

TBD-BD preanalitik evre sempozyumu
ODTÜ Mezunları Derneđi
17.04.2019

KARDİYAK BELİRTEÇLER ve PREANALİTİK
HATA KAYNAKLARI

Uz.Dr. Settar KOSOVA
Zonguldak Çaycuma Devlet Hastanesi

Sunum Planı

- **MI** teşhisinde Yanlış istem
- **hs CTn Hemoliz** etkileşimi
- **hs CTn Biotin** etkileşimi

MI: *Miyokard Enfarktüsü*

hs CTn: *yüksek duyarlı Kard. Trop.*



Miyokard Enfarktüs (MI) teşhisi

- MI teşhisinde Kard. Troponinler kullanılmalı
- CK-MB kullanılmamalı (yanlış istem)



- Errors in test request and interpretation

Dördüncü Evrensel MI tanımı (2018)

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EXPERT CONSENSUS DOCUMENT

Fourth Universal Definition of Myocardial Infarction (2018)



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The Executive Group on behalf of the Joint European Society of Cardiology (ESC)/American College of Cardiology (ACC)/American Heart Association (AHA)/World Heart Federation (WHF) Task Force for the Universal Definition of Myocardial Infarction

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The disclosure forms of all experts involved in the development of this Expert Consensus Document are available on the ESC website www.escardio.org/guidelines.

4. Evrensel (2018) MI tanımı

(5.) *cTn are recommended for routine clinical use*



cTn rutin klinik kullanımı için önerilmekte

4. Evrensel (2018) MI tanımı

(23.) *cTnl and cTnT are the preferred biomarkers recommended to both rule in and rule out myocardial injury,*



(23) *cTnl ve cTnT, tercih edilen biyobelirteçlerdir. Miyokard hasar tanısını koymak veya dışlamak için*

4. Evrensel (2018) MI tanımı

(23) *If a cTn assay is not available, the best alternative is CK-MB measured by a mass assay*



(23) *cTn testi çalışılmıyor ise, en iyi alternatif kütle CK-MB'dir*

Yeni hs CTn testine geiř

- **hs CTn** ile ilgili Klinisyenler bilgilendirilmeli



- Kılavuzlar anlatılmalı ve ortak kararlar **hs CTn** geiř saėlanmalı
- Hemřire ve Laborantlara da sre anlatılmalı

Elektronik istem formu

| | | |
|-------------------------------------|-----------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | KAS ENZİMLERİ | |
| | 902.190-Kreatin kinaz (CK) | <input type="checkbox"/> |
| | 902.260-Laktik Dehidrogenaz (LDH) | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | ACİL KARDİYAK TESTLER | |
| | 904.020-Troponin T | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | EMBOLİ DVT TESTİ | |
| | 904.400-D-dimer (kantitatif) | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | KANDA DİGONİN DÜZİYİ | |
| | 901.790-Digoxin | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | Sevileli Acil | |

HEMOLİZ ETKİLEŞİMİ

HEMOLİZİN SEBEPLERİ

Açılmış damar yolundan kan alma

Uzatılmış turnike uygulaması

İğnenin uygun pozisyonda olmaması(kanın yavaş gelmesi)

Tüpün vakumu bitmeden (tam dolmadan) tüpün çıkarılması

Ön kola masaj yapma ve yumruk sıktırma

Enjektör veya açılmış damar yolundan kan alma

Enjektöre fazla basınç uygulaması

Tüplerin gereğinden fazla ve hızlı çalkalanması

Hemoliz etkileşimi

- Preanalitik hataların başlıca problemlerinden **hemolitik** numunelerdir
- Kardiyak Troponinler belli sınırlar üzerinde **hemolizden** etkilenir
- Hemoliz İndeksi (HI) otomatik ölçülemiyor ise numuneler **renk çizelgesine** göre değerlendirilmeli

Hemoliz

Which laboratory parameters are affected by haemolysis?



(mg/dl)

0

50

100

250

500

1000

Kardiyak Biyo Belirteçlerin Klinik Uygulama Komitesi (IFCC)

www.ifcc.org/ifcc-education-division/emd-committees/committee-on-clinical-applications-of-cardiac-bio-mark

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| F. Apple | Chair | US | 1st | 2017 01 - 2019 12 |
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| G. Lefevre | Member | FR | 1st | 2017 01 - 2019 12 |
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| T. Omland | Member | NO | 1st | 2017 01 - 2019 12 |
| P. Collinson | Consultant | UK | | |
| A. Jaffe | Consultant | US | | |
| J. Ordoñez-Llanos | Consultant | ES | | |

Terms of Reference

Hemolizin hsTroponine etkisi (2018)

| Üretici | Test | Platform | Hemoliz sınırı | Hemoliz etkisi (>sınır) |
|-----------------|---------|---------------|----------------|-------------------------|
| Abbott | hs Tn I | Architect | 500 mg/dl | Belirtilmemiş |
| Abbott | hs Tn I | Alinity i | 500 mg/dl | Belirtilmemiş |
| Beckman-Coulter | hs Tn I | DXI, Access 2 | 400 mg/dl | Belirtilmemiş |
| BioMerieux | hs Tn I | VIDAS | 485 mg/dl | Belirtilmemiş |
| LSI Medience | hs Tn I | PATHFAST | 1000 mg/dl | ↓ |

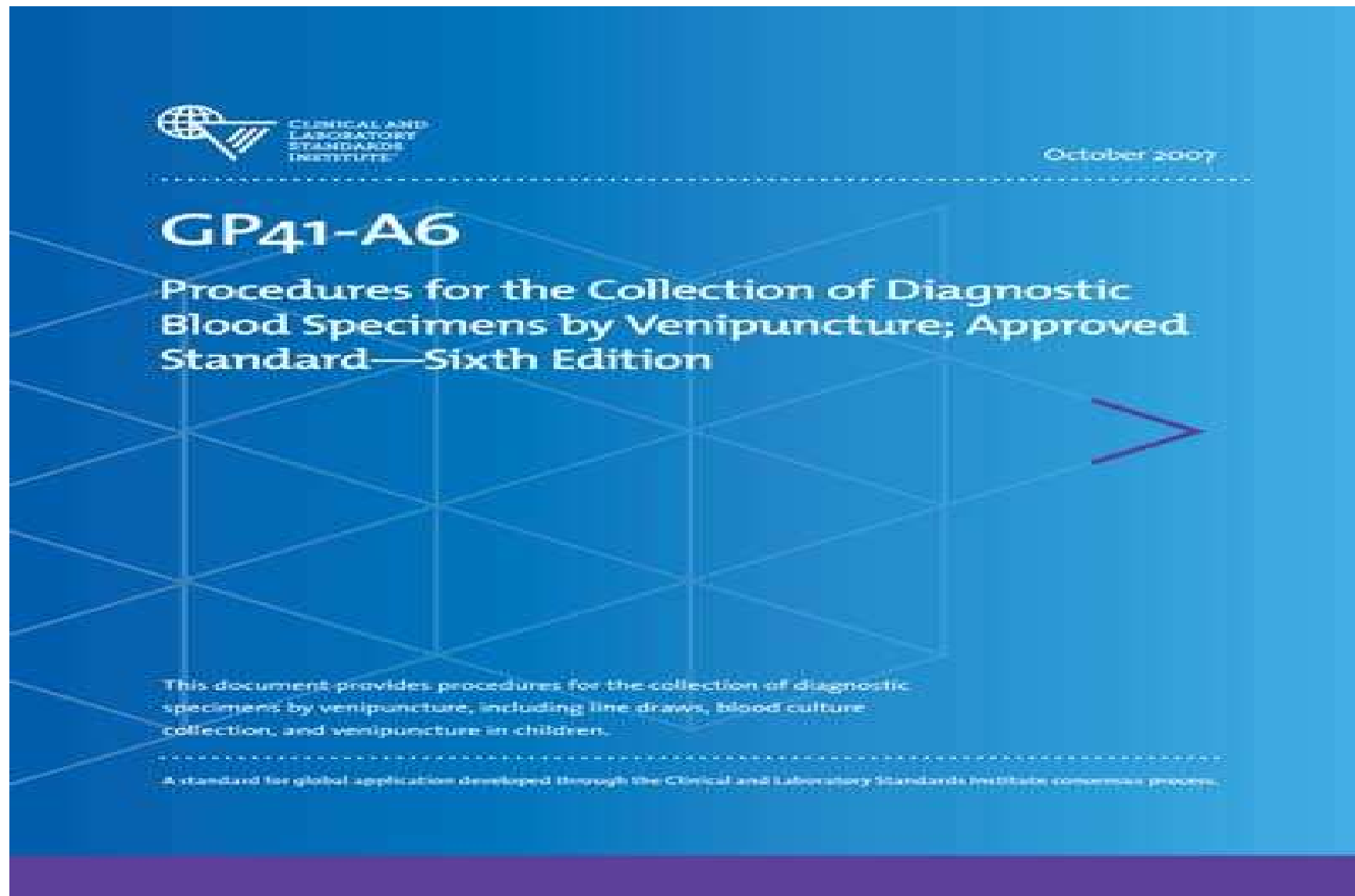
Hemolizin hsTroponine etkisi (2018)

| Üretici | Test | Platform | Hemoliz sınırı | Hemoliz etkisi (>sınır) |
|----------------------|---------|----------------------|----------------|-------------------------|
| Roche Diagnostics | hs Tn T | Modular E 170, cobas | 100 mg/dl | ↓ |
| Siemens Healthineers | hs Tn I | ADVIA Centaur | 500 mg/dl | Belirtilmemiş |
| Siemens Healthineers | hs Tn I | Atellica IM | 500 mg/dl | Belirtilmemiş |
| Siemens Healthineers | hs Tn I | Dimension EXL | 400 mg/dl | Belirtilmemiş |
| Siemens Healthineers | hs Tn I | Dimension Vista | 400 mg/dl | Belirtilmemiş |

Hemolizin HBTC Troponine etkisi (2018)

| Üretici | Test | Platform | Hemoliz sınırı | Hemoliz etkisi (>sınır) |
|------------|------|-------------|----------------|-------------------------|
| Abbott | Tn I | i-STAT | 600 mg/dl | ↓ |
| Quidel | Tn I | Triage | 1000 mg/dl | ↓ |
| Radiometer | Tn I | AQT 90 Flex | 1000 mg/dl | Etkilenmez |
| Radiometer | Tn T | AQT 90 Flex | 200 mg/dl | Etkilenmez |
| Roche | Tn T | h232 | 200 mg/dl | ↓ |

CLSI GP41-A6 Kan alma kılavuzu (2007)



TBD Venöz kan alma kılavuzu (2015)



VENOZ KAN ALMA (FİLEBOTOMİ) KILAVUZU

- Türk Biyokimya Derneği Preanalitik Evre Çalışma Grubu tarafından hazırlanmıştır. 2015-ANKARA
- ISBN 978-605-87229-3-4

EFLM Venöz Kan alma kılavuzu (2018)

eflm-kan alma-kilav.pdf - Adobe Acrobat Reader DC

Dosya Düzenle Görünüm Pencere Yardım

Ana Sayfa Araçlar tbd-kan-alma-kilav... eflm-kan alma-kilav... x

Oturum Aç

Paylaş

EFLM Paper

EFLM
EUROPEAN FEDERATION OF CLINICAL CHEMISTRY
AND LABORATORY MEDICINE

COLABIOCLI

Ana-Maria Simundic*, Karin Bölenius, Janne Cadamuro, Stephen Church, Michael P. Cornes, Edmée C. van Dongen-Lases, Pinar Eker, Tanja Erdeljanovic, Kjell Grankvist, Joao Tiago Guimaraes, Roger Hoke, Mercedes Ibarz, Helene Ivanov, Svetlana Kovalevskaya, Gunn B.B. Kristensen, Gabriel Lima-Oliveira, Giuseppe Lippi, Alexander von Meyer, Mads Nybo, Barbara De la Salle, Christa Seipelt, Zorica Sumarac and Pieter Vermeersch, on behalf of the Working Group for Preanalytical Phase (WG-PRE), of the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) and Latin American Working Group for Preanalytical Phase (WG-PRE-LATAM) of the Latin America Confederation of Clinical Biochemistry (COLABIOCLI)

Joint EFLM-COLABIOCLI Recommendation for venous blood sampling

Hemolizin önlenmesi

- Mümkün olduğunca vakum sistemi ile Venöz kan almak



- Açılmış damar yolundan vakumlu kan alma:

Luer Lok

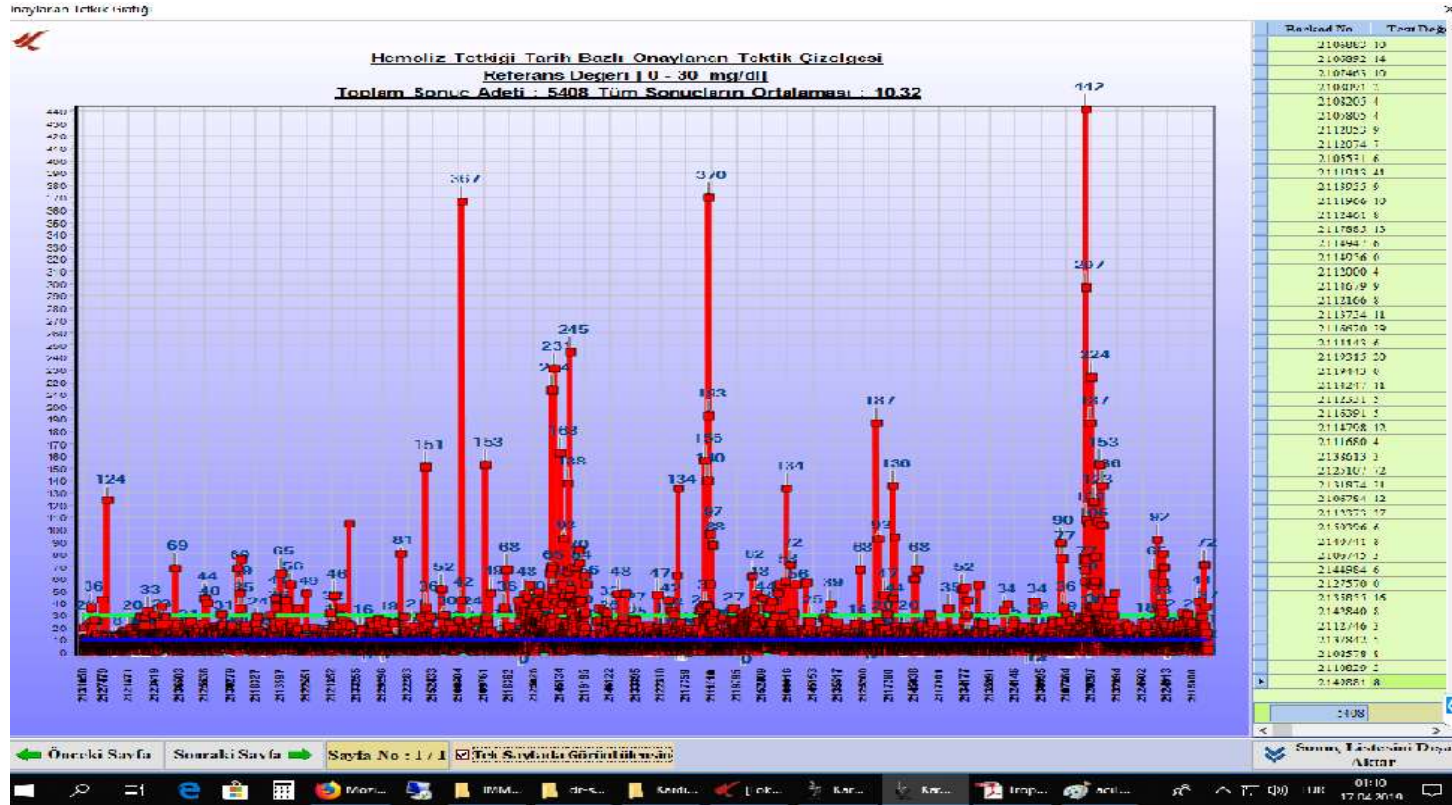


Hemolizin önlenmesi



- Kılavuzların uygulanması
- Acil Poliklinikte kan alma sürecin gözlemi
- Sorumlu Hekim ve Hemşire ile işbirliği
- Uzman dış kuruluş danışmanlık hizmeti

Acil dışı poliklinik Hİ ortalaması: 10,3 mg/dl



BIOTİN ETKİLEŞİMİ

BIOTİN ETKİLEŞİMİ

- Son zamanlarda Biotin tüketimi artmıştır
- Saç ve tırnak ve ayrıca Multipl skleroz tedavisinde kullanılmakta

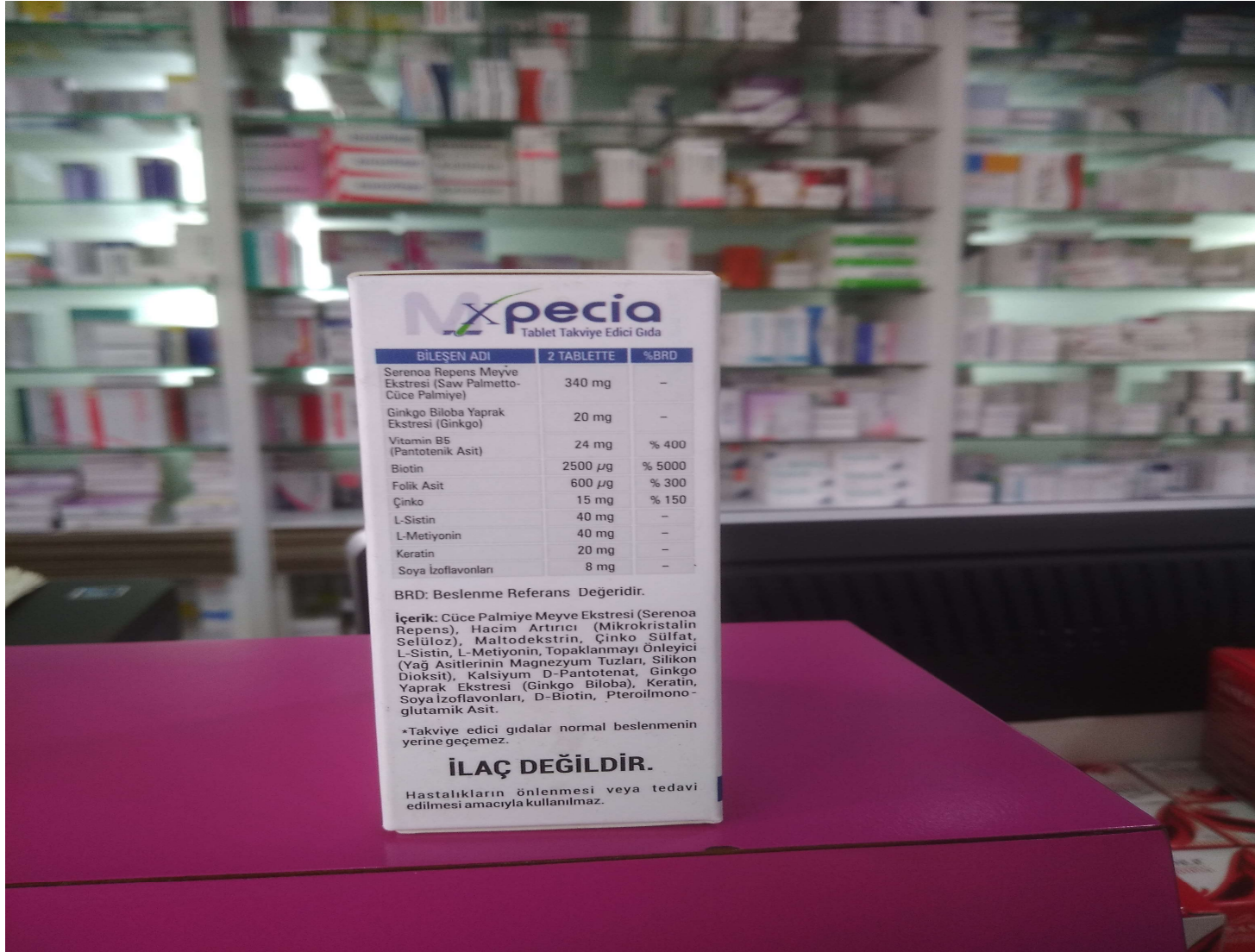


Multi vitamin preparatları (50 µg=0,05 mg)



- Not: Beslenme Referans Değeri (BRD) günlük 50 µg=0,05 mg

Biotin preparatı (2500 µg=2,5 mg)



- Not: Beslenme Referans Değeri (BRD) günlük 50 µg=0,05 mg

BIOTİN ETKİLEŞİMİ

a) Yüksek doz (MS, Onkoloji): 100.000 µg/gün

b) Güzellik vitamin ürünleri: 5.000–10.000 µg/gün

c) İlimli doz ve böbrek yetmezliği durumlarda:

Biotin bazlı platformlarda test etkileşimi mümkün

Normal multivitamin preparat (50 µg/gün) kullanımında etkileşim söz konusu değildir

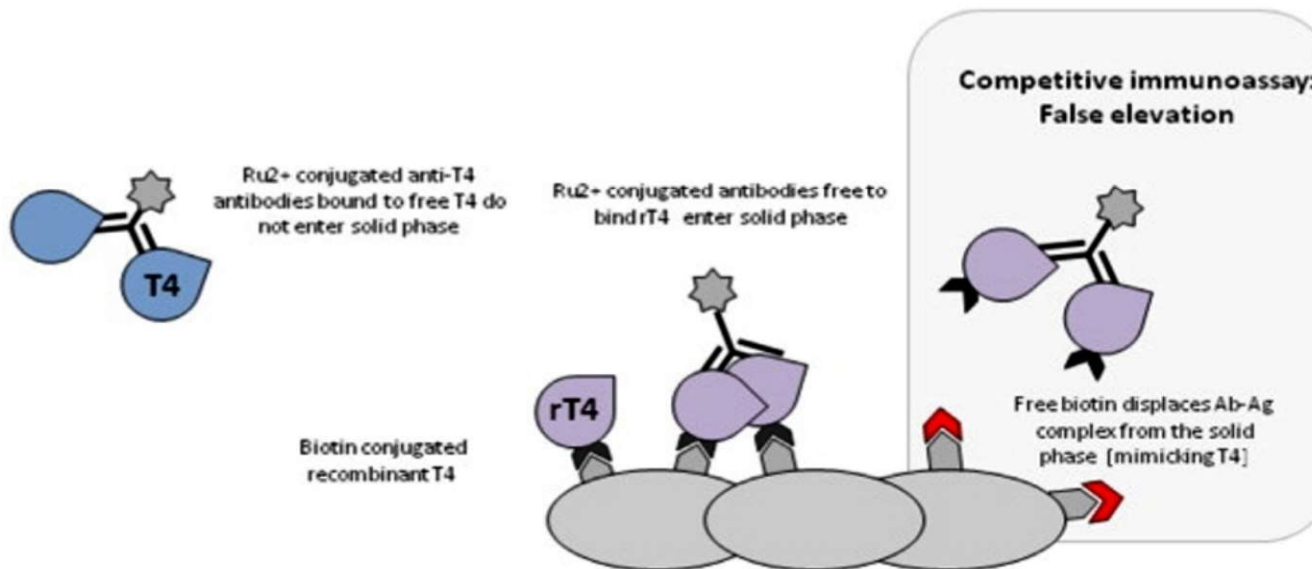
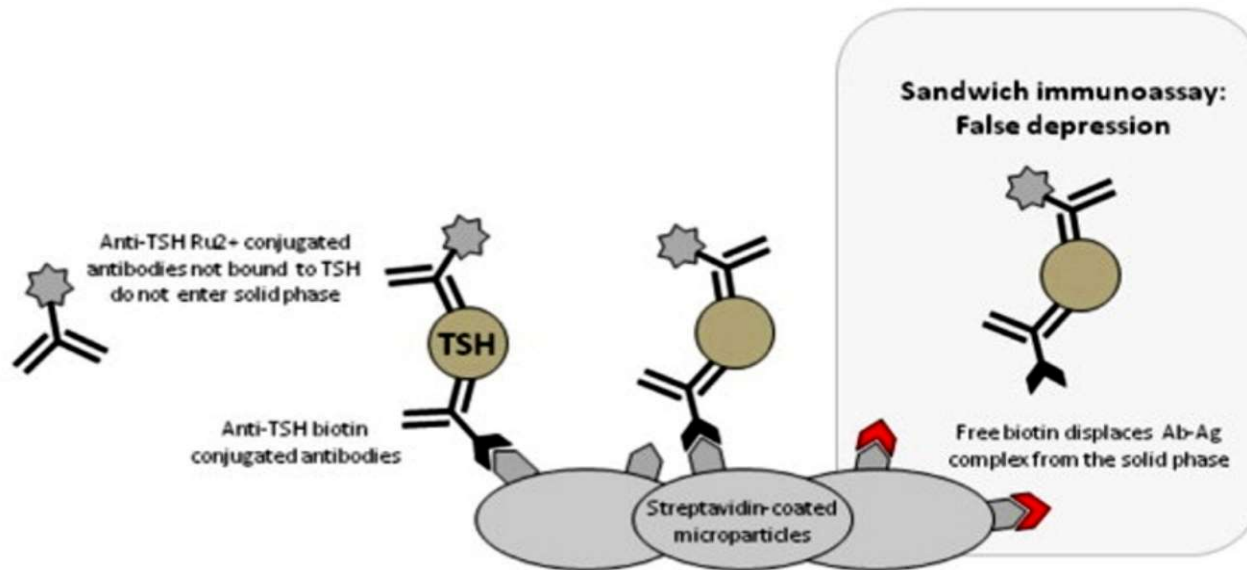
BIOTİN ETKİLEŞİMİ

Kompetitif immün testlerde (\uparrow FT3, \uparrow FT4, \uparrow E2)
yalancı yüksek sonuçlar



Sandviç immün testlerde (\downarrow TSH, \downarrow Troponin)
yalancı düşük sonuçlar

BIOTİN ETKİLEŞİMİ



Biotinin hsTroponine etkisi (2018)

| Üretici | Test | Platform | Biotinize Ab | Testte Biotin kullanımı | İnterfer Sınırı (µg/L) | Biotin etkisi (>sınır) |
|-----------------|---------|---------------|--------------|-------------------------|------------------------|------------------------|
| Abbott | hs Tn I | Architect | Hayır | Hayır | 290 | Belirtilmemiş |
| Abbott | hs Tn I | Alinity i | Hayır | Hayır | 290 | Belirtilmemiş |
| Beckman-Coulter | hs Tn I | DXI, Access 2 | Hayır | Hayır | Belirtilmemiş | Belirtilmemiş |
| BioMerieux | hs Tn I | VIDAS | Evet | Evet | 2000 | Belirtilmemiş |
| LSI Medience | hs Tn I | PATHFAST | Hayır | Hayır | 1500 | Belirtilmemiş |

Biotinin hsTroponine etkisi (2018)

| Üretici | Test | Platform | Biotinize Ab | Testte Biotin kullanımı | İnterfer Sınırı (µg/L) | Biotin etkisi (>sınır) |
|----------------------|---------|----------------------|--------------|-------------------------|------------------------|------------------------|
| Roche Diagnostics | hs Tn T | Modular E 170, cobas | Evet | Evet (conj. Ab) | 21 | ↓ |
| Siemens Healthineers | hs Tn I | ADVIA Centaur | Evet | Evet | 3500 | Belirtilmemiş |
| Siemens Healthineers | hs Tn I | Atellica IM | Evet | Evet | 3500 | Belirtilmemiş |
| Siemens Healthineers | hs Tn I | Dimension EXL | Evet | Evet | 300 | ↓ |
| Siemens Healthineers | hs Tn I | Dimension Vista | Evet | Evet | 300 | ↓ |

Biotinin HBTC Troponine etkisi (2018)

| Üretici | Test | Platfo rm | Biotinize Ab | Testte Biotin kullanımı | İnterfer Sınırı (µg/L) | Biotin etkisi (>sınır) |
|------------|------|-------------------|-------------------|-------------------------------|------------------------------|---------------------------|
| Abbott | Tn I | i-STAT | Hayır | Hayır | Belirtil- memiş | Belirtilmemiş |
| Quidel | Tn I | Triage | Hayır | Hayır | Belirtil- memiş | Belirtilmemiş |
| Radiometer | Tn I | AQT 90 Flex | Evet pre-bound | Evet pre-bound | 3 (araştır- ılıyor) | Uygulanamaz |
| Radiometer | Tn T | AQT 90 Flex | Hayır | Hayır | 50 (araştır- ılıyor) | Uygulanamaz |
| Roche | Tn T | h232 | Evet | Evet (conj. Ab) | 200 | ↓ |

- Biotinden Etkilenebilecek sistemler için:
- Düzenli vitamin kullananlar ve güzellik vitamin takviyesi alan hastalar 12 saat aradan sonra kan verebilir
- >5000 µg/gün Biotin alan hastalar (MS) daha uzun aradan (birkaç gün) sonra kan verebilir



BIOTİN ETKİLEŞİMİ

- Laboratuvar yetkilisi kullandığı platformun **Biotin etkileşim derecesini** (varsa) bilmelidir.
- **Hekim** ve **hasta** konu ile ilgili **bilgilendirilmelidir**.



Kaynakça

1. **Fourth Universal Definition of Myocardial Infarction (2018). JACC/ESC**

DOI: 10.1016/j.jacc.2018.08.1038

2. [Wu AHB](#)¹, [Christenson RH](#)², [Greene DN](#)³, [Jaffe AS](#)⁴, [Kavsak PA](#)⁵, [Ordonez-Llanos J](#)⁶, [Apple FS](#)⁷. **Clinical Laboratory Practice Recommendations for the Use of Cardiac Troponin in Acute Coronary Syndrome: Expert Opinion from the Academy of the American Association for Clinical Chemistry and the Task Force on Clinical Applications of Cardiac Bio-Markers of the International Federation of Clinical Chemistry and Laboratory Medicine.** [Clin Chem](#). 2018 Apr;64(4):645-655. doi: 10.1373/clinchem.2017.277186. Epub 2018 Jan 17.

3. <http://www.ifcc.org/ifcc-education-division/emd-committees/committee-on-clinical-applications-of-cardiac-bio-markers-c-cb/>

4. Giuseppe Lippi, Michael P. Cornes, Kjell Grankvist, Mads Nybo and Ana-Maria Simundic*, on behalf of the Working Group for Preanalytical Phase (WG-PRE), European Federation of Clinical Chemistry and Laboratory Medicine (EFLM). **EFLM WG-Preanalytical phase opinion paper: local validation of blood collection tubes in clinical laboratories.** Clin Chem Lab Med 2016; aop. DOI 10.1515/cclm-2015-1274

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