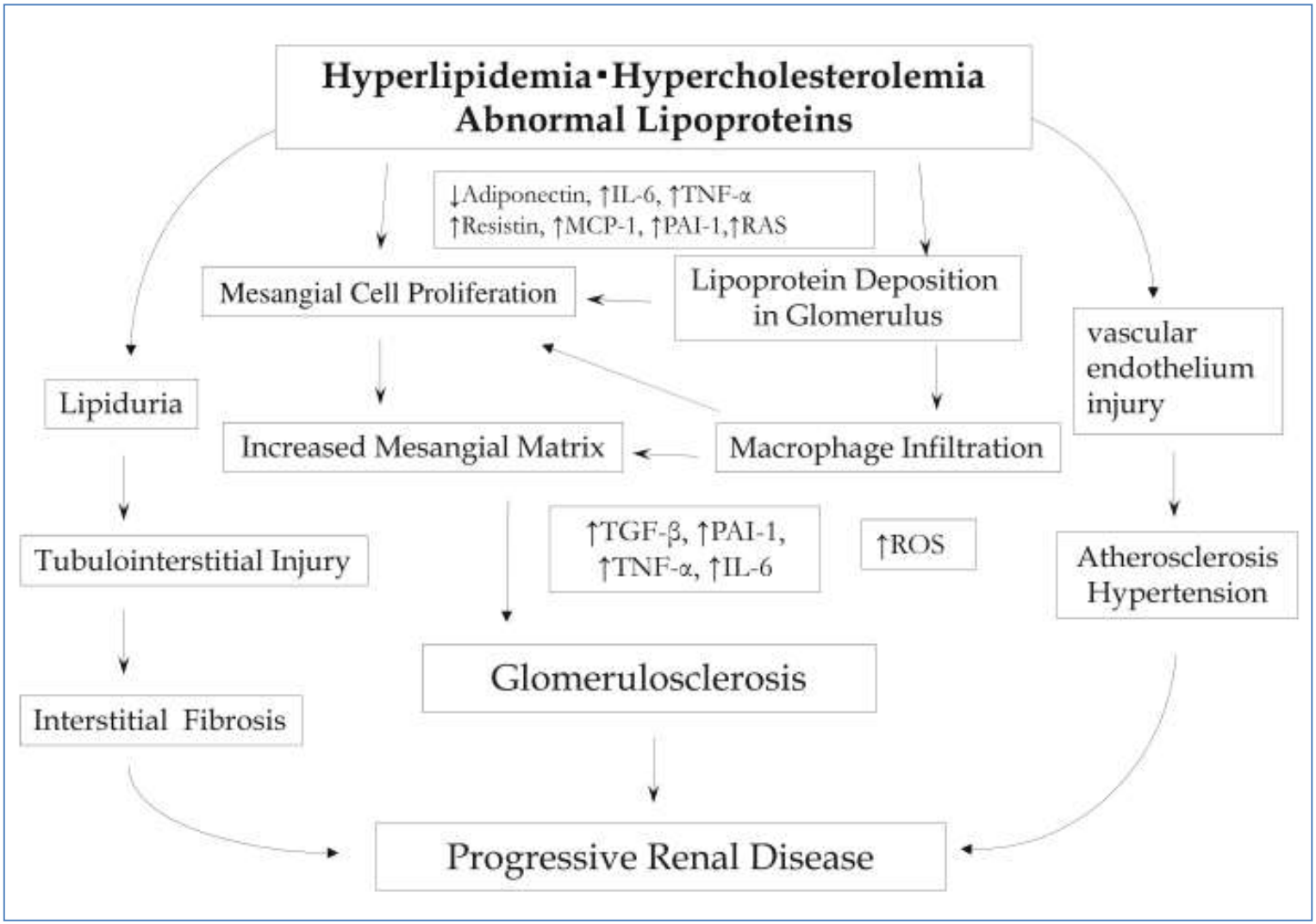


Fig. 2 Retrospective survey of outcome of FGS patients with refractory NS treated by LDL-apheresis. Two-year outcome of 29 FSGS patients (**a**) and 5-year outcome of 15 patients (**b**) are shown



Clin Exp Nephrol (2014) 18:286–290

LDL AFEREZİNİN FSGS'DE MUHTEMEL ETKİ MEKANİZMALARI

Doğrudan etki (LDL, VLDL ve oLDL)	•oLDL' nin makrofaj uyarıcı etkisini azaltır •Makrofaj fonksiyonlarını düzeltir •İnflamatuvar sitokin salınımını azaltır
Çeşitli patojenik faktörlerin dextran sulfate ile absorbe eder	•Fibrinojen ve koagulasyon faktörleri azalır •VEGF/NO/bradikinin üretimi artar •Vasküler permeabilite faktörü absorbe edilir
Hücre içi ilaç transportunu düzelterek immunosüpresiflere yanıtı artırır	•Steroid yanıtı artar •Lipoprotein reseptörü aracılığı ile siklosporin A •MDR-1 gen sunumunu üzerine inhibitör etki yapar

Pediatric Nephrology
https://doi.org/10.1007/s00467-019-04296-6

ORIGINAL ARTICLE

LDL-apheresis-induced remission of focal segmental glomerulosclerosis recurrence in pediatric renal transplant recipients

- 19 ay-7 yaş arası 7 hasta
- Post Tx FSGS

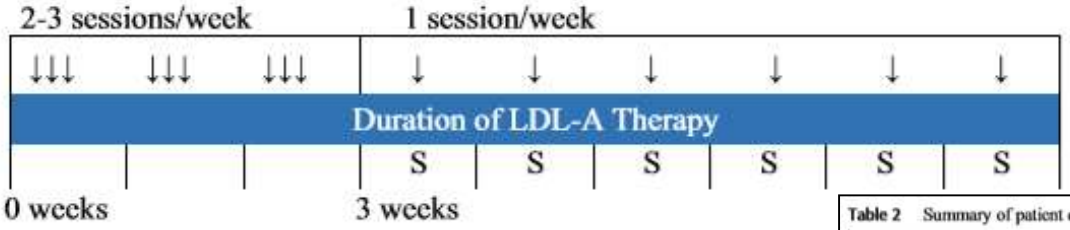


Table 2 Summary of patient descriptions (following renal transplantation)

Case	Post-transplant therapies in addition to LDL-A	Total duration of post-transplant plasmapheresis	Plasmapheresis regimen	Time to initiate LDL-A from transplant/FSGS recurrence	Total duration of post-transplant LDL-A therapy
1	Corticosteroids Azathioprine Rituximab Plasmapheresis	3 months	3 sessions/week	8 months	14 weeks
2	Corticosteroids Rituximab Plasmapheresis	4 months	3 sessions/week	4 months	9 weeks
3	Corticosteroids Rituximab Cyclosporine Abatacept Plasmapheresis	20 weeks prior to LDL-A 20 weeks concurrently with LDL-A	3 sessions/week for 20 weeks 2 sessions/week for 20 weeks	3 months	22 weeks
4	Corticosteroids Rituximab Cyclophosphamide Plasmapheresis	5 months	3 sessions/week	5 months	16 weeks
5	Corticosteroids Rituximab Plasmapheresis	1 week	3 sessions/week	1 week	9 weeks
6	Corticosteroids Rituximab Plasmapheresis	18 months	3 sessions/week for 3 weeks 2 sessions/week for 3 weeks 1 session/week until LDL-A initiation	18 months	9 weeks
7	Corticosteroids Plasmapheresis	2 months	3 sessions/week	2 months	9 weeks

Pediatric Nephrology
https://doi.org/10.1007/s00467-019-04296-6

ORIGINAL ARTICLE

LDL-apheresis-induced remission of focal segmental glomerulosclerosis recurrence in pediatric renal transplant recipients

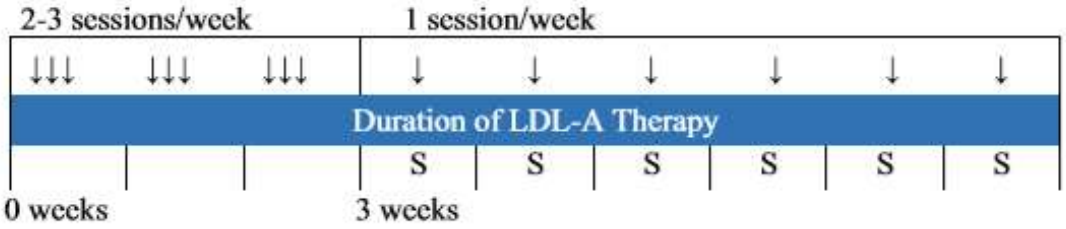
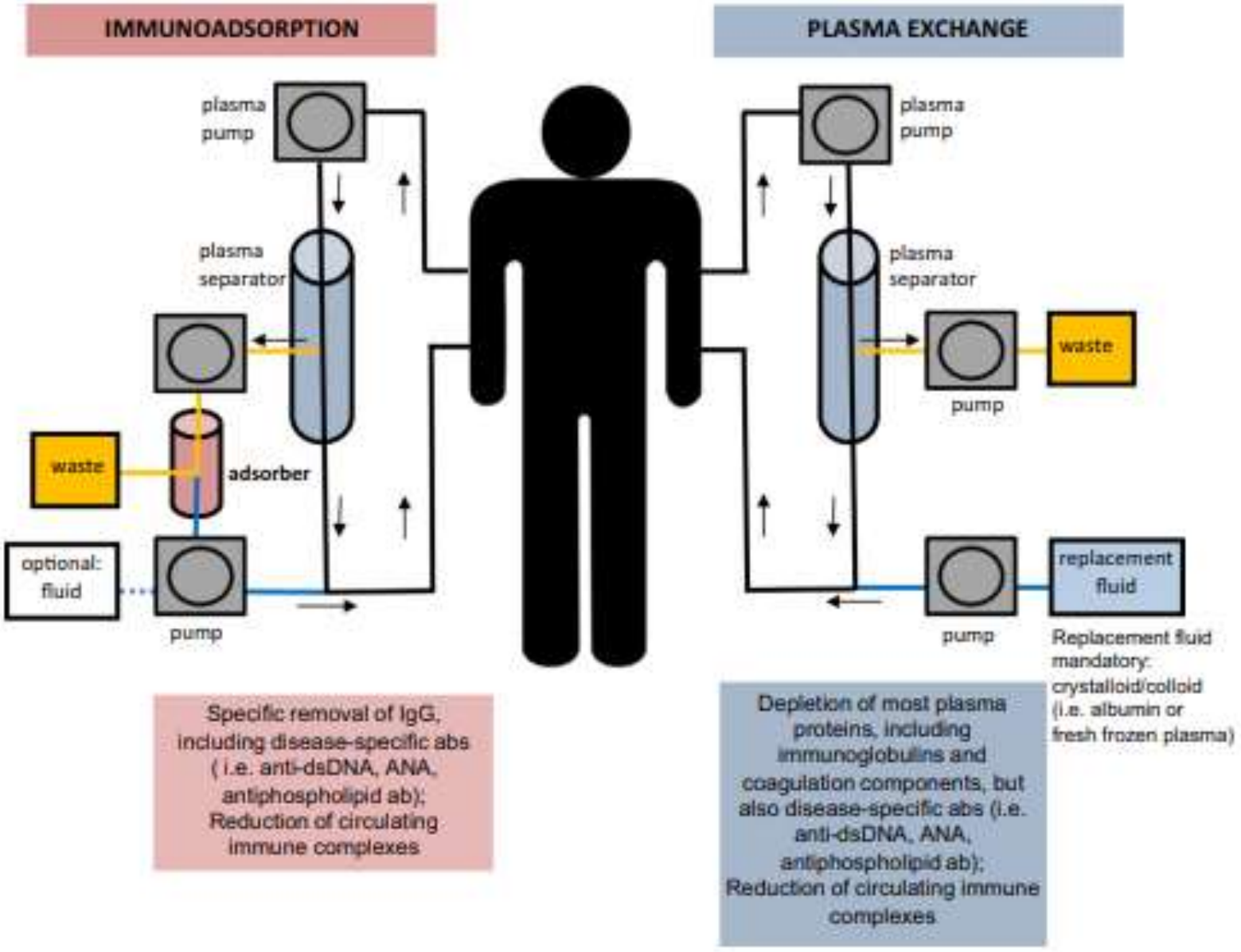


Table 3 Trends of estimated GFRs

Case	eGFR before transplantation (mL/min/1.73 m^2)	eGFR before FSGS recurrence (mL/min/1.73 m^2)	eGFR at the time of FSGS recurrence (mL/min/1.73 m^2)	eGFR at LDL-A initiation (mL/min/1.73 m^2)	Most recent eGFR after LDL-A completion (mL/min/1.73 m^2)	Time of most recent follow up since LDL-A completion
1	12.0	190.0	190.0	50.3	98.0	25 months
2	5.4	115.6	33.0	115.1	169.3	16 months
3	0.0	18.0	18.0			20 months
4	5.0	60.0	60.0	47.0	60.0	12 months
5	4.6	86.7	20.8	20.8	105.7	6 months
6	5.3	130.6	130.6	40.0	107.4	10 months
7	0.0	67.0	11.0	46.0	105.9	4 months

PLAZMAFEREZ YÖNTEMLERİ

- Santrifügasyon
- Membran filtrasyonu
- Selektif yöntemler
  - ✓ “Çift” membran filtrasyonu
  - ✓ Plazma adsorbsiyon
    - -İmmunadsorbsiyon plazmaferez
    - -LDL-aferez
    - -Bilurubin aferez


IMMUNOADSORPTION
PLASMA EXCHANGE
plasma pump
plasma separator
waste
adsorber
optional: fluid
pump
plasma pump
plasma separator
waste
pump
replacement fluid
pump
Replacement fluid mandatory: crystalloid/colloid (i.e. albumin or fresh frozen plasma)
Specific removal of IgG, including disease-specific abs (i.e. anti-dsDNA, ANA, antiphospholipid ab); Reduction of circulating immune complexes
Depletion of most plasma proteins, including immunoglobulins and coagulation components, but also disease-specific abs (i.e. anti-dsDNA, ANA, antiphospholipid ab); Reduction of circulating immune complexes

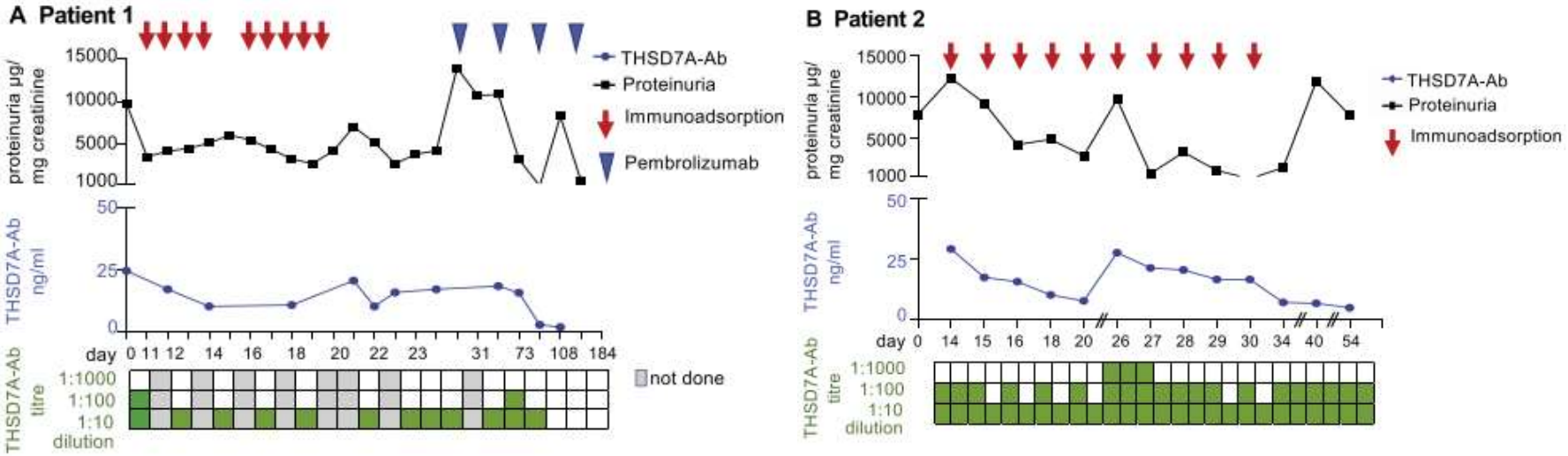
ARTICLE IN PRESS

Case Report

AJKD

Treatment of Membranous Nephropathy in Patients With THSD7A Antibodies Using Immunoadsorption

- PLA_2R
- trombospondin tip 1 domain içeren protein 7A (THSD7A)'e karşı oluşan otoantikorlar MN'de önemli
- Anti-PLA_2R negatif hastaların %10'u THSD7A taşır



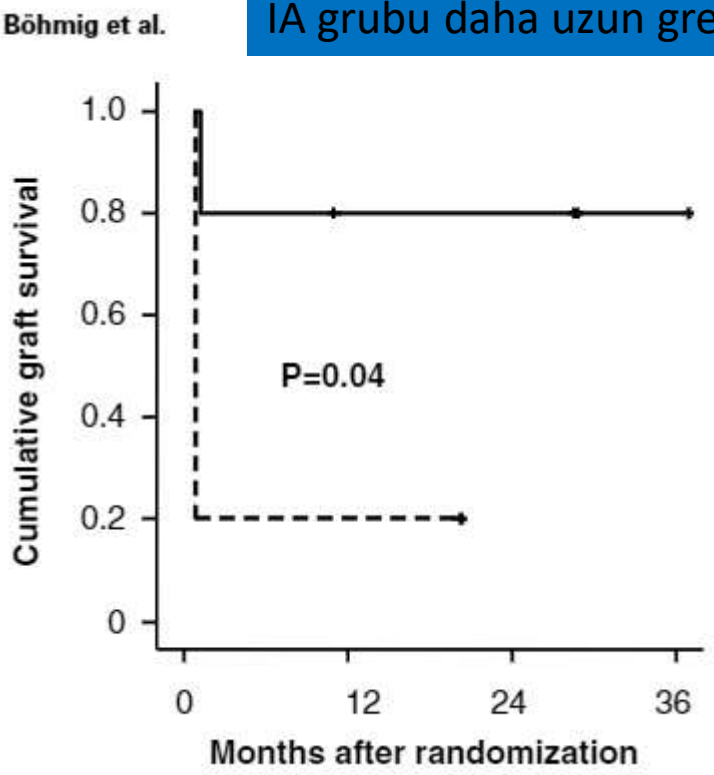
American Journal of Transplantation 2007; 7: 117–121
Blackwell Munksgaard

doi: 10.1111/j.1600-6143.2006.01613.x

Immunoadsorption in Severe C4d-Positive Acute Kidney Allograft Rejection: A Randomized Controlled Trial

İA grubu daha uzun greft sağ kalımına sahip

5 hasta İA
5 hasta diğer ilaçlar



Nephrol Dial Transplant (2018) 33: 954–963
doi: 10.1093/ndt/gfx214
Advance Access publication 28 July 2017

ndt
Nephrology Dialysis Transplantation

Treatment by immunoadsorption for recurrent focal segmental glomerulosclerosis after paediatric kidney transplantation: a multicentre French cohort

Patient	Recurrence[a] (days)	CNIs	RTX	Other therapies before (b), during (d) and after (a) IA	TPE before IA	Number of IA sessions
1	0	FK	N[b]		N	14
2	7	FK	N		N	
3	21	FK	Y		N	10
4	18	IV CsA	Y	(b) bortezomib, saquinavir, etanercept, galactose; (a) galactose	Y	111 30 51
5	9	IV CsA	Y	(d) abatacept	N	40
6	8	FK	Y	(d) levamisole, galactose; (a) abatacept	N	32 38
7	8	IV CsA	Y	(a) saquinavir	Y	45
8	2	IV CsA	Y		Y	
9	2	IV CsA	Y		Y	49
10	2	IV CsA	Y	(d) cycloph	Y	10
11	1	IV CsA	Y		Y	
12	2	IV CsA	Y		N	71

- Greft sağ kalımı %100

Nephrol Dial Transplant (2018) 33: 954–963
doi: 10.1093/ndt/gfx214
Advance Access publication 28 July 2017

ndt
Nephrology Dialysis Transplantation

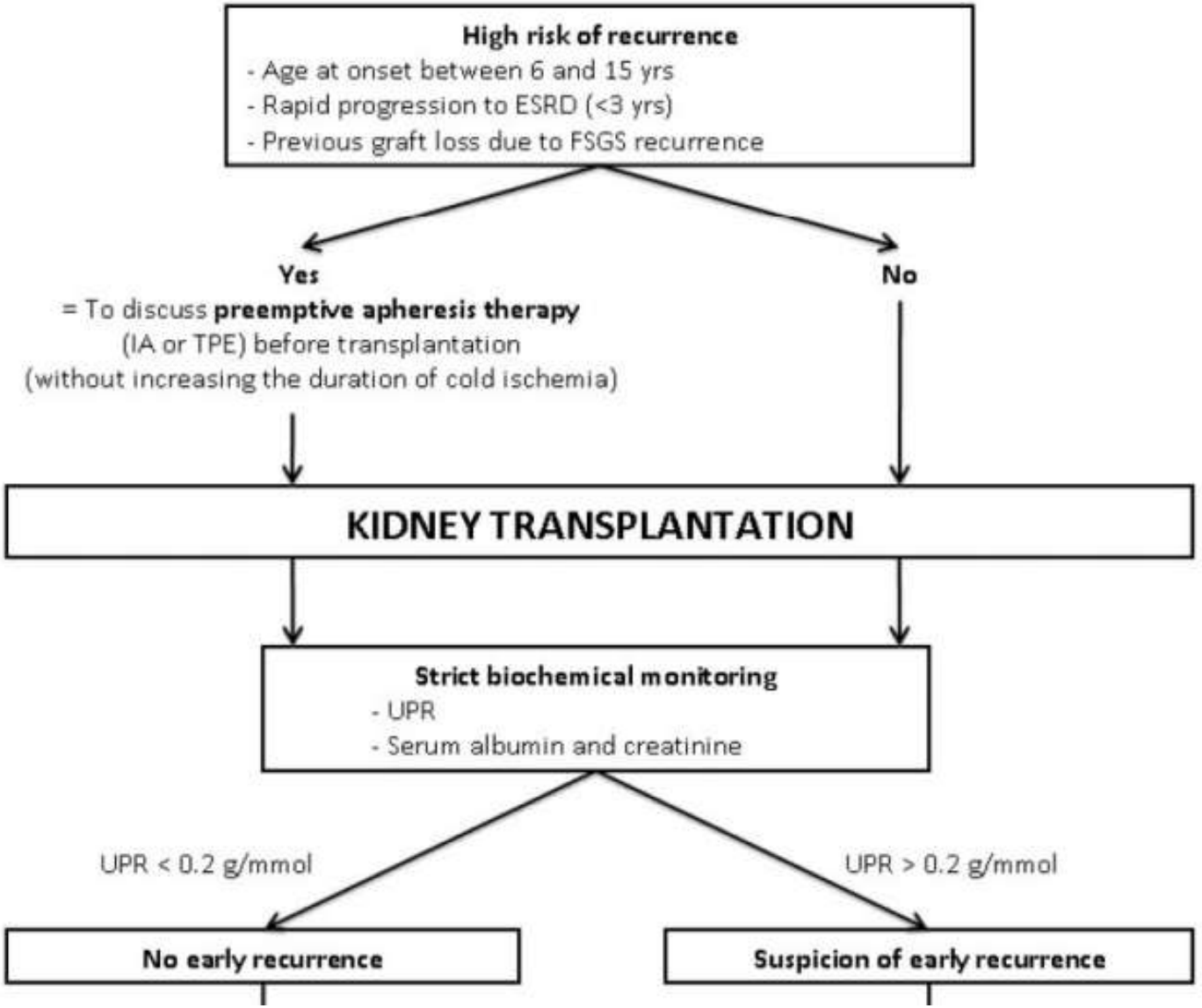
Treatment by immunoadsorption for recurrent focal segmental glomerulosclerosis after paediatric kidney transplantation: a multicentre French cohort

Table 4. Results of IA according to the delay of initiation after FSGS recurrence

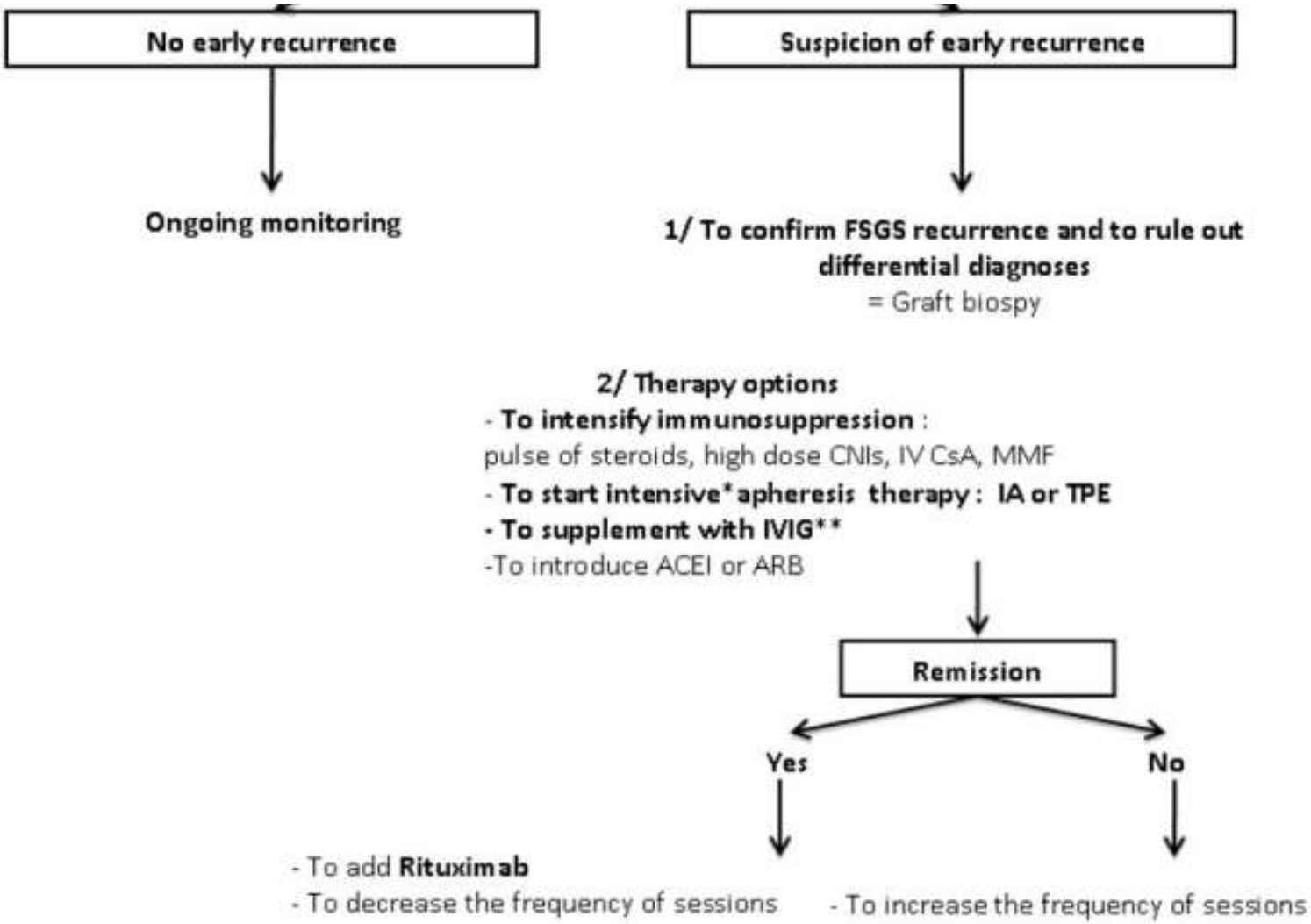
	Patient	Response to TPE		Response to IA				Current UPCR (g/mmol)	Current SCr (μmol/L)	Follow-up time since first IA (months)
		Initial	Continuation	Initial	Follow-up	Continuation	Reason of stopping IA			
Early initiation of IA (0–69 days) ($n = 8$)	1	—	—	CR	Sustained CR	N	Sustained CR	0.01	97	30
	2	—	—	CR	Sustained CR	N	Sustained CR	0.01	118	16
	3	—	—	CR	IA dependance	Y		0.63	139	16
	5	—	—	CR	IA dependance	Y		0.01	52	15
	6	—	—	CR	IA dependance	Y	Switch to TPE available in the centre of follow-up	0.38	35	10
	12	—	—	NR	No effect of IA	N	Failure	0.80	72	8
	10	PR	Y	PR	IA dependance	Y		0.57	121	6
	11	NR	Y	NR	No effect of IA	N	Failure	0.26	58	12
Later initiation of IA (226–1644 days) ($n = 4$)	4	PR	N	CR	IA dependance	N	Poor quality of life	0.19	52	6
	7	CR	Y	CR	IA dependance	N	Switch to TPE because of the cost of the technique	0.03	53	24
	8	PR	Y	CR	IA dependance	N	Poor quality of life	1.51	74	15
	9	NR	Y	PR	IA dependance	N	Poor quality of life	0.65	53	10

139/88.4=1.57 mg/dl

POSTTRANSPLANT FSGS TAKİP VE TEDAVİ PROTOKOLÜ

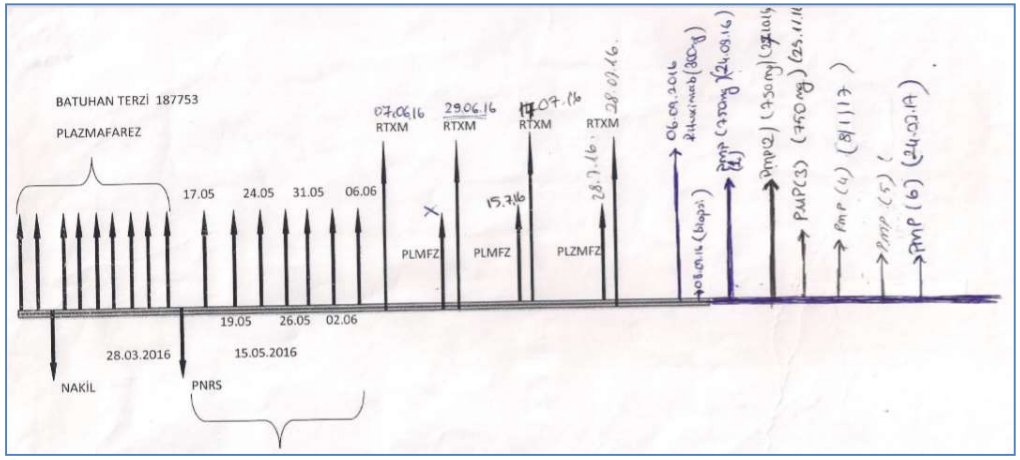


POSTTRANSPLANT FSGS TAKİP VE TEDAVİ PROTOKOLÜ

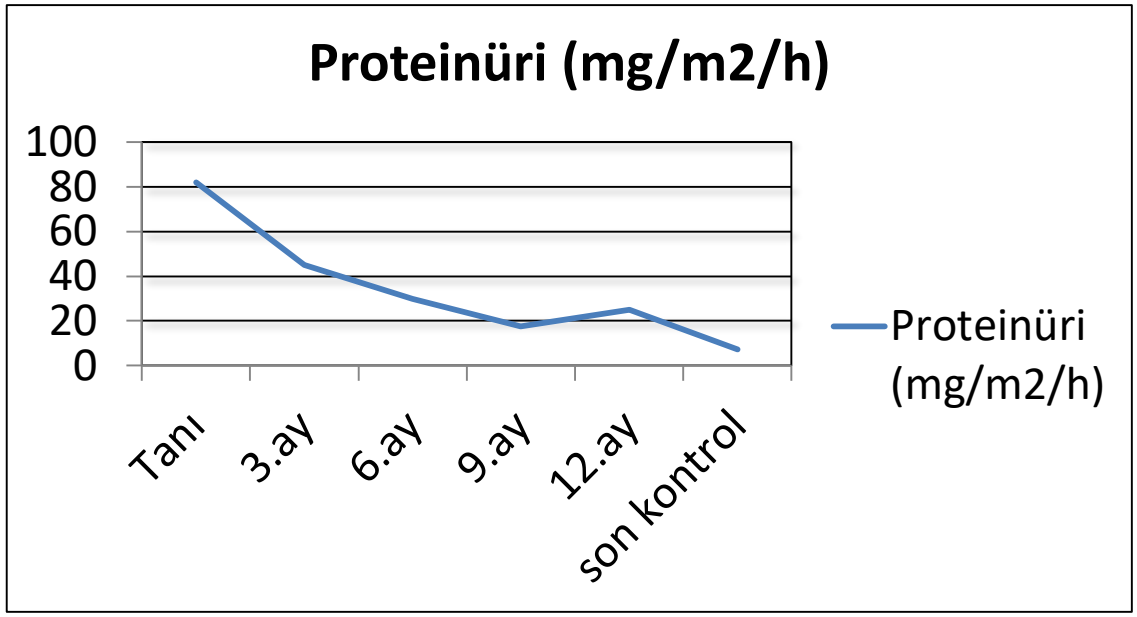


Nephrol Dial Transplant (2018) 33: 954–963

BT, 12 yaş erkek



İmmunoadsorbsiyon



-Kreatinin 0.64 mg/dl
-Proteinüri=7.8 mg/m2/h

- **TPD de ilaç doz ayarlanması**

Seminars in Dialysis

THERAPEUTIC APHERESIS FOR NEPHROLOGISTS

Medications in Patients Treated with Therapeutic Plasma Exchange: Prescription Dosage, Timing, and Drug Overdose

Seminars in Dialysis

Medications in Patients Treated with Therapeutic Plasma Exchange: Prescription Dosage, Timing, and Drug Overdose

Drug class, drug	PK characteristics: plasma protein binding; V_d[a]	TPE exchange: Drug removal	TPE exchange: Time from last dose (hours)	TPE exchange: No. exchanges /volume removed (l)	Reference; study type	Recommendation
Basiliximab	N/A; 4.8–8 l[88]	Yes; 65% of circulating drug removed based on blood concentration reduction after a 20-mg dose	>4	N/A	(89); case report (n = 1)	Likely removed; administer after TPE
Cyclosporine	90–98%, 13 l/kg	No; 10% fraction eliminated from whole blood and plasma (160-mg oral dose)	2.5	1 × 3	(90); case report (n = 1)	Not removed by TPE; however, likely removed by protracted whole blood exchange sessions
		No; TPE clearance was 1% of total body clearance of a 4-hour cyclosporine intravenous infusion	1	1 × 4	(91); case report (n = 1)	
		No; 0.2–0.3% of total dose (single 150- or 250-mg oral dose)	2	3 × 3.5	(92); case report (n = 1)	
		No (whole blood exchange)	~10	N/A	(83); case report (n = 1)	
		Yes; whole blood exchange followed by TPE; blood levels decreased from 8900 ng/ml to 475 ng/ml after the procedure	N/A	3 × ~3.8 (blood volume): 1316 ml (red cell volume) and 2058 ml (TPE)	(81); case report (n = 1)	
		Yes; TPE followed by whole blood exchange then TPE; serum concentration decreased from toxic to therapeutic levels in 16 hours	10 and 23 (TPE); 12 (red cell exchange)	2 × 2–3.7 (TPE) 1 × 2.7 (red cell volume)	(82); case report (n = 1)	
Mycophenolic acid (Oral form)	>98%; ~54 l[93]	No; ~0.5% of total daily oral dose and ~2.5% of total body stores	~4–6	3 × ~3–3.3 l	(94); case report (n = 2)	Likely removed if given close (<4 hours prior) to TPE
Natalizumab	N/A; ~5.7 l[95]	Yes; a mean reduction of ~75% and 75% in natalizumab concentration and total drug load, respectively	10–14 days	3 × 5.65 (mean volume)	(34); phase II study (n = 12)	Likely removed; administer after TPE
Prednisone/ Prednisone	90–95%, 0.6–0.7 l/kg	No; 0.83% (prednisone) + 0.74% (prednisolone) of total prednisone dose (50–60 mg/day at steady state)	0.42–1.16	1 × 2–2.34	(8); case report (n = 2)	Not removed by TPE if given under similar conditions
Tacrolimus	75–99%, 0.85–65 l/kg[96]	No	1	1 × 1.5 plasma volume and 1 × 2	(97); case report (n = 2)	Not removed by TPE; however, likely removed by protracted whole blood exchange sessions (similar to cyclosporine)
		No	1	2–4 × 2	(98); case report (n = 1)	

Komplikasyonlar

- Hipotansiyon….%15
- Hipokalsemi… %9.7 (TDP ve sitrat kullanıldığında daha sık)
- Allerjik reaksiyonlar
- Anemi
- Tromboz
- Enfeksiyon

ERCİYES ÜNİVERSİTESİ TIP FAKÜLTESİ
ÇOCUK NEFROLOJİ-ROMATOLOJİ SONBAHAR TOPLANTISI
(Prof. Dr. Ruhan Düşünsel onuruna)
7-8 Kasım 2019, KAYSERİ

7 Kasım 2019, Perşembe	
13.00-14.30	Açılış-Emeklilik Töreni
14.30-15.00	Çay-kahve Arası
	NEFROLOJİ OTURUMU (Lupus Nefriti Fizyopatolojisi)
15.00-15.20	SLE nefritinde doğal bağışıklık ..... Seza Özen
15.20-15.40	SLE nefritinde T hücrelerin rolü ..... Harika Alpay
15.40-16.00	SLE nefritinde B hücrelerin rolü ..... Necla Buyan
16.00-16.15	Tartışma
16.15-16.45	Çay-kahve Arası
	NEFROLOJİ-ROMATOLOJİ OTURUMU (SLE Nefriti Tanısında Güçlükler ve Yeni Tedaviler)
16.45-17.15	Tanıda Kriterler Yeterli mi?.... Salih Kavukçu
17.15-17.35	Biyolojik ajanlar..... Metin Kaya Gürgöze
17.35-17.55	Kök Hücre Tedavisi ..... Musa Karakükçü
17.55-18.00	Tartışma
19.00	**Akşam Yemeği**

8 Kasım2019, Cuma	
	ROMATOLOJİ OTURUMU - I
09.00-09.15	Otoinflamatuar hastalıkların doğuştan kusurları ..... Yıldız Camcıoğlu
09.15-09.45	Olgularla romatolojik ortaya çıkan immün yetmezlikler ..... Ayşenur Paç Kısaarslan
09.45-10.00	Tartışma
10.00-10.30	Çay-kahve Arası
	ROMATOLOJİ OTURUMU – II
10.30-11.00	JIA patogenezinde yenilikler(Sistemik ve non-sistemik) ..... Betül Sözeri
11.00-11.30	JIA'da yeni tedaviler..... Nuray Aktay Ayaz
11.30-12.00	Tartışma ve kapanış

Toplantıya katılacak olan misafirlerimizin konaklama ihtiyacı (üniversitemiz uygulama oteli ve misafirhanesi) ile havaalanı/otogar transfer işlemleri tarafımızdan yapılacaktır.

Katılım durumu ve konaklama/transfer istekleri için iletişim

Prof. Dr. İsmail DURSUN … 0505 906 71 45
Dr. Öğr. Üyesi : Sibel Yel … 0532 583 05 66