



# İNTOKSİKASYONDA KULLANILAN EKSTRAKORPORAL YÖNTEMLER

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# Sunum Planı

Renal destek sistemleri

**Plazmaferez**

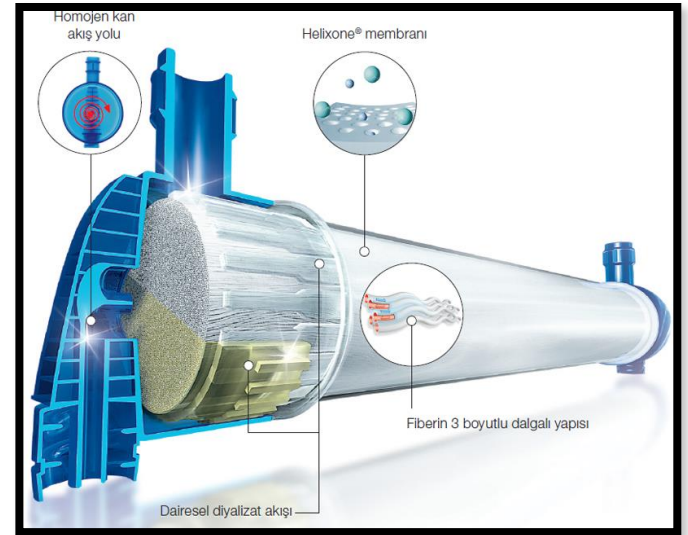
Karaciğer destek sistemleri

Kalp ve akciğer destek sistemleri (ECMO)

# Renal Replasman Tedavileri

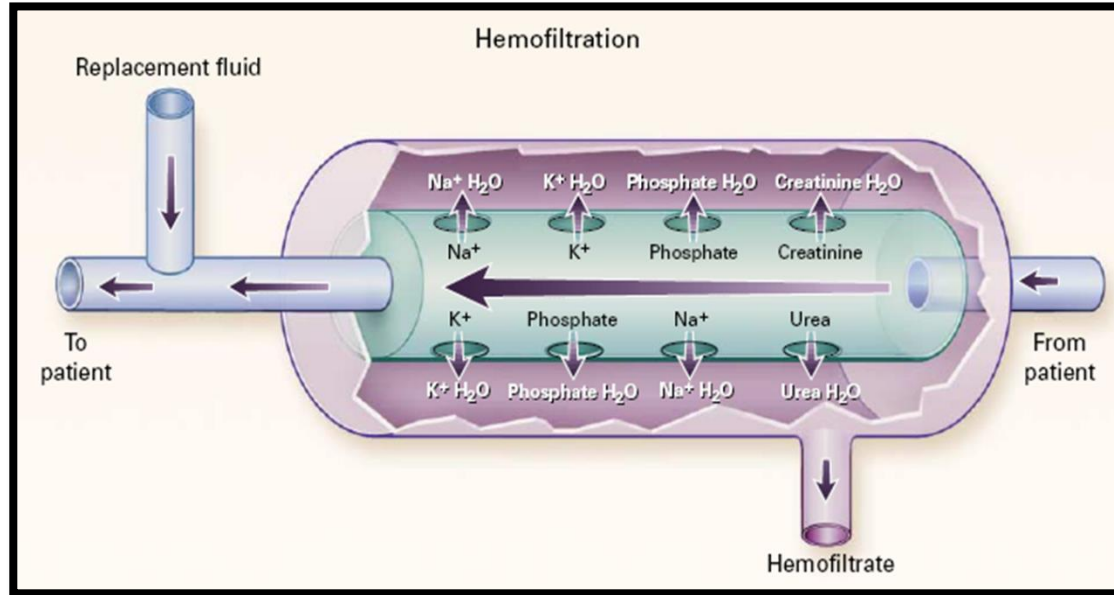
RRT; vücutta biriken üremik toksinler, enflamatuvar mediatörler, ilaç metabolitlerinin vücuttan uzaklaştırılması.

Kan bir membran ile temas eder, içindeki suda çözünmüş maddeler membranın diğer tarafına geçer.



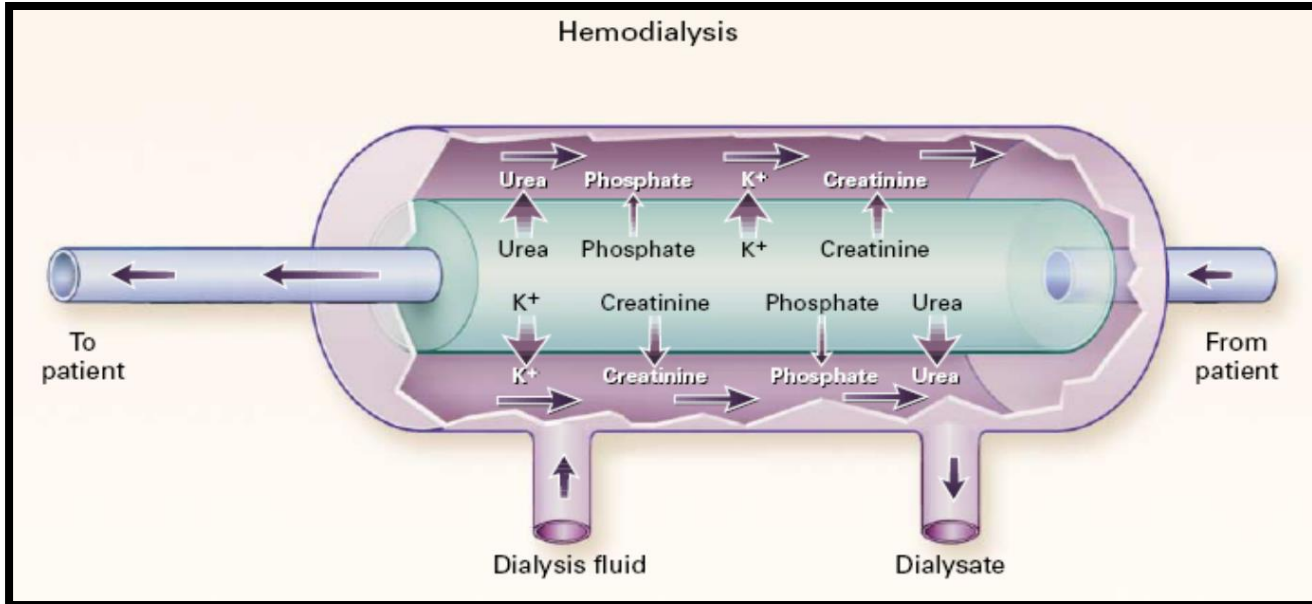
# Renal Replasman Tedavileri/ HEMOFİLTRASYON

Su moleküllerinin, içerisinde çözülmüş maddelerle, hareket ederek membranın dış tarafına doğru yer değiştirmesine **konveksiyon** denir.



# Renal Replasman Tedavileri/ HEMODİYALİZ

Kandaki maddeler yarı-geçirgen bir membran kullanılarak kan ve diyalizat arasındaki konsantrasyon farkı (**diffüzyon**) ile atılır.



# Renal Replasman Tedavileri

## Hemodiyaliz

- MA <500Da
- Suda çözünen
- Plazma proteinine bağlanmayan

## Hemoperfüzyon

- Aktif kömürle absorbe edilen

## Hemofiltrasyon

- MA 1000-4000 Da

# Hemodiyaliz

MA <500 DA

Suda çözünürlüğü yüksek

Plazma proteinine bağlanmayan

Fomepizol ve etanol gibi (metanol veya etilen glikol zeh.)

Terapötik ilaçlar da atılır; diyaliz yapılan hastalarında doz ayarlaması gerekebilir

Vücutta dağılım hacminin küçüklüğü (<1lt/kg)

(salisilatlar, lityum, etanol ve metanol)

# Hemoperfüzyon

Dağılım hacmi  $<3$  L/kg

Kömüre afinitesi olanlar

**Proteine yüksek oranda bağlanan** ve **yağda** çözünen ilaçlar kartuştaki kömür veya reçinede adhezyona uğrarlar ve böylece hemoperfüzyon ile daha kolay uzaklaştırılırlar





# Hemodiyaliz-Hemoperfüzyon Farkları

Hemoperfüzyonda diyaliz solüsyonu kullanılmaz.

Genellikle 3 saatten uzun süren hemoperfüzyon etkin değildir.

En önemli handikapları- hemoperfüzyon kartuşunun maliyetinin yüksek olması, yüksek maliyet ve eksik eğitim nedeniyle hemoperfüzyon tedavisinin başlatılmasının gecikmesidir.

Mantar zehirlenmelerinde reçine içeren kartuşların kullanıldığı hemoperfüzyon işlemi hemodiyalizden daha başarılı.

# ACUTE CARBAMAZEPINE POISONING TREATED WITH CHARCOAL HEMOPERFUSION SUCCESSFULLY

Carbamazepine (CBZ) is a commonly used antiepileptic agent. Carbamazepine is **highly protein bound**. There is **no antidote** for the medication. Carbamazepine **is not removed** effectively through conventional **hemodialysis**. Supportive measures and **charcoal hemoperfusion** have been regarded as efficient treatment methods.

Case: A 19-year-old girl was admitted to the emergency department of an institution 6 hours after ingesting 50 tablets of CBZ, 400 mg each. Her blood pressure was 110/80 mm Hg; pulses, 66 beat.min<sup>-1</sup>; temperature, 36.5°C; and respiratory rate, 20/min. The laboratory analysis yielded serum CBZ concentration level greater than 20 mg/L (blood concentration >20 mg/L could not be shown because of limitation of experimental condition). Immediate hemoperfusion therapy was started with hemoperfusion machine. (Prismaflex, Gambro, France).the rate of blood flow was set to be 150 to 200 mL/min, perfusion time 3 hours per time, once a day for 2 days. **After 2 session HP treatment**, labaratory results returned back to normal limits; and the patient recovered gradually. The CBZ serum concentration decreased from greater than 20 mg/L to **8 mg/L after second course**. She was discharged on the 5th day after admission without any major sequelae.

# YÜKSEK DOZ AMİTRİPTİLİN İNTOKSİKASYONUNDA HEMOPERFÜZYON UYGULAMASI

32 yaşında erkek, **bilinç kaybı ve hemodinamik şok** tablosu ile başvurdu. Anamnezinde yaklaşık 68 tablet 25 mg’lık Laroxyl® (amitriptilin) aldığı öğrenilen hasta yoğun bakıma yatırıldı

Fizik muayenede, bilinci kapalı, pupilleri middilate olan hastanın Glaskow koma skoru: 9, KH: 143/dk ve TA: 85/42 mmHg idi. Sıvı yüklemesine rağmen hipotansiyonu devam eden hastaya dopamin ve noradrenalin infüzyonu başlandı. Mide lavajı yapıp, 1 gr/kg dozunda aktif kömür verildi. Elektrokardiyografisinde sinüs taşikardisi vardı.

Genel durumu bozulan, tonik klonik nöbet geçiren hasta acil şartlarda entübe edilerek acil **hemoperfüzyon** planlandı. İki gün ard arda **kömür hemoperfüzyonu** yapılan hasta mekanik ventilatörde takip edildi. Solunum ve hemodinamik parametreleri normale dönen hasta 3. günde ekstübe edildi.

# Devamlı Renal Replasman Tedavileri

Hemodinamik  
olarak stabil  
olmayan  
hastalarda

Kliniklerde yatak  
başı

HD sonrası  
dokudan **tekrar**  
**kana**  
**karişabilecek**  
toksik maddelerin  
varlığı

Geniř daęılım  
hacmi ve büyük  
MA maddelerde



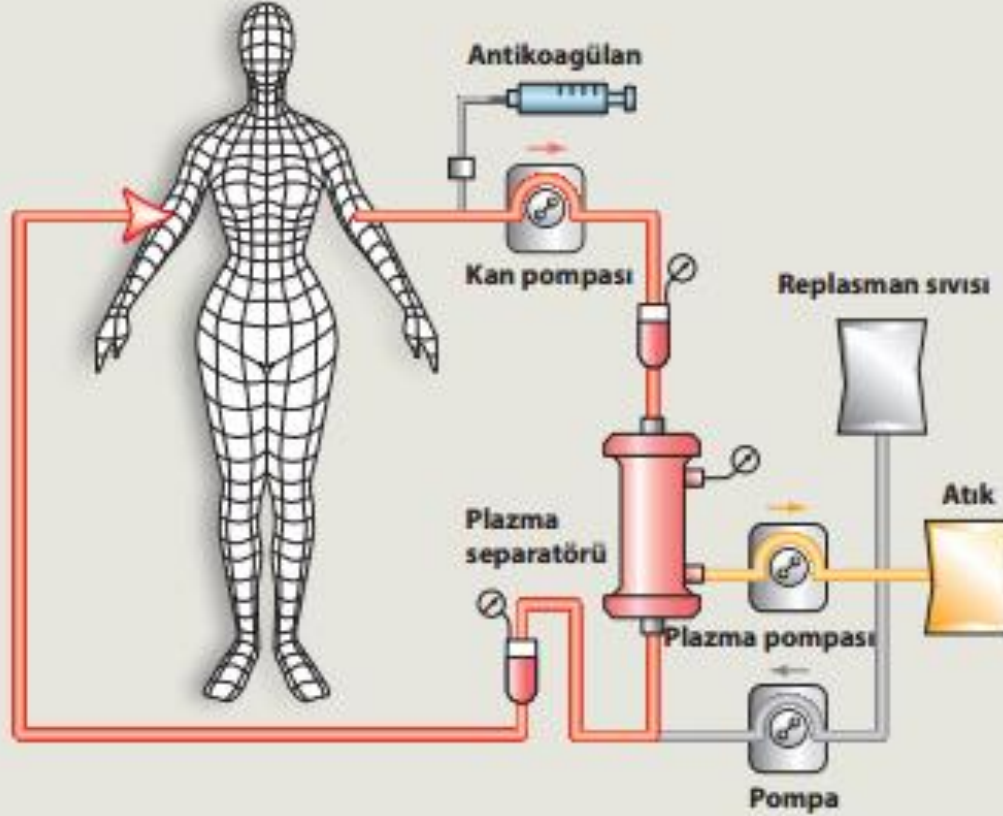
# Metformin Zehirlenmesi

On beş yaşında kız hasta acil servisimize metformin zehirlenmesi nedeniyle yönlendirildi. İntihar amaçlı 40 adet 1000 mg metformin içeren tableti aldıktan sonra karın ağrısı başlayan olguya mide yıkaması ve aktif kömür uygulaması yapılmış ve yoğun bakımdaki kan şekeri 28 mg/dL saptanması nedeniyle İV dekstroz hızla verilmişti.

Acil servisteki muayenede bilinci **konfü**, zaman zaman belirgin ajitasyonları saptanan ve **Kussmaul** solunumu belirginleşen hasta yoğun bakıma alındı. **Kan gazında pH 6,99, HCO<sub>3</sub> 6,3 mmol/L**, PCO<sub>2</sub> 27,3 mmHG, BE -22,7 mmol/L iken **laktat düzeyi 134 mg/dL** (0,4-2,2) olarak saptandı. Hb 12,5 g/dL, lökosit 17 000 mm<sup>3</sup>, trombosit 389 000 mm<sup>3</sup>, üre 21 mg/dL, kreatinin 1,97 mg/dL, sodyum 123 mEq/L, potasyum 3,1 mEq/L idi. Solunum sıkıntısı artan hasta hastaneye kabulünün sekizinci saatinde entübe edildi. Hastaya sağ juguler santral venöz diyaliz kateteri takıldı.

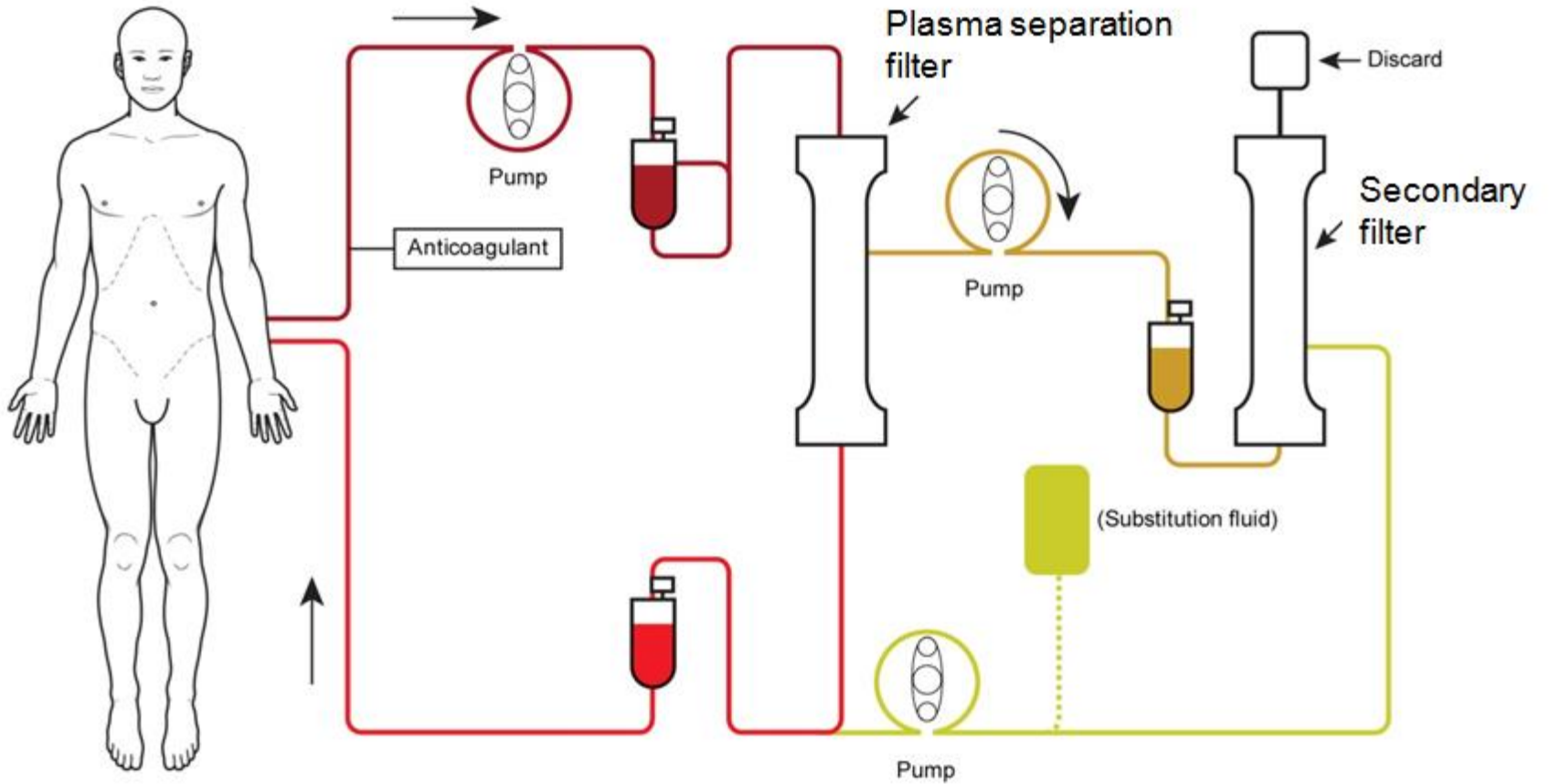
**Hipotansiyon** gelişmesi nedeniyle dopamin tedavisi başlandı ve 120 ml/dak olacak şekilde devamlı venö-venöz **hemodiyafiltrasyon** uygulaması yapıldı. Yatışının dördüncü gününde pH 7,44, HCO<sub>3</sub> 22 mmol/L, PCO<sub>2</sub> 45,3 mmHg, BE - 1,5 mmol/L, **laktat 7 mg/dL**, üre 20 mg/dL, kreatinin 0,53, sodyum 135 mEq/l, potasyum 3,7 mEq/l olunca yoğun bakımdan çıkarıldı. Olgu yatışının 10. gününde taburcu edildi.

## PD'nin Akış Diyagramı



Kan, bir membran plazma separatörü kullanılarak kan hücrelerine ve plazmaya ayrılır; patojenik olan plazma ayrılır yerine replasman sıvısı eklenir.

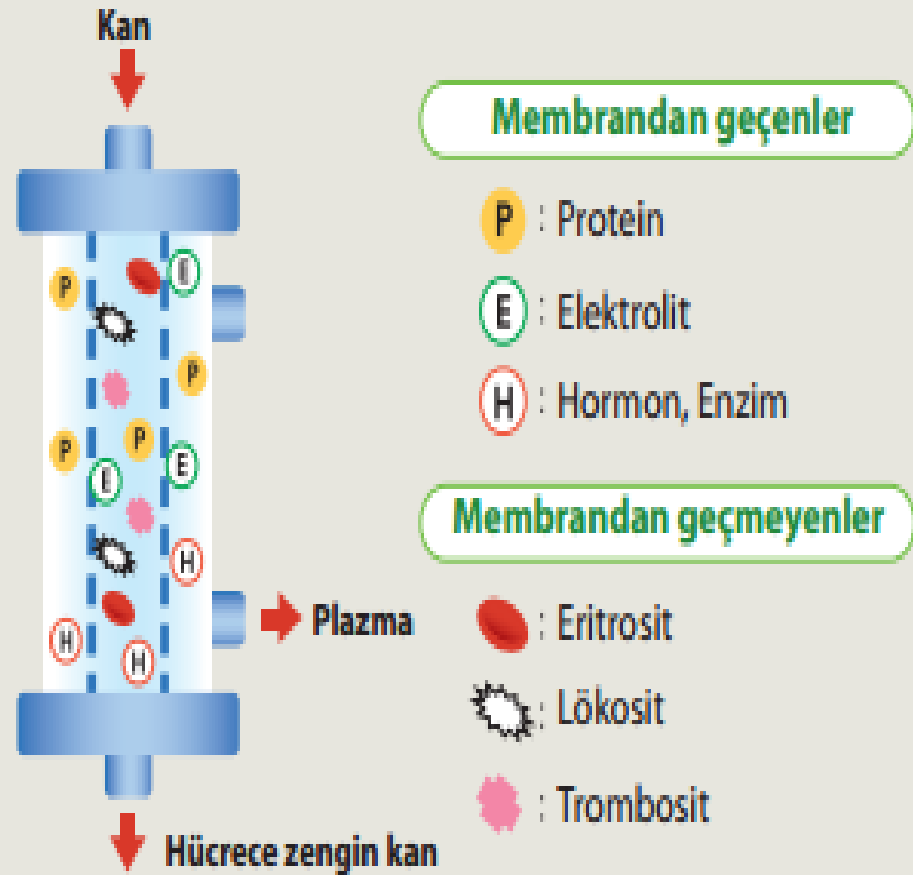
Double filtrasyon plazmaferezde önce plazma ayrılır sonrasında ayrılan plazma ikinci bir filtreden geçirilir porlardan büyük olan moleküller atık kısmına ayrılırken diğer kısım tekrar hastaya döner



# Plazmaferez

Plazma ve proteinler membran-  
dan geçmekte ancak porlar  
küçük olduğu için şekilli kan  
hücreleri geçememektedir.

Plazma ve plazma içerisindeki  
patojenik maddeler  
uzaklaştırılarak ya da  
saflaştırılarak hastaya geri verilir.





# İşlenecek Plazma Hacmi

Genellikle hastanın tahmini plazma hacmi (TPH) kadardır.

$$\text{TPH} = \text{VA} \times 1/13 \times (1 - \text{Ht}/100)$$

VA: Vücut Ağırlığı (kg)

Ht: Hematokrit (%)

Örnek: Hastanın Vücut Ağırlığı = 65kg, Ht: %40 = 3L

# Plazmaferezin klinik kullanım alanları

Guillain Barre sendromu

Myastenia Gravis

Anti-GBM hastalığı

Faktör VIII'e karşı antikor oluşması

Posttransfüzyon purpurası

Hızla ilerleyen glomerülonefrit

Hiperviskozite sendromları

Hiperkolesterolemi

Kriyoglobülinemi

Pemfigus

Sistemik lupus eritematozus

Graves oftalmopatisi

Renal transplantasyon

## Bazı zehirlenmeler

Trombotik trombositopenik purpura

Hemolitik üremik sendrom

Anti-nötrofilik sitoplazmik antikor (ANCA) ile ilişkili vaskülit

Böbrek tutulumu olan multipl miyeloma

# Plazmaferez

**İlaçları elimine etmek :** Amitriptilin, teofilin, diltiazem, karbamazepin, digoksin

Yüksek protein bağlanma nedeniyle HD'den az fayda gören

Proteine bağlanma (>%80)

Dağılım hacmi (<0.2 l/kg

**Ağır metal zehirlenmeleri :** Civa, vanadate

**Mantar zehirlenmesi:** Amanita phalloides

**Yılan ısırıkları:** Vipera ammodytes meridionalis

# 20

ANKARA



## ■ KLİNİK TOKSİKOLOJİ ULUSAL KONGRESİ

22-24 Mayıs 2015

Ankara Gar Kule “Behiç Erkin Toplantı Salonu”

# YILAN ISIRIĞI TEDAVİSİNDE PLAZMAFEREZİN ETKİNLİĞİ

Hasan Hüsnü YüceAhmet Küçük, Mahmut Alp Karahan, Evren Büyükfırat, Şaban Yalçın

Harran Üniversitesi Tıp Fakültesi Anesteziyoloji ve Reanimasyon AD, Şanlıurfa



Resim A: Ayak dorsalinde yılan ısırık yeri (1.gün)  
 Resim B: Isırık sonrası ekimoz ve hematoma  
 Resim C: Ayak dorsalinde ekimoz ve artmış ödem (3.gün)



	Plazmaferez Tedavisi Öncesi	Plazmaferez Tedavisi Sonrası	p
Platelet( $10^9/L$ )	82.79 $\pm$ 51.49	224.25 $\pm$ 63.89	<0.001
PT(sn)	17.4 $\pm$ 5.49	14.7 $\pm$ 3.32	>0.001
INR	1.42 $\pm$ 0.59	1.14 $\pm$ 0.15	>0.001
aPTT	26.3 $\pm$ 5.4	22.9 $\pm$ 3.4	>0.001

Az sayıda çalışma

Sınırlı hasta sayısı

Endikasyonlar tartışmalı



Journal of Clinical Apheresis 21: 219–223 (2006)

## The Use of Therapeutic Plasmapheresis in the Treatment of Poisoned and Snake Bite Victims: An Academic Emergency Department's Experiences

Cuma Yildirim,<sup>1\*</sup> Ziya Bayraktaroğlu,<sup>2</sup> Nurullah Gunay,<sup>1</sup> Selim Bozkurt,<sup>1</sup> Ataman Köse,<sup>1</sup> and Mehmet Yilmaz<sup>3</sup>

Transfusion and Apheresis Science 49 (2013) 494–498



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### Transfusion and Apheresis Science

journal homepage: [www.elsevier.com/locate/transci](http://www.elsevier.com/locate/transci)



Plasma exchange as a complementary approach to snake bite treatment: An academic emergency department's experiences



# AKREP SOKMASINA BAĞLI İZOLE HİPERBİLİRUBİNEMİ

Olgu 36 yaşında erkek hasta sol el parmağından akrep sokması nedeniyle acil servise getirildi. Hastaya akrep zehirine karşı antivenom uygulandı. Yapılan ilk kan tahlilinde **hemoglobin 7,5 g/dl**, hemotokrit %28,16, trombosit 279 bin/mL, PT; 16,92, INR; 1,18, PTT; 30,65, AST 26 U/L, ALT 14 U/L **direk bilirubin 1,5 mg/dl**, **indirek bilirubin 23,5 mg/dl** ve LDH 220 U/L tespit edildi. Hastaya acil şartlarda **plazmaferez yapıldı** ve sonrası kontrol hemoglobin 7,2 g/dl, trombosit 292 bin/mL, **direk bilirubin 0,5 mg/dl**, **indirek bilirubin 9,9 mg/dl** olarak tespit edildi. 48 saatin sonunda **indirek bilirubin 0,9 mg/dl** olan hasta hematoloji poliklinik kontrolü önerilerek taburcu edildi.

Sonuç: Akrep sokması vakaları acil tedavi gerektirir. Akrep sokması sonucu hızlı bir şekilde bilirubin değerinde artış görülebilirken benzer vakalarda plazmaferezle hızlı ve etkin bir iyileşme sağlanabilir.









# Case Series and Case Reports

## A case of Crimean-Congo haemorrhagic fever successfully treated with therapeutic plasma exchange and ribavirin

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Ramazan Coskun MD<sup>‡</sup>  
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TROPICAL DOCTOR 2011; 41: 181–182  
DOI: 10.1258/td.2011.100470

vomiting. Her complaints had started 10 days before admission. She was dealing with livestock husbandry but her history did not reveal any tick bites. She had been using methyl prednisolone and sulphasalazine for rheumatoid arthritis but the duration and doses were not clear. On physical examination, she had a fever of 38°C, abdominal tenderness and gingival bleeding. Her Glasgow Coma Score was 8; her white blood cell (WBC) count was  $23.1 \times 10^9/L$  (neutrophils 90%); haemoglobin was 13 g/L; and her platelet count (PLT) was  $25 \times 10^9/L$ . The level of aspartate aminotransferase (AST) was 9490 U/L; alanine aminotransferase (ALT) was 410 U/L; lactate dehydrogenase (LDH) was 8190 U/L; Gama-glutamyltransferase (GGT) 969 U/L; total bilirubin was 4.9 mg/dL; prothrombin time was 14.2 s; activated partial thromboplastin time was 24.1 s; and her International Normalized Ratio was 1.2. The renal function tests and serum electrolytes were in the normal range. An abdominal ultrasonography showed choledochal dilatation, gallbladder wall thickness and pericholecystic fluid.

She was hospitalized in the intensive care unit with a diagnosis of Gram-negative bacilli sepsis due to acute cholecystitis. Ceftriaxone was initiated after the blood cultures had been taken. Serological tests for brucellosis and hepatitis A, B and C were performed for a differential diagnosis. A serum sample was shipped to Refik Saydam National Public Health Agency for the diagnosis of Crimean-Congo haemorrhagic fever (CCHF), after which oral ribavirin was started at 1000 mg four times a day following a 2000 mg loading dose. At the second day, despite erythrocyte and thrombocyte replacement therapy her PLT dropped to  $8 \times 10^9/L$ .



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### Case Report

## Double filtration plasmapheresis for a case of Crimean-Congo hemorrhagic fever

Başak C. Meço<sup>a,\*</sup>, Osman Memikoğlu<sup>b</sup>, Osman İlhan<sup>c</sup>, Erol Ayyıldız<sup>c</sup>, Ceren Gunt<sup>a</sup>, Necmettin Ünal<sup>a</sup>, Mehmet Oral<sup>a</sup>, Melek Tulunay<sup>a</sup>

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### A B S T R A C T

Crimean-Congo hemorrhagic fever (CCHF), is a fatal viral infection transmitted to humans through a tick bite or exposure to blood or tissues of viremic hosts. The clinical presentation is characterized by sudden onset high fever, headache, myalgia, abdominal pain and nausea–vomiting followed by gastrointestinal, urinary, respiratory tract and brain hemorrhage. Laboratory findings include leucopenia, thrombocytopenia, elevated liver enzymes, prolonged prothrombin time and activated partial thromboplastin time. We report a case of CCHF who was treated with a combination of DFPP and ribavirin therapy. As a result of this multimodal treatment, patient's clinical symptoms and laboratory findings improved gradually.

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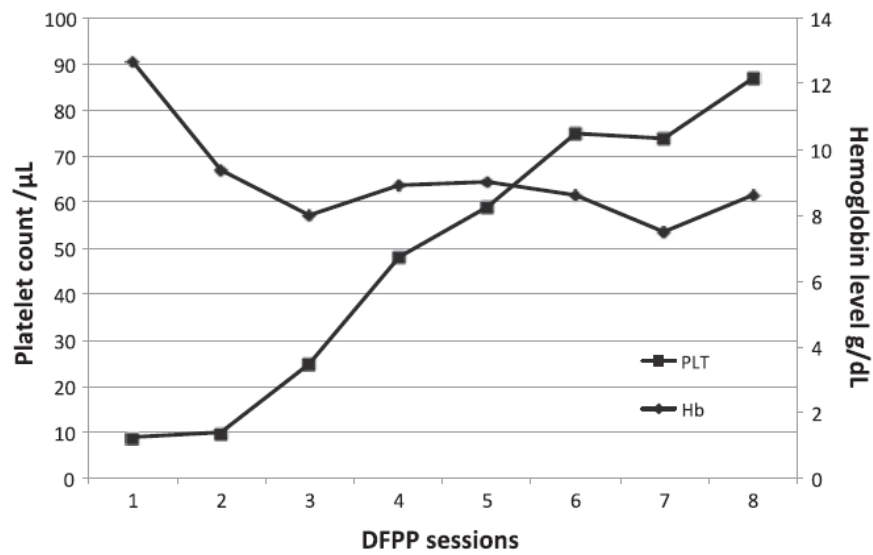


Fig. 1. Hemoglobin and platelet levels during DFPP.

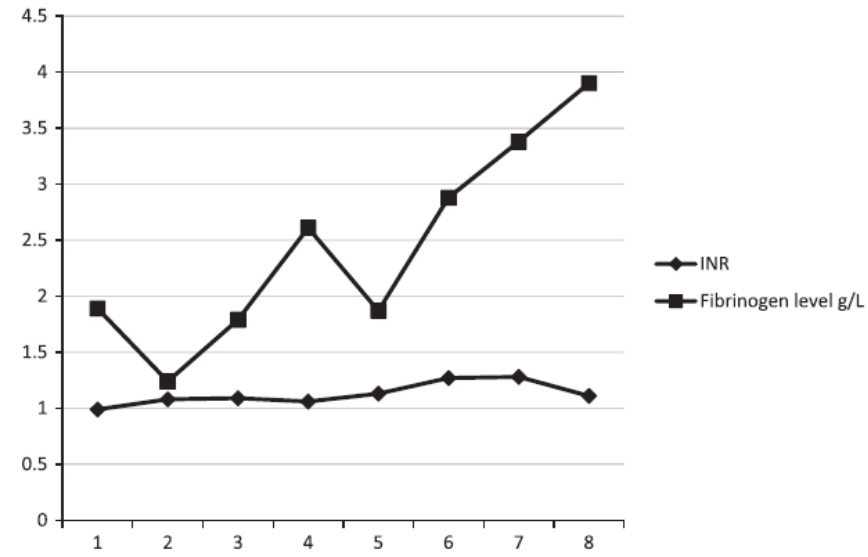
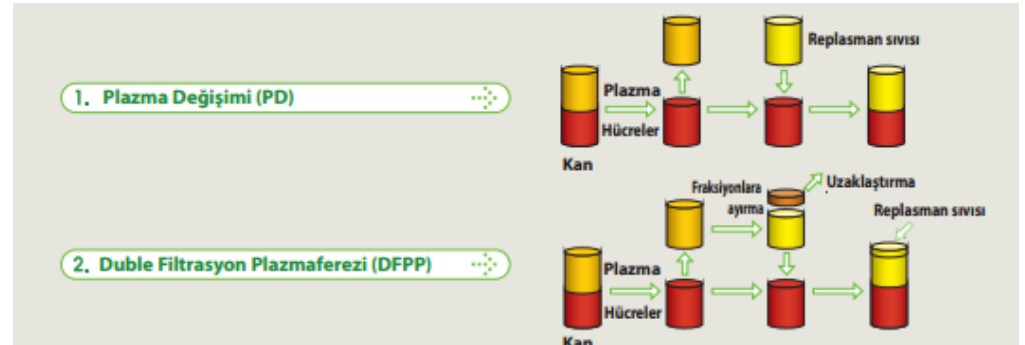
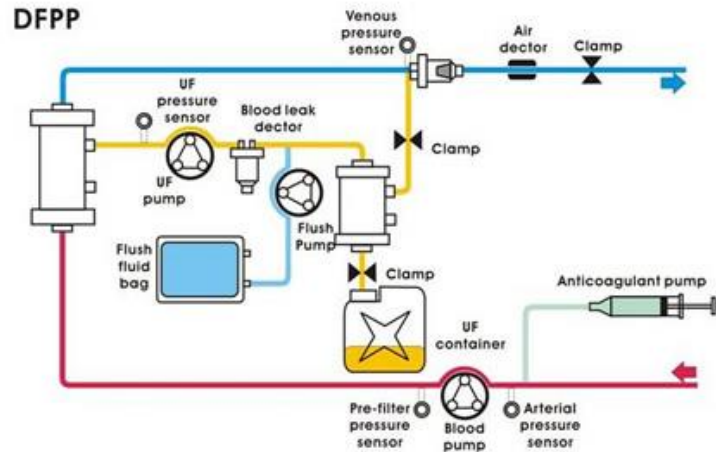


Fig. 2. Fibrinogen and INR levels during DFPP.



## Current applications of plasmapheresis in clinical toxicology

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### Abstract

The clinical applications of plasmapheresis are rapidly increasing in number and scope. This trend is also observed in the application of plasmapheresis as a method of detoxification in clinical toxicology. Because of a lack of large controlled series, the rationale for using plasmapheresis must be confirmed in each type of intoxication by evidence of effective clearance, as well as by high plasma protein binding and a low volume of distribution of the toxic substance. Plasmapheresis is used mostly to treat phalloid mushroom intoxications. In this potentially fatal intoxication, for which there is no antidote, plasmapheresis is at least as effective as haemoperfusion in reducing mortality from as high as 30–50% with conventional therapy to <20%. In our series of 28 patients treated with plasmapheresis, mortality was 17.8%. In our experience, plasmapheresis is also very effective in the treatment of life-threatening intoxications with tricyclic (amitriptyline) and 4-cyclic (maprotyline) antidepressants. We confirmed a 63% reduction in the plasma level of amitriptyline in one patient after single plasmapheresis. Other drugs such as L-thyroxine, verapamil, diltiazem and carbamazepine are also removed effectively by plasmapheresis, as are theophylline and heavy metals (mercury and vanadate). Phosphoroorganic substances are not removed effectively. We measured the plasma concentrations of dimethoate in two patients with this intoxication and did not find clinically significant clearance with plasmapheresis.

**Keywords:** amitriptyline; maprotyline; phalloid intoxication; plasmapheresis; theophylline

methods are usually applied in selected cases of diagnosed severe forms of intoxications as the only option of fast elimination of the intoxicating agent. They are, however, also applied whenever certain potentially lethal intoxications are diagnosed and/or suspected, even without evidence of life impediment at the time of institution of therapy. Finally, these methods are applied even in severe cases, when the toxic substance is unknown, because of the high risk of death and the probability of success. Even in such cases, combined extracorporeal detoxification is justified, given that there is sufficient technical expertise to minimize the risk of complications of the technique.

According to the volume of distribution, protein binding and solubility in water, different methods should be chosen in different intoxications. While haemodialysis is the best method for water-soluble and dialysable substances such as ethylene glycol or methanol, other intoxications, such as phenobarbital poisoning, are best treated by charcoal haemoperfusion. There is a third group of substances, which remain highly bound to plasma proteins and are not removed effectively by either haemodialysis or haemoperfusion. In such cases, plasmapheresis is reasonably the best option available. There are, however, no controlled studies on the usefulness of plasmapheresis in any particular intoxication because of the lack of large reported series. Case reports are published instead and, depending on the severity of the reported intoxication and on the plasmapheresis protocol used, either dramatic improvement or no effect is reported. Documentation of removal of the toxic substance from the blood therefore remains the major objective judgement of the effectiveness of plasmapheresis in any particular type of intoxication.





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## Transfusion and Apheresis Science

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### Therapeutic plasma exchange in amitriptyline intoxication: Case report and review of the literature

Ismail Sari<sup>a,\*</sup>, Ibrahim Turkcuer<sup>b</sup>, Tuba Erurker<sup>c</sup>, Mustafa Serinken<sup>b</sup>, Murat Seyit<sup>b</sup>, Ali Keskin<sup>a</sup>

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#### A B S T R A C T

Severe amitriptyline poisoning results in cardiac and neurological toxicity and continues to be a leading cause of significant morbidity and mortality both in children and adults. We present a case of severe amitriptyline poisoning successfully treated with plasma exchange. Due to high plasma protein binding property of amitriptyline, plasma exchange therapy should be considered in cases of severe amitriptyline intoxication as a life saving therapeutic modality.

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## *Case Report*

# **Combined use of plasmapheresis and antidigoxin antibodies in a patient with severe digoxin intoxication and acute renal failure**

Carla Santos-Araújo<sup>1</sup>, Martins Campos<sup>2</sup>, Cristina Gavina<sup>2</sup>, F. Rocha-Gonçalves<sup>2</sup> and Manuel Pestana<sup>1</sup>

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**Keywords:** digitalis intoxication; renal failure; plasmapheresis

Digitalis intoxication is a common and potentially life-threatening situation [1]. In this condition, the administration of digoxin-specific antibodies (Fab) have proven to be effective in controlling serious complications [2]. However, in patients with severe renal impairment, the clearance of Fab–digoxin complexes is compromised, and this may reduce the utility of Fab therapy in those conditions. Plasmapheresis (PE), by removing the digoxin–Fab

During the session of PE, the patient gradually recovered consciousness and sinus rhythm. During the following hours there was no clinical deterioration and the pacemaker was removed. Plasma digoxin levels were 13 and 2.4 ng/ml at 10 and 24 h after PE, respectively. The patient was released from hospital by the fifth day, electrically stabilized and with improved renal function.

Because neither digoxin nor Fab can be efficiently removed by haemodialysis or haemofiltration, the presence of renal failure represents an important limitation to the treatment of patients with digitalis intoxication with Fab [3]. Although PE proved to be

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## Extracorporeal Life Support in Severe Propranolol and Verapamil Intoxication

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Jacek Kolcz, MD, PhD

Jacek Pietrzyk, MD, PhD

Katarzyna Januszewska, MD, PhD

Malgorzata Procelewska, MD

Tomasz Mroczek, MD

Edward Malec, MD, PhD

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Combined poisoning with calcium-channel blockers and  $\beta$ -blockers is usually associated with severe heart failure. This report shows the effectiveness of emergency extracorporeal life support in treating life-threatening simultaneous propranolol and verapamil intoxication. A 15-year-old girl presented in cardiogenic shock after alcohol consumption and a propranolol and verapamil overdose; plasma concentrations: propranolol, 0.53 m/mL; verapamil, 1.06 mg/mL. She was successfully resuscitated with extracorporeal life support. Therapeutic plasma exchange was initiated. Extracorporeal support was discontinued 70 hours later. The patient made a full recovery. Simultaneous verapamil and propranolol overdoses can cause severe hemodynamic compromise and arrest of electrical and mechanical function of the heart. Emergency extracorporeal life support can successfully maintain vital organ blood flow and allows time for drug metabolism, redistribution, and removal. Therapeutic plasma exchange may reduce the time of emergency extracorporeal life support. Emergency extracorporeal life support should be considered early in cases of near-fatal intoxications with cardiodepressive drugs.

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**Key words:** *propranolol/verapamil intoxication; cardiopulmonary resuscitation; extracorporeal life support*

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Propranolol is a popular nonselective  $\beta$ -adrenergic blocking agent used in the management of hypertension, arrhythmias, ischemic heart disease, and thyrotoxicosis. It is well absorbed from the gastrointestinal tract: 90% of the drug in the blood is bound to plasma proteins (albumin and  $\alpha_1$  acid glycoprotein). Propranolol is metabolized in the liver by cytochrome P450. The volume of distribution of propranolol is approximately 4 L/kg. The principal manifestations of propranolol overdose are bradycardia and severe hypotension. Therapeutic plasma levels of propranolol are 0.1 to 0.3  $\mu$ g/mL, with toxic values at 0.5  $\mu$ g/mL or higher. Bronchospasm, hypoglycemia, hyperkalemia, lethargy, stupor, coma, and seizures are observed as adverse reactions. In most cases of acute propranolol overdosage, the patients recover; however, severe toxicity may result in death [3].

Verapamil is a calcium-channel blocking agent used in the management of dysrhythmias, ischemic heart disease, hypertrophic cardiomyopathy, and hypertension [4]. It is rapidly absorbed after oral administration. In the blood, 98% of the drug is bound to plasma albumins and  $\alpha_1$  acid glycopro-

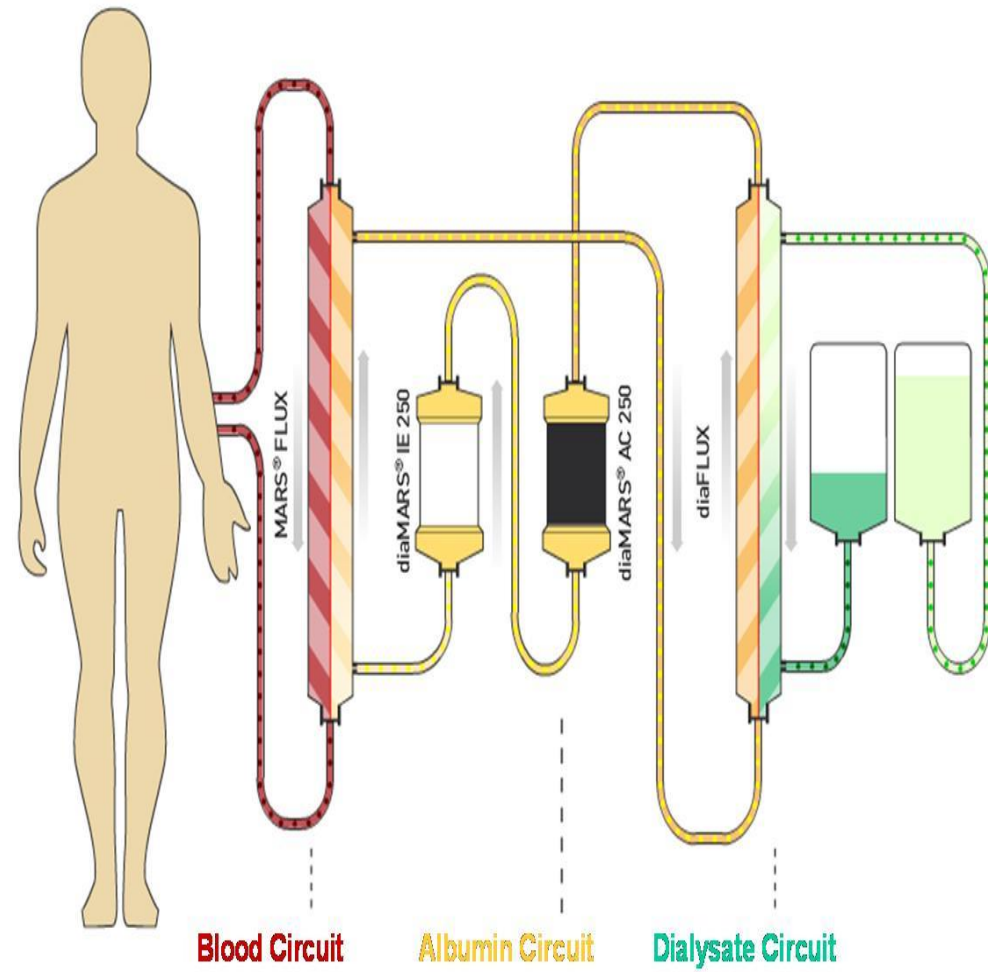
# Karaciğer Destek Sistemleri

Kan hasta albümininin ayrılmasını sağlayan özel seçici bir filtreden geçirilir.

Daha sonra hastanın kanından ayrılan albümin iki adet özel adsorberden geçirilerek albümine bağlı toksinler uzaklaştırılır.

Düşük ve orta molekül ağırlıklarına sahip suda çözünebilen moleküllerin oluşturduğu toksinler ise diyaliz devresinde gerçekleştirilen hemodiyaliz sayesinde hasta kanından uzaklaştırılır.





# Karaciger Destek Sistemlerinin Uygulama Alanları Nelerdir?

İntoksikasyon (mantar zehirlenmesi, parasetamol ve diğer proteine bağlı ilaçların temizlenmesi)

Hepatorenal sendrom

Hepatik ensefalopati

İnatçı pruritus

Transplantasyona köprü

# Usage of liver assist device in chemotherapy induced acute hepatic failure

Karaciğer destek aygıtının kemoterapiye bağlı akut karaciğer yetmezliğinde kullanımı

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## Abstract

Drugs, especially chemotherapeutics might induce acute hepatic failure with different mechanisms. Mortality rates in patients with acute liver failure still remain unacceptably high. Management should aim to prevent complications to allow the liver to regenerate or, if this is unlikely, to allow enough time to find a suitable organ for transplantation. Different liver support devices have been developed to stabilize the patient during this period. In this case report we present the usage of liver support device in an acute lymphoblastic leukemia (ALL) patient with chemotherapy induced acute hepatic failure while waiting chemotherapy results in bone marrow.

**Key words:** chemotherapy, hepatic failure, liver assist device

## Özet

İlaçlar özellikle kemoterapötikler farklı mekanizmalarla akut karaciğer yetmezliğine neden olmaktadır. Akut karaciğer yetmezlikli hastalarda mortalite oranları hala kabul edilemeyecek düzeyde yüksektir. Tedavide, karaciğer rejenere olana kadar veya bu mümkün değilse organ nakli için uygun bir organ bulunana kadar komplikasyonları engellemek hedeflenmelidir. Bu bekleme periyodunda hastayı stabilize etmek için farklı karaciğer destek araçları geliştirilmiştir. Bu olgu sunumunda ALL'li bir hastada kemoterapiye bağlı gelişen akut karaciğer yetmezliğinde, kemik iliğinin kemoterapiye cevabı beklenirken, yapay karaciğer desteği kullanımı sunulmuştur.

**Anahtar kelimeler:** kemoterapi, karaciğer yetmezliği, karaciğer destek aygıtı

## ÇATAPAT YUTARAK ZEHİRLENEN ÇOCUK, DAYISININ KARACİĞERİYLE HAYATA TUTUNDU



20.05.2013 14:52

**Bitlis'te çatapat yutma sonucu zehirlenerek İnönü Üniversitesi Turgut Özal Tıp Merkezi'nde tedavi altına alınan iki kardeşten Sabetullah Atik'e (4), dayısı tarafından bağışlanan karaciğer nakledildi.**

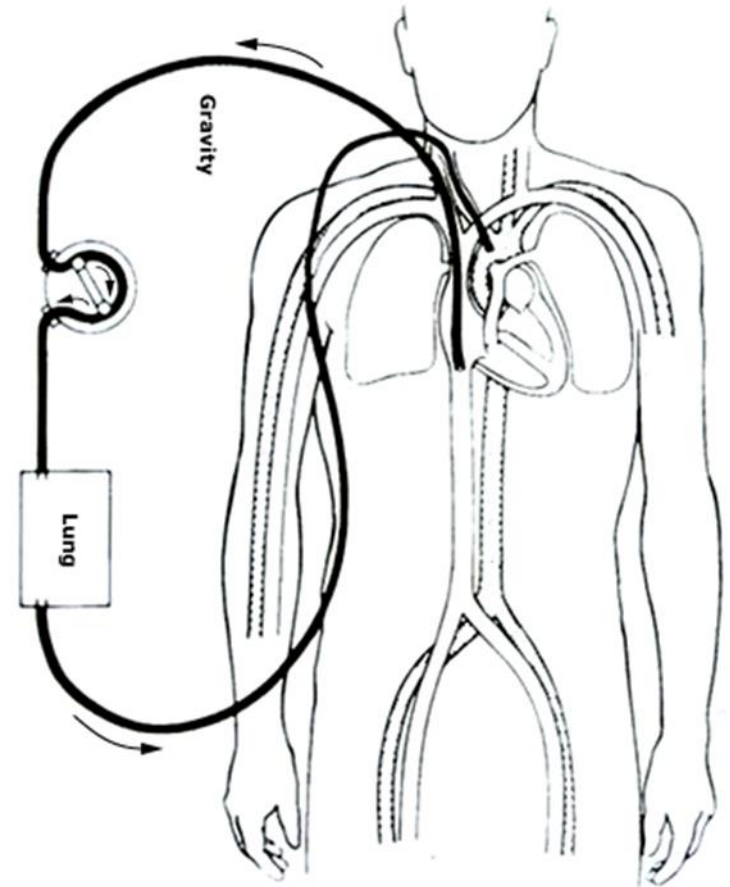
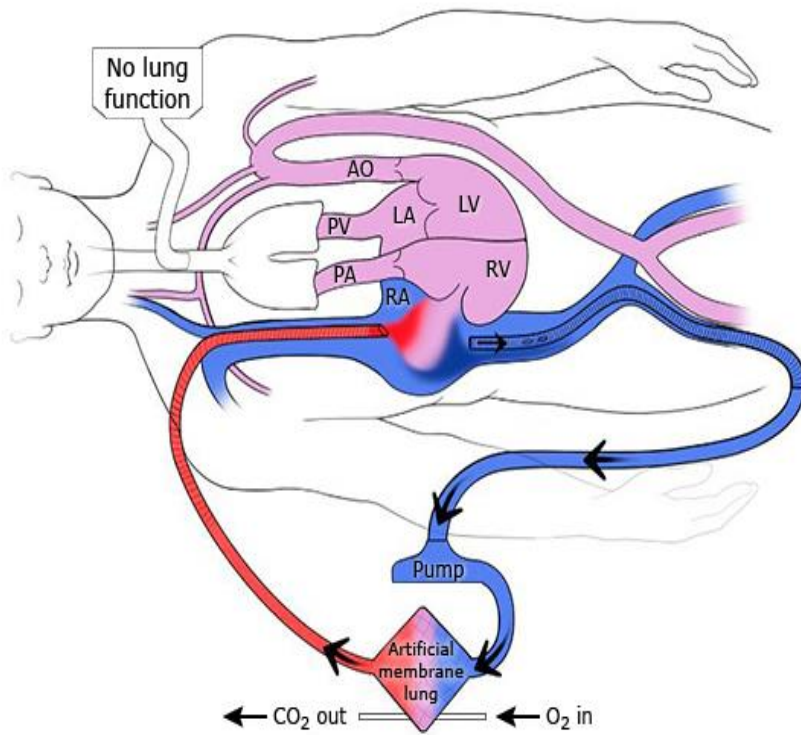
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Bitlis'in Hizan ilçesine bağlı Gayda köyünde 'çatapat' isimli kimyasal oyun malzemesini yutarak zehirlenen Ayetullah (6) ve Sabetullah Atik (4) adlı iki kardeş, İnönü Üniversitesi Turgut Özal Tıp Merkezi'nde tedavi görüyor. Çocuk Yoğun Bakım Servisi'nde Yoğun Bakım Ünitesi'ne bağlı olarak yaşamlarını sürdüren iki kardeşten Sabetullah Atik'e, dayısı tarafından bağışlanan karaciğer başarılı bir operasyonla nakledildi. İki kardeşin Yoğun Bakım Servisi'nde tedavilerinin sürdürüldüğü bildirildi.

CİHAN



# KALP ve AKCİĞER DESTEK SİSTEMLERİ (ECMO)



# Tissue concentration of paraquat on day 32 after intoxication and failed bridge to transplantation by extracorporeal membrane oxygenation therapy

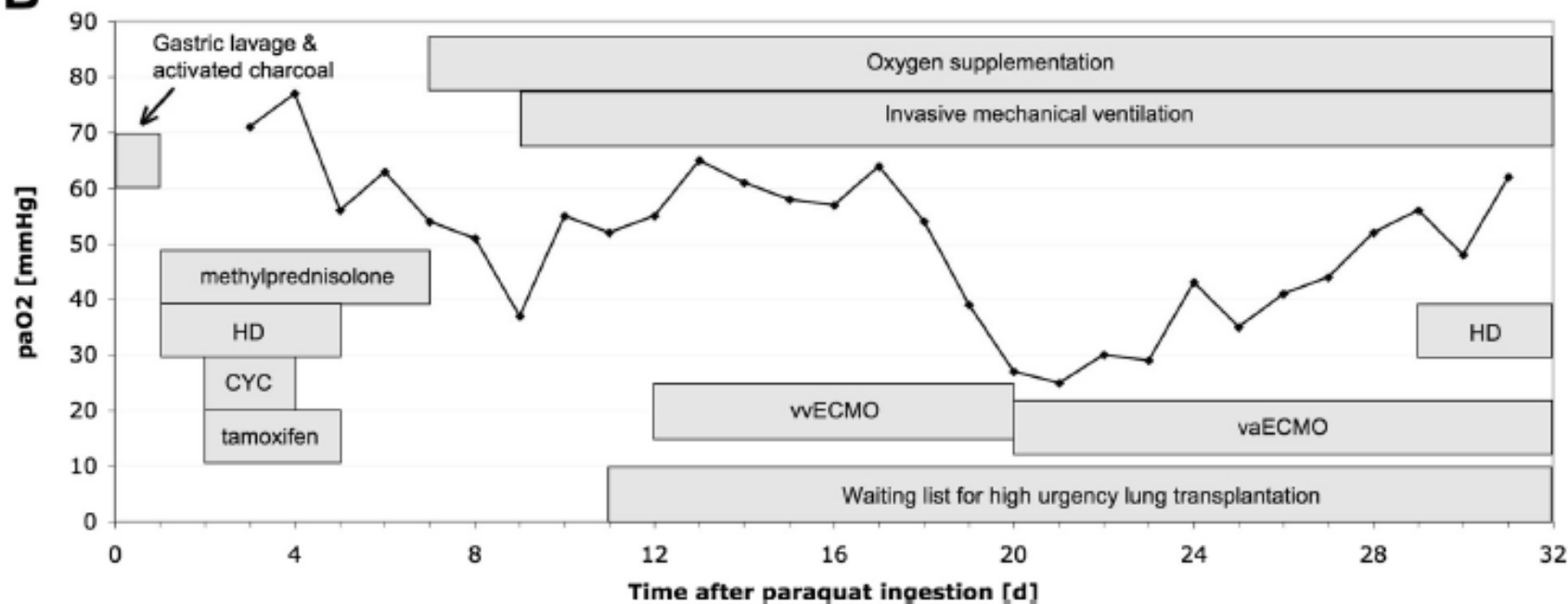
## Abstract

**Background:** Paraquat is a highly toxic herbicide, which not only leads to acute organ damage, but also to pulmonary fibrosis. There are only anecdotal reports of rescue lung transplantation, as paraquat is stored and only slowly released from different tissues. Bridging the time to complete depletion of paraquat from the body could render this exceptional therapy strategy possible, but not much is known on the time interval after which transplantation can safely be performed.

**Case presentation:** We report on a case of accidental paraquat poisoning in a 23 years old Caucasian man, who developed respiratory failure due to pulmonary fibrosis. The patient was listed for high urgency lung transplantation, and extracorporeal membrane oxygenation was implemented to bridge the time to transplantation. The patient died 32 days after paraquat ingestion, before a suitable donor organ was found. In postmortem tissue specimen, no paraquat was detectable anymore.

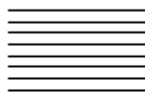
**Conclusion:** This case report indicates that complete elimination of paraquat after oral ingestion of a lethal dose is achievable. The determined time frame for this complete elimination might be relevant for patients, in which lung transplantation is considered.

**Keywords:** Paraquat, Poisoning, Extracorporeal membrane oxygenation, Lung transplantation

**B**

**Figure 1 Clinical course.** **A)** Paraquat serum and urine levels over time. Serum levels exceeding 0.6 mg/l at 6 h or 0.1 mg/l at 24 h predict an unfavourable outcome [6]. The low serum values on day 3 and 4 reflect post-dialysis values. **B)** Arterial partial oxygen tension and flow chart of therapeutic interventions (HD: hemodialysis; CYC: cyclophosphamide).





## Selected Topics: Toxicology



CrossMark

### EXTRACORPOREAL LIFE SUPPORT AND PLASMAPHERESIS IN A CASE OF SEVERE POLYINTOXICATION

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**Abstract—Background:** Resuscitation without return to spontaneous circulation in patients with suicidal ingestion of cardiotoxic drugs necessitates alternative bridging therapies for drug removal. **Objectives:** To show the effectiveness of emergency extracorporeal membrane oxygenation (ECMO) and plasmapheresis in severe polyintoxication. **Case Report:** A 21-year-old woman developed asystole after suicidal polyintoxication with 1.75 g carvedilol, 300 mg amlodipine, 6 g amitriptyline, 500 mg torsemide, 1.5 g ketoprofen, 28 g nicotinic acid, and 16 g gabapentin. After 3 h of cardiopulmonary resuscitation without return to spontaneous circulation, ECMO was used as a bridging therapy and a temporary pacemaker was inserted. Plasma peak levels were measured for amlodipine (29.3  $\mu\text{g/L}$ ), amitriptyline (1456  $\mu\text{g/L}$ ), carvedilol (585  $\mu\text{g/L}$ ), and gabapentin (126.8 mg/L). To facilitate drug removal, therapeutic plasma exchange was performed. The patient could be weaned from ECMO at day 4 and extubated on day 8 after admission without neurologic sequelae. **Conclusion:** ECMO and plasma exchange should be considered as a therapeutic option in selected patients under resuscitation without return to spontaneous circulation after severe intoxication. © 2014 Elsevier Inc.

**Keywords—**resuscitation; ECMO; plasmapheresis; intoxication;  $\beta$ -blocker; tricyclic antidepressant; calcium channel blocker

### INTRODUCTION

Polyintoxication with more than four substances is rare, with cardiovascular drugs and cyclic antidepressants belonging to the drugs most frequently ingested for suicide (1).

Toxicity of  $\beta$ -blockers is significantly increased after co-ingestion of further cardioactive drugs, especially calcium channel antagonists or tricyclic antidepressants (2). The cardiotoxic action of the ingested drugs represents a potentially reversible cause that prevents return to spontaneous circulation (ROSC) even under sufficient resuscitation measures. Thus, enhanced drug removal, for example, by plasmapheresis, is an effective but time-consuming treatment of cardiac failure under these circumstances. Extracorporeal membrane oxygenation (ECMO) could serve as a bridging tool to maintain a sufficient circulation until the complete drug removal enables ROSC.

**Table 1** Summary of case reports

Author/ year	Drug(s)	Dose (mg)	Age/sex	Weight (kg)	Time to ECPB (h)	ECPB technique	Time on ECPB (h)	Outcome
Hendren et al. (1989)	Verapamil SR	1,440	2/M	13.5	Unknown	Unknown	3.75	Died 29 h post-OD
Yasui et al. (1997)	Flecainide	Unknown	20/F	Unknown	2.5 after OD 2 after arrival	VA femoral	10	Died 10 days post-OD; brain damage and renal failure
Berhinger et al. (1998)	Digoxin	10	79/M	Unknown	5.17 from OD 0.37 from admission	VA femoral	4	Died 12 days post-OD; ARDS and septic shock
Holzer et al. (1999)	Verapamil	4,800–6400	60/M	60	8.10 from OD 3.5 from admission	VA femoral	5.5	Full recovery
Corkeron et al. (1999)	Flecainide	4,000	20/F	Unknown	5.15 from OD 5.0 from admission	VA femoral	30	Full recovery
Pasic et al. (2000)	Praijmalium bitartrate	320	25/F	Unknown	1.30 from OD	Ascending aorta	16.75	Mild ataxia, discharged 35 days post-OD
Durward et al. (2003)	Diltiazem SR	12,000	16/F	50	17 from OD 10 from admission	Right atrium; aorta	48	Full recovery
MacLaren et al. (2004)	Verapamil SR Doxepin Quetiapine Diazepam Clonazepam Temazepam	7,200 1,600 10,000 2,000 100 200	45/F	Unknown	Unknown	VA femoral	144	Full recovery
Kolcz et al. (2007)	Verapamil SR Propanolol	960 550	15/F	60	2 from admission	Right atrium; aorta	70	Full recovery
Marciniak et al. (2007)	Ibuprofen	10,000	14/M	75	7 from OD	VA carotid; internal jugular	96	Full recovery
Shenoi et al. (2011)	Bupropion SR	9,000	11 months/M	12	21 from OD 18 from admission	VA	71	Full recovery

SR sustained release, M male, F female, OD overdose, VA veno-arterial

# Zehirlenmelerde ekstrakorporal tedavileri uygulama kriterleri

1. Destek tedavisine rağmen, hastanın **genel durumunun kötüleşmesi**
2. **Serebral işlevlerin** baskılandığını düşündüren (hipotermi, hipotansiyon, hipoventilasyon) belirtilerin ortaya çıkması
3. İlacın normal **metabolizma** yolunun bozuk olması ( karaciğer, böbrek hastalığı gibi),
4. Toksik **etkisini geç gösteren** metanol, etilen glikol, paraquat gibi maddelerle zehirlenme
5. Ekstrakorporal tedavi yöntemleri zehirlenmeye neden olan ilacı endojen mekanizmalardan **daha hızlı** uzaklaştırılabiliyor ise
6. **Komplikasyonların** (septisemi, pnömoni vb) oluşmaya başlamış ise
7. Zehirlenmeye neden olan ilacın **dağılım hacmi düşükse** ve serum düzeyleri ile toksik belirtilerin şiddeti arasında pozitif korelasyon varsa
8. Zehirlenmeye neden olan ilacın **metabolitlerinin** kendisinden daha toksik olması

Sonuç olarak akut ilaç intoksikasyonlarının tedavisinde hastaya sistematik yaklaşımda vital bulguların ve genel durumun dikkatli değerlendirilmesinin yanısıra **ilacın özellikleri ve metabolizmasının** iyi bilinmesi gereklidir.

Akut ilaç intoksikasyonlarında destek tedavileri, uygun klinik takip çoğu zaman yeterlidir. Bununla birlikte organ hasarına yol açabilecek ağır zehirlenmelerde ekstrakorporeal tedavi yöntemlerinden yararlanmak gerekir.

















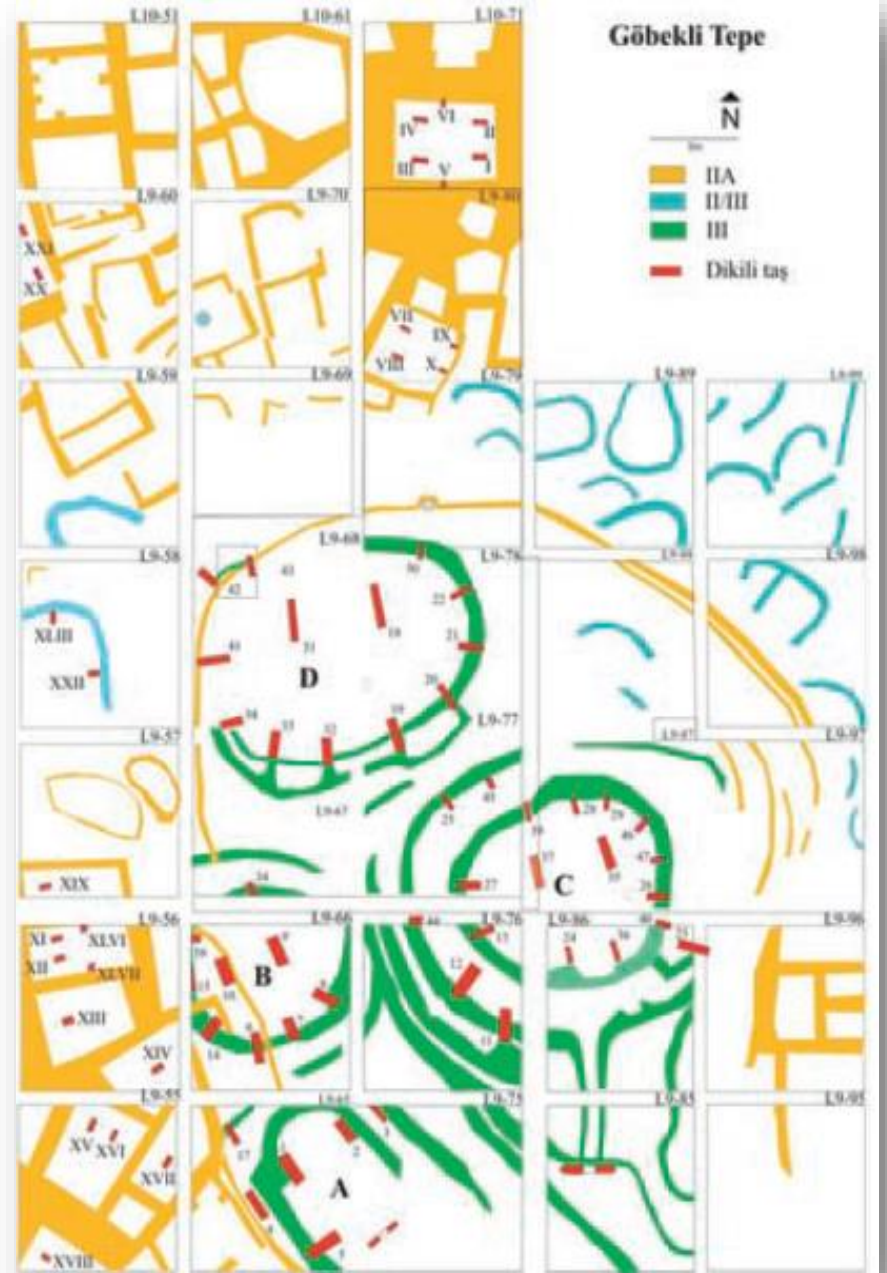
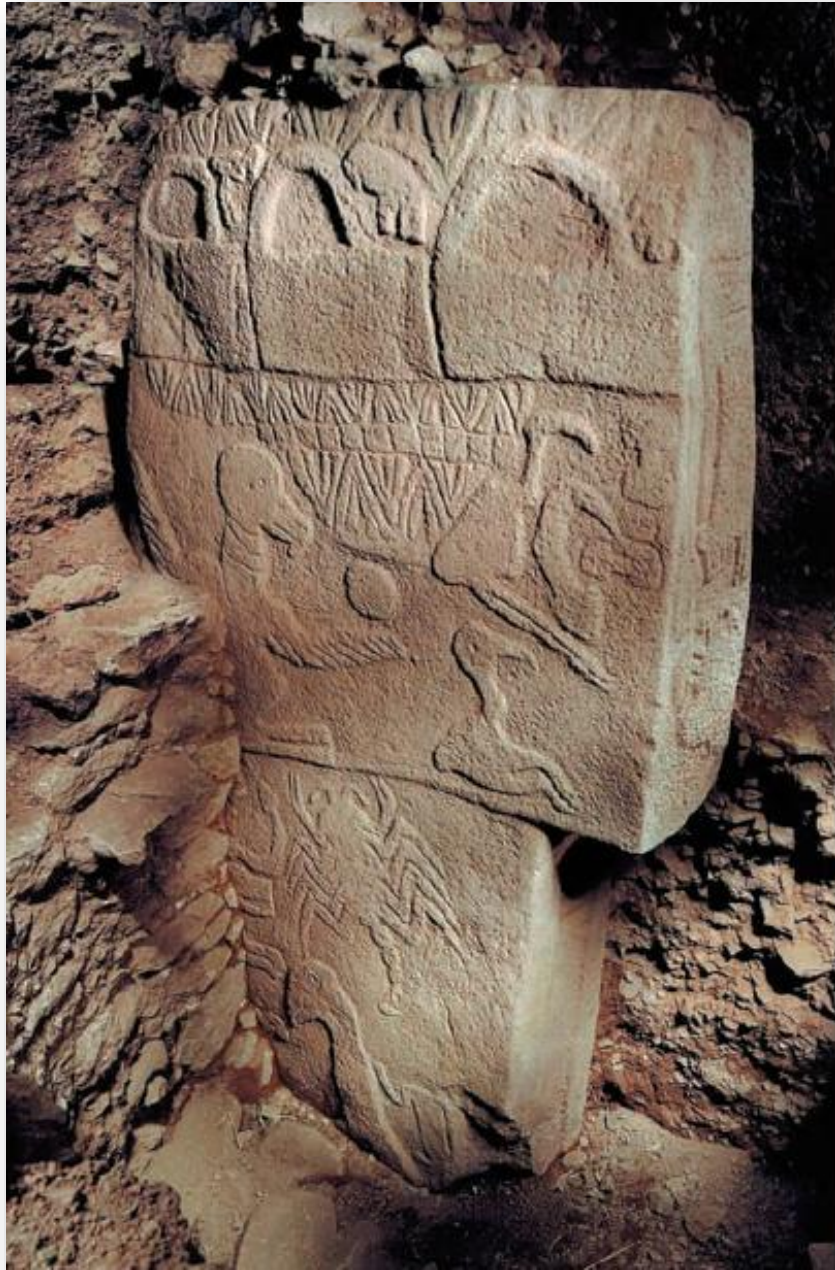




















**TEŞEKKÜRLER**

# "Savaşçı Amazon Kraliçelerinin Mozaïğe Resmedilmiş Dünyadaki İlk Örnekleri"

