HIZLI ANTİBİYOTİK DUYARLILIK TESTLERİ

Prof. Dr. Gülşen Çetin Hazırolan

İleri Eğitim Programı
Tanısal Yönetişim
5-6.12.2025, Ankara

Antimicrobial Stewardship Core Team

- Share goals such as minimizing antimicrobial resistance
- Expert in initiative development
- Liaison for dual initiatives

- Compile raw isolate & susceptibility data
- Implement micro-driven initiatives

- Expert in analyzing population-level data
- Support research study design & outcomes reporting

- Design & integrate clinical decision support systems
- Ensure patient- and population-level data interface across systems

*A-II recommendation, others are A-III

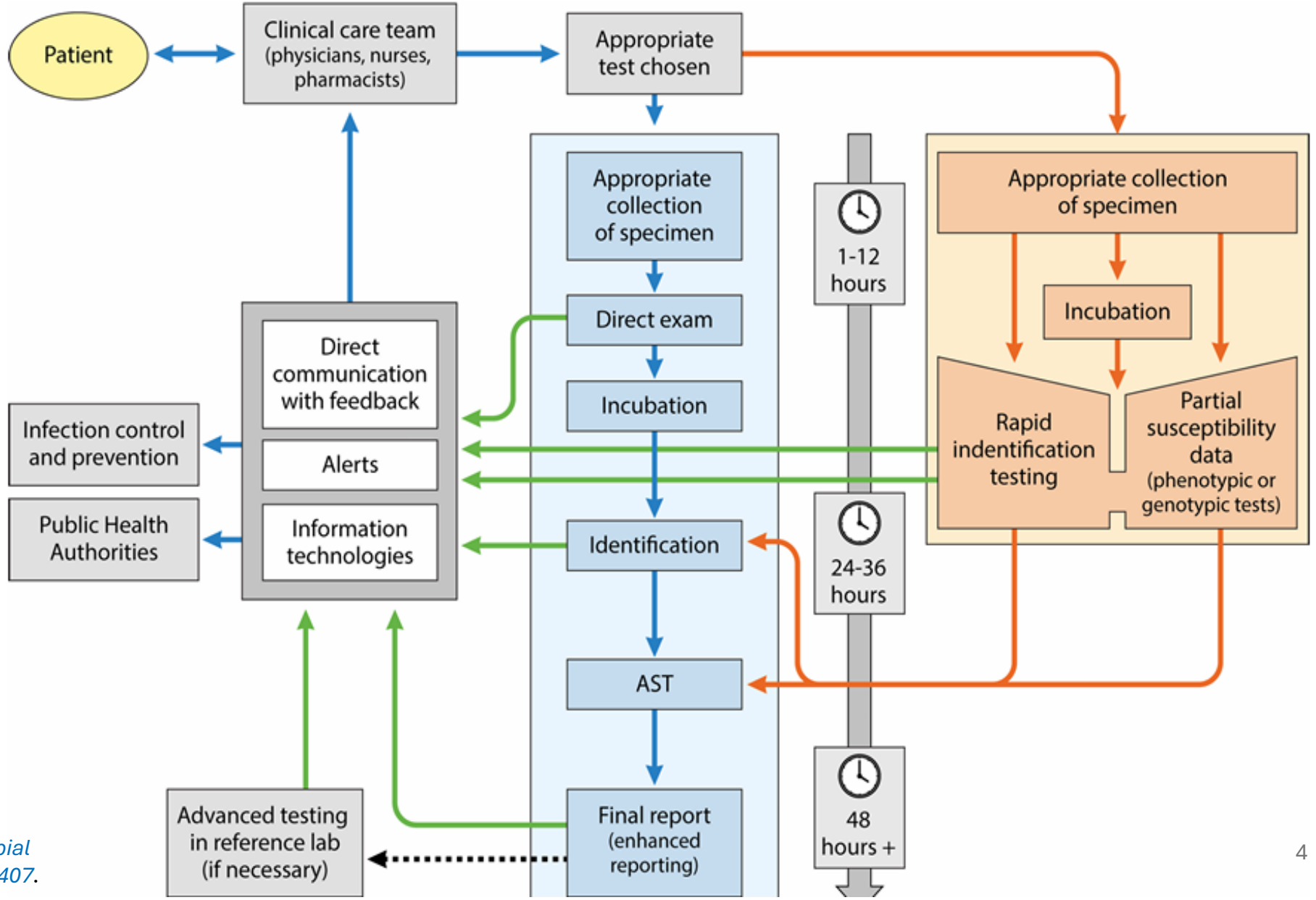
1. Dellit TH, et al. Clin Infect Dis 2007; 44: 159-177.

- Etkeninin **doğru-hızlı** tanımlanması, antibiyotik duyarlılık test sonuçlarının **standart** şekilde çalışılması, zamanında ve doğru sonucun verilmesi

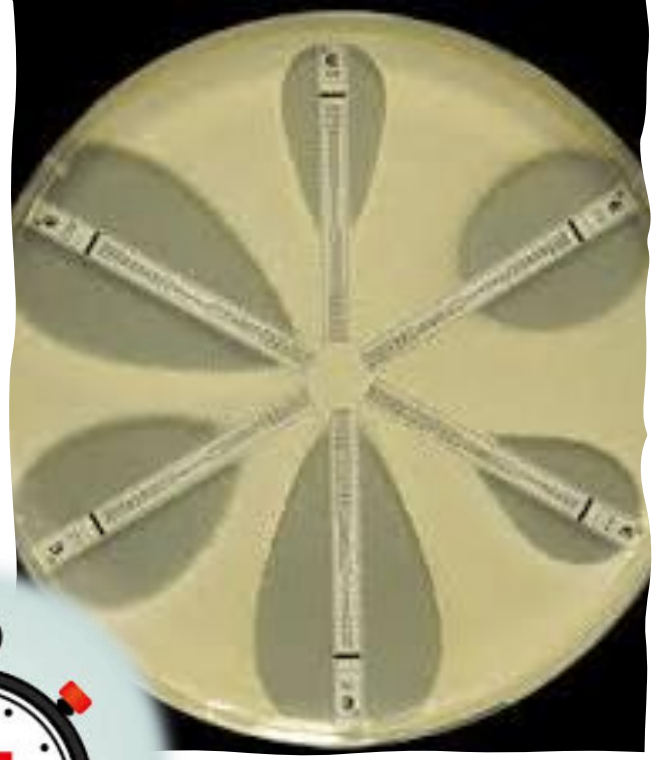
- Klinisyen etkene özgü tedaviyi seçebilir

- Geniş spektrumlu antibiyotik kullanımının engellenmesinde ve **AMR** mücadelede önemli bir rol oynar

Klinik Mikrobiyoloji Laboratuvarları



Morency-Potvin P, et al. 2017. Antimicrobial stewardship. Clin Microbiol Rev 30:381–407.



Antibiyotik duyarlılık testleri (ADT)

Kantitatif yöntemler (MİK, mg/L)

- Agar veya broth dilüsyon
- Gradyan şeritleri (Etest, MICE)

Kalitatif yöntemler (S/I/R)

- Disk difüzyon

Otomatize sistemler

- ÇİD-TİD izolatların saptanması
- Doğal Direnç ve Beklenmeyen Fenotip

Rutin ADT metodlarının günler ile ifade edilen süreleri yavaş kalmaktadır...

YENİ VE HIZLI ADT

ADT sonuç zamanı

Bildirilen sonuçların klinik değeri

YENİ VE HIZLI ADT

GENOTİPİK HIZLI ADT

Önceden tanımlanmış hedefler (direnç mekanizmaları)

Gen VAR- YOK

Duyarlı = tespit edilen direnç mekanizmalarının yokluğu

Asla duyarlılığı garanti edemez, en iyi durumda direnci garanti edebilir

Tespit edilen direnç mekanizmalarının yokluğu, ampirik tedavinin azaltılması için yeterli midir?

GENOTİPİK HIZLI ADT

- Genellikle iyi tanımlanmış direnç mekanizmaları

MRSA/VRE, OXA-48, KPC, NDM, VIM, IMP, mcr

- Özgüllük ve özellikle duyarlılıkları %100 değil
- Çok fazla direnç geni – kompleks direnç mekanizmaları
- Gram (-)'lerde direnç saptayan testler az
- Mutasyonel direnç
- İnd. direnç

Moleküler Testler

Test	MO	Direnç geni
Biofire BCID2 (Biofire, Salt Lake City, UT) **1 s**	9 GP -14 GN -7 MAYA	blaIMP, blaKPC,, blaOXA−48−like blaNDM, blaVIM mcr-1 ESBL blaCTX−M mecA/C vanA/B
Verigene BC-GN (Luminex, Austin, TX) 9 Gram-negative bacterial targets	9 GN	blaIMP blaKPC blaOXA−48−like blaNDM blaVIM ESBL blaCTX−M
Verigene BC-GP (Luminex)	13 GP	mecA -vanA/B
ePlex® BCID-GP (GenMark, Carlsbad, CA)	20 GP	mecA -vanA/B
ePlex® BCID-GN (GenMark)	21 GN	blaIMP blaKPC blaOXA−48/OXA−23 blaNDM blaVIM ESBL blaCTX−M
Xpert® MRSA/SA BC (Cepheid, Sunnydale CA)	1 GP	mecA

Acinetobacter calcoaceticus-baumannii complex

Bacteroides fragilis

Enterobacterales

- *Enterobacter cloacae* complex
- *Escherichia coli*
- *Klebsiella aerogenes*
- *Klebsiella oxytoca*
- *Klebsiella pneumonia* group
- *Proteus* spp.
- *Salmonella* spp.
- *Serratia marcescens*

Haemophilus influenzae

Neisseria meningitidis

Pseudomonas aeruginosa

Stenotrophomonas maltophilia

Candida albicans

Candida auris

Candida glabrata

Candida krusei

Candida parapsilosis

Candida tropicalis

Cryptococcus (C. neoformans/C. gattii)

Enterococcus faecalis

Enterococcus faecium

Listeria monocytogenes

Staphylococcus spp.

- *Staphylococcus aureus*
- *Staphylococcus epidermidis*
- *Staphylococcus lugdunensis*

Streptococcus spp.

- *Streptococcus agalactiae*
- *Streptococcus pneumoniae*

Streptococcus pyogenes

RESISTANCE GENES

Carbapenemases

IMP

KPC

OXA-48-like

NDM

VIM

Colistin Resistance

mcr-1

ESBL

CTX-M

Methicillin Resistance

mecA/C

mecA/C and MREJ (MRSA)

Vancomycin Resistance

vanA/B

14 G (-) **7 Mantar** **9 G (+)** **11 Direnç geni**

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Critically ill;
Drug-resistant pathogen;
Intensive care units;
Multiplex polymerase chain reactio

Methods: This retrospective observational study, conducted from July 2021 to August 2023, involved adult ICU patients with positive blood cultures who underwent BCID2 testing. The concordance between BCID2 and conventional culture results was examined, and its impact on antimicrobial stewardship was assessed through a comprehensive retrospective review of patient records by intensivists.

Results: A total of 129 blood specimens from 113 patients were analysed. Among these patients, a high proportion of drug-resistant strains were noted, including carbapenem-resistant *Klebsiella pneumoniae* (CRKP) (57.1%), carbapenem-resistant *Acinetobacter calcoaceticus-baumannii* complex (100%), methicillin-resistant *Staphylococcus aureus* (MRSA) (70%), and vancomycin-resistant *Enterococcus faecium* (VRE) (100%). The time from blood culture collection to obtaining BCID2 results was significantly shorter than conventional culture (46.2 h vs. 86.9 h, $p < 0.001$). BCID2 demonstrated 100% concordance in genotype–phenotype correlation in antimicrobial resistance (AMR) for CRKP, carbapenem-resistant *Escherichia coli*, MRSA, and VRE. A total of 40.5% of patients received inadequate empirical antimicrobial treatment. The antimicrobial regimen was adjusted or confirmed in 55.4% of patients following the BCID2 results.

Conclusions: In the context of a high burden of drug-resistant pathogens, BCID2 demonstrated rapid pathogen and AMR detection, with a noticeable impact on antimicrobial stewardship in BSI in the ICU.

YBÜ-113 HASTA

%57.1: CRKP

%100: CRABCC

%70 MRSA

%100 VRE

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https://doi.org/10.1007/s10096-024-04820-z

RESEARCH

Clinical impact and cost-consequence analysis of ePlex® bl identification panels for the rapid diagnosis of bloodstrean a single-center randomized controlled trial

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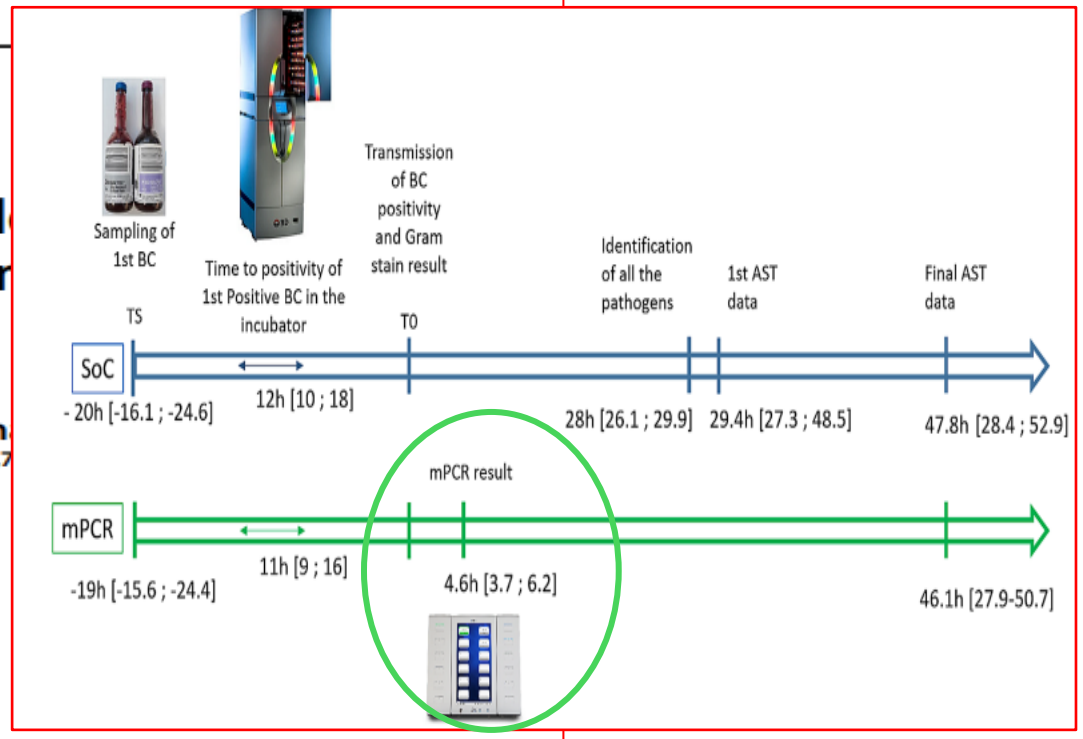


Abstract

Purpose To assess clinical impact and perform cost-consequence analysis of the broadest multiplex PCR panels available for the rapid diagnosis of bloodstream infections (BSI).

Methods Single-center, randomized controlled trial conducted from June 2019 to February 2021 at a French University hospital with an institutional antimicrobial stewardship program. Primary endpoint was the percentage of patients with optimized antimicrobial treatment 12 h after transmission of positivity and Gram stain results from the first positive BC.

Results This percentage was significantly higher in the multiplex PCR (mPCR) group (90/105 = 85.7% %, CI95% [77.5 ; 91.8] vs. 68/107 = 63.6%, CI95% [53.7 ; 72.6]; $p < 10^{-3}$) at interim analysis, resulting in the early termination of the study after the inclusion of 309 patients. For patients not optimized at baseline, the median time to obtain an optimized therapy was much shorter in the mPCR group than in the control group (6.9 h, IQR [2.9; 17.8] vs. 26.4 h, IQR [3.4; 47.5]; $p = 0.001$). Early optimization of antibiotic therapy resulted in a non-statistically significant decrease in mortality from 12.4 to 8.8% ($p = 0.306$), with a trend towards a shorter median length of stay (18 vs. 20 days; $p = 0.064$) and a non-significant reduction in the average cost per patient of €3,065 ($p = 0.15$). mPCR identified all the bacteria present in 88% of the samples.

Conclusion Despite its higher laboratory cost, the use of multiplex PCR for BSI diagnosis leads to early-optimised therapy, seems cost-effective and could reduce mortality and length of stay. Their impact could probably be improved if implemented 24/7.

56 etken, 10 direnç geni

GENOTİPİK HIZLI ADT

Test maliyeti

X

Antibiyotik kullanım oranı

Tedavinin başlanma süresi

Tedavi süresi

Yatış süresi

Mortaliteye

AYP olmaksızın etkileri sınırlı veya yok

Yeni Fenotipik ADT

- Kısa süreli antibiyotik maruziyeti

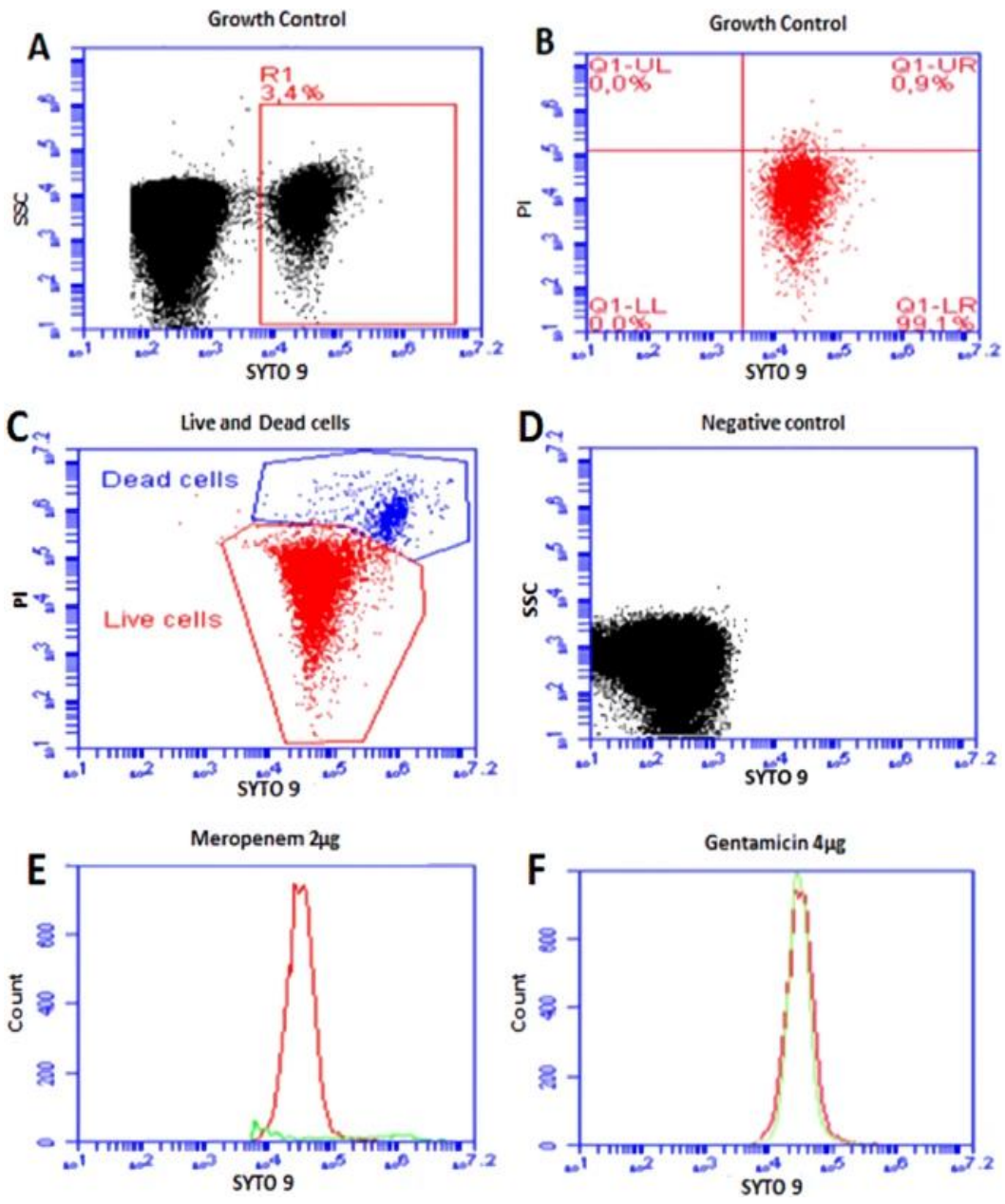
- Antibakteriyel etkilerin yüksek duyarlılıkta tespiti

Popülasyon düzeyinde

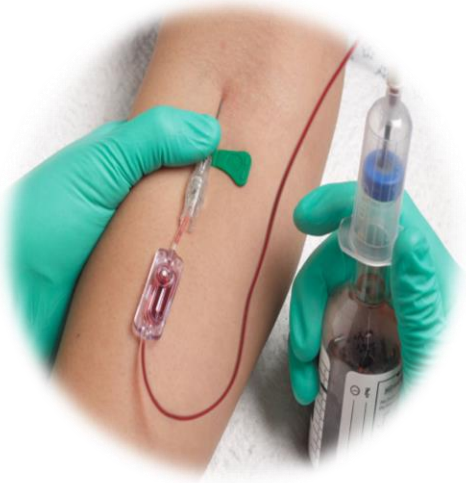
✓ Flow sitometrisi – hücre sayısı
✓ Raman spektroskopisi
✓ Mikrokalorimetri
✓ Ortalama mo kütlesi

Tek hücre düzeyinde

✓ Flow sitometrisi – hücre morfolojisi/floresan
✓ Zaman aralıklı mikroskopi – morfoloji/biyokütle



KAN KÜLTÜRLERİNDEN DOĞRUDAN HADT



EN ZOR

KAN ALIMI

KK POZİTİF

BAKTERİ ID

ADT

EN KOLAY

EN ÇOK İHTİYAÇ DUYULAN

PCR/HİBRİDİZASYON

KAN KÜLTÜRLERİNDEN DOĞRUDAN HADT

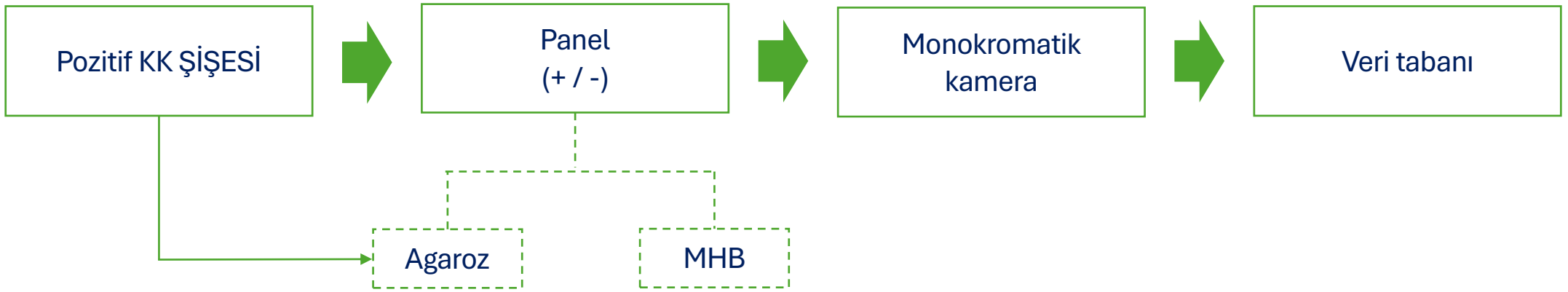
TEST	ADT TEKNOLOJİ	TTR	ONAY
PhenoTest BC (Accelerate Diagnostics)	Karanlık alan mikroskobisi ile zaman aralıkları görüntüleme (Bakterideki morfolojik ve kinetik değişiklikleri analiz etme)	7 s	US FDA CE-IVD
dRAST (QuantaMatrix)	Bakterileri hücresini plastik mikroçiplerde zaman aralıklı görüntüleme	6s	CE-IVD
Alfred (AliFAX)	Sıvı besiyerinde bakteri üremesini ışık şaçma ile tespiti	3-5 s	CE-IVD
Reveal AST (Specific Diagnostics)	Mikroorganizma büyümesi sırasında yayılan uçucu organik bileşikler için sensör dizisi	4-5 s	CE-IVD
ASTar (Q-linea)	Sıvı besiyerinde bakteri üremesinin zaman aralıklı görüntülenmesi	3-6 s	CE-IVD
Fastinov	Akım sitometri :Ab altında oluşan hücre hasarını flörosans boyala ile tespiti	80 dk	CE-IVD

dRAST™

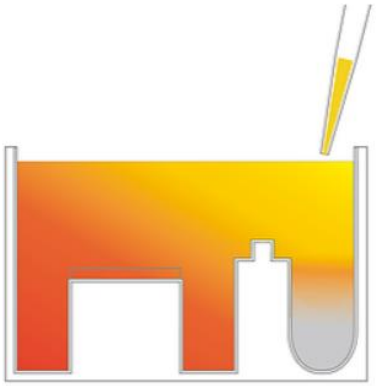
Farklı konsantarsyonlarda AB içeren 96 kuyucuklu plak

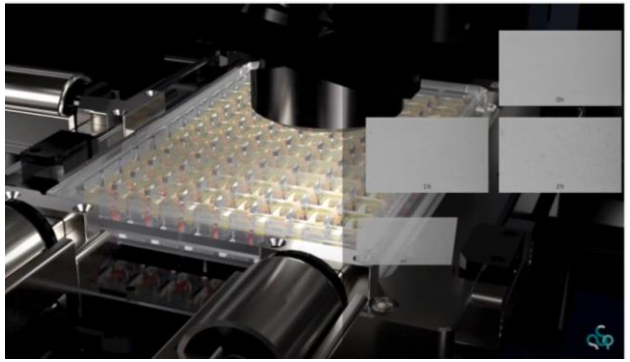
Yüksek çözünürlüklü **monokromatik** kamera ile saat başı çekim (4-6)

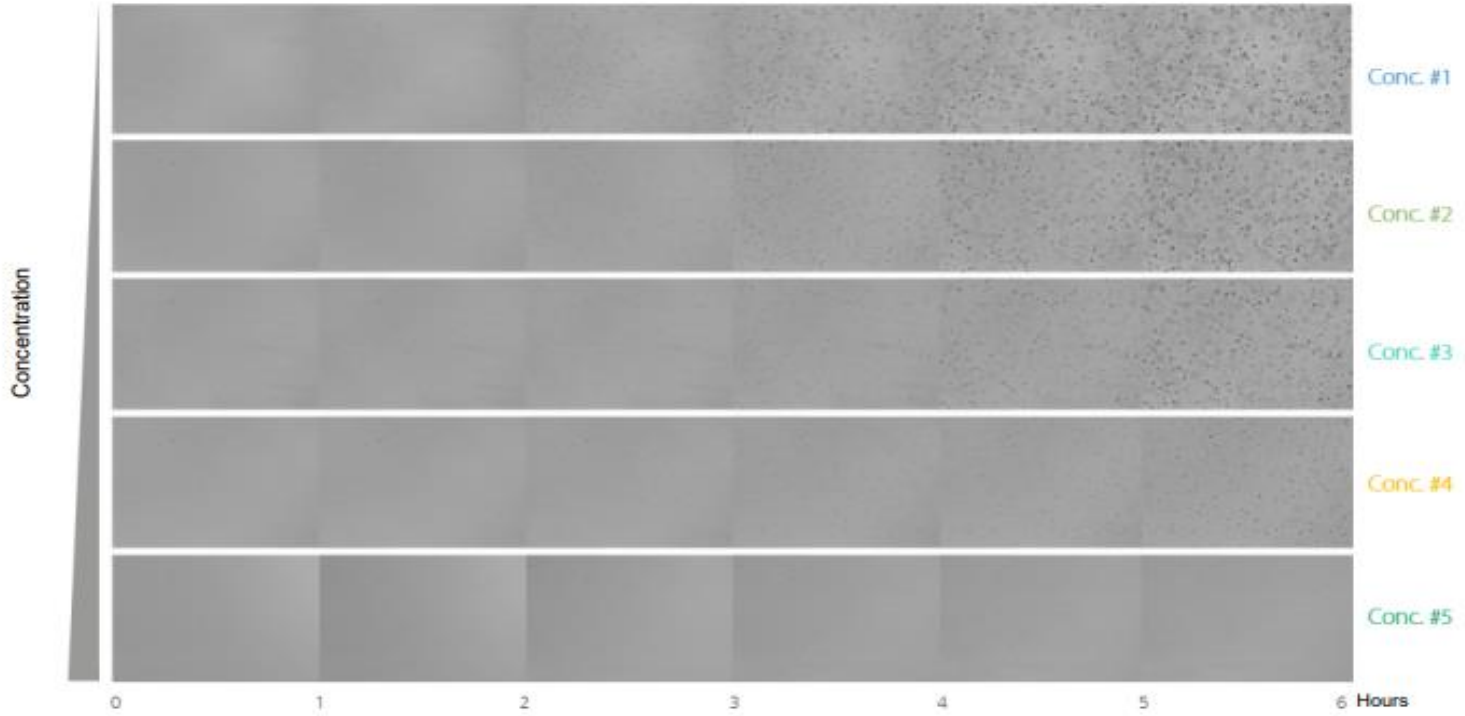
Veri tabanındaki algoritmalar MİK belirler- EUCAST kriterlerini uygulayarak sonuç verir



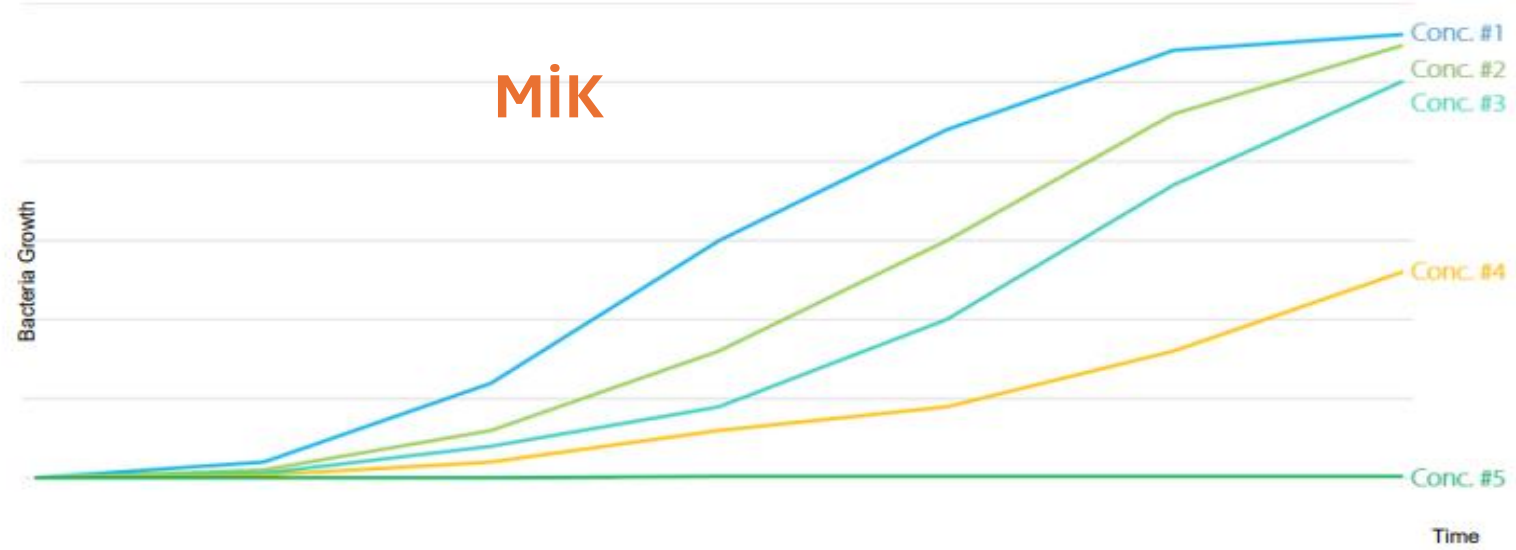
dRAST™

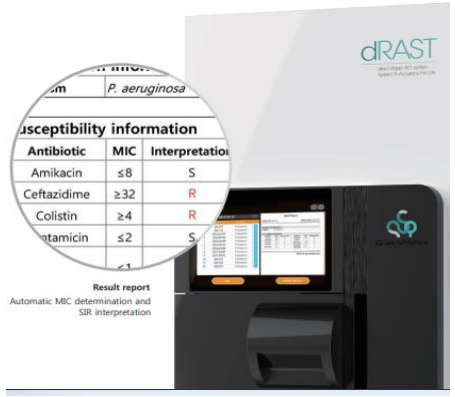





Concentration
Conc. #1
Conc. #2
Conc. #3
Conc. #4
Conc. #5
0
1
2
3
4
5
6
Hours

MİK


Bacteria Growth
Conc. #1
Conc. #2
Conc. #3
Conc. #4
Conc. #5
Time



dRAST™

CE-IVD, MFDS KOREA

Performance of dRAST™ on prospective clinical blood culture samples in a simulated clinical setting and on multidrug-resistant bacteria

Alicia Y. W. Wonga , Alexander T. A. Johnssonb , Volkan Özenci

KU:%95.6

MDR-KU: %87.2

Hızlı antibiyotik duyarlılık testi dRAST™ performansının sınırda direnç gösteren mikroorganizmalarda değerlendirilmesi

Gülşen Hazırolan, Onur Karatuna, Volkan Özenci

KU: %95.3

VRE-MRSA-KU: %100

Pa-KU:% 81.3

JOURNAL OF MEDICAL MICROBIOLOGY

RESEARCH ARTICLE

Kim *et al.*, *Journal of Medical Microbiology* 2018;67:325–331

DOI 10.1099/jmm.0.000678

MICROBIOLOGY SOCIETY

Direct rapid antibiotic susceptibility test (dRAST) for blood culture and its potential usefulness in clinical practice

Jeong-Han Kim,[1]† Taek Soo Kim,[2]† Sang Hoon Song,[2] Jungil Choi,[3] Sangkwon Han,[3] Dong Young Kim,[3] Sunghoon Kwon,[3] Eunyoung Lee,[1] Kyoung-Ho Song,[1] Pyeong Gyun Choe,[1] Ji Hwan Bang,[1] Eu Suk Kim,[1] Sang Won Park,[1] Hong Bin Kim,[1] Nam Joong Kim,[1] Wan Beom Park[1,*] and Myoung-don Oh[1]

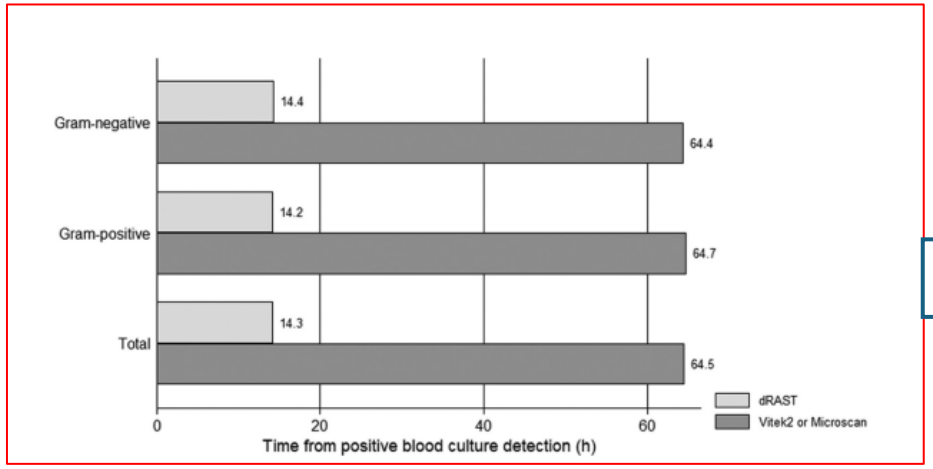
Abstract

Purpose. The direct rapid antibiotic susceptibility test (dRAST), based on analysing changes in bacterial micro-colonies under antibiotic conditions, detects antibiotic resistance within 6 h of direct smear examination results. This study aimed to assess the accuracy of dRAST and evaluate its potential usefulness for improving selection of appropriate antibiotic in real clinical practice settings.

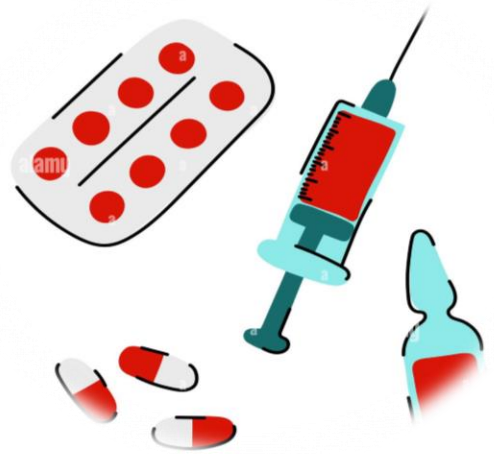
Methodology. We evaluated the accuracy of dRAST by comparing the antibiotic treatments that should have been administered based on dRAST results and the broth microdilution (BMD) test and its potential usefulness via simulation.

Result. For 49/52 (94.2 %) patients with Gram-positive bacteraemia and 66/67 (98.5 %) patients with Gram-negative bacteraemia, antibiotics indicated by dRAST results were the same as those indicated by the BMD test. Among 34 patients with ineffective and suboptimal treatment, 19 (55.9 %) of patients could have received optimal treatment 1 to 2 days earlier with dRAST results. Among 33 patients given unnecessary broad-spectrum antibiotics, 1 to 2 days earlier de-escalation could have been possible for 27 (81.8 %) patients based on dRAST results.

Conclusion. The introduction of dRAST could increase the use of optimal antibiotics and reduce unnecessary broad-spectrum antibiotic use in the early period of bacteraemia.



BMD
%94.2 GP bakteriyemi
%98.5 GN bakteriyemi



Geniş spekt. tdv. % 81.8, DE-ESKELASYON: 1-2 gün

Uygun olmayan tedavi: %55- OPTİMAL TDV: 1-2 gün

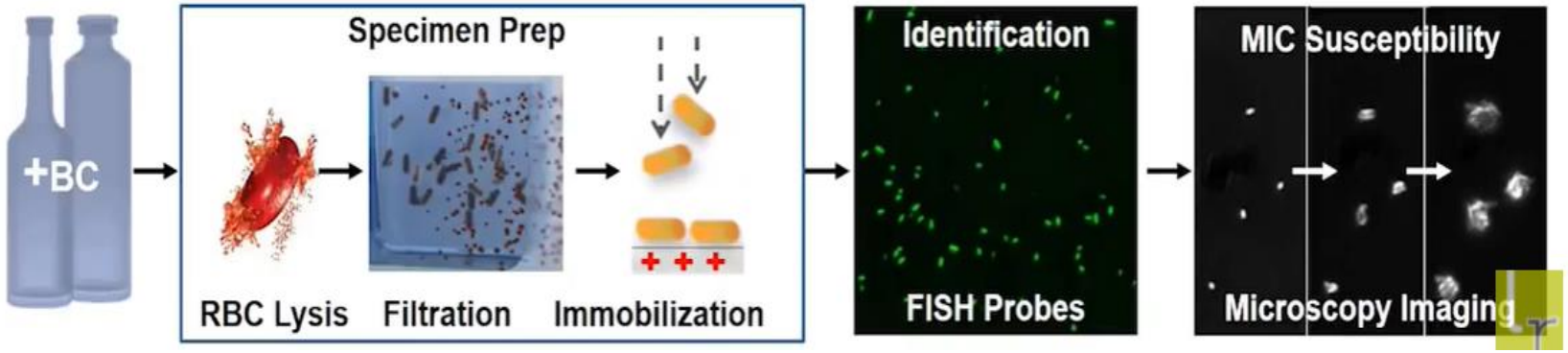
14.3±4.2 - 64.5 ±22.3 s

Accelerate Pheno System

FISH prob ID (17 mo) -Zaman aralıklı görüntüleme ADT

FDA onaylı

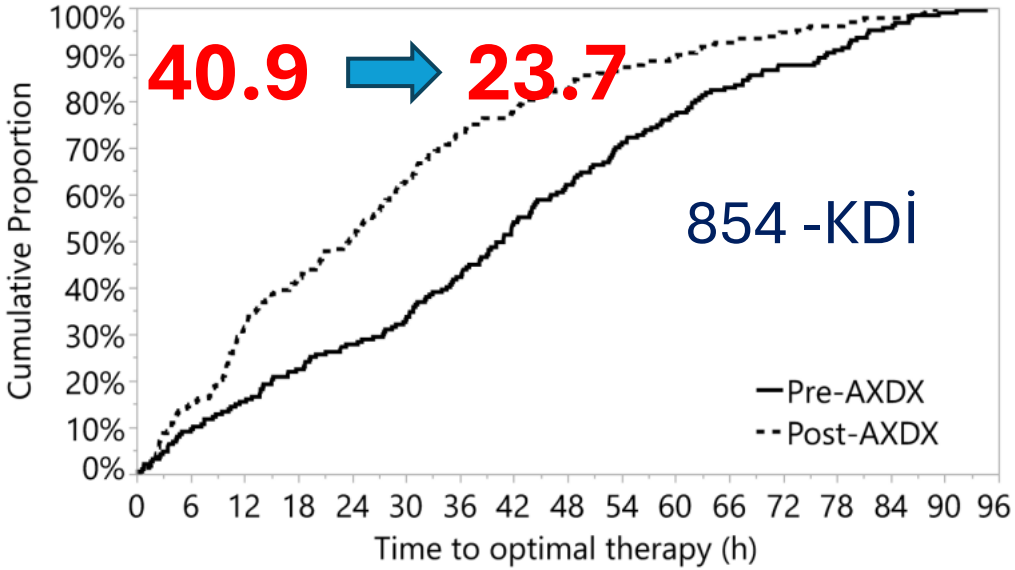
ID: 1.5 s
ADT: <7 s



17 AB ve fenotipik MRSA & MLSb

Table 4. Antimicrobial Modifications and Clinical Outcomes

	All[a]			Gram-Negative[b]		
Endpoint	Pre-AXDX	Post-AXDX	*P* Value	Pre-AXDX	Post-AXDX	*P* Value
Antimicrobial modification[c]						
Time to first antimicrobial modification[d]	24.2 (7.3–46.2)	13.9 (5.0–31.1)	**<.0001**	22.8 (7.0–45.3)	13.6 (5.8–30.9)	**.01**
Time to first gram-positive antimicrobial modification[e]	30.1 (11.2–52.8)	18.3 (6.7–41.8)	**.0013**	28.1 (10.5–51.7)	18.6 (9.4–42.1)	.11
Time to first gram-negative antimicrobial modification[f]	34.6 (9.2–53.4)	18.6 (8.2–36.8)	**<.0001**	30.2 (7.6–52.8)	16.7 (8.6–35.2)	**.003**
Time to first antimicrobial escalation[g]	9.5 (3.4–28.9)	9.0 (3.7–18.4)	.22	9.5 (3.7–31.6)	9.6 (3.9–18.4)	.44
Time to first antimicrobial deescalation[h]	36.0 (17.1–54.5)	27.2 (13.5–43.6)	**.0004**	34.5 (16.6–52.8)	25.4 (12.0–42.5)	**.003**
Time to effective therapy[i]	13.3 (3.1–35.9)	6.7 (3.1–16.2)	**.02**	13.7 (3.3–38.1)	10.0 (3.6–18.6)	.10
Clinical outcome						
30-day mortality	38 (8.7)	25 (6.0)	.12	25 (8.3)	19 (6.7)	.47
Post-blood culture length of stay, median (interquartile range), days	7.0 (4.0–12.4)	6.5 (3.7–12.0)	.43	6.4 (3.7–11.7)	5.4 (3.4–9.7)	**.03**
Acute kidney injury (aged ≥18 years)	92 (23.2)	78 (21.1)	.49	64 (22.7)	57 (21.6)	.76
14-day renal replacement therapy	15 (3.5)	9 (2.2)	.25	10 (3.3)	5 (1.8)	.24
30-day *Clostridioides difficile* infection (day 3–30)	3 (0.7)	4 (1.0)	.67	0	1 (0.4)	.48
Acquisition of new multidrug-resistant organisms within 30 days	22 (5.1)	15 (3.6)	.29	17 (5.7)	9 (3.2)	.15
Readmission within 30 days	76 (19.4)	91 (23.8)	.14	52 (18.6)	51 (19.4)	.82
Readmission within 30 days from bacteremia	15 (3.8)	16 (4.2)	.68	7 (2.5)	11 (4.2)	.54

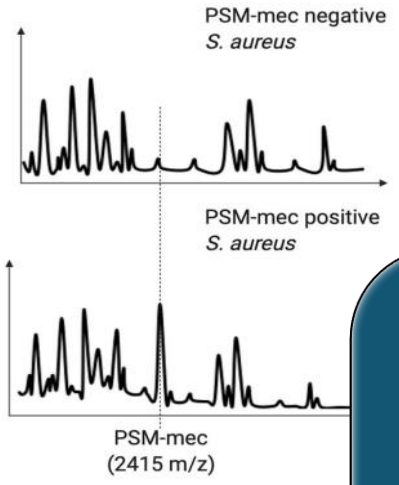


Bhalodi AA et al., Clin Infect Dis. 2021 Oct 27:ciab921.

KAN KÜLTÜRLERİNDEN DOĞRUDAN ADT

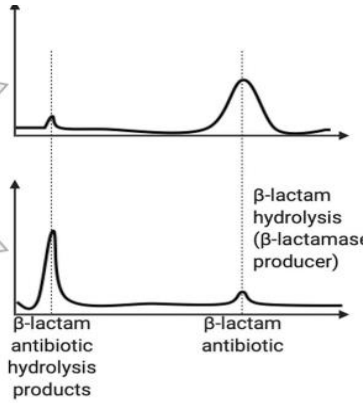
MALDI TOF MS

HIZLI ADT - MALDI-TOF MS



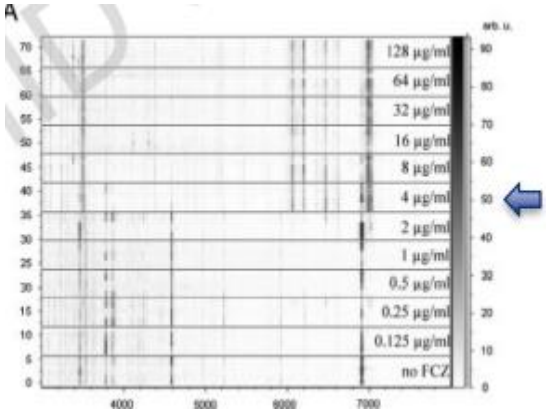
DİRENÇ TESPİTİ

- Karakteristik bir “direnç tepe paterni” analizi
- Yeni sentezlenmiş bakteri proteinlerine dâhil edilen kararlı (radyoaktif olmayan) izotop etiketli amino asitlerin saptanması
- Bakterinin *β*-laktam antibiyotiği hidroliz analizi
- Ab varlığında veya yokluğunda bakteri üremesinin analizi



- *β-laktamaz aktivititesi tespiti*
- *Porin tespiti*

- VRE
- MRSA-MSSA
- *B. fragilis* KARBA R

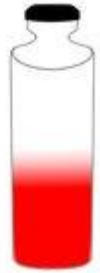


HIZLI ADT - MALDI-TOF MS

Filtrasyon/dilüsyon

Dilüsyon

Lizis/santrifügasyon



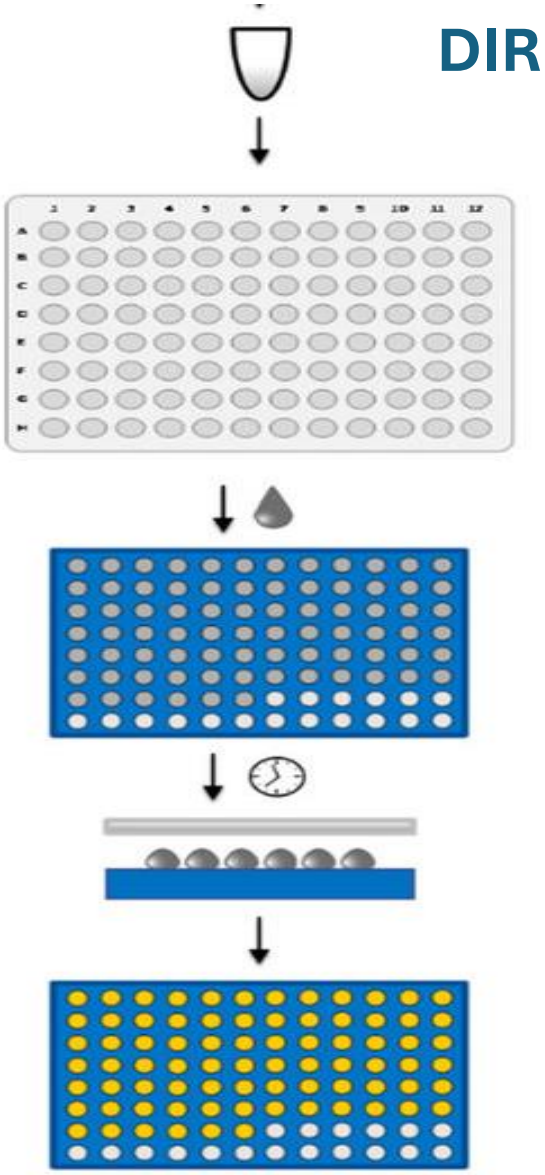
Ayırıcı santrifügasyon

TABLE 2 Performance of MALDI-TOF MS DOT-MGA for direct detection of carbapenem nonsusceptibility in *Enterobacterales* from positive blood cultures using evaluation with MALDI Biotyper scores[a]

		Values for 3-h incubation (%)			Values for 4-h incubation (%)[b]		
Processing method	Dilution	Validity[c]	Sensitivity[d]	Specificity[d]	Validity	Sensitivity	Specificity
Filtration/dilution	1:100	96.3	100	42.9	100	92.3	14.3
	1:1,000	96.3	91.7	71.4	100	84.6	64.3
	1:10,000	85.2	80.0	100	88.9	81.8	100
Dilution	1:100	100	92.3	71.4	96.3	100	46.2
	1:1,000	96.3	83.3	85.7	100	84.6	92.9
	1:10,000	92.6	63.6	100	92.6	90.9	100
Lysis/centrifugation		92.6	90.9	100	**96.3**	**91.7**	**100**
Differential centrifugation		92.6	90.9	92.9	**96.3**	**83.3**	**100**

DIRECT-ON-TARGET MICRODROPLET GROWTH ASSAY

DOT-MGA



Bakteri Ab varlığı ve yokluğunda (ÜK) ink.

Farklı Ab kont-seri dilüsyonlar- Hedef MİK

Mikrodamlacıklar direkt plağa sürülür

4 ml su içeren plastik kutularda ink.

Absorban ile broth bakteri-ab karışımından uzaklaştırılır.

MALDI TOF MS: Üreme var/yok

Plaktaki her kuyucukta AB kons: MİK

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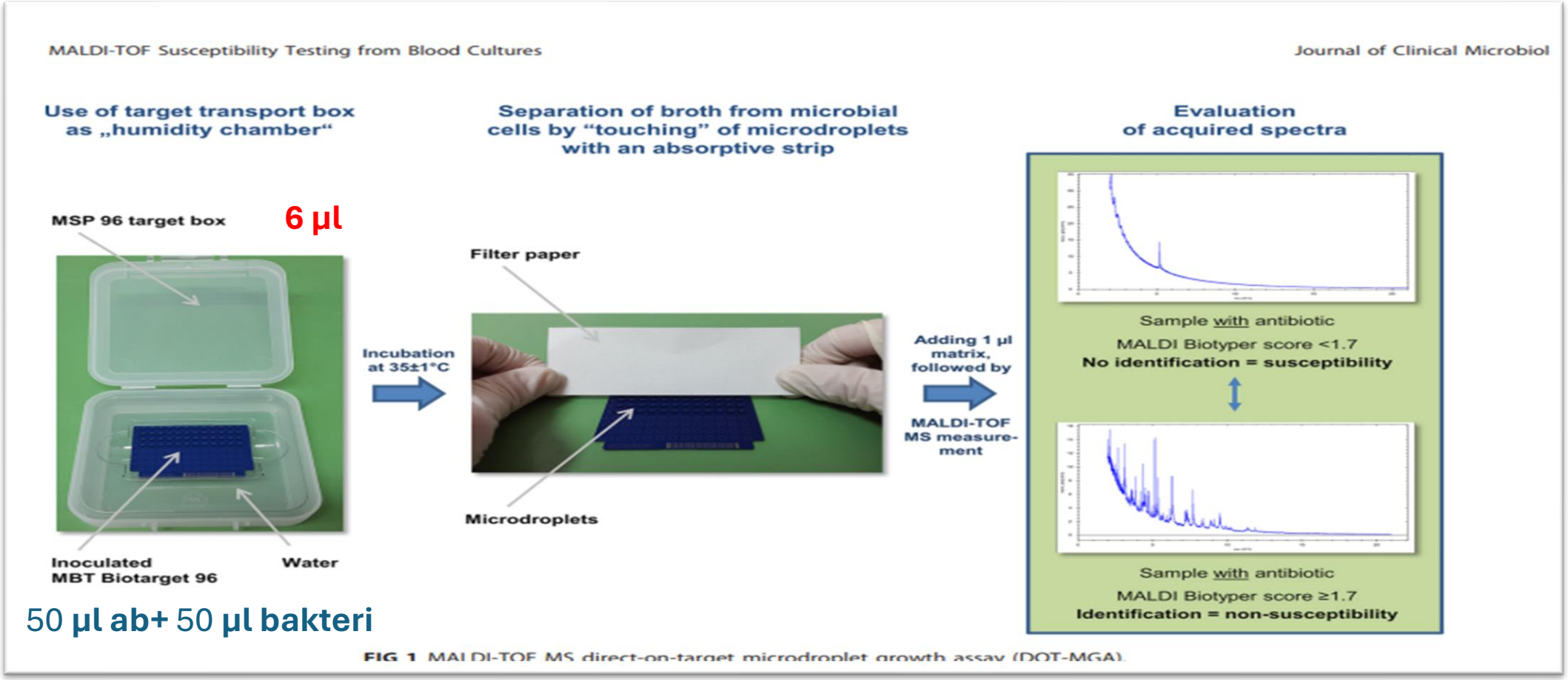
BACTERIOLO

Rapid Direct Susceptibility Testing from Positive Blood Cultures by the Matrix-Assisted Laser Desorption Ionization–Time of Flight Mass Spectrometry-Based Direct-on-Target Microdroplet Growth Assay

Evgeny A. Idelevich,[a] Luise M. Storck,[a] Katrin Sparbier,[b] Oliver Drews,[b] Markus Kostrzewa,[b] Karsten Becker[a]

Skor ≤ 1.7 NS
Skor ≥ 1.7 S

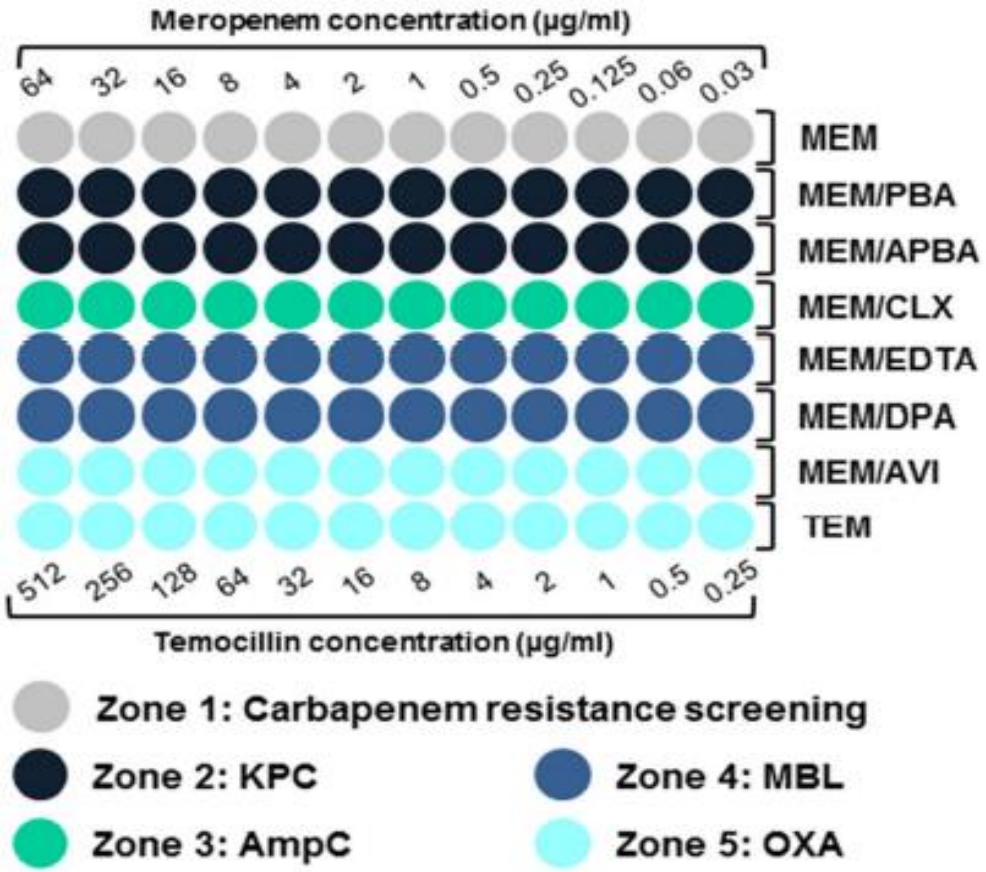


50 **µl ab+** 50 **µl bakteri**

FIG 1 MALDI-TOF MS direct-on-target microdroplet growth assay (DOT-MGA).

3 -4 s at 35 ± 1 °C.

MALDI-TOF MS & DOT-MGA



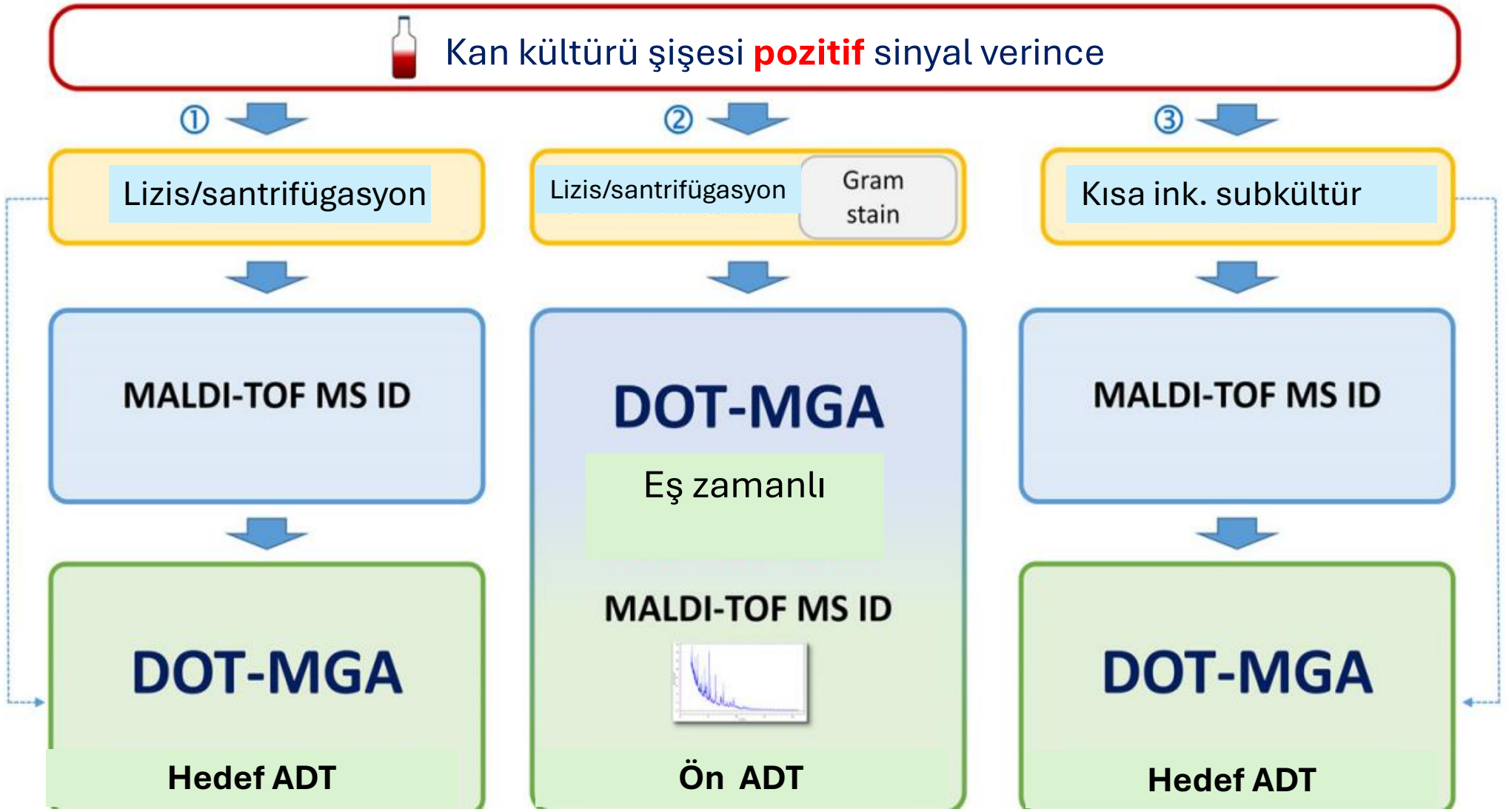
MİK TESPİTİ

ADT sonucu : 4- 5 s (pozitif KK den)

5×10^5 CFU/ml: 3 µl
3 µl AB

Correa-Martínez CL er al., Sci Rep. 2020 Mar 19;10(1):4988

MALDI TOF MS HIZLI TANIMLAMA ve ADT



MALDI-TOF MS & DOT-MGA

- ID+ADT
- Umut verici, kolay
- G(+), G(-)
- Pozitif KK şişesi-Kültür

Ülkemiz-HADT.....

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING

European Society of Clinical Microbiology and Infectious Diseases

Methodology - EUCAST rapid antimicrobial susceptibility testing (RAST) directly from positive blood culture bottles.

Version 1.1

May 2019

STANDART METODOLOJİ, MATERYAL VE EKİPMAN KULLANARAK....

- ✓Tüm lab. uygulanabilir...
- ✓En önemli bakteriyel etkenler...
- ✓Sepsis tdv. kullanılan ab...
- ✓Basit işlemler...
- ✓Kalibre direnç sınır değerleri...
- ✓Web sitesinde kullanıma açık...

https://www.eucast.org/bacteria/rapid-ast-in-blood-culture/

Kan Kültürü Şişelerinden Doğrudan Hızlı Antibiyotik Duyarlılık Testi (HADT)

- Her MH/MH-F agar plağı için 100-150 µl seyreltilmemiş kan kültürü besiyeri, pozitif kan kültürü şişesinden doğrudan alınır
- 4, 6, 8,16-20 saat

- *E. coli*
- *K. pneumoniae*
- *Salmonella enterica*
- PA, ABCC
- SA, *S. pneumoniae*
- *E. faecium/faecalis*

EUCAST EUROPEAN COMMITTEE ON ANTIMICROBIAL SUSCEPTIBILITY TESTING
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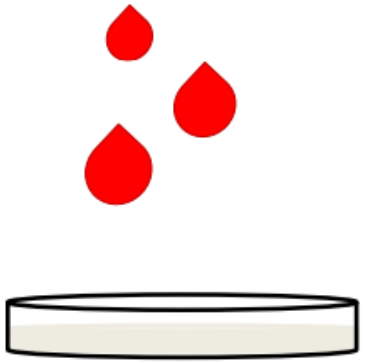
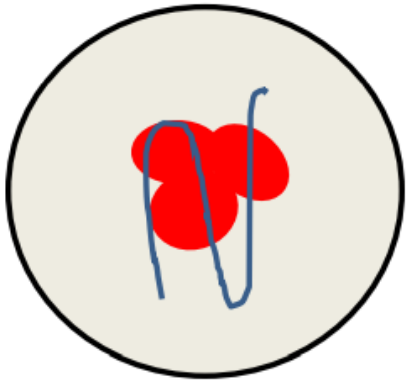
4 saatlik inkübasyon *sonunda E. coli*.

İNOKÜLASYON

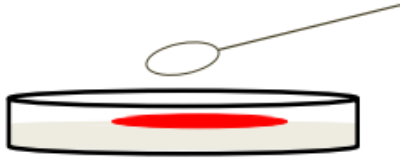
Gram/ID 3 s



125±25 µL



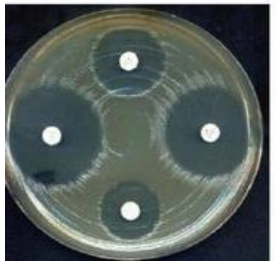
Dağıt

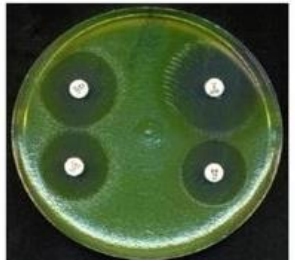


Yay

18 s

Maksimum 4-6 disk





OKUNABİLİNİRLİK...

	4 s (%)	6 s (%)	8 s (%)	16-20 s (%)
Escherichia coli	90	99	99	100
Klebsiella pneumoniae	96	98	98	100
Pseudomonas aeruginosa	-	88	97	100
Acinetobacter baumannii	99	100	100	100
Staphylococcus aureus	55	91	95	100
Enterococcus faecalis	93	99	100	100
Enterococcus faecium	44	93	99	100
Streptococcus pneumoniae	68	83	95	100

Klebsiella pneumoniae

Zone diameter breakpoints for RAST directly from blood culture bottles

EUCAST rapid disk diffusion method directly from positive blood culture bottles
Medium: Mueller-Hinton (MH) agar
Inoculum: 125±25 µL directly from a positive blood culture bottle
Incubation: Air, 35±1ºC
Incubation time: 4, 6, 8 and 16-20 hours
Generall reading instructions: Inhibition zones should only be read when the growth is confluent and zone edges are clearly visible.
Reading 4, 6 and 8 hours: Remove the lid and read zone diameters from the front against a dark background illuminated with reflected light.
Reading 16-20 hours: Read zone diameters from the back of the plate against a dark background illuminated with reflected light.

QC for implementation of RAST

Breakpoints are valid for *K. pneumoniae*, *K. variicola* and *K. quasipneumoniae*.

Antimicrobial agent	Disk content (µg)	4 hours			6 hours			8 hours			16-20 hours		
		S ≥	ATU	R <	S ≥	ATU	R <	S ≥	ATU	R <	S ≥	ATU	R <
Amoxicillin-clavulanic acid	20-10	15	13-14	13	16	14-15	14	16	14-15	14	18	16-17	16
Piperacillin-tazobactam	30-6	15	13-14	13	16	14-15	14	16	14-15	14	17	15-16	15
Temocillin	30	50	14	14	50	15	15	50	16	16	50	16	16
Cefotaxime[1]	5	15	12-14	12	18	15-17	15	18	15-17	15	16	14-15	14
Ceftazidime[1]	10	15	13-14	13	16	14-15	14	16	14-15	14	18	15-17	15
Ceftazidime-avibactam	10-4	12	10-11	10	13	11-12	11	13	11-12	11	14	12-13	12
Ceftolozane-tazobactam	30-10	16	14-15	14	16	14-15	14	17	15-16	15	20	17-19	17
Imipenem[2]	10	16	14-15	14	17	15-16	15	17	15-16	15	15	12-14	12
Imipenem-relebactam	10-25	15	13-14	13	15	14	14	15	14	14	17	15-16	15
Meropenem[2]	10	15	13-14	13	17	15-16	15	17	15-16	15	15	13-14	13
Meropenem-vaborbactam	20-10	16	14-15	14	17	16	16	17	16	16	15	13-14	13
Ciprofloxacin	5	17	15-16	15	18	16-17	16	18	16-17	16	19	17-18	17
Levofloxacin	5	17	14-16	14	18	15-17	15	18	15-17	15	18	15-17	15
Amikacin[3]	30	(15)	(13-14)	(13)	(14)	(12-13)	(12)	(14)	(12-13)	(12)	(15)	(13-14)	(13)
Gentamicin[3]	10	(14)	(12-13)	(12)	(14)	(12-13)	(12)	(13)	(11-12)	(11)	(14)	(13)	(13)
Tobramycin[3]	10	(14)	(12-13)	(12)	(13)	(11-12)	(11)	(13)	(11-12)	(11)	(14)	(13)	(13)
Trimethoprim-sulfamethoxazole	1.25-23.75	11	9-10	9	11	9-10	9	11	9-10	9	10	8-9	8

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AB seçimi: Gram negatif

MİKROORGANİZMA	ANTİBİYOTİK
Escherichia coli *Klebsiella pneumoniae*	**Piperacillin-tazobactam**, Ceftazidime, **Cefotaxime**, Ceftazidime-avibactam, Ceftolozane-tazobactam, Imipenem, **Meropenem**, **Ciprofloxacin**, Levofloxacin, Amikacin, Gentamicin, Tobramycin, Trimethoprim-sulfamethoxazole Ampicillin • Amoxicillin-clavulanic acid • Temocillin • Imipenem-relebactam • Meropenem-vaborbactam
Pseudomonas aeruginosa	**Piperacillin-tazobactam,** Cefepime, Ceftazidime, Ceftazidime-avibactam, Ceftolozane-tazobactam, Imipenem, Meropenem, Ciprofloxacin, Levofloxacin, Amikacin, Tobramycin Imipenem-relebactam • Meropenem-vaborbactam
Acinetobacter baumannii	Imipenem, Meropenem, Ciprofloxacin, Levofloxacin, Amikacin, Gentamicin, Tobramycin, Trimethoprim-sulfamethoxazole

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AB seçimi: Gram pozitif

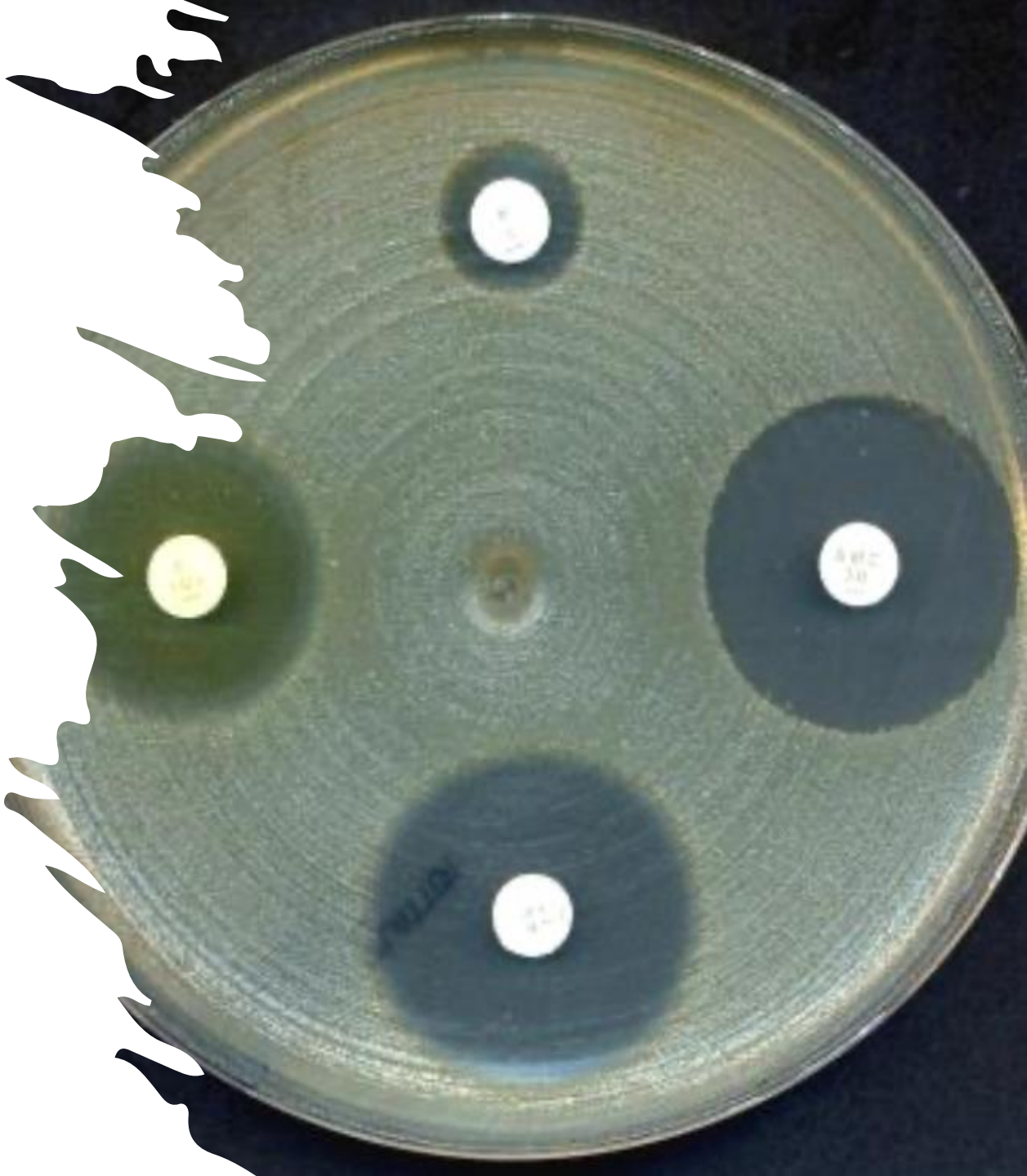
MİKROORGANİZMA	ANTİBİYOTİK
Staphylococcus aureus	Cefoxitin (TARAMA), Norfloxacin (TARAMA), Amikacin, Gentamicin, Tobramycin, Clindamycin
Enterococcus faecalis Enterococcus faecium	Ampicillin, Imipenem, Vancomycin, Linezolid, Gentamicin (YÜKSEK DÜZEY AG DİRENCİ)
Streptococcus pneumoniae	Oxacillin (TARAMA), Norfloxacin (TARAMA), Erythromycin, Clindamycin, Trimethoprim-sulfamethoxazole

Enterobacterales –PİP-TAZ
S. aureus, S. pneumoniae - DA

Gram negatif HADT*

- **PİP-TAZ 30/6 µg/ml**
- **CEFOTAKSİM 5µg/ml**
- **CEFTAZİDİM 10µg/ml**
- **MEROPENEM 10µg/ml**
- **CİPROFLOKSASİN 5µg/ml**
- **CZA10/4µg/ml**

YBÜ, Dahiliye, Onkoloji servisleri, iletişim



H-ID ve HADT sonuçları ile hastalara yapılan öneriler ve değerlendirme yapılsaydı aynı gün yapılabilecek potansiyel tanı ve tedavi önerileri

	YAPILAN ÖNERİLER	DEĞERLENDİRME YAPILSAYDI POTANSİYEL ÖNERİLER
Antibiyotik tedavisi etki kapsamının genişletilmesi (eskalasyon)	19	3
Antibiyotik tedavisi etki kapsamının daraltılması (de-eskalasyon)	2	4
Santral venöz kateter çekilmesi	6	1
Cilt flora kontaminasyonu	17	23
Ekokardiyografi	1	-

SONUÇ

- Rutin olarak kullanılan yöntemler hala kültüre bağlıdır = hızlı sonuçlar elde etmede darboğaz
- EUCAST HADT, hem hız hem de doğruluk açısından yeni ADT yöntemlerinin rekabet etmesini zorlaştıran yeni bir standart belirlemiştir-MONOMİKROBİYAL-TÜR
- Hedefe yönelik genotipik yöntemler belirli durumlarda (örn. yerel epidemiyoloji, hastane salgınları, yüksek riskli hastalar) gerekebilir.
- Hızlı fenotipik yöntemler – farklı tespit yaklaşımları, bazı yöntemler umut verici, ancak mevcut tüm ilaç/bakteri kombinasyonları için geçerliliğini doğrulamak çok zor.

Thank You !