

Dirençli Kandida İnfeksiyonlarının Yönetimi

Dr. Öğr. Üyesi Özlem GÜLER

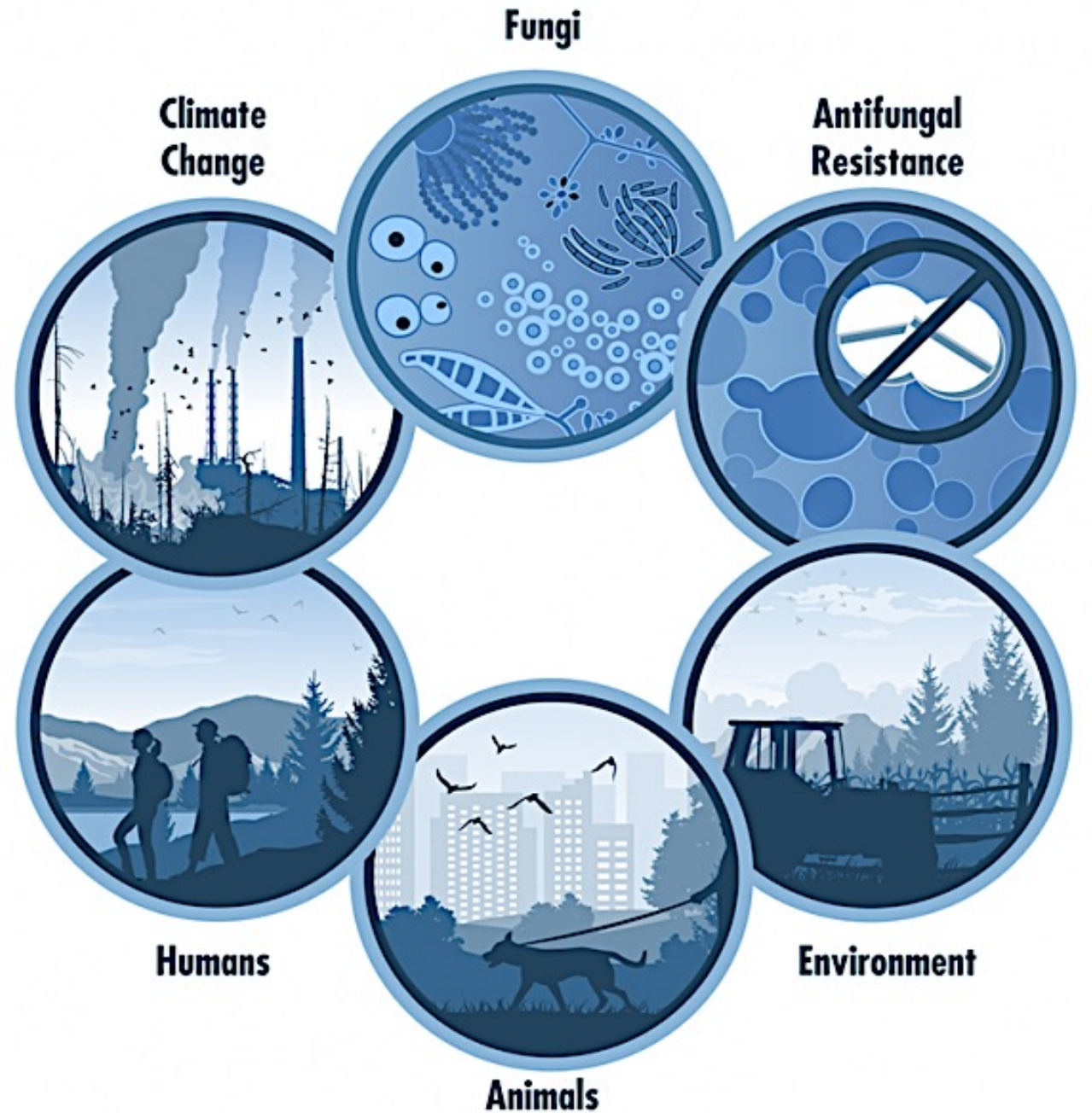
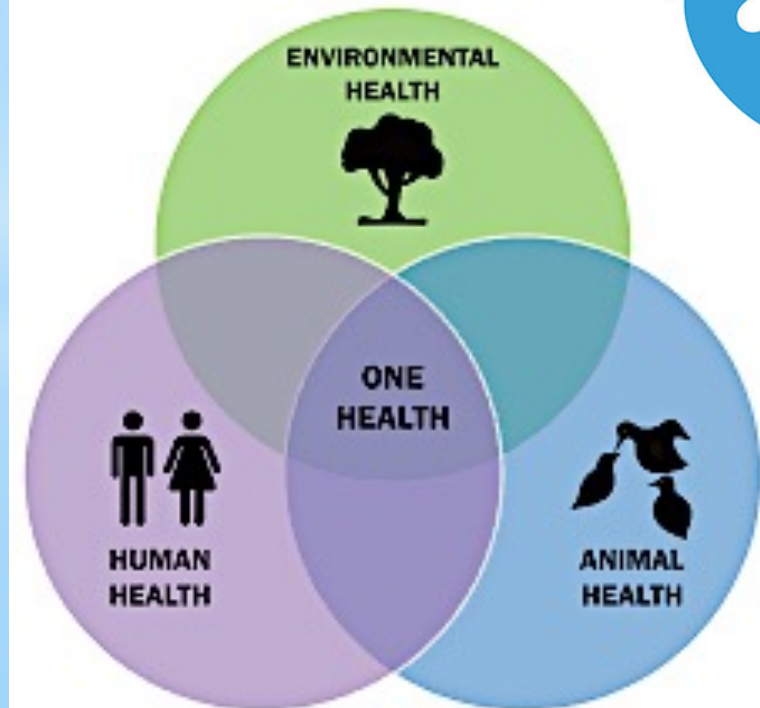
Kocaeli Üniversitesi İnfeksiyon Hastalıkları
ve Klinik Mikrobiyoloji Anabilim Dalı



Sunu planı

- * Hangi *Candida* türleri direnç açısından önemli
- * Mevcut ilaçlarla dirençli *Candida* infeksiyonlarının yönetimi
- * Yeni geliştirilen ilaçlar
- * Farklı modaliteler

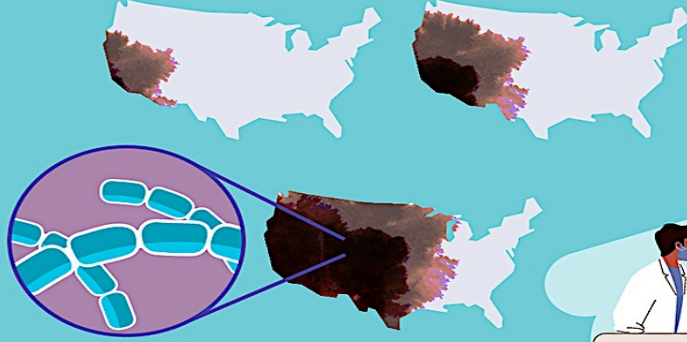
Tek Sağlık ve Mantar Enfeksiyonları



Fungal Diseases

As temperatures rise, fungal diseases may increase because:

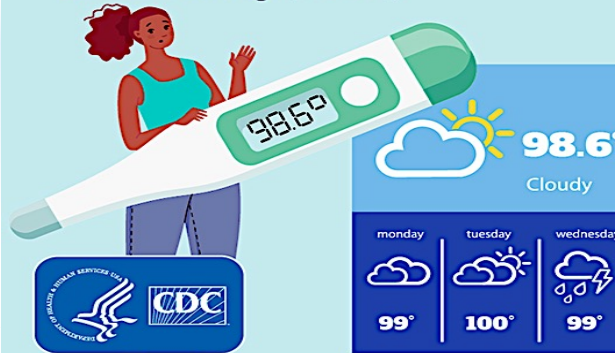
More places may become the **right temperature** for **disease-causing fungi to spread**.



More **extreme weather** events may **spread fungi** and create better conditions for fungi to grow. Injuries and property damage may **increase risk for infections** through wounds or breathing.



If temperatures become consistently higher, fungi could **more easily infect people** and may **adapt to live in the human body** (98.6°).



Fungal diseases in plants may increase, which could lead to **greater use of agricultural fungicides**. Use of any type of antifungal can contribute to **antifungal resistance**.



* İklim Değişikliği

* Uç hava koşullarıyla mantarlar yayılıyor

* Daha tropikal iklim

* Tarımda kullanılan triazololler

* Hava sıcaklığı arttıkça mantarların insan bedeninde yaşaması kolaylaşıyor

The WHO fungal priority pathogens list as a game-changer

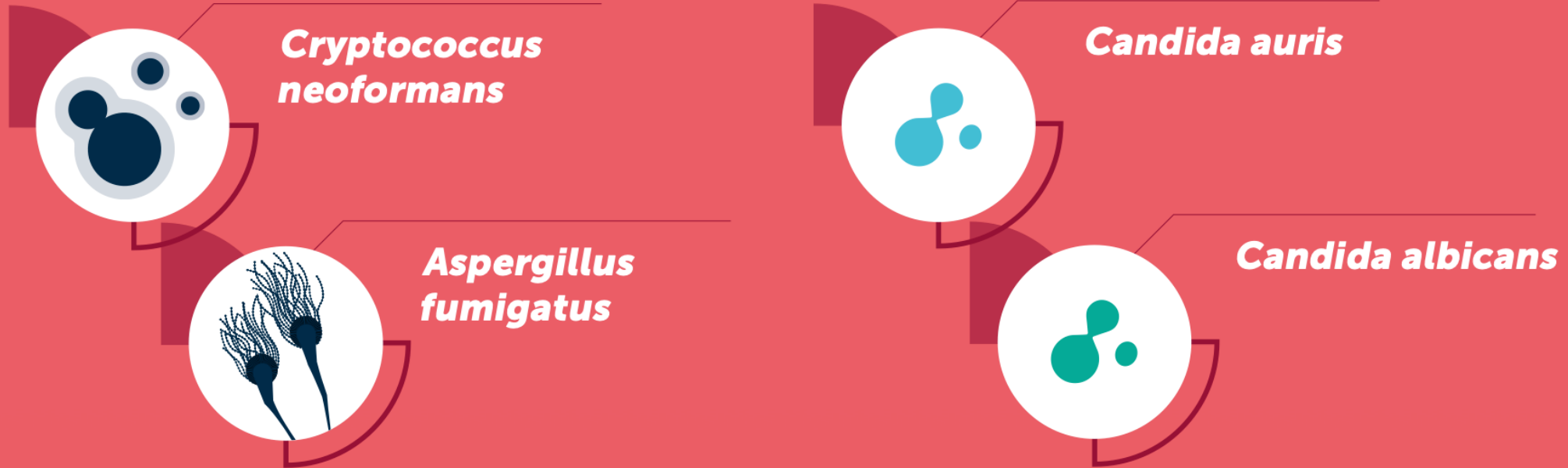
[Matthew C. Fisher](#)  & [David W. Denning](#)

Nature Reviews Microbiology **21**, 211–212 (2023) | [Cite this article](#)

- * Dünya sađlık örgütü ilk defa tehdit oluşturan **19** fungal patojeni Ekim 2022'de yayınladı
 - * Coğrafik dağılım yoğunluğu
 - * Bulaş ihtimali
 - * Mortalite
 - * Komplikasyonlar
 - * Teşhis ve tedavi seçenekleri
 - * **ANTİFUNGAL DİRENÇ**

Fig. 1. WHO fungal priority pathogens list (WHO FPPL)

Critical Priority Group

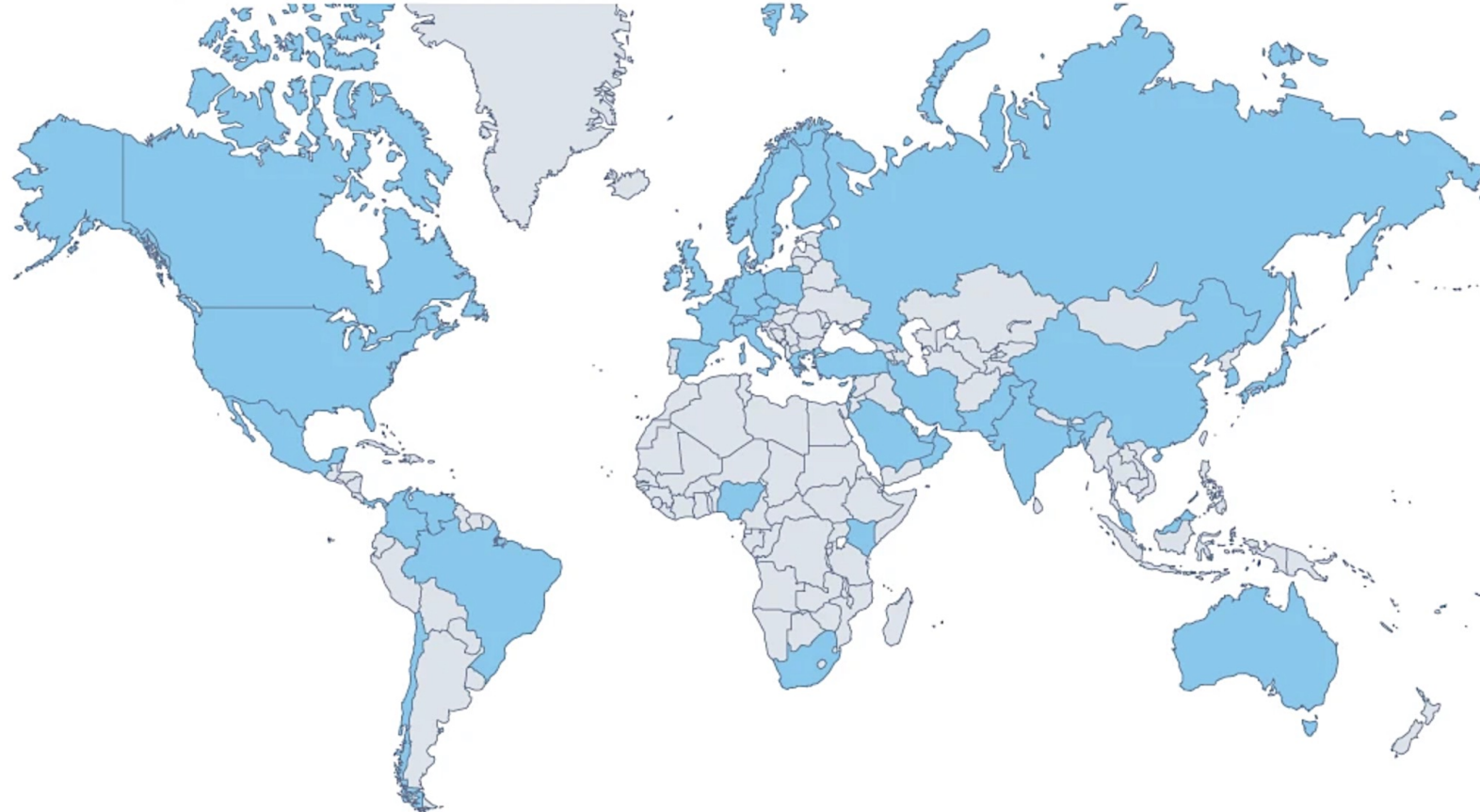


The rapid emergence of antifungal-resistant human-pathogenic fungi

[Shawn R. Lockhart](#) , [Anuradha Chowdhary](#) & [Jeremy A. W. Gold](#)

[Nature Reviews Microbiology](#) **21**, 818–832 (2023) | [Cite this article](#)

a *Candida auris*



Candida auris

AZOLLER



%60-90 direnç

ERG11 mut; 14 alfa demetilaz enzimi
Lanosterolden ergosterol sentezi
Hücre memb

POLIENLER



%10-30 direnç

FKS mut ; 1,3 BDG sentaz enzimi

EKINOKANDİNLER



%0-7 direnç

Sitoplazmik mebrandaki
egosterole bağlanarak memb
porlar açar

İzolatların %90'ı en az 1 antifungale dirençli
İzolatların >%30'u en az 2 antifungale dirençli
İzolatların % 4'ü tümüne dirençli

High Priority Group



Nakaseomyces glabrata
(*Candida glabrata*)



***Histoplasma* spp.**



Eumycetoma causative agents



Mucorales



***Fusarium* spp.**



Candida tropicalis



Candida parapsilosis

Medium Priority Group



Scedosporium
spp.



Cryptococcus
gattii



Lomentospora
prolificans



Talaromyces
marneffeii



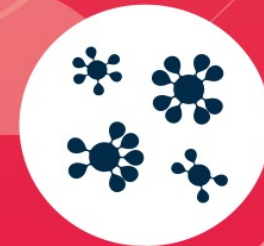
Coccidioides spp.



Pneumocystis
jirovecii



Pichia
kudriavzevii
(*Candida krusei*)



Paracoccidioides
spp.

Kandida türlerinin antifungal duyarlılığı ve değişenler

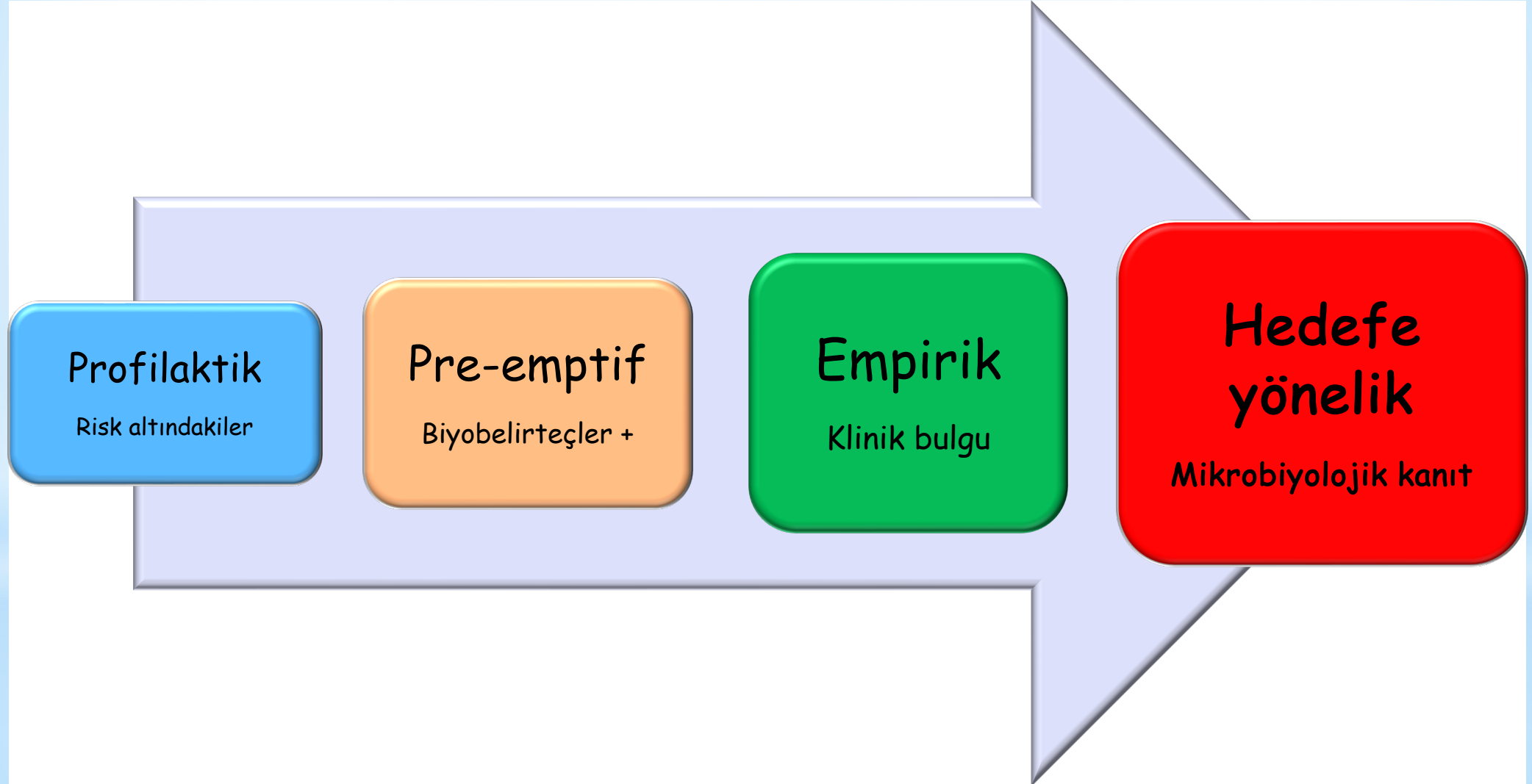
	flukonazol	itrakonazol	vorikonazol	posakonazol	Amp-B	ekinokandin	Değişen
<i>C. albicans</i>	S	S	S	S	S	S	Azollere artan direnç (%1-20)
<i>C. tropicalis</i> (Asya, Hindistan, Pakistan)	S	S	S	S	S	S	Azollere artan direnç (%1-20), bazı bölgelerde %40-80 R
<i>C. parapsilosis</i> (Güney Avrupa, Asya, güney Amerika)	S	S	S	S	S	S-R	Sık görülen bölg. azollere direnç %10 (çalışmamızda %13) ekinokandinlerde artmış MIC
<i>C. glabrata</i> (Avrupa, Amerika, Kanada)	S-DD,R	S-DD,R	S-DD,R	S-DD,R	S-I	S	(Avrupa'da ekinokandin direnci <%3), Amerika; %6-12 ekinokandin direnci, azol direnci %10-30 (ekinokandin direnci artıyor ve sorumlu önceden ekinokandin kullanımı ve FKS mutasyonu)
<i>C. krusei</i>	R	S-DD, R	S	S	S-I	S	Diğer azollere ve ekinokandinlere olan direnç oranı %0-5

C. auris flukonazol R; %60-90, AmB R; %10-30 ekinokandin R; %0-7, üçlü antifungal R;%4

S: duyarlı I; orta duyarlı, R; dirençli S-DD; doza bağlı duyarlı

E-guideline, idsa bundle, candidasis WHO , fungal priority pathogens,2022

Antifungal tedavi- tanımlar



ISHAM

INTERNATIONAL SOCIETY FOR
HUMAN AND ANIMAL MYCOLOGY



2024 yılı rehberi

Global Guideline for the Diagnosis and Management of Candidiasis:

An Initiative of the ECMM in Cooperation with ISHAM

—

Full Version for Supplementary Appendix

W Only

Kandidemi ve İnvaziv Kandidiyazda Tedavi Öneriler-Farmakokinetik- Doz

Flukonazol		<ul style="list-style-type: none">• 12 mg/kg yüklenme• 6 mg/kg idame
Flukonazol	BMI > 30 >120 kg	<ul style="list-style-type: none">• Total vücut ağırlığını kullanın
Flukonazol	CCRT,ECMO	<ul style="list-style-type: none">• Terapötik ilaç monitörü
Flukonazol	Karaciğer nakli	<ul style="list-style-type: none">• Nakilden sonra ilk 20 gün yüklenme dozu 600 mg,• 21 gün ve sonrasında 400 mg• İdame dozu <50 yaş 200 mg• >50 yaş 100 mg

Kandidemi ve İnvaziv Kandidiyazda Tedavi Öneriler-Farmakokinetik- Doz

Kandida ürosepsis Sepsis Yara enfeksiyonu	Anidulafungin Kaspofungin Mikafungin	Standart dozda
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Kaspofungin BMI >30 >120	Yükleme dozu 2 mg/kg gün	İdame 1,25 mg/kg gün
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Kaspofungin Karaciğer yetmezliği	Yükleme 70 mg	İdame 50 mg
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Kandidemi ve İnvaziv Kandidiyazda Tedavi Öneriler-Farmakokinetik- Doz

Mikafungin

150-200 mg

CCRT

ECMO

Ağır yanık

Anidulafungin

250 mg yükleme 125 mg idame

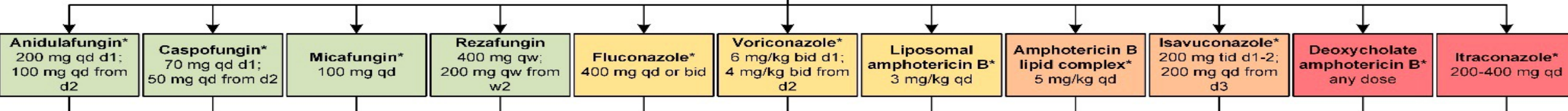
>140 kg

Kandidemi-Organ Tutulumu Yok

Candidemia without organ involvement

Consider local epidemiology and review treatment decision in light of susceptibility testing results

First-line treatment – If all options available



CVC removal

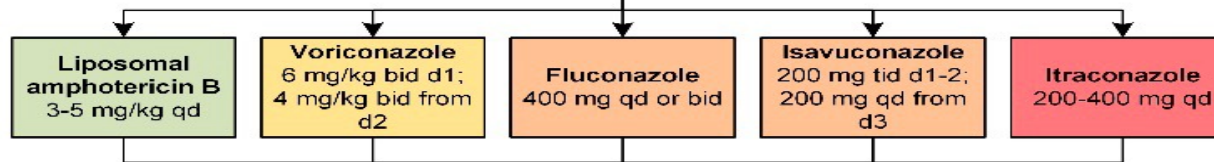
as early as possible (<48-72h) if in place

Daily follow-up blood cultures until 3 consecutive negative days

If blood from d5 is positive, repeat search for intravascular or other uncontrolled source

Second-line / Salvage treatment

Switch drug class



Traditional treatment duration 14d after last positive blood culture

*After 5 days of 1st line treatment consider switch to oral, if all 6 pre-requisites fulfilled:

1. Haemodynamically stable
2. Documented clearance of *Candida* from blood stream
3. Non-neutropenic
4. Source control
5. Oral azole tolerated
6. Susceptibility confirmed

If blood cultures from day five are still positive, repeat search for an intravascular, or other uncontrolled source

Strongly recommended ■
 Moderately recommended ■
 Marginally recommended ■
 Recommended against ■

Kandidemi-Tedavi Süresi

Table 30. Recommendations on treatment duration.

Population	Intention	Intervention	SoR	QoE	Original Source	Annotation
Any	To cure IC/C	Treatment for 14d after last positive blood culture	A	III	Rex NEJM 1994 ⁷⁹⁶	N=237, Study set the standard all studies thereafter adhered to it
Any	To cure C	Treatment for 10-14d after last positive blood culture	B	II ^t	Oude Lashof EJCMIID 2003 ⁸¹⁴	N=81 patients with candidaemia only who completed treatment, 20 (25%) received <14d antifungals, and none of these had delayed complications
Any	To cure C	Treatment for 5-11 days	C	II ^t	Vena OFID 2023 ⁸¹⁵	N=35 patients treated for 7-11 days (median 9 days) compared to N=79 patients treated for 12-24 days for with uncomplicated candidaemia (without deep-seated or metastatic foci)

C, candidaemia; d, days; IC, invasive candidiasis; N, number of subjects investigated; QoE, quality of evidence; SoR, strength of recommendation. When dosage is not specified, the standard dosing (including potential loading doses) according to the label is recommended.

* Kan kültürü negatifleştikten sonra 14 gün

Kandidemi-Oral tedaviye geçilebilir mi?

Table 31. Strategies for switch-to-oral.

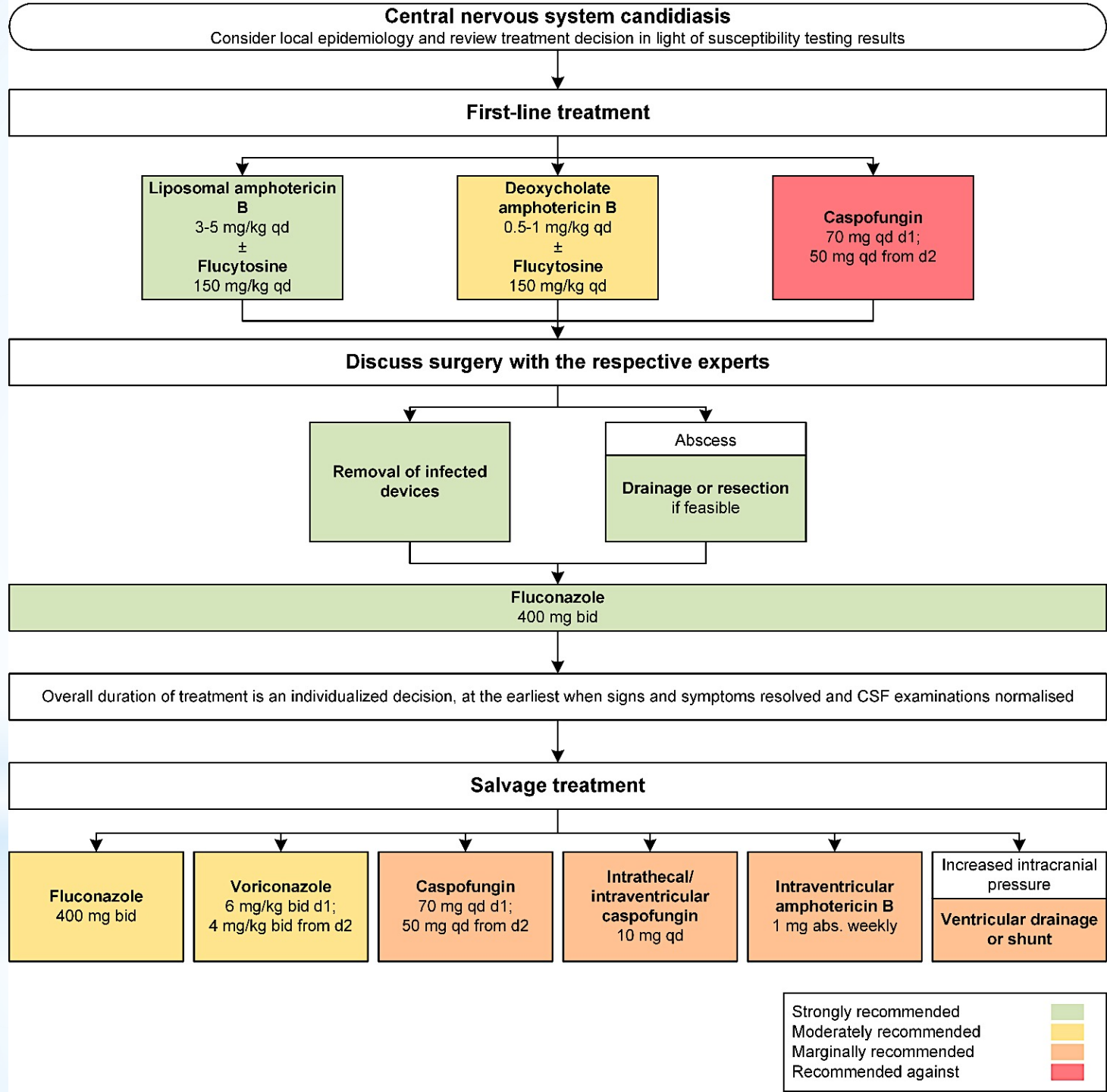
Population	Intention	Intervention	SoR	QoE	Original Source	Annotation
Any	To cure IC/C	Step down to azole po after 5-10d of iv treatment in clinically stable patient and susceptible isolate	B	I	Mora-Duarte NEJM 2002 ⁸²⁰	N=224, CASPO or AMB to FCZ
					Pappas CID 2007 ⁷⁸⁷	N=595, MICA to FLUC
					Reboli NEJM 2007 ⁷⁷⁰	N=245, ANID to FCZ
				IIh	Nucci Mycoses 2013 ⁸²¹	N=54, ANID to VCZ
IIu	Vazquez BMCID 2014 ⁸¹⁹	N=282, ANID to FCZ or VCZ. Response rate similar in early switch				
ICU patients	To cure IC/C	Step down to azole po after 5-10d of iv treatment in clinically stable patient and susceptible isolate	B	IIa	Bailly ICM 2015 ⁸¹⁸	N=647, Echinocandin to azole. In some treatment stop after 5d
				IIu	Garnacho-Montero CCM 2018 ⁸¹⁷	N=119; retrospective multicentre study

ANID, anidulafungin; AMB, amphotericin B; C, candidaemia; CASPO, caspofungin; d, days; FCZ, fluconazole; IC, invasive candidiasis; ICU, intensive care unit; iv, intravenous; N, number of subjects investigated; QoE, quality of evidence; SoR, strength of recommendation; VCZ, voriconazole.
When dosage is not specified, the standard dosing (including potential loading doses) according to the label is recommended.

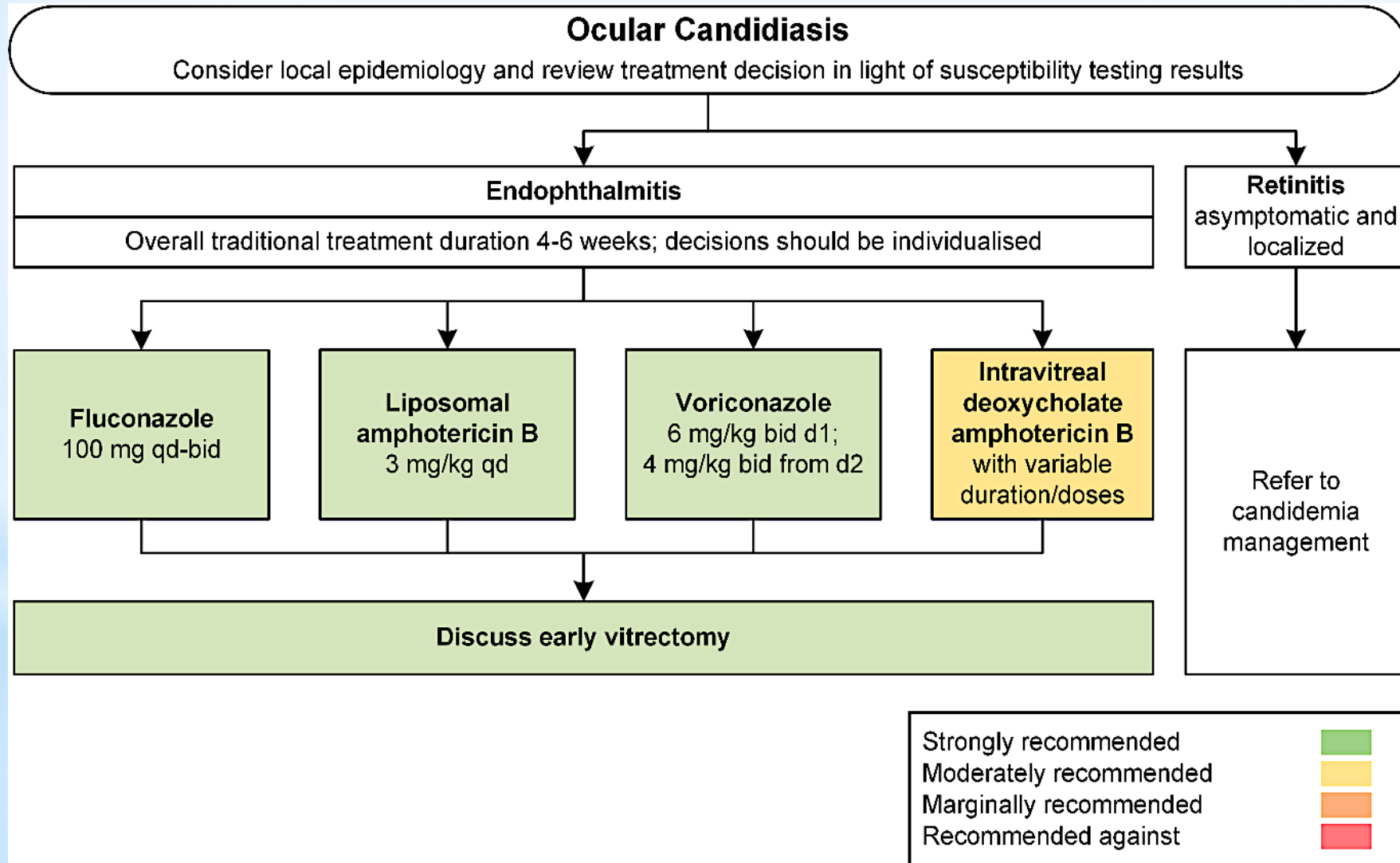
* Hasta stabilse

* 5-10 gün sonra olabilir.

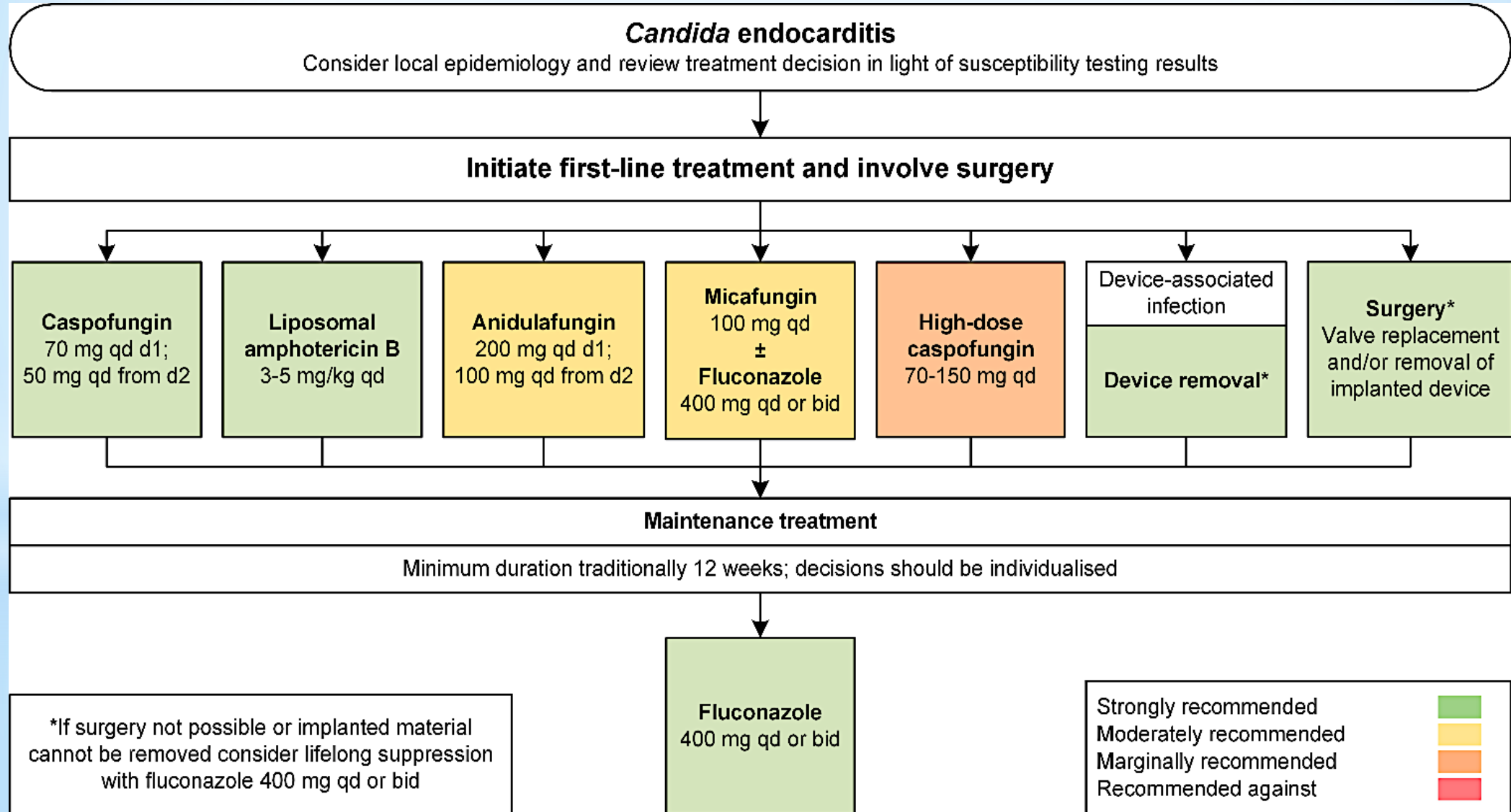
Santral Sinir Sistemi-Kandidiyaz



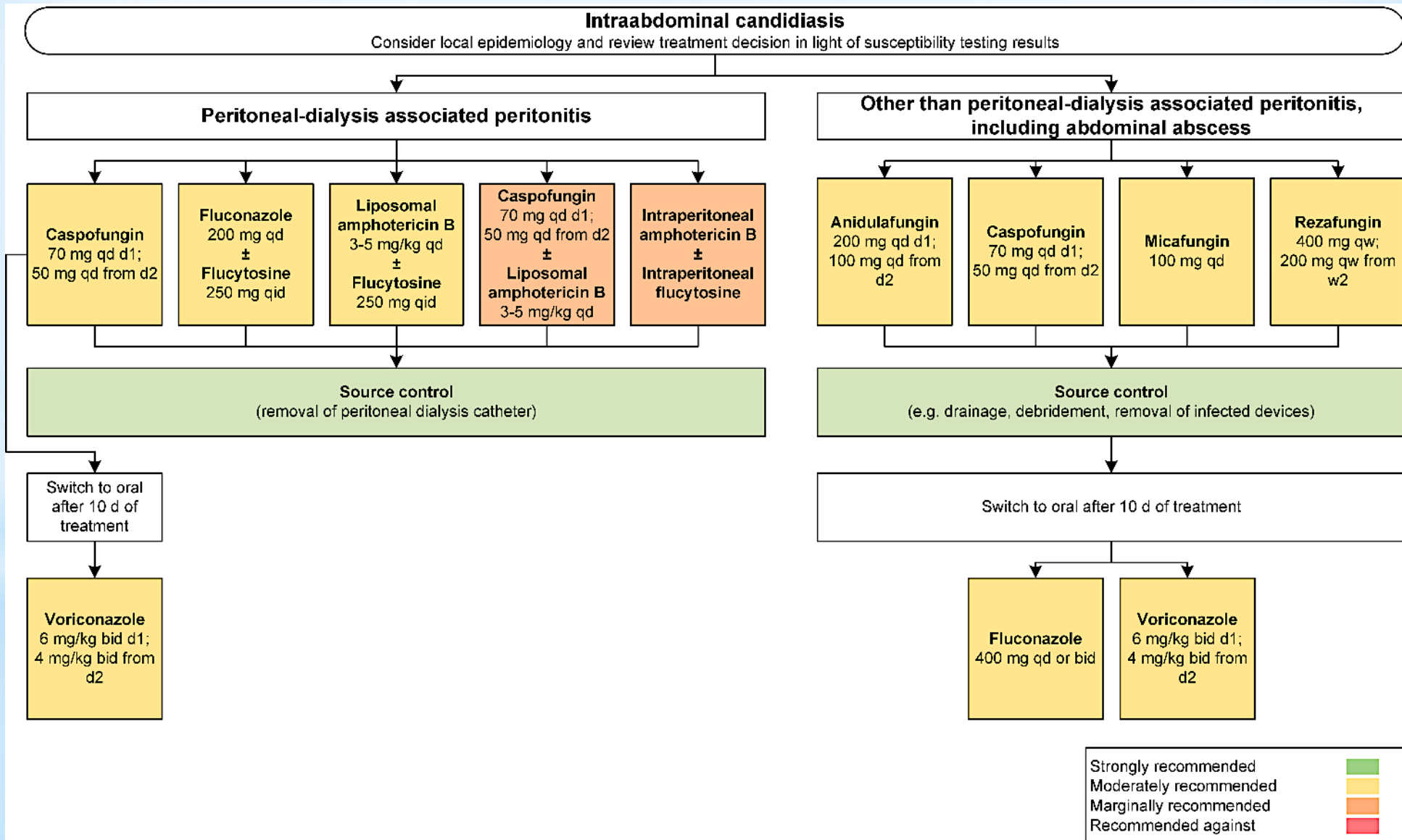
Oküler Kandidiyaz



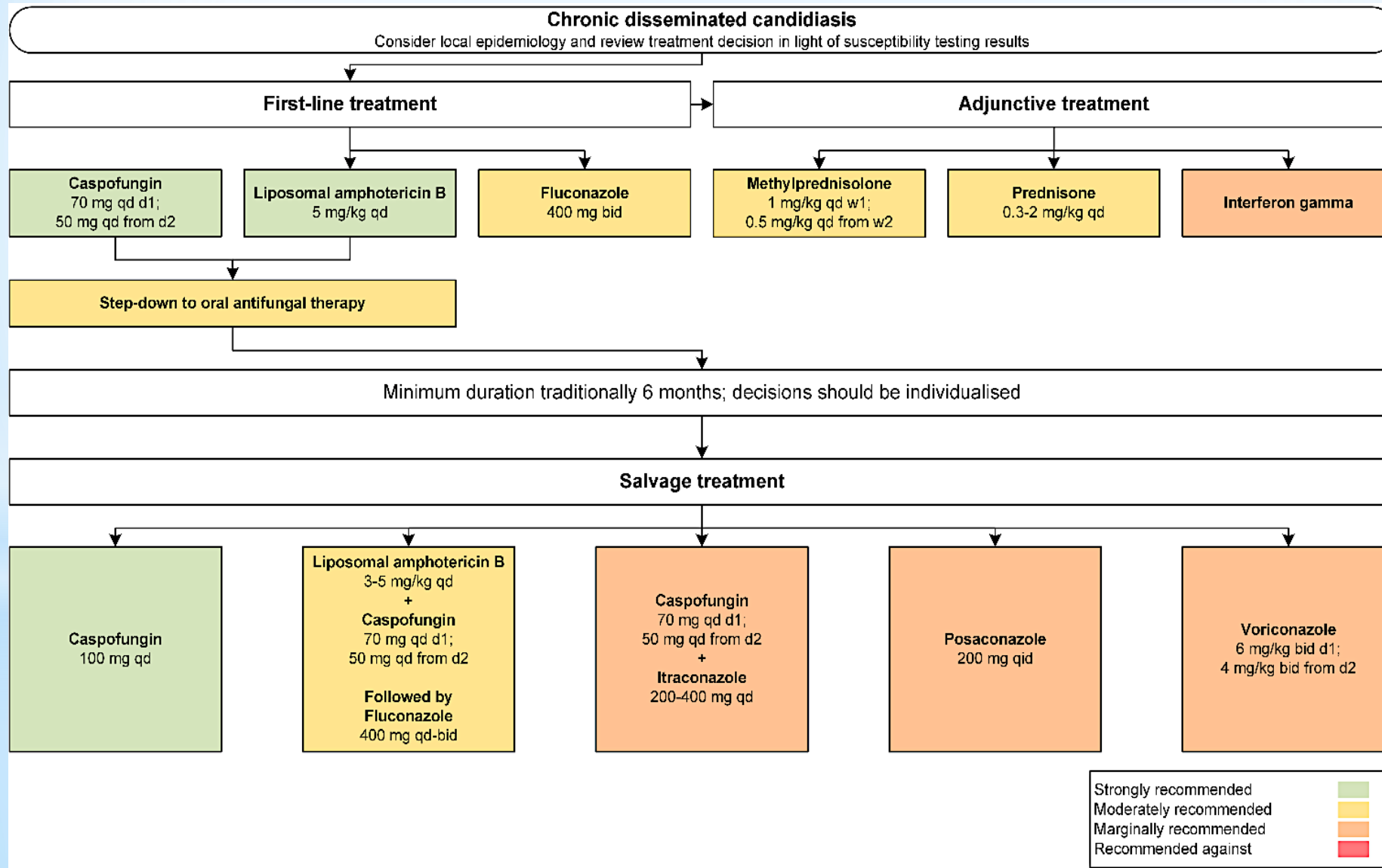
Kandida Endokardit



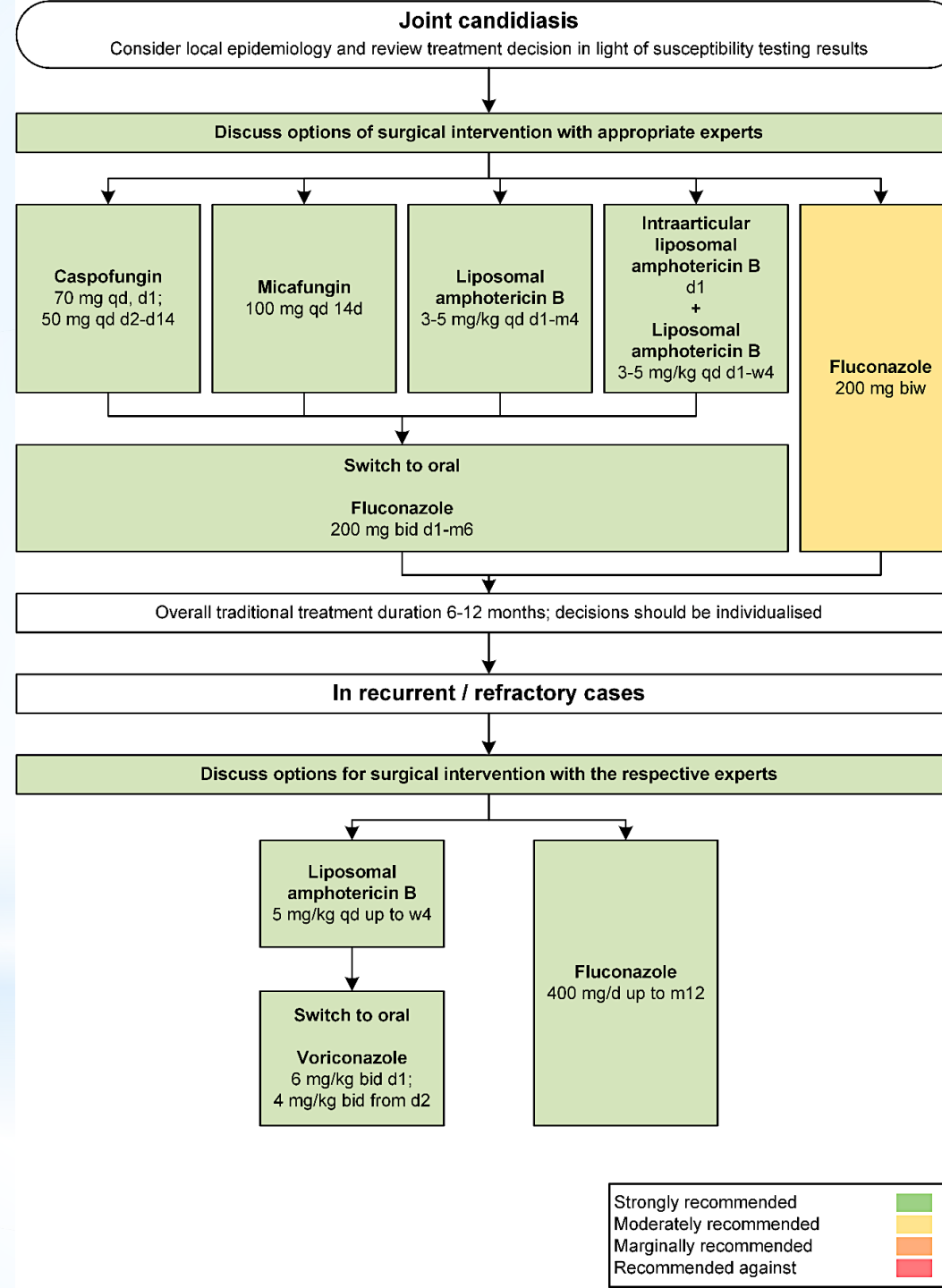
Batın İçi Kandidiyaz



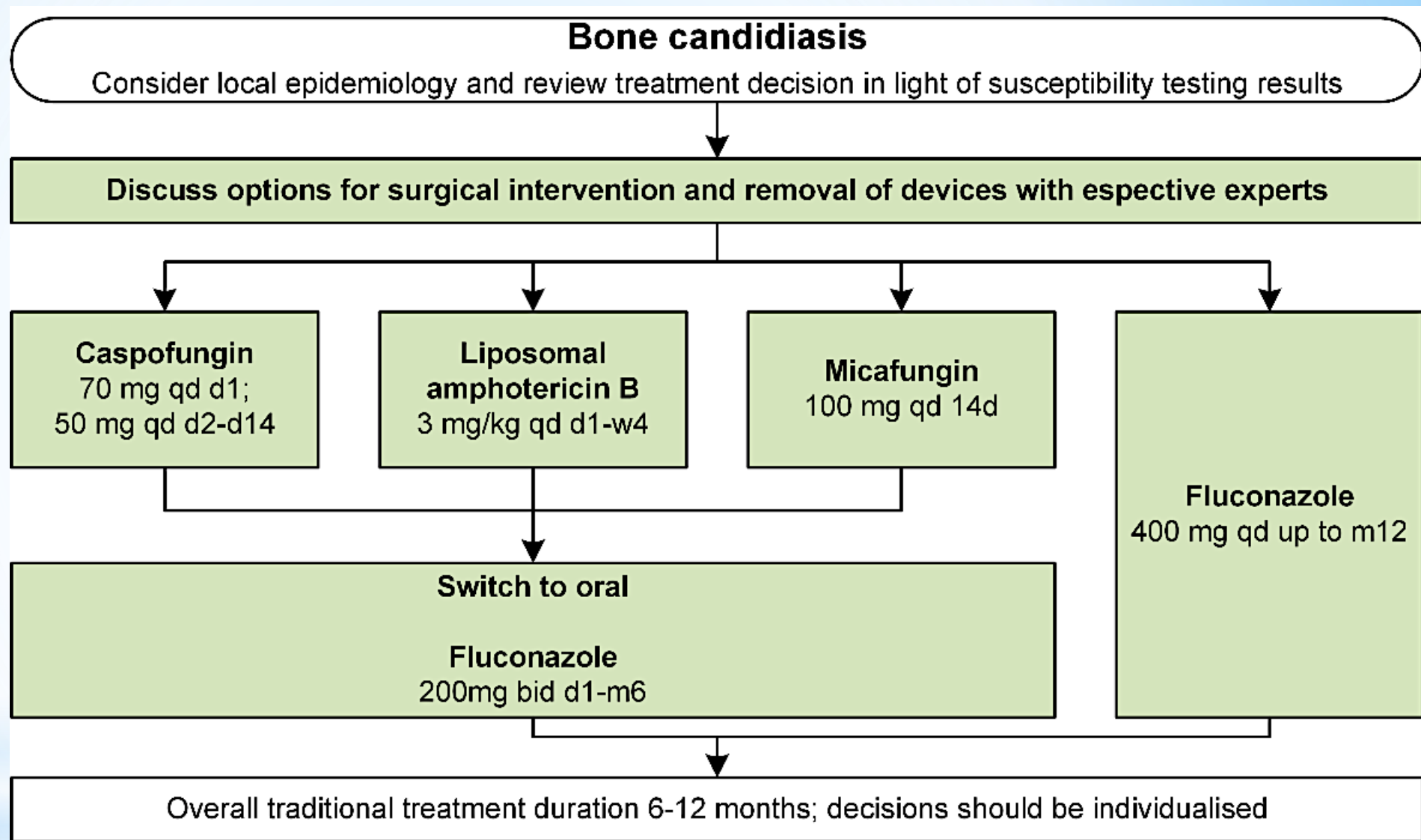
Kronik Dissemine Kandidiyaz



Eklem Kandidiyaz



Kemik- Kandidiyaz



Strongly recommended
Moderately recommended
Marginally recommended
Recommended against



Kandida-Üriner Sistem Enfeksiyonu

Table 41. Recommendations on the management of *Candida* urinary tract infection.

Population	Intention	Intervention	SoR	QoE	References	Annotation
Any	To cure UTI + candidaemia	Echinocandin	C	IIu	Cuervo CID 2017 ⁹⁸¹	N=35 echinocandin, n=88 FCZ, results comparable (candidaemia of UT source)
		MICA	C	III	Multani TID 2019 ⁹⁸²	N=1, liver transplant recipient, <i>C. krusei</i>
Any	To cure candiduria	FCZ 200 mg po qd for 14d	D	I	Sobel CID 2000 ⁹⁷⁹	n=159 FCZ vs n=157 placebo, higher short-term clearance, low long-term eradication
<65 years	To cure UTI	D-AMB bladder irrigation	C	IIu	Tuon IJID 2009 ⁹⁸⁴	Higher clearance after 24h than with FCZ
				IIu	Kauffman 2000 ⁹⁷⁸	Eradication: FCZ 45.5%, D-AMB 54.4%
≥65 years	To cure UTI	D-AMB bladder irrigation	D	I	Jacobs CID 1996 ⁹⁸⁰	N=50 FCZ, n=59 AMB, eradication higher but also all-cause mortality

- * Flukonazol dirençli ise
- * D-AMB
- * Ekinokandinler

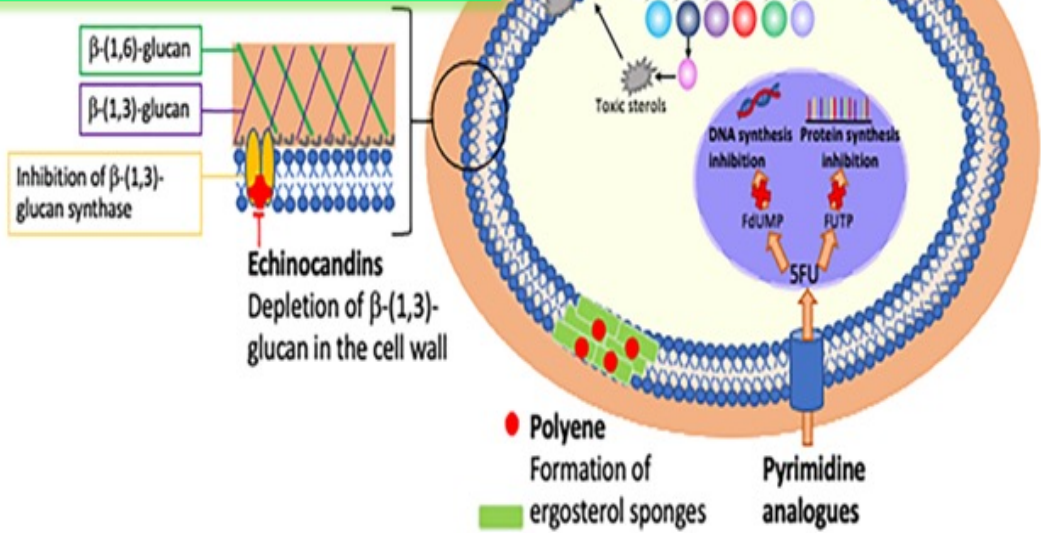
Mevcut antifungaller

Amfoterisin B deoksikolat- 1958

Flusitozin- 1973

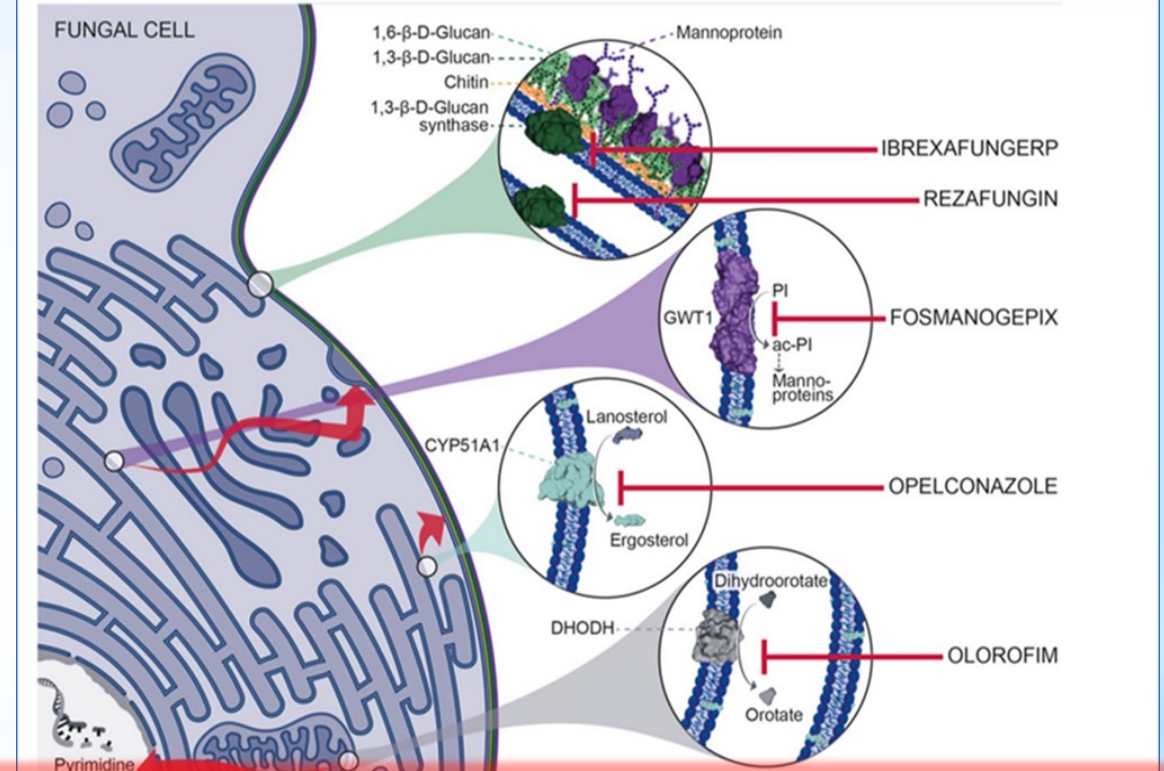
Azoller; 1990

Ekinokandinler: 2000



- ✓ Sınırlı antifungal tedavi seçeneği; ilaç ilaç etkileşimi, toksisite ve uygulama yolundaki kısıtlamalar

Yeni antifungaller



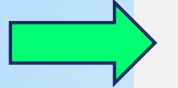
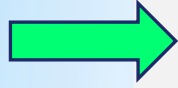
- ✓ İFİ epidemiyolojisi değişiyor
- risk altındaki yeni popülasyon
- Antifungallerin artan oranda profilaksi, empirik tedavi ve tarımda kullanımı ile seleksiyon ve direnç gelişmesi

Yeni İlaçlar

- *Yeni ilaç gelişimi
- *Zaman ve maliyeti
- *Örneğin isavuconazol için
- *13 yıl ve 130 milyon dolar



Agent	Phase 1	Phase 2	Phase 3	Types of Fungal Infections for Enrollment in Clinical Trials
Olorofim (F901318)		NCT05101187		Invasive aspergillosis
		NCT03583164		Invasive infections due to <i>Lomentospora prolificans</i> , <i>Scedosporium</i> spp., <i>Aspergillus</i> , and other resistant fungi
Rezafungin (CD101)		NCT03667690		Candidemia and/or invasive candidiasis (Completed)
		NCT04368559 (ReSPECT)		Antifungal prophylaxis in adults with allogeneic blood or bone marrow transplant
Oteseconazole (VT-1161)		NCT03562156 & NCT03561701 (VIOLET)		Recurrent vulvovaginal candidiasis (Completed)
Fosmanogepix (APX001)		NCT05421858		Candidemia and/or invasive candidiasis
		NCT04240886		Invasive infections due to <i>Aspergillus</i> or rare molds
Opelconazole (PC945)		NCT05037851		Antifungal prophylaxis or pre-emptive therapy against pulmonary aspergillosis in lung transplant
Enochleate Amphotericin B (MAT2203 or CAMB)		NCT02971007		Moderate to severe vulvovaginal candidiasis (Completed)
		NCT04031833 (EnACT)		Cryptococcal meningitis in HIV+ patients
		NCT02629419		Mucocutaneous candidiasis in patients who are refractory or intolerant to standard non-intravenous therapies
Ibrexafungerp (SCY-078) *approved for vulvovaginal candidiasis in U.S.		NCT05399641		Complicated vulvovaginal candidiasis
		NCT03672292 (SCYNERGIA)		Invasive pulmonary aspergillosis combined with voriconazole
		NCT03363841 (CARES)		Candidiasis caused by <i>Candida auris</i>
		NCT03059992 (FURI)		Invasive fungal infections in patients who are refractory or intolerant to standard therapies



Tetrazol
14 alfa demetilaz inb (CYP51)
azol dirençli kandidalar
Oral tedavi seçeneği
RVVK (FDA 2021)

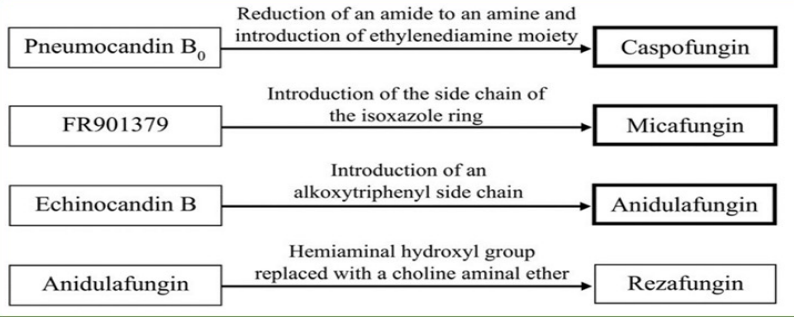


* Rezafungin

İbreksafungerp



Fosfamanogepiks /Manogepiks



* FDA Mart 2023; kandidemi ve invazif kandidozda ≥18 yaş

* Ekinokandin sınıfı ilaç; uzun yarılanma ömrü haftalık kullanım; iv

* İnvazif kandidozda ayaktan yeni bir tedavi seçeneği (erken taburculuk)

* *C. auris* in vitro etkili

* 400 mg iv sonra 200 mg iv/hafta

➤ Ekinokandinlerin, invazif kandidozun standart tedavisinde iv formu var oral tedavi alternatifi yok,

➤ Triterpenoid sınıfı ilaç; 1,3 beta gluklan sentaz inhibitörü (farklı bölgelerden bağlanan)

➤ *C. auris* ve *C. glabrata*yı da içeren invazif kandidoz tedavisinde geniş fungisidal etki (CARES ve FURI çalış)

➤ VVK, RVVK FDA endikasyonlu (2x300 mg)

➤ Yan etkisi az, ilaç etkileşimi kısıtlı, yüksek doku konsantrasyonu, oral yoldan uygulanabilme

➤ 1000-1500 mg po sonra 500-750 mg po

❑ Gwt1 inhibisyonu (mannoproteinlerin hücre duvarına ve zarına taşınmasını engeller)

❑ geniş spektrumlu antifungal aktiviteye sahiptir (*Aspergillus spp*, *Scedosporium spp*, *Fusarium spp*, *Mucorales*, *Cryptococcus spp*, *Coccidioidomycoses*)

❑ *C. krusei* hariç invazif kandidoz tedv.

❑ Ekinokandin dirençli *C. auris* dahil (yeni etki mekanizması çapraz direnç yok)

❑ Göz ve SSS penetrasyonu iyi

❑ oral ve iv yoldan uygulanabiliyor
2x1000 mg sonrası 4x600 mg iv veya 4x700-800 mg po/ gün

Farklı Modaliteler

- * Enfeksiyon hastalıkları uzmanının denetimi
- * Terapötik ilaç düzeyi izlemi
- * Çevresel önlemler

İnvazif kandidoz- antifungal ilaç düzeyi izleme

Antifungal direnci , toksisiteyi önler ve tedaviye yanıtı iyileştirir

➤ Triazololler (itrakonazol, vorikonazol ve posakonazol) ve flusitozin

➤ Flukonazol için rutin değil (örn. hemofiltrasyondaki kritik hastalar)

➤ IDSA; vorikonazol, ESCMID; vorikonazol, posakonazol, flusitozin

* Ne zaman bakalım?

* Emilim veya atılımda bozulma (nazogastrik sonda, gastrostomi, CRRT..)

* Tedavi başarısızlığı

* Breakthrough kandidemi

* Ciddi toksisite

* MIC yüksek olan kandida türlerinin tedavisinde

* Kötü prognoz beklenen invazif infeksiyonlar

CONFERENCE REPORT AND EXPERT PANEL

Antimicrobial therapeutic drug monitoring in critically ill adult patients: a Position Paper[#]



Avrupa Yoğun Bakım Derneği (ESICM)

Avrupa Klinik Mikrobiyoloji ve İnfeksiyon Hastalıkları Derneği (ESCMID)

Antifungals	Suggested sampling scheme/strategy	Target
Echinocandins	TDM recommendation by Panel: "NEITHER RECOMMEND NOR DISCOURAGE"	
Fluconazole	TDM recommendation by Panel: "NEITHER RECOMMEND NOR DISCOURAGE"	
Flucytosine	TDM recommendation by Panel: "NEITHER RECOMMEND NOR DISCOURAGE"	
	C_{max} monitoring One sample 2 h post-dose Sampling should occur 48 h post-initiation of therapy	$C_{max} < 100$ mg/L
	C_{min} monitoring One sample 30 min or just before the next dosing Sampling should occur 72 h post-initiation of therapy	$C_{min} \geq 25$ mg/L ^d
Isavuconazole	TDM recommendation by Panel: "NEITHER RECOMMEND NOR DISCOURAGE"	
Itraconazole	TDM recommendation by Panel: "NEITHER RECOMMEND NOR DISCOURAGE"	$C_{min} > 0.5$ –1 mg/L
	C_{min} monitoring One sample 30 min or just before the next dosing Sampling should occur within 5–7 days post-initiation of therapy	
Posaconazole	TDM recommendation by Panel: "NEITHER RECOMMEND NOR DISCOURAGE"	
	C_{min} monitoring One sample 30 min or just before the next dosing Sampling should occur after 7 days of initiation of therapy	$C_{min} > 0.5$ –0.7 mg/L (prophylaxis) $C_{min} > 1$ mg/L (treatment)
Voriconazole	TDM recommendation by Panel: "YES" C_{min} monitoring One sample 30 min or just before the next dosing Sampling should occur between 2 and 5 days of initiation of therapy	C_{min} : 2–6 mg/L (prophylaxis or treatment)

Nosocomial Fungal Infections: Epidemiology, Infection Control, and Prevention

[Geehan Suleyman](#)¹, [George J Alangaden](#)²

Affiliations + expand

PMID: 34752219 DOI: [10.1016/j.idc.2021.08.002](#)

Nozokomiyal Fungal Enfeksiyonlar: Epidemiyoloji, Enfeksiyon Kontrolü ve Önleme

* *Candida* spp.

* *Malassezia* spp.

* *Trichosporon* spp.

* *Aspergillus* spp.

* Zigomiçetes

* *Fusarium* spp.

*26 randomize ve randomize olmayan alıřmanın meta analizine gre

*%2 klorhekzidin glukonat banyosu, bakteriyel ve *Candida spp.*'ye baėlı kan dolařımı enfeksiyonunu azaltmaktadır

*ok merkezli bařka bir alıřmaya gre klorhekzidin banyosu,

*Mantar nedenli santral kateter iliřkili kan dolařımı enfeksiyonunu %90 oranında azaltmaktadır.



Evaluation of Total Body Weight versus Adjusted Body Weight Liposomal Amphotericin B Dosing in Obese Patients

Michelle H Ting ¹, Andrej Spec ², Scott T Micek ^{1 3}, David J Ritchie ^{1 3}, Tamara Krekel ¹

Vücut Ağırlığı ve Ayarlanmış Vücut Ağırlığına
Karşılaştırılarak Obez Hastalarda

Lipozomal Amfoterisin-B Dozunun Değerlendirilmesi

Ayarlanmış Vücut Ağırlığı

Please provide the following data:

Sex [Female](#) ▾

Height 160 [cm](#) ▾

Actual body weight 80 [kg](#) ▾

Results of the calculations:

Ideal body weight 54.09 [kg](#) ▾

Adjusted body weight 64.45 [kg](#) ▾

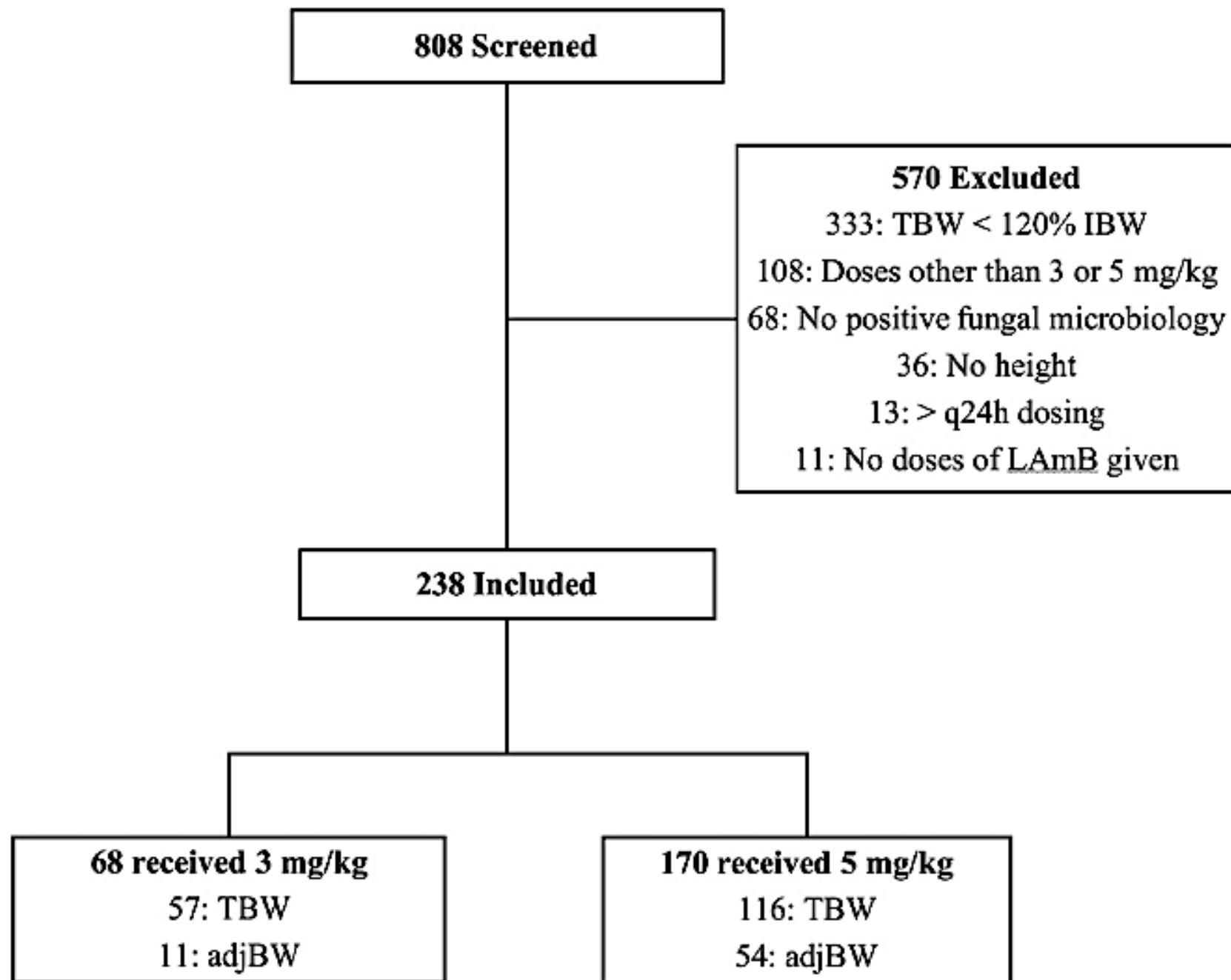
*Lipozomal amfoterisin B (LAmB) obez hastalardaki doz net deęil

*Tek merkezli retrospektif bir kohort alıřması

*İdeal vücut aęılıęının %120'sini geen hastalarda

*238 hasta alıřmaya alınmıř





*Total vücut ağırlığına göre

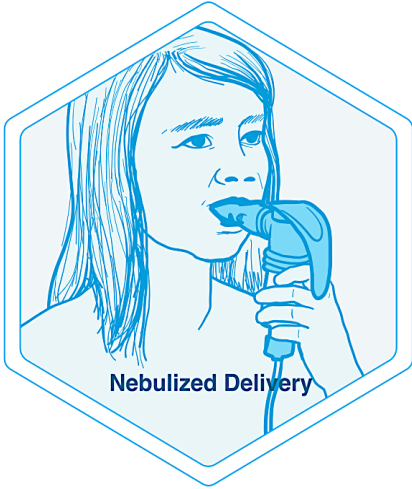
*3 mg/kg alan hastalarda güvenlik ve etki açısından fark yok

*5mg/kg alan hastalarda %57 nefrotoksisite gelişmiş (p=0.016)

- *Ayarlanmış vücut ağırlığına göre tedavi alan hastalarda
- *90 günlük mortalite (%60'a %40) hafif daha yüksek $p=0.079$
- *Kritik ve mortalite riski yüksek hastalar için
- *Total vücut ağırlığının kullanılması önerilmiş

Farklı Modaliteler

- * Opelkonazole
- * Yeni formüle edilmiş bir azol,
- * Akciğerlere nebül şeklinde uygulanıyor



Inhaled route of administration

Opelconazole has a particle size ideal for delivery via inhalation similar to the size of *Aspergillus* spores (2 μm to 3 μm) and is designed to target infection in the lungs.¹⁷

Farklı Modaliteler

- *İmmünoterapi
- *Mantar aşıları- *C. albicans* rekombinant Als3 protein aşısı
 - *Faz 2 çalışmada
- *Mantarlara karşı antikorlar

The Role of B-Cells and Antibodies against *Candida* Vaccine Antigens in Invasive Candidiasis

Manisha Shukla ¹, Pankaj Chandley ¹, Soma Rohatgi ¹

İnvaziv Kandidiyazda *Candida* Aşısı Antijenlerine Karşı

B hücrelerinin ve Antikorların Rolü

*Mantar ilaçlarına karşı direnç gelişimi söz konusudur

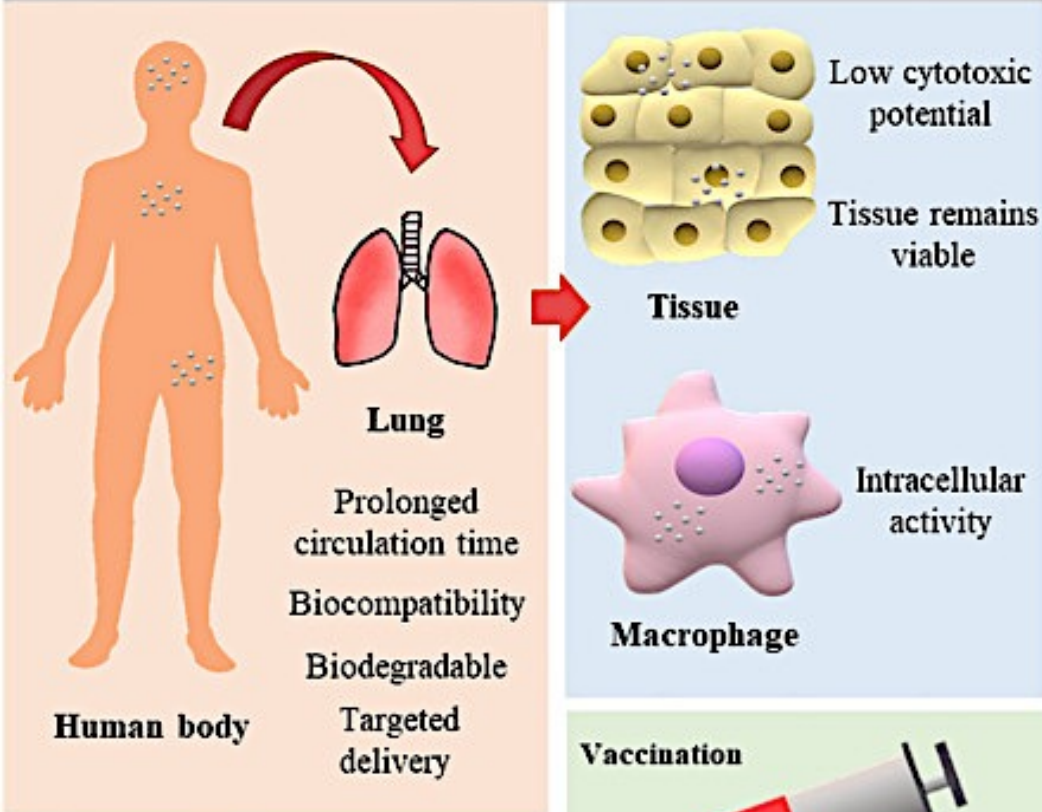
*İmmün terapiler araştırılmalıdır.

*Hücre sel yanıt bilinmekte ancak humoral yanıt net bilinmiyor

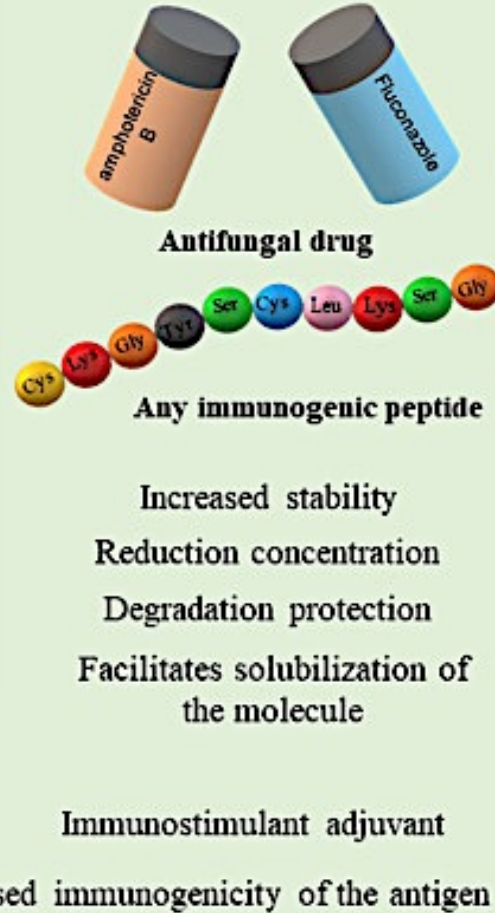
*Monoklonal antikor terapileri geliştirilmeye çalışılıyor

Mantar aşılarında nanopartiküller

Advantages of using nanoparticles for health



Advantages in the delivery of drugs and antigens



- * Stabilitede artış
- * Dolaşımda daha uzun kalır
- * Molekülün çözülmesi kolaylaşır, hücre içi aktivite
- * Antijenin immünojenitesi artar

Subtitle:  Nanoparticles

Farklı Modaliteler-Kombinasyon Tedavileri

- * Mikafungin, efflux pompalarını inhibe eder
 - * Flukonazol ile birlikte tedavi hücre içi konsantrasyonu artırır.
- * Kriptokok enfeksiyonları için
 - * Flukonazol ve flusitozin birlikte zaten kullanılıyor

> [Virulence](#). 2021 Dec;12(1):217-230. doi: 10.1080/21505594.2020.1870079.

Mangiferin enhances the antifungal activities of caspofungin by destroying polyamine accumulation

Juan Shen ¹, RenYi Lu ², Qing Cai ¹, LingZhi Fan ¹, WanNian Yan ¹, ZhenYu Zhu ²,
LianJuan Yang ¹, YingYing Cao ¹

Mangiferin

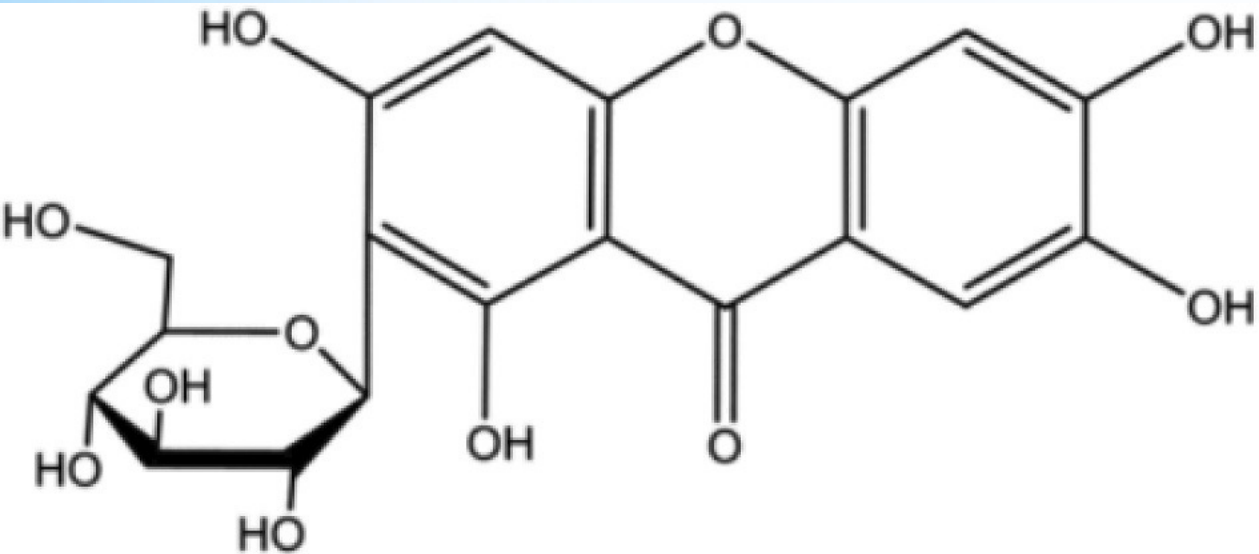
Kaspofunginin Mantara Karşı Olan Etkinliğini

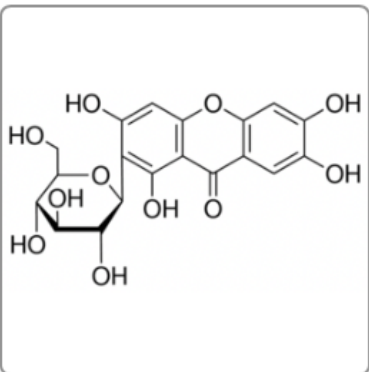
Poliamin Birikimini Engelleyerek

Arttırmaktadır

*Mangiferin mangodan

*Ksanton





Mangiferin

Synonym(s): Shamimin, 1,3,6,7-Tetrahydroxyxanthone C₂-β-D-glucoside, Chinomin, Chinonin

Empirical Formula (Hill Notation): C₁₉H₁₈O₁₁

CAS No.: **4773-96-0** **Molecular Weight:** 422.34

Compare	Product No.	Description	SDS	Pricing
<input type="checkbox"/>	PHL89729	phyproof [®] Reference Substance	↓	Hide ^
SKU	Pack Size	Availability	Price	
PHL89729-20MG	20 MG	Only 5 left in stock (more on the way) Details...	€229.00	

To order products, please **contact** your local dealer.

* *Candida albicans* ile çalışılmış

* Sıçan deneyi yapılmış

* Dissemine kandidiyaz modeli oluşturulmuş

* Tek başına kaspofungin ya da mangiferinle verilmiş

* Mantar yükü ölçülmüş

* Poliamin yok olduğunda oksidatif strese bağlı mantar hücresi ölümü olmuş

Table 1. Interaction of mangiferin and caspofungin against fungi.

Strains	MIC ₈₀ alone ^a		MIC ₈₀ in combination		FIC index ^b
	MG	CAS	MG	CAS	
<i>Candida albicans</i> (CAS-S)					
SC5314	>64	0.25	4	0.0625	0.313
178	>64	0.25	4	0.0625	0.313
678	>64	0.5	2	0.0313	0.094
181	>64	0.5	2	0.0625	0.156
182	>64	0.25	4	0.0313	0.188
503	>64	0.25	4	0.0313	0.188
531	>64	0.25	4	0.0313	0.188
<i>Candida albicans</i> (CAS-R)					
S20	>64	8	4	0.25	0.094
S33	>64	8	4	0.25	0.094
S36	>64	8	4	0.25	0.094
<i>Candida parapsilosis</i>					
311	>64	1	2	0.125	0.156
327	>64	2	4	0.125	0.125
328	>64	1	4	0.125	0.188
<i>Candida krusei</i>					
213	>64	1	8	0.25	0.375
204	>64	0.5	4	0.125	0.313
266	>64	1	4	0.125	0.188

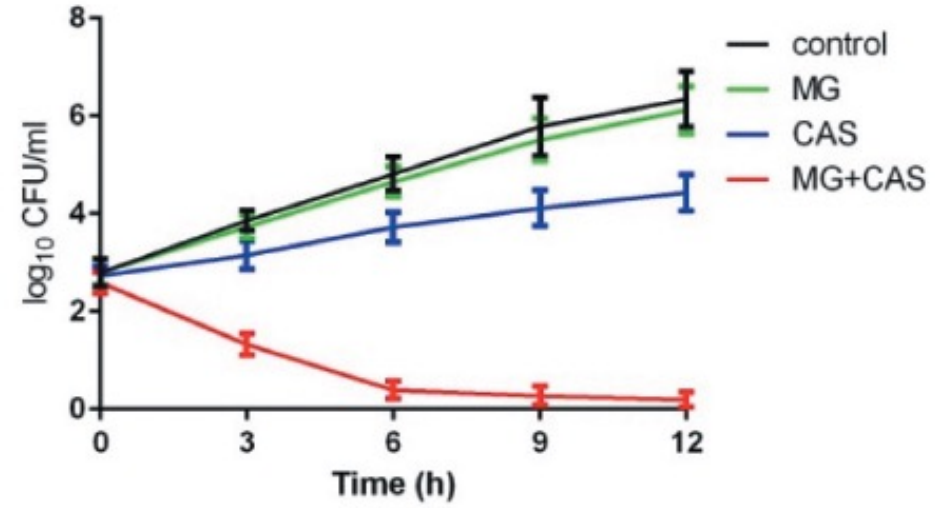
^aThe unit of mangiferin (MG) and caspofungin (CAS) is µg/ml.

^bSynergism and antagonism were defined by FIC indices of ≤ 0.5 and >4 , respectively. The FIC indices of >0.5 but ≤ 4 was defined as indifferent.

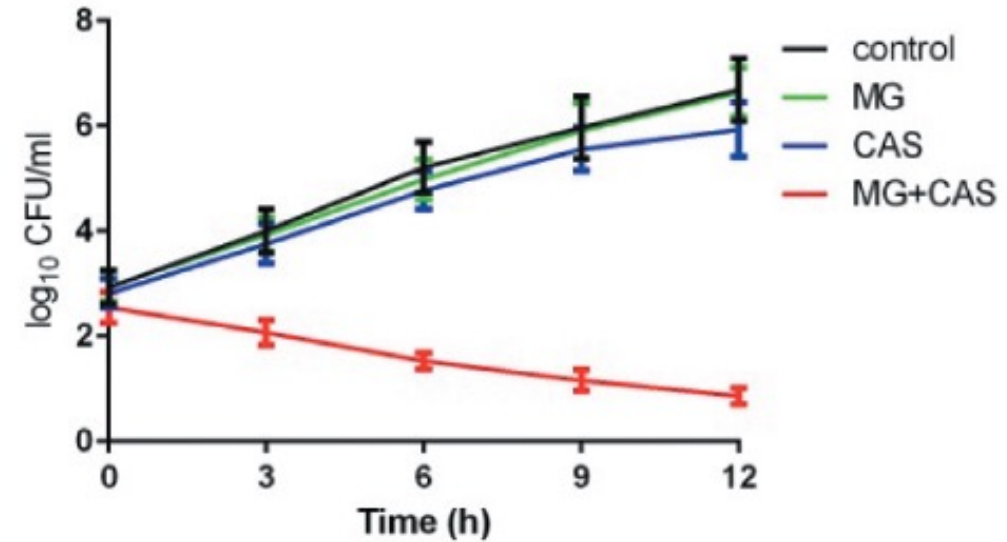
Zaman Ölüm Eğrisi

A-*Candida albicans*,
Kaspofungin duyarlı

a



b



B-*Candida albicans*,
Kaspofungin dirençli

İlginiz İçin
Teşekkür Ederim

