Akut Böbrek Hasarının Tanısı

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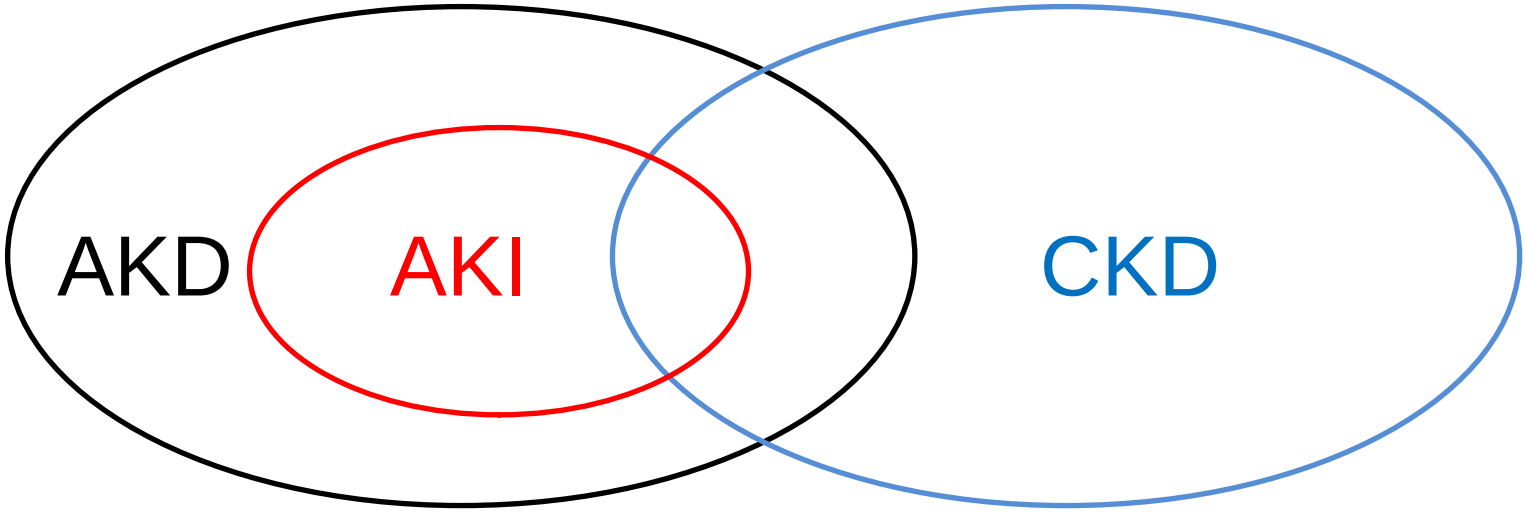
Konunun Akışı

- İsimlendirme ve ABH için kavramsal modeller
- ABH tanısı için serum kreatinin düzeyinin geçerliliği
- RIFLE, AKIN, KDIGO ve ERBP kriterlerine göre ABH tanısı
- ABH'nın kreatinin dışındaki tanı belirteçleri

İsimlendirme

- Ischuria Renalis (William Heberden, 1802)
- Acute Bright's Disease (William Osler's Textbook for Medicine, 1909)
- War Nephritis (First World War)
- Acute Renal Failure (Homer W. Smith, 1951)
- Acute Tubular Necrosis, Acute Uremia, Acute Azotemia …
- Acute Kidney Injury/Impairment (Acute Dialysis Quality Initiative, 2004)
- Acute Kidney Diseases and Disorders (KDIGO, 2012)

AKİ, CKD ve AKD Entegrasyonu için Kavramsal Model

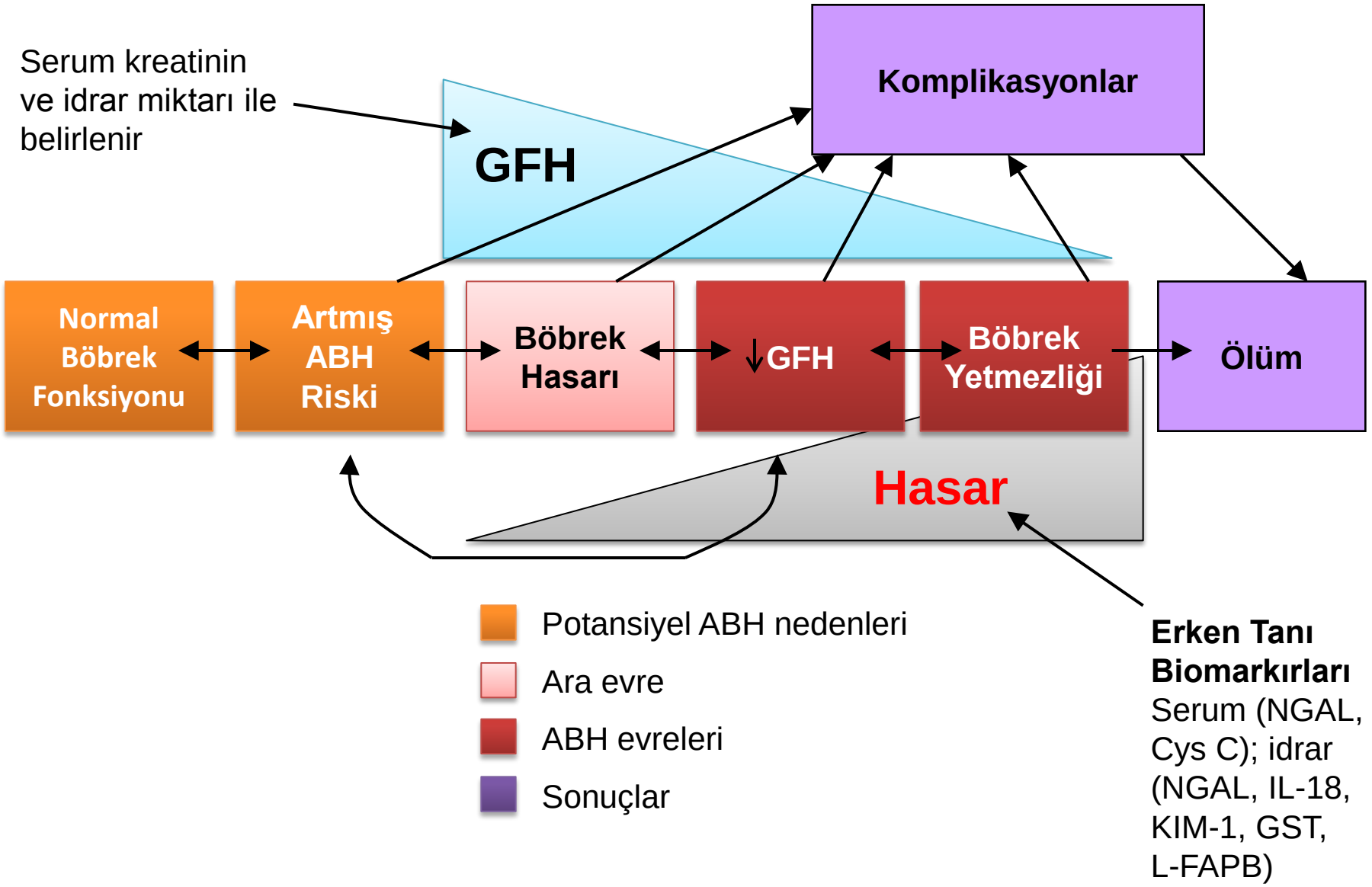


AKI, Acute Kidney Injury

AKD, Acute Kidney Diseases and Disorders

CKD, Chronic Kidney Disease

ABH için Kavramsal Modeller



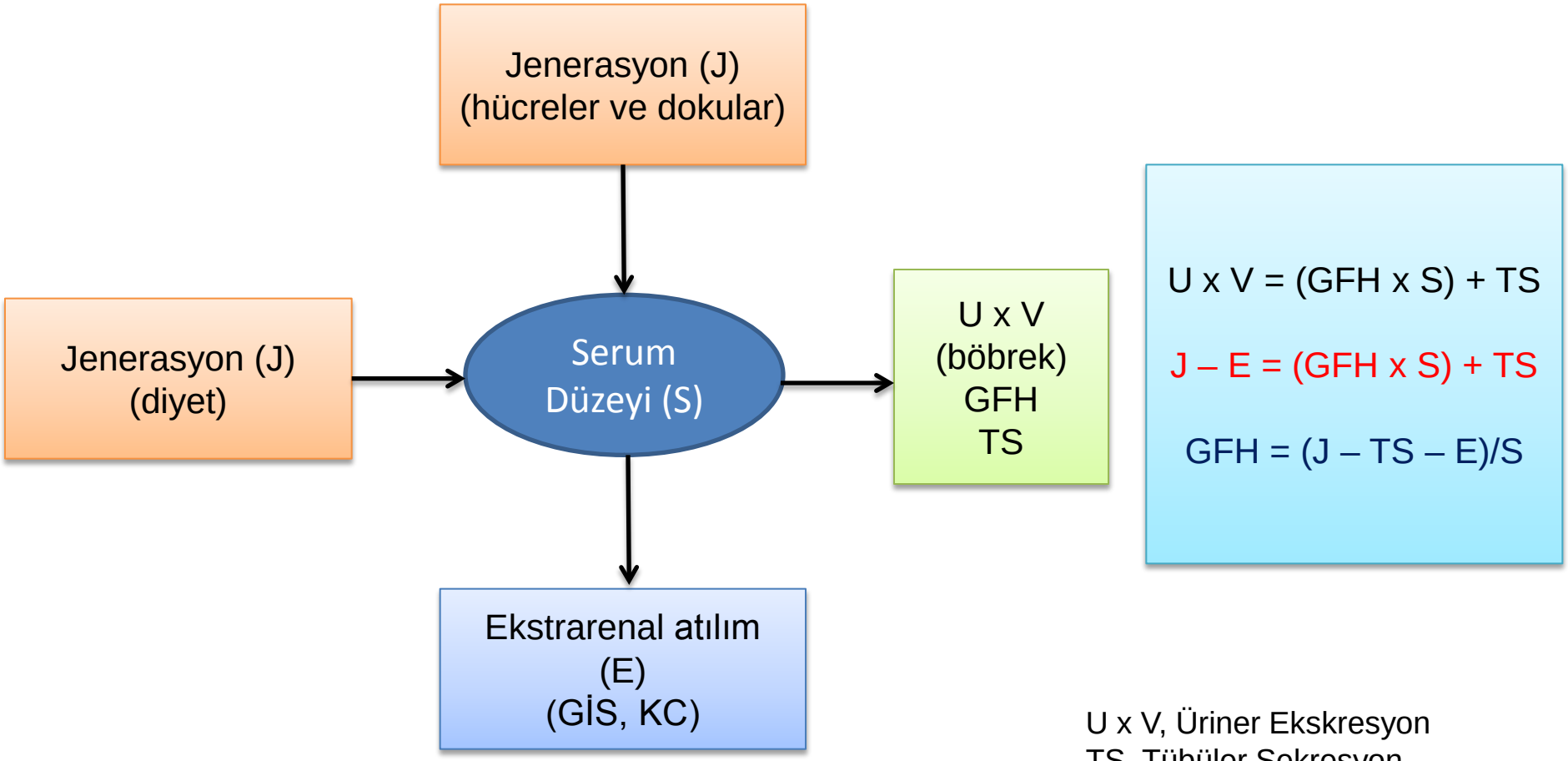
❖ABH tanısı; tüm kısıtlamalara ve yeni gelişmelere rağmen,

- Artmış serum kreatinin seviyesi
- İdrar miktarında azalma temelinde yapılmaktadır

ABH Tanısı için Serum Kreatinin Düzeyi

- Böbrek fonksiyonunu değerlendirmek için kullanılan **en yaygın parametre**
- Geniş normal aralık **0.6 – 1.4 mg/dl**
- Birçok faktör böbrek fonksiyonundan bağımsız olarak serum kreatinini etkilemekte
  - Hemodinamik değişiklikler
  - Böbrek dışı atılım
  - Tübüler sekresyon
- Üretimi kas kitlesi ile doğru orantılı
  - Yaş
  - Cinsiyet
  - Vücut ağırlığı
  - Diyet (protein alımı, pişmiş et)

Serum Kreatinin Düzeyinin Belirleyicileri



U x V, Üriner Ekskresyon
TS, Tübüler Sekresyon
GFH, Glomerüler Filtrasyon Hızı

Kreatinin Klirensindeki %90 Akut Azalma sonrasında Serum Kreatinindeki Zaman-Bağımlı Değişiklikler

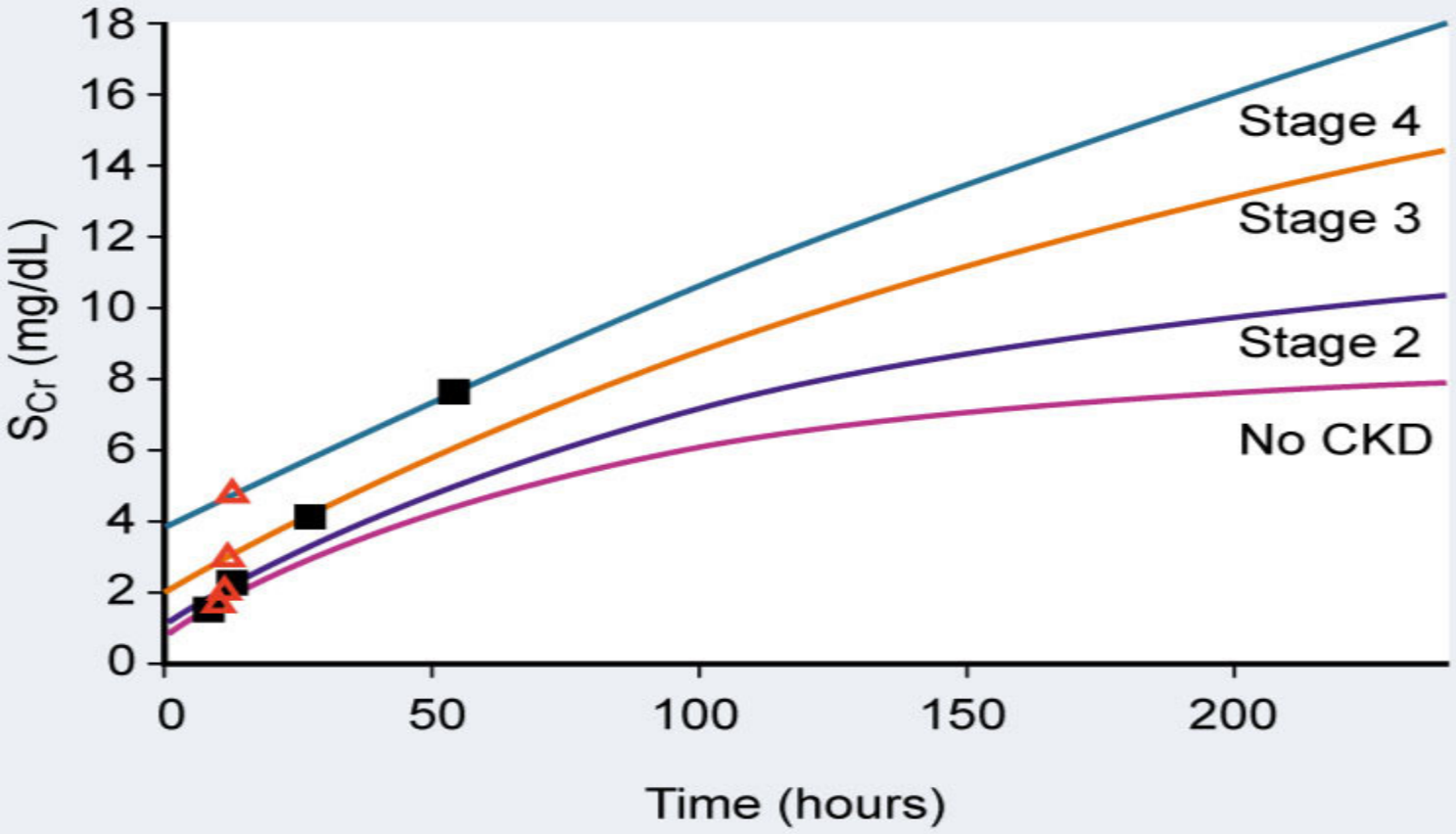


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Fig. 68-2. **A model of time-dependent changes in S_{Cr} concentrations after an abrupt 90% reduction in CrCl, reflecting the pattern of increase at four different stages of baseline kidney function (no CKD and stages 2 to 4 CKD).** *Solid squares* show the point at which a 100% increase in S_{Cr} has occurred; open triangles show the point at which an increase of 1.0 mg/dl in S_{Cr} has occurred. SCr, serum creatinine; CrCl, creatinine clearance; CKD, chronic kidney disease.

❖ En önemli kısıtlama, GFH'daki reel azalmadan sonra olan **gecikmiş** serum kreatinin yükselmesidir

❖ ABH tanısında gecikme (özellikle yoğun bakım hastaları ile yaşlı hastalarda)

❖ Tedavinin ve koruyucu önlemlerin alınmasında gecikme

- Bu problemin etkisini azaltmak için [*hastanın volüm durumu maksimum olarak optimize edildikten sonra*] mevcut serum kreatinin düzeyi tanı aralığına göre değil, **bireyselleştirilmiş** değerlere göre ABH tanısı konulması önerilmektedir

- RIFLE kriterleri (2004)
- AKIN kriterleri (2007)
- KDIGO ve ERBP kriterleri (2012)

❖ Akut Diyaliz Kalite Girişimi (Acute Dialysis Quality Initiative, ADQI ABH tanı ve sınıflandırması için,

- Bazal değere göre serum kreatinin düzeyi artışı
- Bazal değere göre GFH azalması
- İdrar miktarına dayalı bir konsensüs geliştirdi

- **R – renal risk**
- **I – injury**
- **F – failure**
- **L – loss of kidney function**
- **E – end stage renal disease**

RIFLE Kriterleri (7 gün içerisinde)

Sınıf	GFH kriterleri	İdrar çıkış kriterleri
R – Risk	Kreatinin artışı X 1.5 *ya da* GFR azalması >%25	<0.5 ml/kg/sa X 6 sa
I – Injury	Kreatinin artışı X 2 *ya da* GFR azalması >%50	<0.5 ml/kg/sa X 12 sa
F – Failure	Kreatinin artışı X 3 *ya da* GFR azalması >%75 *ya da* kreatinin artışı >4 mg/dl (akut artış >0.5 mg)	<0.3 ml/kg/sa X 24 sa (oligüri) *ya da* anüri X 12 sa
L – Loss	Kalıcı böbrek fonksiyon kaybı (>4 hafta)	
E – ESRD	Son dönem böbrek hastalığı (>3 ay)	

Sensitif

Spesifik

- Acute Kidney Injury Network (AKIN) ‘R-Risk’ evresinde de mortalitede belirgin artış saptandığı için bazı düzeltmeler yaparak ABH tanı ve sınıflandırmasını değiştirdi
  - Serum kreatinin artışı daha da aşağı çekildi
  - GFH kriteri kaldırıldı
  - Olay gelişme süresi 48 saate indirildi
  - ABH 3 evreye ayrıldı
  - İdrar miktarı değiştirilmedi

AKIN Kriterleri (48 saat içerisinde)

Evre	Serum kreatinin kriterleri	İdrar çıkış kriterleri
1	Kreatinin artışı X 1.5-2 *ya da* >0.3 mg/dl (48 saat içerisinde)	<0.5 ml/kg/sa X 6 sa
2	Kreatinin artışı X 2-3	<0.5 ml/kg/sa X 12 sa
3	Kreatinin artışı X 3 *ya da* >4mg/dl (akut artış >0.5 mg/dl) *ya da* RRT	<0.3 ml/kg/sa X 24 sa *ya da* anüri X 12 sa

RIFLE&AKIN Geçerlilik Çalışmaları

- 1 milyona yakın hastada bu kriterlerin geçerliliği araştırılmıştır
- Her bir çalışmada binleri geçen hasta sayıları yer almıştır
- Çok çeşitli hasta grupları ayrı ayrı çalışılmıştır (erişkin, çocuk, yoğun bakım, transplantasyon, yanık, kardiyak cerrahi, travma, sepsis, HIV, siroz, hastane içi …)
- Bu kriterlerin hastane mortalitesi, böbrek fonksiyonlarının iyileşme süresi, RRT ihtiyacı ve hastanede kalma süresi ile anlamlı olarak ilişkili olduğu saptanmıştır
- Serum kreatinin düzeyindeki çok ufak artışların (≥0.3 mg/dl) bile mortalite üzerine anlamlı etkisi olduğunu göstermiştir

kidney
INTERNATIONAL
supplements

KDIGO Clinical Practice Guideline for Acute Kidney Injury

VOLUME 2 | ISSUE 1 | MARCH 2012

ABH için KDIGO Rehberi (Mart 2012)

- RIFLE ve AKIN kriterlerinin geçerliliği temel alınarak klinik uygulamalar, araştırmalar ve halk sağlığı için **tek bir basit tanımlama** ile ABH tanısı koymak amacıyla geliştirilmiştir
- Bazal serum kreatinin düzeyi ve idrar çıkış miktarı kullanılmaktadır
- AKIN kriterlerine benzer olarak ABH 3 ayrı evreye ayrılmıştır

KDIGO Rehberine göre ABH Tanısı

- Aşağıdakilerden herhangi birisinin varlığı ABH olarak tanımlanır:
  - 48 saat içinde serum kreatinin düzeyinde ≥0.3 mg/dl artış olması (derecelendirilmemiş) *ya da*
  - Son 7 gün içerisinde ortaya çıktığı bilinen ya da tahmin edilen serum kreatinin düzeyinde bazale göre ≥1.5 kat artış olması (derecelendirilmemiş) *ya da*
  - İdrar çıkışı 6 saattir <0.5 ml/kg/saat (derecelendirilmemiş)

KDIGO Rehberine göre ABH Evreleri

Evre	Serum kreatinin düzeyi	İdrar miktarı
1	Bazal değerden 1.5-1.9 kat *ya da* ≥0.3 mg/dl artış	6-12 saattir <0.5 ml/kg/saat
2	Bazal değerden 2.0-2.9 kat artış	≥12 saattir <0.5 ml/kg/saat
3	Bazal değerden 3 kat artış *ya da* Serum kreatinin >4.0 mg/dl *ya da* RRT başlanması *ya da* <18 yaş hastalarda eGFR'de <35 ml/dk/1.73 m^2 azalma	≥24 saattir <0.3 ml/kg/saat *ya da* ≥12 saattir anüri

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NDT Perspectives

A European Renal Best Practice (ERBP) position statement on the Kidney Disease Improving Global Outcomes (KDIGO) Clinical Practice Guidelines on Acute Kidney Injury: Part 1: definitions, conservative management and contrast-induced nephropathy†

The ad-hoc working group of ERBP: Danilo Fliser[1], Maurice Laville[2], Adrian Covic[3], Denis Fouque[4], Raymond Vanholder[5], Laurent Juillard[2] and Wim Van Biesen[5]

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†This document has been produced according to the instructions for authors of ERBP (see www.european-renal-best-practice.org).

ABH için ERBP Rehberi (Ekim 2012)

- Mart 2012 de yayınlanan KDIGO ABH kriterlerine karşı ERBP nin pozisyonunu ifade etmek için yayınlanmıştır
- Genel olarak kabul edilmekle birlikte bazı noktalara karşı çıkılmaktadır
- Literatür dayanaklarında eksiklik olduğu belirtilmektedir
- KDIGO kriterlerine benzer olarak, bazal serum kreatinin düzeyi ve idrar çıkış miktarı kullanılmaktadır
- ABH 3 ayrı evreye ayrılmıştır

ABH için ERBP Rehberi (Ekim 2012)

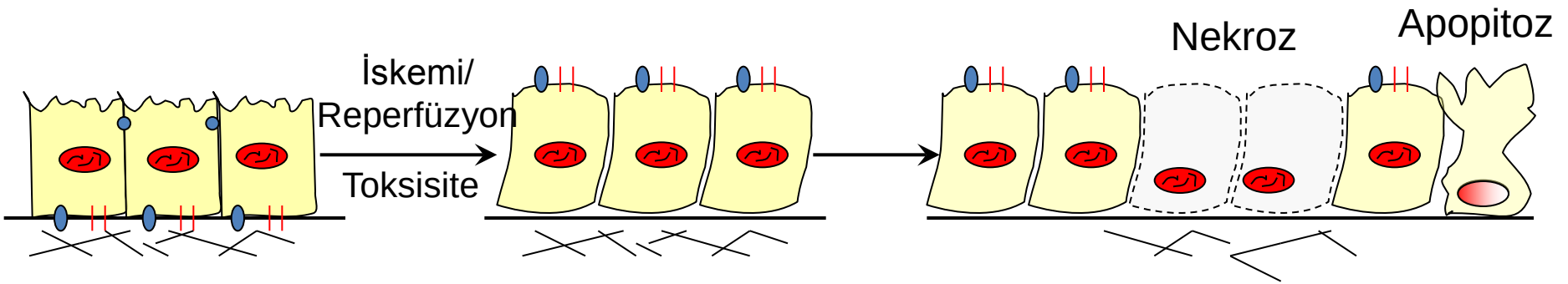
- KDIGO'nun aksine ABH için henüz direkt tanı kriteri koymamıştır
- ABH tanısı için bazal serum kreatinin düzeyi ve idrar çıkış miktarının **birlikte** kullanılmasını önermektedir (1C)
- Bazal kreatinin değeri olarak geçmiş değerlerden ziyade hastaneye ilk başvurudaki değeri temel almaktadır (1C)
- İdrar çıkış kriteri için 'shift-based' hesaplamayı (1C) ve 'ml/dk/kg' için reel vücut ağırlığından ziyade ideal vücut ağırlığının kullanılmasını (derecelendirilmemiş) önermektedir

ERBP Rehberine göre ABH Evreleri

Evre	Serum kreatinin düzeyi	İdrar miktarı
1	Bazal değerden 1.5-1.9 kat *ya da* >0.3 mg/dl artış	6 saatlik blok boyunca <0.5 ml/kg/saat
2	Bazal değerden 2.0-2.9 kat artış	İki 6 saatlik blok boyunca <0.5 ml/kg/saat
3	Bazal değerden 3 kat artış *ya da* Serum kreatinin >4.0 mg/dl *ya da* RRT başlanması	24 saatten daha uzun süre boyunca <0.3 ml/kg/saat *ya da* ≥12 saattir anüri

ABH Erken Tanı Biyomarkırları

- Böbrek hasarı sonrası böbrekten kana ve idrara salınan çeşitli biyomarkırlar, henüz serum kreatinin artışı olmadan, ABH'nı daha erken dönemde tanımlayabilir



Normal epitelyum

Hasarlaşma

Hücre ölümü

ABH erken tanısı için potansiyel biomarkırlar

NAG	NGAL
RBP	FABP
Cys C	NHE 3
KIM-1	Fetüin A
IL-18	Clusterin
Mikroglobülinler	OPN

↓ GFR

ABH tanısı için gecikmiş biomarkırlar

↑ Serum kreatinin
↑ Serum üre

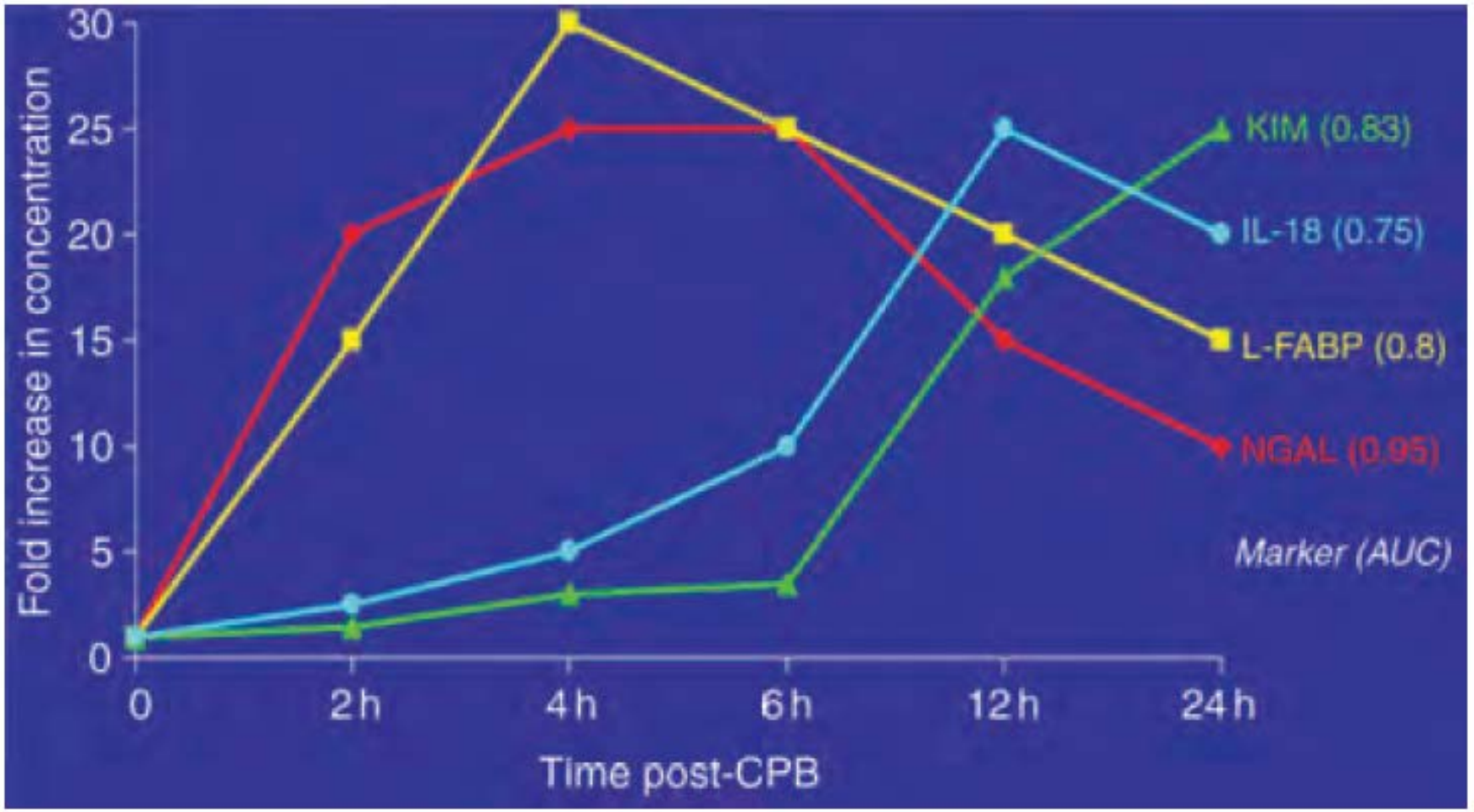
ABH için İdeal Biyomarkır Özellikleri

- Non-invasive olmalı, erken tanı koymalı
- İdrar ve kan gibi basit örneklerde kolayca saptanmalı
- ABH için yüksek duyarlılık ve özgüllüğe sahip olmalı
- Hasarın süresi, etiyolojisi ve doğası hakkında bilgi vermeli
- Hem böbrek fonksiyonunu hem de hasarı ölçebilmeli
- ABH'nın şiddetini ve iyileşmesini öngörebilmeli
- Diğer biyolojik değişkenlerden etkilenmemeli
- Pahalı olmamalı

Biyomarkırların Gelişim Süreci

Akut Böbrek		Kronik Böbrek Hastalığı
Serum Kreatinin 1926		Serum Kreatinin 1926
Biyomarkırların Keşfedilmeleri	Biyomarkırların İnsan Çalışmalarında Kullanılması	Kreatinin klirensi 1933
KIM-1 1961	İdrar KIM-1 2002	Cockcroft Gault formülü 1976
Cystatin C 1968	Serum Cystatin C 1985	Serum Cyctatin C 1985
IL-18 1985	İdrar IL-18 2004	MDRD formülü 1999
NGAL 1993	İdrar NGAL 2005	

KPB Cerrahisi sonrası ABH Gelişen Hastalardaki İdrar Biyomarkır Düzeyleri



Neutrophil Gelatinase-Associated Lipocalin (NGAL)

- Böbrek tübül hücrelerinden eksprese edilen lipocalin ailesinden 25 kD ağırlığında küçük bir proteindir
- Tübüler hasar sonrası idrar ve kana geçer
- En çok ümit veren erken tanı biyomarkırıdır
- ABH sonrası en erken dönemde idrar düzeyi artar
- ABH erken tanısında serum düzeyleri de kullanışlıdır
- Farklı hasta gruplarında benzer sonuçlar vermiştir

Accuracy of Neutrophil Gelatinase-Associated Lipocalin (NGAL) in Diagnosis and Prognosis in Acute Kidney Injury: A Systematic Review and Meta-analysis

Michael Haase, MD,[1] Rinaldo Bellomo, MD,[2] Prasad Devarajan, MD,[3] Peter Schlattmann, MD, MSc,[4] and Anja Haase-Fielitz, PharmD,[1] and the NGAL Meta-analysis Investigator Group

Background: Neutrophil gelatinase-associated lipocalin (NGAL) appears to be a promising biomarker for the early diagnosis of acute kidney injury (AKI); however, a wide range in its predictive value has been reported.

Study Design: Meta-analysis of diagnostic test studies using custom-made standardized data sheets sent to each author.

Setting & Population: Different clinical settings of AKI.

Selection Criteria for Studies: MEDLINE, EMBASE, and CENTRAL databases and congress abstracts were searched for studies reporting the value of NGAL to predict AKI.

Index Tests: Plasma/serum and urine NGAL within 6 hours from the time of insult (if known) or 24-48 hours before the diagnosis of AKI if the time of insult was not known.

Reference Tests: The primary outcome was AKI, defined as an increase in serum creatinine level > 50% from baseline within 7 days or contrast-induced nephropathy (creatinine increase > 25% or concentration > 0.5 mg/dL in adults or > 50% increase in children within 48 hours). Other outcomes predicted using NGAL were renal replacement therapy initiation and in-hospital mortality.

Results: Using a hierarchical bivariate generalized linear model to calculate the diagnostic odds ratio (DOR) and sample size–weighted area under the curve for the receiver-operating characteristic (AUC-ROC), we analyzed data from 19 studies and 8 countries involving 2,538 patients, of whom 487 (19.2%) developed AKI. Overall, the DOR/AUC-ROC of NGAL to predict AKI was 18.6 (95% CI, 9.0-38.1)/0.815 (95% CI, 0.732-0.892). The DOR/AUC-ROC when standardized platforms were used was 25.5 (95% CI, 8.9-72.8)/0.830 (95% CI, 0.741-0.918) with a cutoff value > 150 ng/mL for AKI compared with 16.7 (95% CI, 7.1-39.7)/0.732 (95% CI, 0.656-0.830) for "research-based" NGAL assays. In cardiac surgery patients, the DOR/AUC-ROC of NGAL was 13.1 (95% CI, 5.7-34.8)/0.775 (95% CI, 0.669-0.867); in critically ill patients, 10.0 (95% CI, 3.0-33.1)/0.728 (95% CI, 0.615-0.834); and after contrast infusion, 92.0 (95% CI, 10.7-794.1)/0.894 (95% CI, 0.826-0.950). The diagnostic accuracy of plasma/serum NGAL (17.9 [95% CI, 6.0-53.7]/0.775 [95% CI, 0.679-0.869]) was similar to that of urine NGAL (18.6 [95% CI, 7.2-48.4]/0.837 [95% CI, 0.762-0.906]). We identified age to be an effective modifier of NGAL value with better predictive ability in children (25.4 [95% CI, 8.9-72.2]/0.930 [95% CI, 0.883-0.968]) compared with adults (10.6 [95% CI, 4.8-23.4]/0.782 [95% CI, 0.689-0.872]). NGAL level was a useful prognostic tool with regard to the prediction of renal replacement therapy initiation (12.9 [95% CI, 4.9-33.9]/0.782 [95% CI, 0.648-0.917]) and in-hospital mortality (8.8 [95% CI, 1.9-40.8]/0.706 [95% CI, 0.530-0.747]).

Limitations: Serum creatinine level was used for AKI definition.

Conclusions: NGAL level appears to be of diagnostic and prognostic value for AKI.

Am J Kidney Dis 54:1012-1024.

INDEX WORDS: Neutrophil gelatinase-associated lipocalin (NGAL); plasma NGAL; urine NGAL; meta-analysis; acute kidney injury (AKI).

AJKD - Sistematik Review ve Metanaliz

- 8 farklı ülkeden 19 klinik çalışma,
- 2538 hasta sayısı (çocuk ve erişkin)
- Ağırlıklı olarak KPB cerrahisi geçirmiş hastalar
- İndeks testler olarak serum/plazma ve idrar NGAL düzeyleri hasardan 6 saat önce ya da ABH tanısından 24-48 önce ölçülmüş
- Sonuçta, idrar ve serum NGAL seviyeleri ABH nın erken tanısında kullanışlı bulunmuştur

Urine Neutrophil Gelatinase-Associated Lipocalin Moderately Predicts Acute Kidney Injury in Critically Ill Adults

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ABSTRACT

Urine neutrophil gelatinase-associated lipocalin (uNGAL) has shown promise as a biomarker for the early detection of acute kidney injury (AKI) in fixed models of injury, but its ability to predict AKI and provide prognostic information in critically ill adults is unknown. We prospectively studied a heterogeneous population of 451 critically ill adults, 64 (14%) and 86 (19%) of whom developed AKI within 24 and 48 h of enrollment, respectively. Median uNGAL at enrollment was higher among patients who developed AKI within 48 h compared with those who did not (190 *versus* 57 ng/mg creatinine, $P < 0.001$). The areas under the receiver operating characteristic curves describing the relationship between uNGAL level and the occurrence of AKI within 24 and 48 h were 0.71 (95% Confidence Intervals [CI]: 0.63 to 0.78) and 0.64 (95% CI: 0.57 to 0.71), respectively. Urine neutrophil gelatinase-associated lipocalin remained independently associated with the development of AKI after adjustment for age, serum creatinine closest to enrollment, illness severity, sepsis, and intensive care unit (ICU) location, although it only marginally improved the predictive performance of the clinical model alone. A Cox proportional hazards model using time to first dialysis, adjusted for APACHE II score, suggested that uNGAL independently predicts severe AKI during hospitalization [HR 2.60, 95% CI:1.55 to 4.35]. In summary, although a single measurement of uNGAL exhibited moderate predictive utility for the development and severity of AKI in a heterogeneous ICU population, its additional contribution to conventional clinical risk predictors appears limited.

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Plasma neutrophil gelatinase-associated lipocalin is an early biomarker for acute kidney injury in an adult ICU population

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Electronic supplementary material
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Abstract *Purpose:* Neutrophil gelatinase-associated lipocalin (NGAL) is a useful marker for acute kidney injury (AKI), particularly when the timing of renal insult is known. However, its performance in an adult critical care setting has not been well described. We performed this study to estimate the diagnostic accuracy of plasma NGAL for early detection of AKI and need for renal had AKI during their ICU stay. Plasma NGAL was a good diagnostic marker for AKI development within the next 48 h (area under ROC 0.78, 95% CI 0.65–0.90), and for RRT use (area under ROC 0.82, 95% CI 0.70–0.95). Peak plasma NGAL concentrations increased with worsening AKI severity ($R = 0.554$, $P < 0.001$). *Conclusions:* Plasma NGAL is a useful early marker for AKI in a heterogeneous adult ICU population, in which the timing of renal insult is largely unknown. It allows the diagnosis of AKI up to 48 h prior to a clinical diagnosis based on AKI consensus definitions. Additionally, it predicts need for RRT and correlates with AKI severity.

Urinary Biomarkers in the Early Detection of Acute Kidney Injury after Cardiac Surgery

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Background and objectives: Serum creatinine (Scr) does not allow for early diagnosis of acute kidney injury (AKI). The diagnostic utility of urinary kidney injury molecule-1 (KIM-1), N-acetyl-β-D-glucosaminidase (NAG), and neutrophil gelatinase associated lipocalin (NGAL) was evaluated for the early detection of postoperative AKI in a prospective study of 90 adults undergoing cardiac surgery.

Designs, setting, participants, & measurements: Urinary KIM-1, NAG, and NGAL were measured at 5 time points for the first 24 h after operation and normalized to the urinary creatinine concentration after cardiac surgery. Receiver-operating characteristic curves were generated and the areas under the curve (AUCs) compared for performance of biomarkers in detection of postoperative AKI.

Results: Thirty-six patients developed AKI, defined as an increase in Scr of ≥0.3 mg/dl within 72 h after surgery. The AUCs for KIM-1 to predict AKI immediately and 3 h after operation were 0.68 and 0.65; 0.61 and 0.63 for NAG; and 0.59 and 0.65 for NGAL, respectively. Combining the three biomarkers enhanced the sensitivity of early detection of postoperative AKI compared with individual biomarkers: the AUCs for the three biomarkers combined were 0.75 and 0.78. The performance of combining biomarkers was even better among 16 early postoperative AKI patients with AUCs of 0.80 and 0.84, respectively.

Conclusions: The results of this study support that a combination of urinary biomarkers may allow for early detection of postoperative AKI after cardiac surgery before a rise in Scr.

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Acute Kidney Injury During Liver Transplantation as Determined by Neutrophil Gelatinase-Associated Lipocalin

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Acute kidney injury (AKI) has significant prognostic implications for long-term outcomes in patients undergoing liver transplantation. In several retrospective studies, perioperative variables have been associated with AKI. These variables have been mainly associated with changes in creatinine concentrations over several days or months post-transplantation. To better define AKI, new markers have become available that help to identify patients at risk for renal injury within hours of a triggering insult. We prospectively enrolled liver transplant patients at our institutions to evaluate neutrophil gelatinase-associated lipocalin (NGAL), a marker of early renal injury, as a surrogate for AKI in patients undergoing liver transplantation. Blood was prospectively collected at predetermined time points from 59 patients at 2 institutions. The electronic anesthesia records and the hospital computer data system were reviewed for perioperative variables. Data collection included patient demographics, intraoperative variables such as fluid management, transfusion requirements, hemodynamics, and urine output. Subsequently, patients were grouped according to the presence of risk for developing AKI as defined by the RIFLE (risk, injury, failure, loss, and end-stage kidney disease) criteria. The difference between the NGAL concentration 2 hours after reperfusion and the baseline NGAL concentration was predictive of AKI in all patients, including patients with preexisting renal dysfunction. In patients with creatinine concentrations less than 1.5 mg/dL, a single NGAL determination 2 hours after reperfusion of the liver was associated with the development of AKI. Total occlusion of the inferior vena cava was associated with AKI. In conclusion, NGAL concentrations obtained during surgery were highly associated with postoperative AKI in patients undergoing liver transplantation. These findings will allow the design of larger interventional studies. Our findings regarding the impact of surgical techniques and glucose require validation in larger studies. *Liver Transpl 15:1852-1860, 2009.*

Cyctatin C

- Çekirdekli hücreler tarafında üretilen bir proteindir
- Glomerüllerden serbest olarak filtre edilir
- GFH'nın fonksiyonel bir markırıdır
- Erken böbrek hasarını nispeten daha geç gösterir
- Serum kreatinine bir alternatif olarak düşünülmüştür
- İlk sonuçlar ümit verici olsa da son çalışmalarda kreatinine bir üstünlüğü saptanamamıştır

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Serum Cystatin C- Versus Creatinine-Based Definitions of Acute Kidney Injury Following Cardiac Surgery: A Prospective Cohort Study.

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Abstract

BACKGROUND: The primary aim of this study was to compare the sensitivity and rapidity of acute kidney injury (AKI) detection by cystatin C level relative to creatinine level after cardiac surgery.

STUDY DESIGN: Prospective cohort study.

SETTINGS & PARTICIPANTS: 1,150 high-risk adult cardiac surgery patients in the TRIBE-AKI (Translational Research Investigating Biomarker Endpoints for Acute Kidney Injury) Consortium.

PREDICTOR: Changes in serum creatinine and cystatin C levels.

OUTCOME: Postsurgical incidence of AKI.

MEASUREMENTS: Serum creatinine and cystatin C were measured at the preoperative visit and daily on postoperative days 1-5. To allow comparisons between changes in creatinine and cystatin C levels, AKI end points were defined by the relative increases in each marker from baseline (25%, 50%, and 100%) and the incidence of AKI was compared based on each marker. Secondary aims were to compare clinical outcomes among patients defined as having AKI by cystatin C and/or creatinine levels.

RESULTS: Overall, serum creatinine level detected more cases of AKI than cystatin C level: 35% developed a ≥25% increase in serum creatinine level, whereas only 23% had a ≥25% increase in cystatin C level ($P < 0.001$). Creatinine level also had higher proportions meeting the 50% (14% and 8%; $P < 0.001$) and 100% (4% and 2%; $P = 0.005$) thresholds for AKI diagnosis. Clinical outcomes generally were not statistically different for AKI cases detected by creatinine or cystatin C level. However, for each AKI threshold, patients with AKI confirmed by both markers had a significantly higher risk of the combined mortality/dialysis outcome compared with patients with AKI detected by creatinine level alone ($P = 0.002$).

LIMITATIONS: There were few adverse clinical outcomes, limiting our ability to detect differences in outcomes between subgroups of patients based on their definitions of AKI.

CONCLUSIONS: In this large multicenter study, we found that cystatin C level was less sensitive for AKI detection than creatinine level. However, confirmation by cystatin C level appeared to identify a subset of patients with AKI with a substantially higher risk of adverse outcomes.

ABH Biyomarkırları ile ilgili Problemler

- Küçük hasta gruplu çalışmalar
- Tek merkezli
- Ağırlıklı olarak CPB cerrahisi geçirmiş ya da kontrast almış hastalardan oluşuyor
- Karşılaştırmalar serum kreatinini ile yapıldığı için tanı değeri zayıf kalmakta
- Maliyetler henüz pahalı

ABH’nın Tanısında Güncel Durum

- ABH’da yeni bir isimlendirme ve kavramsal modeller oluşturma girişimleri var
- Serum kreatinin değeri önemini koruyor
- Bu önemin derecesi ve evrelendirme hakkındaki tartışmalar sürüyor (KDIGO *vs* ERBP)
- ABH tanısı için serum kreatinin ve idrar çıkışının birlikte kullanılması daha akılcı olabilir
- Erken tanı markırları için biraz daha yol almak gerekiyor