

# Candidose invasive quand y penser?

32<sup>ème</sup> congrès national de la STPI

2<sup>ème</sup> congrès francophone de pathologie infectieuse et de microbiologie clinique

Rim Abdelmalek

7/5/2023

The poster features logos for the Tunisian Society of Infectious Pathology (STPI) and the French Society of Infectious Pathology (SPLIF) at the top. The main title is in large blue letters, with the dates and location in red. A list of themes is provided in blue and red. Contact information for two speakers is at the bottom left. A call to action for submission is in a white starburst at the bottom right. The background includes a world map and a cityscape illustration.

La Société Tunisienne de Pathologie Infectieuse & La Société de Pathologie Infectieuse de Langue Française  
organisent

**32<sup>ème</sup>** Congrès National de la Société Tunisienne de Pathologie Infectieuse  
**2<sup>ème</sup>** Congrès Francophone de Pathologie Infectieuse et de Microbiologie Clinique

Du 5 au 7 Mai 2023  
Hôtel Golden Tulip Taj Sultan Hammamet

**THÈMES**

- ♦ Maladies Tropicales Négligées
- ♦ Pneumonies aiguës communautaires de l'adulte
- ♦ Infections virales émergentes et réémergentes
- ♦ Sepsis
- ♦ Antibiorésistance
- ♦ Candidoses invasives
- ♦ Vaccination
- ♦ Best of Infectiologie

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**1<sup>ère</sup> Annonce**  
Soumission obligatoire sur le site  
[infectiologie.org.tn](http://infectiologie.org.tn)  
Dernier délai  
15 Mars 2023

# Introduction

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La Société Tunisienne de Pathologie Infectieuse & La Société de Pathologie Infectieuse de Langue Française organisent

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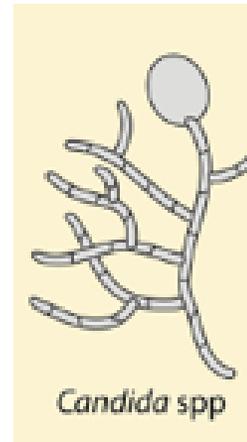
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Dernier délai **15 Mars 2023**

Levures  
Microorganismes eucaryotes

Réchauffement climatique  
Prévalence / chez les mammifères

~ 400 espèces levures isolées à ce jour  
≥ 15 *Candida* spp pathogènes pour  
l'homme  
> 90% formes invasives à 5 espèces  
majeures



Modification environnement  
Dispersion intensifiée des levures

Symbiote

Fonction  
Rendre les nutriments au sol

Émergence  
Millions d'années

Historiquement  
Pathogènes plantes, insectes, amphibiens, rotifères

Mortalité 27-55%

Symptômes non spécifiques  
Retard diagnostique et ttt

↑ incidence candidémie 10-20 ans  
4<sup>ème</sup> pathogène USA  
< 10 premiers Europe  
40.000 dollars/CI surcoût

Diagnostic de confirmation  
Hc Sabouraud 50-70%  
Prélèvements profonds difficiles  
Méthodes sophistiquées, coûteuses

Candidose  
invasive

Mortalité globale  
40% (5-71%) → 80%  
Retard thérapeutique > 24 h  
→ décès x 2  
70% pas traitement empirique précoce

Importance chercher facteurs de risque/scores

MINIREVIEW



# and Fungal-Bacterial ease

**Table 1** Major components of the mycobiome in different body sites

Site	Fungal composition
Oral cavity	<i>Candida</i> spp., <i>Cladosporium</i> , <i>Aspergillus</i> spp., <i>Fusarium</i>
Nasal cavity	<i>Cladosporium</i> , <i>Penicillium</i> , <i>Alternaria</i> , <i>Aspergillus</i> spp.
Gut	<i>Wallemia</i> , <i>Trichocomaceae</i> , <i>Saccharomyces</i> , <i>Rhodotorula</i> , <i>Candida</i> spp., uncultured fungi, <i>Aspergillus</i> , <i>Simplicillium</i> , <i>Rhodotorula</i> , <i>Galactomyces</i> , <i>Trametes</i> , <i>Pleospora</i>
Vagina	<i>Candida</i> , <i>Pichia</i> , <i>Eurotium</i> , <i>Alternaria</i>
Conjunctiva (leprosy)	<i>Candida</i> , <i>Aspergillus</i> , <i>Geotrichum</i> , <i>Acremonium</i>
Skin	<i>Candida</i> , <i>Malassezia</i> , <i>Cladosporium</i> , <i>Cryptococcus</i>

- Breast milk:**
- *Malassezia*
  - *Davidiella*
  - *Sistotrema*
  - *Penicillium*

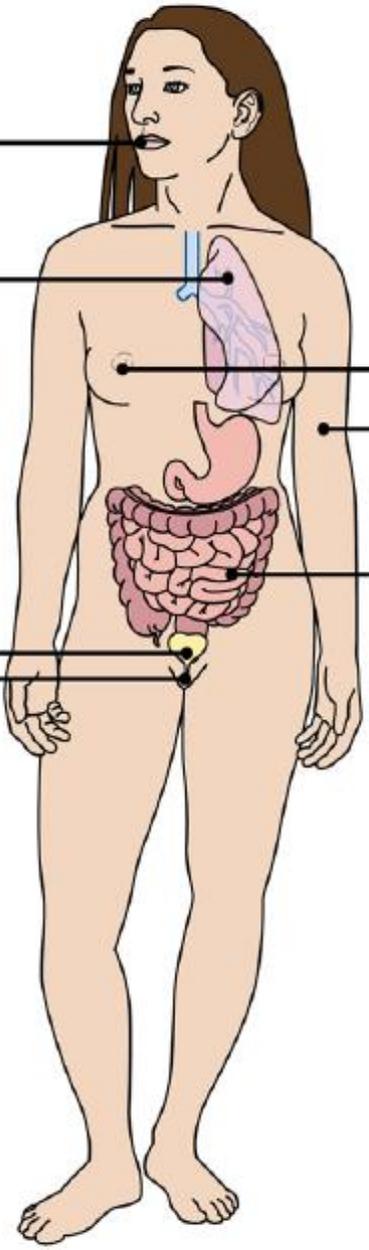
- Skin:**
- *Malassezia*
  - *Aspergillus*
  - *Candida*

- Oral cavity:**
- *Candida*
  - *Aspergillus*
  - *Malassezia*
  - *Cladosporium*
  - *Saccharomyces*
  - *Fusarium*
  - *Penicillium*
  - *Pichia*
  - *Rhodotorula*

- Lungs:**
- *Aspergillus*
  - *Cladosporium*
  - *Penicillium*
  - *Candida*

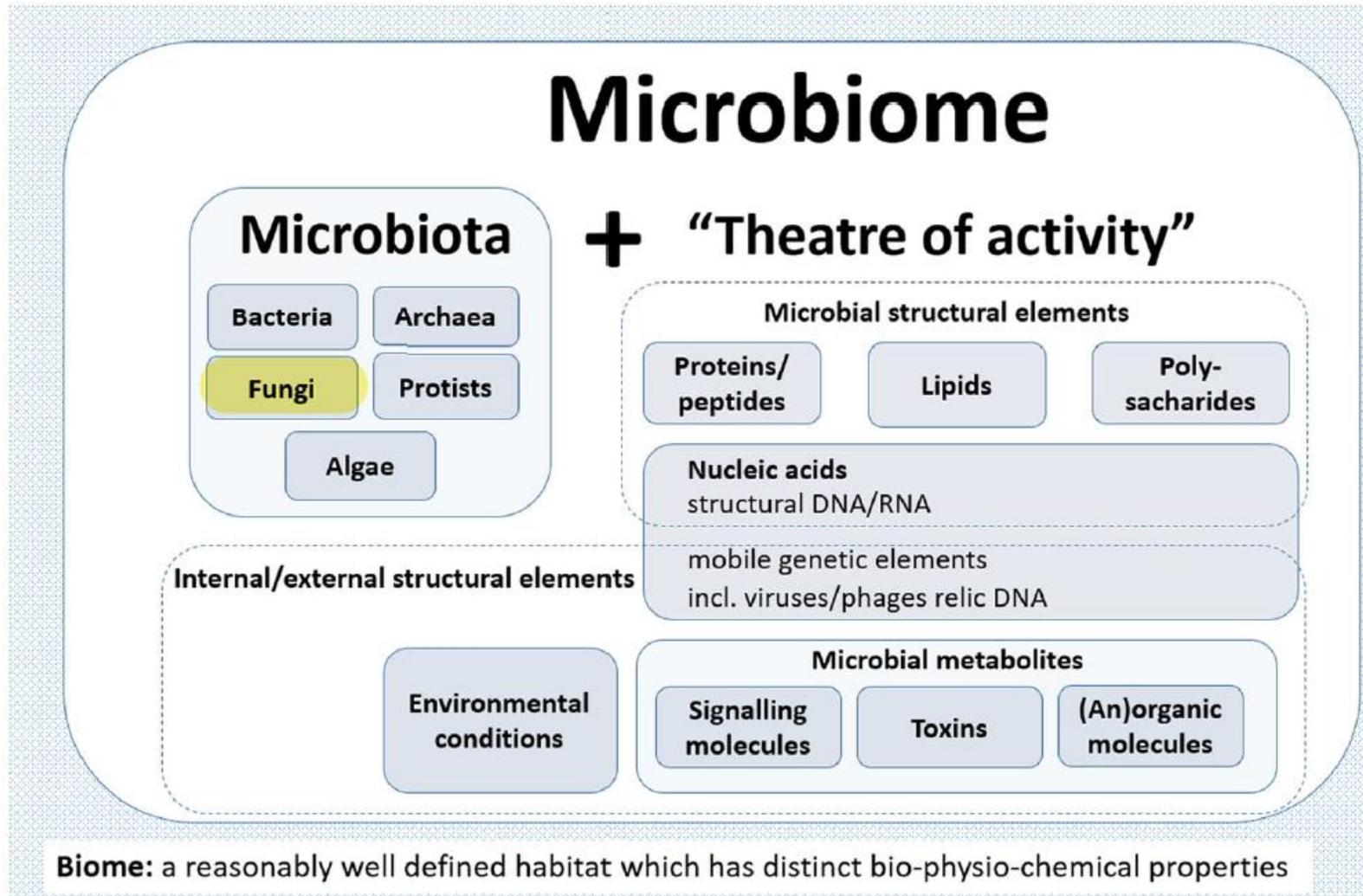
- Urinary tract:**
- *Candida*
  - *Saccharomyces*
  - *Malassezia*

- Vagina:**
- *Candida*
  - *Saccharomyces*
  - *Pichia*
  - *Cladosporium*
  - *Rhodotorula*



# Microbiome definition re-visited: old concepts and new challenges

Berg *et al. Microbiome* (2020) 8:103  
<https://doi.org/10.1186/s40168-020-00875-0>



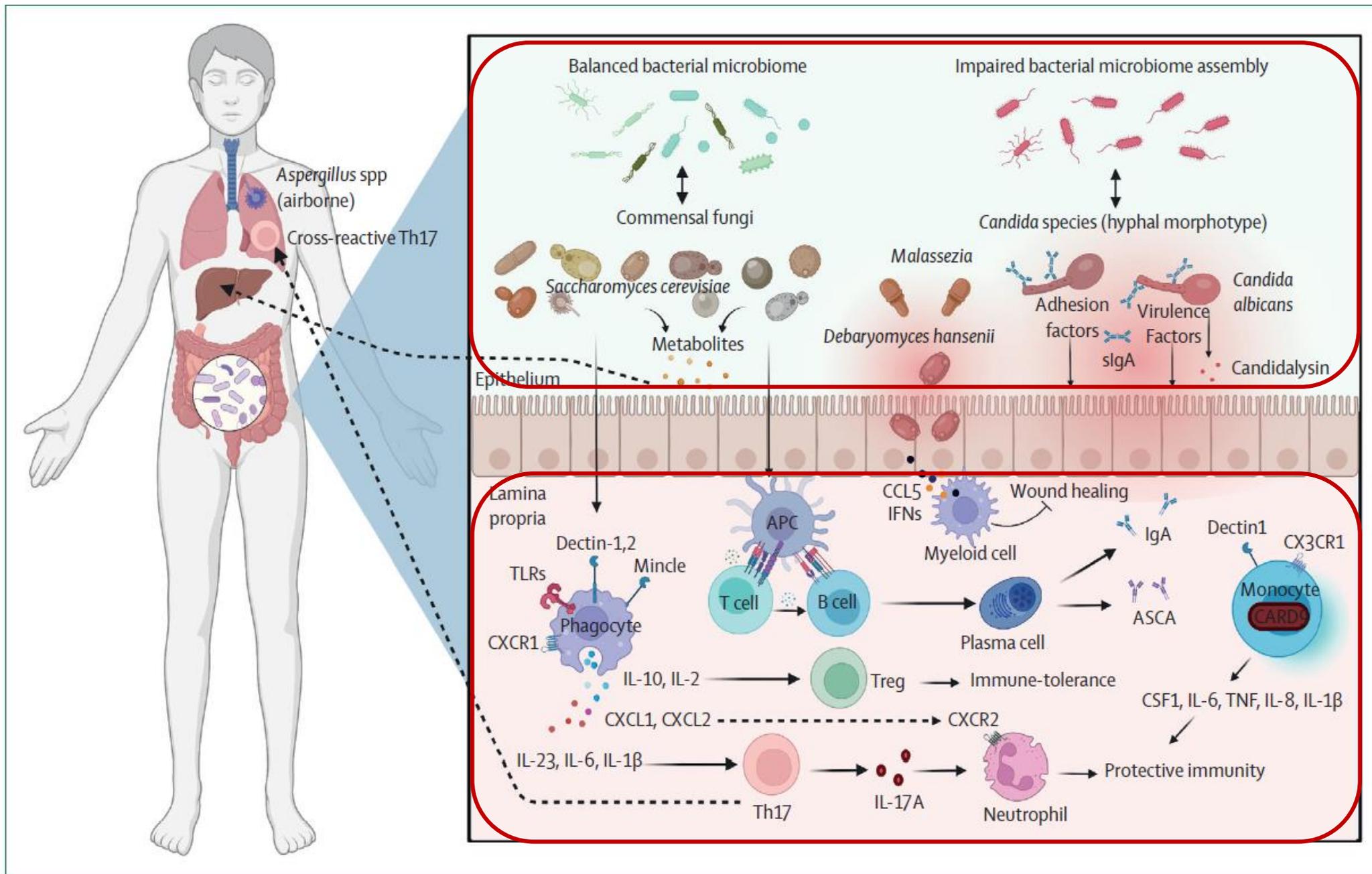
RESEARCH

# The gut mycobiome Microbiome Project

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Matthew C. Ross<sup>1</sup>, Christopher J. Stewart<sup>1</sup>, Gin  
Nadim J. Ajami<sup>1</sup> and Joseph F. Petrosino<sup>1\*</sup>

**Table 3** Top 10 most prevalent fungi found in metagenomic WGS sequences

Species	Volunteers (n = 215)	Samples (n = 472)	Reads (n = 27,091,491,028)
<i>Malassezia restricta</i>	131	191	5829
<i>Saccharomyces cerevisiae</i>	128	198	6205
<i>Malassezia globosa</i>	115	168	2373
<i>Cyberlindnera jadinii</i>	67	92	88,922
<i>Saccharomyces pastorianus</i>	66	84	307
<i>Candida albicans</i>	45	55	2426
<i>Debaryomyces hansenii</i>	31	32	278
<i>Malassezia sympodialis</i>	24	28	92
<i>Alternaria alternata</i>	24	24	81
<i>Candida parapsilosis</i>	23	25	158



**Figure 1: Interplay between gut mycobiome and host immunity in association with the assembly of the bacterial microbiome**  
 ASCA=anti-*Saccharomyces cerevisiae* antibody. Treg=regulatory T cell. Th17=T-helper-17 cell.

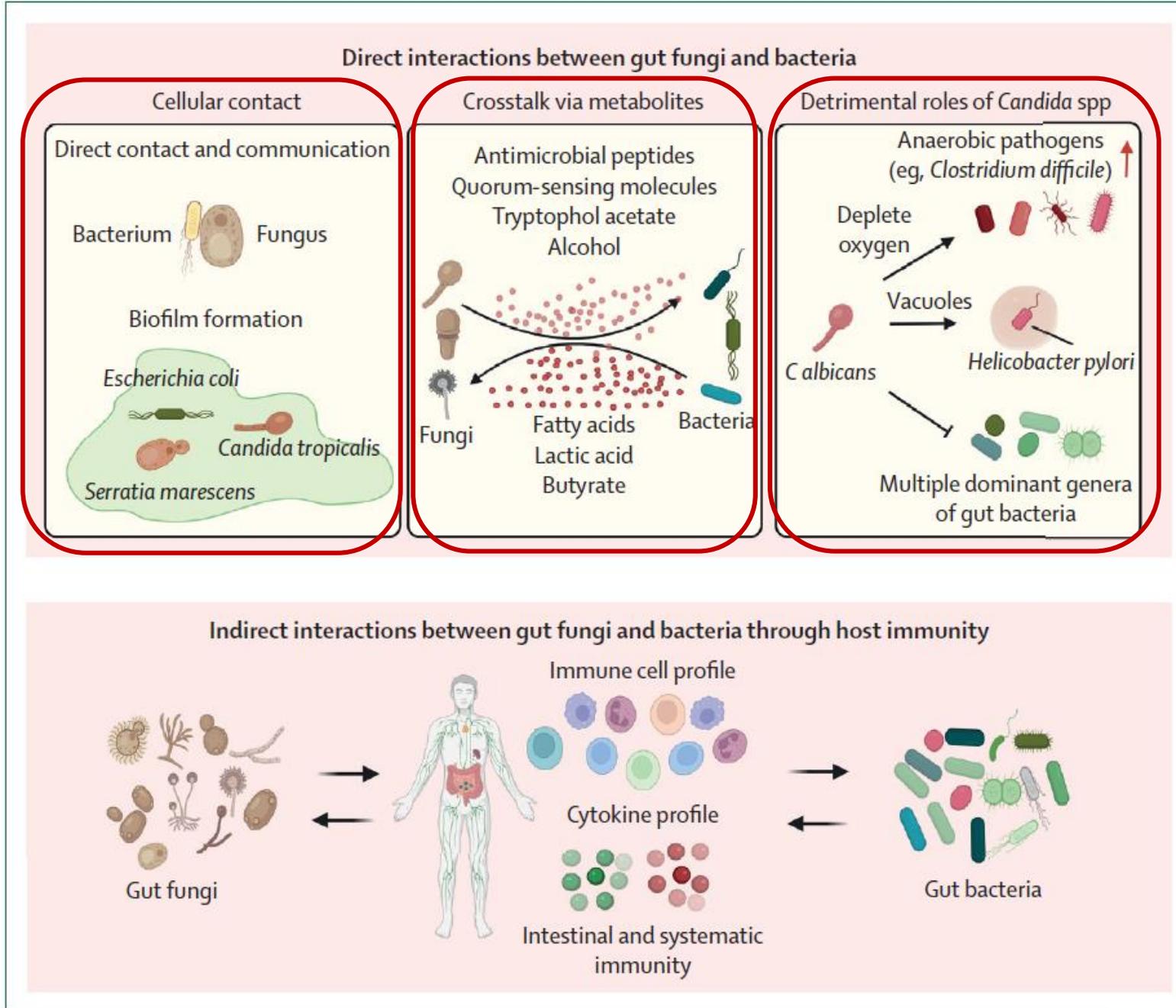
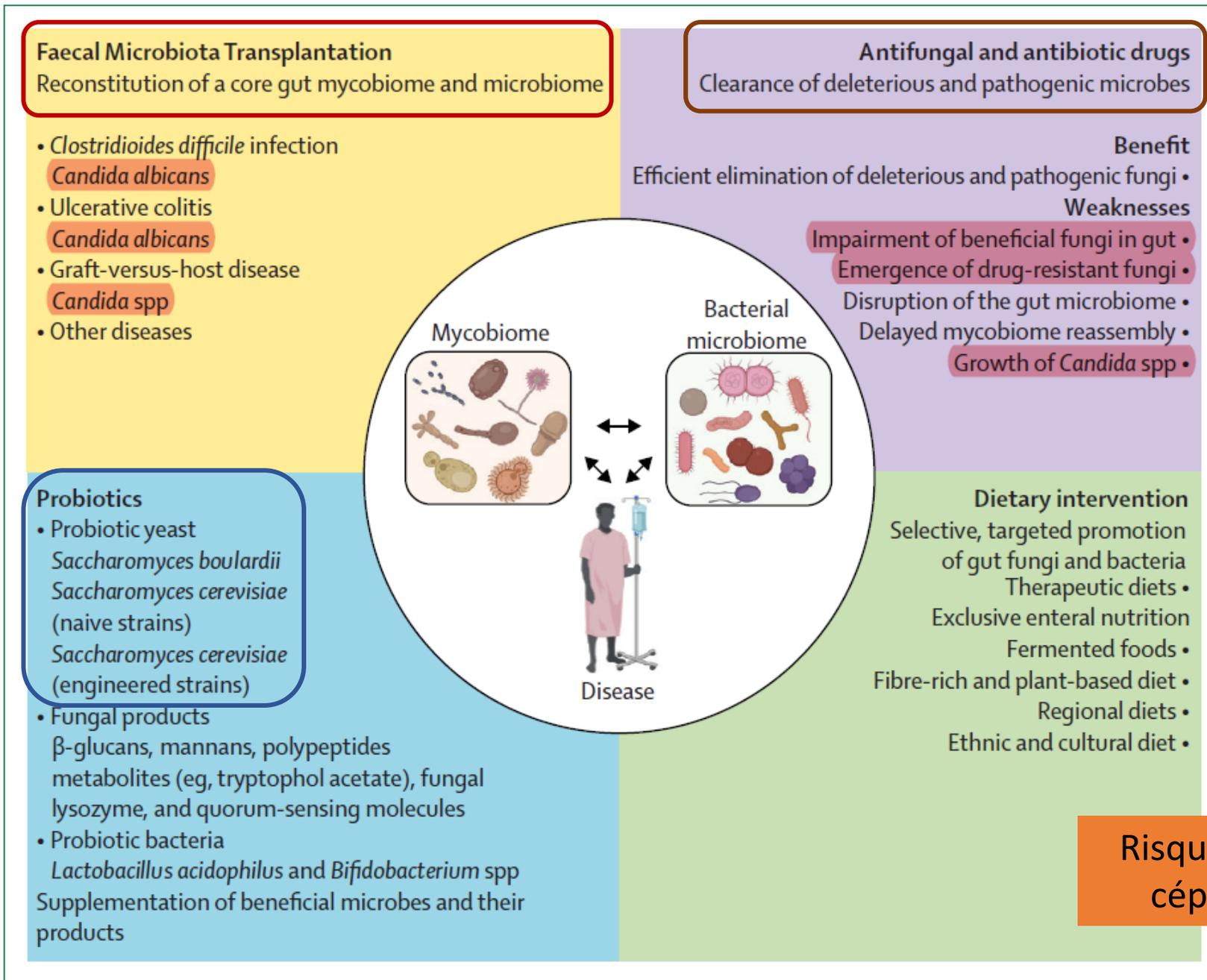


Figure 2: Cross-kingdom interactions between the gut fungi and bacteria in the host



Probiotiques diminuent colonisation de 30% dès J7

Risque élevé de candidose invasive // céphalosporines et ciprofloxacine

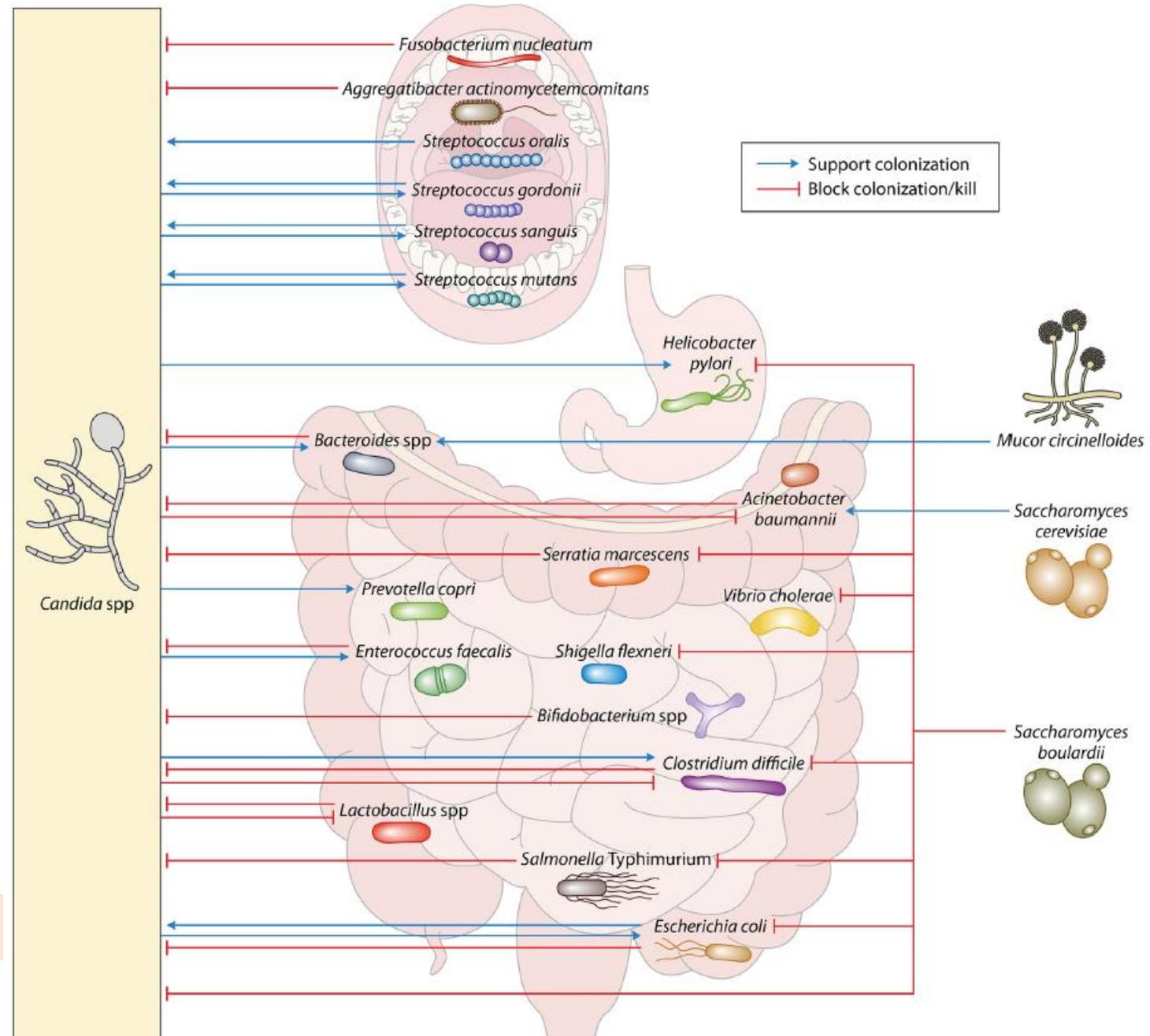
Figure 3: Therapeutic avenues in clinical setting based on gut mycobiome modification

Microbiome=mycobiome+microbiote  
 0,1% des microorganismes TD  
 Symbiote  
 Colonise peau et muqueuses  
 Opportuniste

*Pseudomonas* et *Enterococcus faecalis*  
 inhibent la filamentation

Le jeûne diminue le nitrogène  
 et active la filamentation

Colonisation USI par *Candida* 80% en 7 jours



# Mécanisme pathogénique

- Candidose superficielle dépend de
  - Mode de vie
  - Conditions socio-économiques
- Candidose invasive dépend de
  - Immunité de l'hôte
  - Espèce de *Candida*

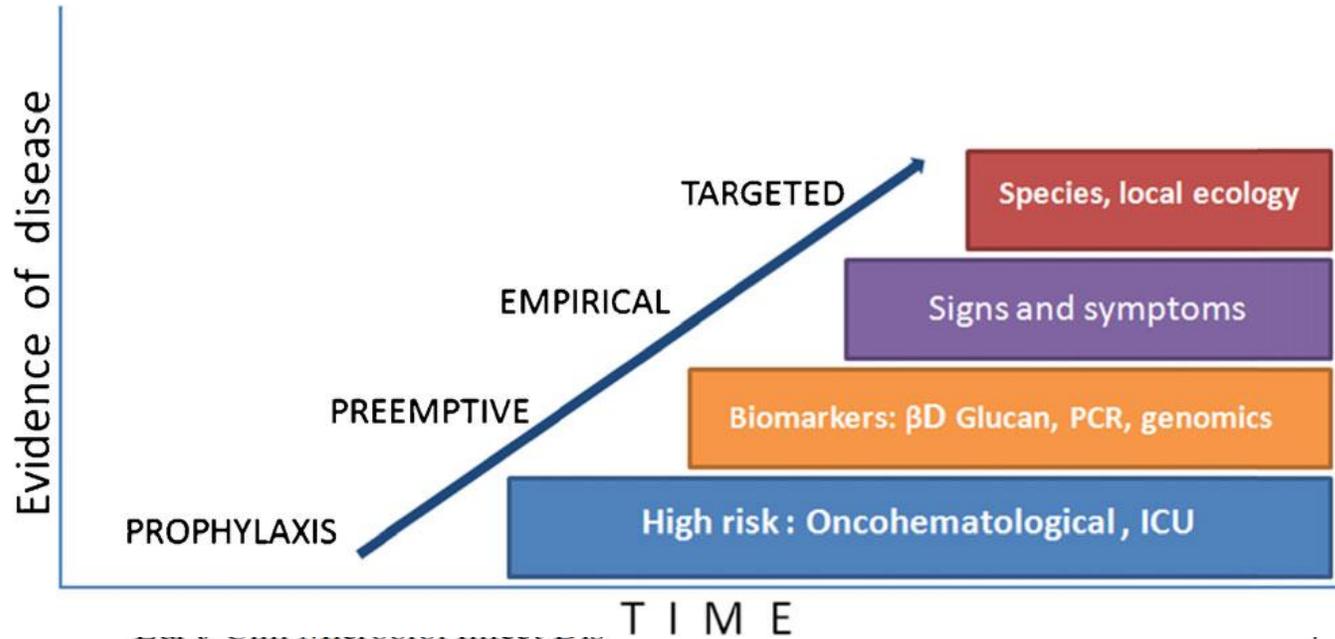
Virulence *Candida*  
Adaptation à l'hôte  
Prédisposition génétique

Prévalence diminue avec niveau  
d'hygiène et sanitaire

*Candida* passe sang  
Translocation fongique  
Suite lâchage, déhiscence

Prévalence augmente

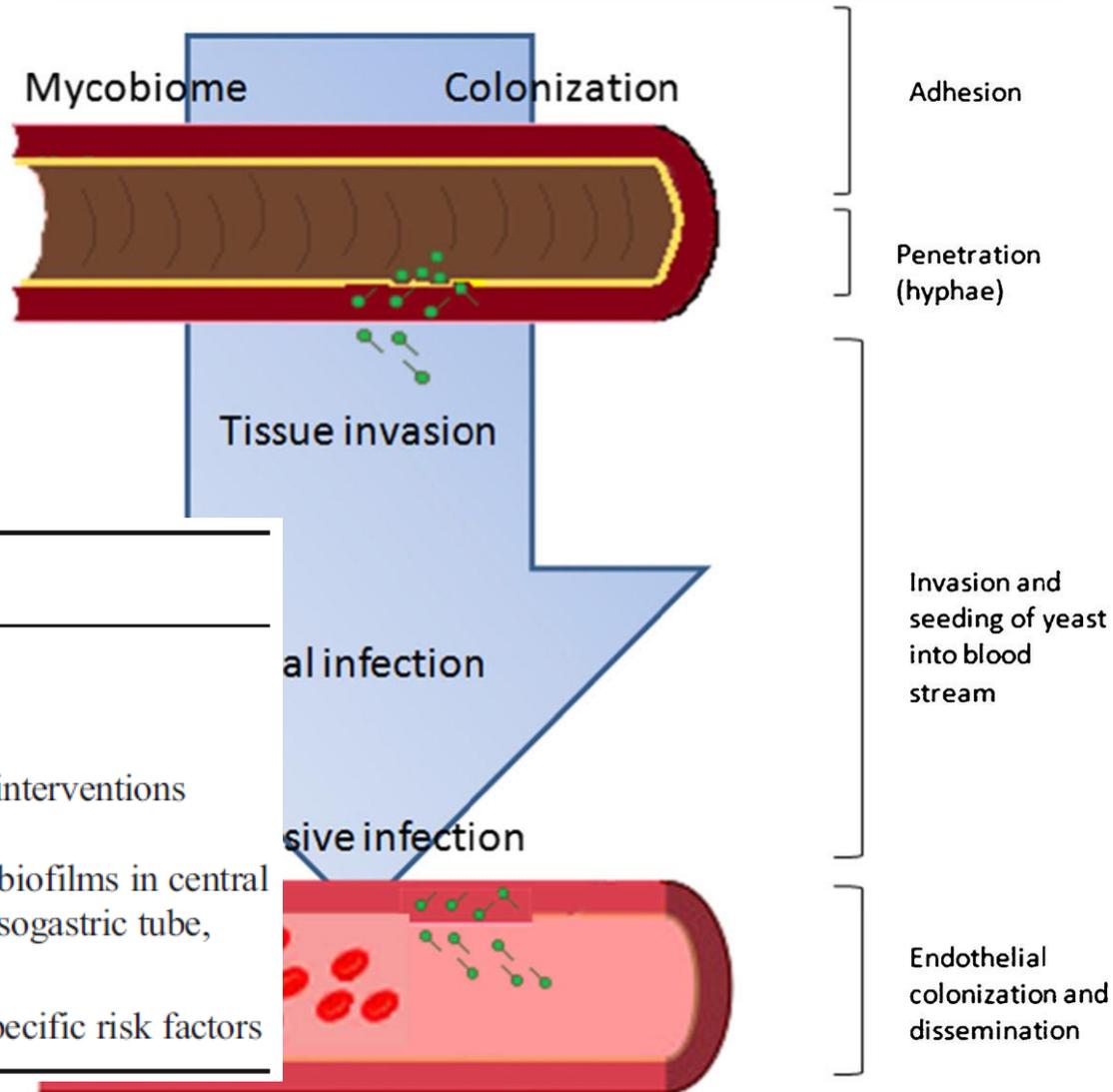
Terrains à risque  
Immunodépression induite par traitement  
Greffe de MO  
Greffe d'organe solide  
Chimiothérapie



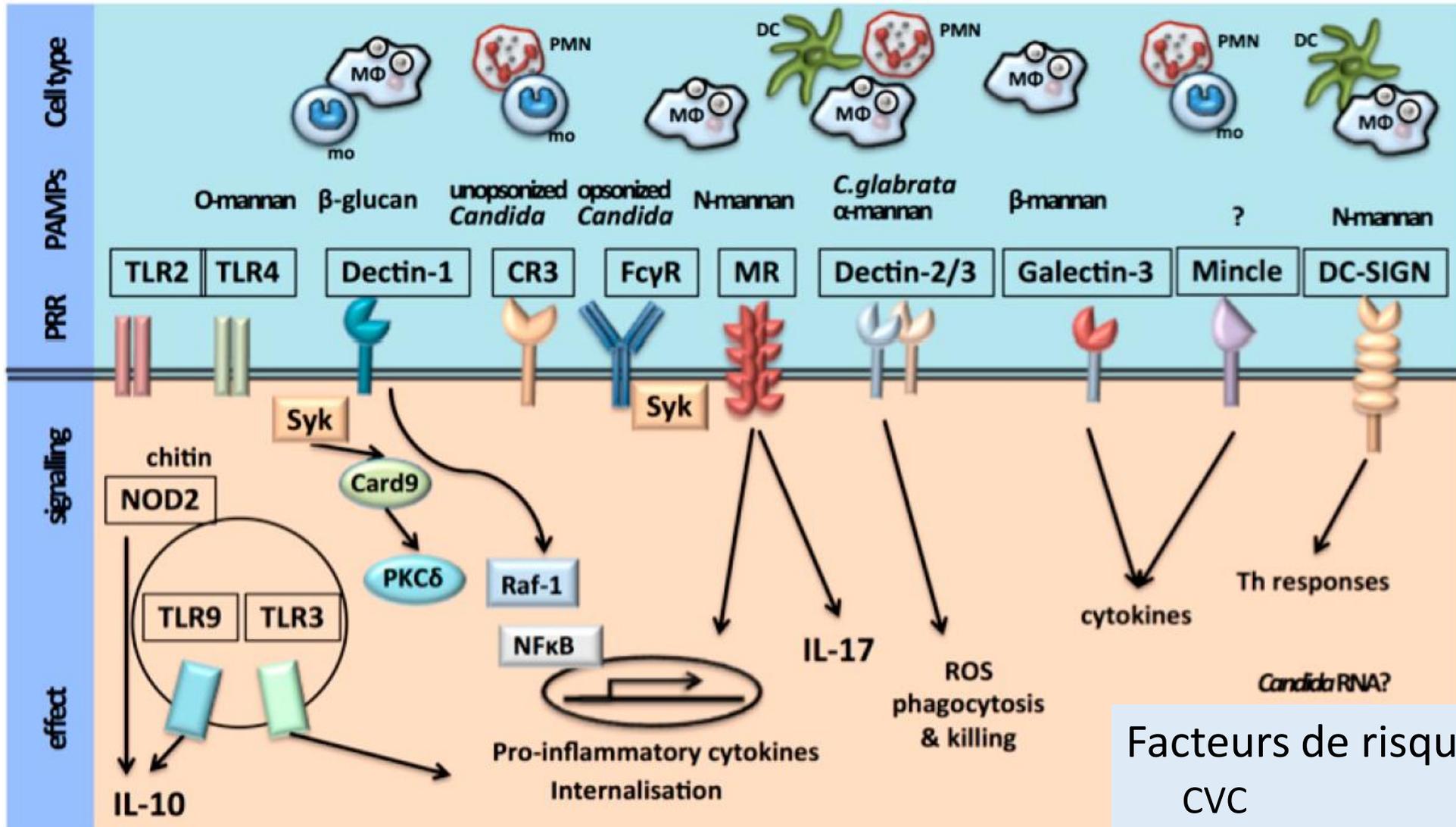
DOI 10.1007/s10096-016-2658-0

Candidose invasive

- 1- candidémie
- 2- candidose profonde (intra-abdominale)
- 3- association des deux



Type of patient	Risk factor
Oncohematological	Mucositis, altered neutropenic function
Solid organ transplant recipient	Immunosuppressive agents
Surgical patients (multiple abdominal surgeries, severe acute pancreatitis)	Contamination of peritoneum if repeated interventions
Non-surgical critically ill patient	Septic shock, broad-spectrum antibiotics, biofilms in central venous catheters, endotracheal tube, nasogastric tube, or urinary catheters
Surgical critically ill patients	Contamination of peritoneum plus ICU specific risk factors



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d University

Déséquilibre du microbiote  
 Altération de la barrière  
 Perte de la fonction des PNN

y innate immune cells. Ligand b

Facteurs de risque connus

- CVC
- Chirurgie abdominale récente
- Hémopathies malignes
- ATB à large spectre
- Colonisation multisite

Candidose invasive?

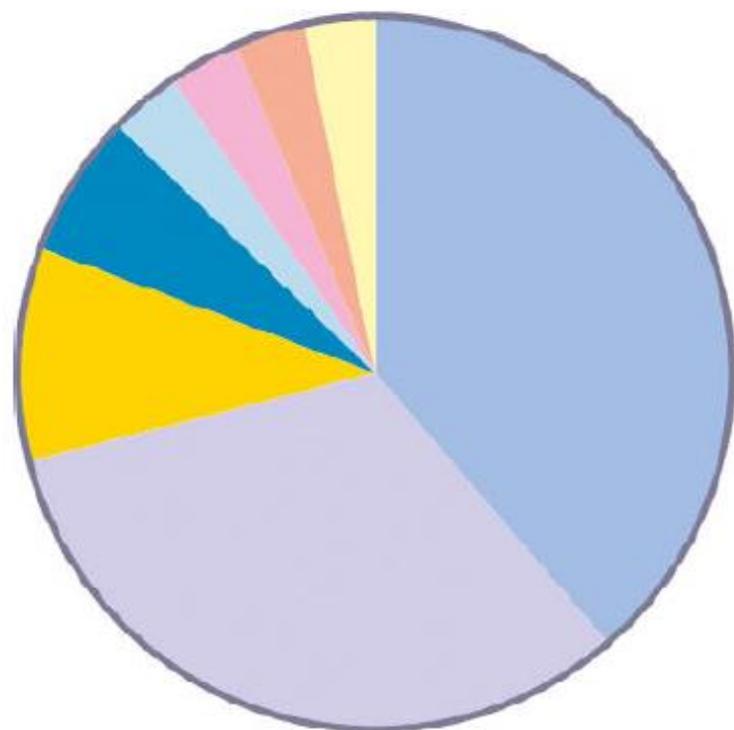
Signes cliniques évocateurs

Terrains prédisposants  
Contexte évocateur

Scores diagnostiques

Candidose invasive? Laquelle?

**(a)** Candidiasis



- Urinary tract, 38.7%
- Abdominal cavity, 32.3%
- Esophagus, 9.7%
- Blood stream, 6.5%
- Biliary tract, 3.2%
- Lung, 3.2%
- Abdominal cavity+blood stream, 3.2%
- Blood stream+renal pelvis, 3.2%

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# Candidémies

- Candidémie > 50% des candidoses invasives
- Mortalité 5-71%
  - Mortalité imputée à CI 15-20% chez adultes

# Candidose invasive du nouveau-né

- USI néonatale
- Signes non spécifiques
- *Candida* envahit tous les tissus
- Méningites/méningo-encéphalite fréquentes
- Facteurs de risque
  - Poids de naissance  $\leq 1000$  g
  - Grande prématurité

S. Nouri-Merchaoui<sup>a,\*</sup>, N. Mahdhaoui<sup>a</sup>, M. Fekih<sup>b</sup>, M. Adouani<sup>a</sup>, R. Zakhama<sup>a</sup>,  
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# Forme aiguë disséminée

- Neutropénie profonde post-chimiothérapie agressive
- Atteinte multiviscérale poumon > TD > reins, foie, rate
- Eruption papuleuse et finement hémorragique
- Pronostic sombre



# Candidémie = ETT + FO

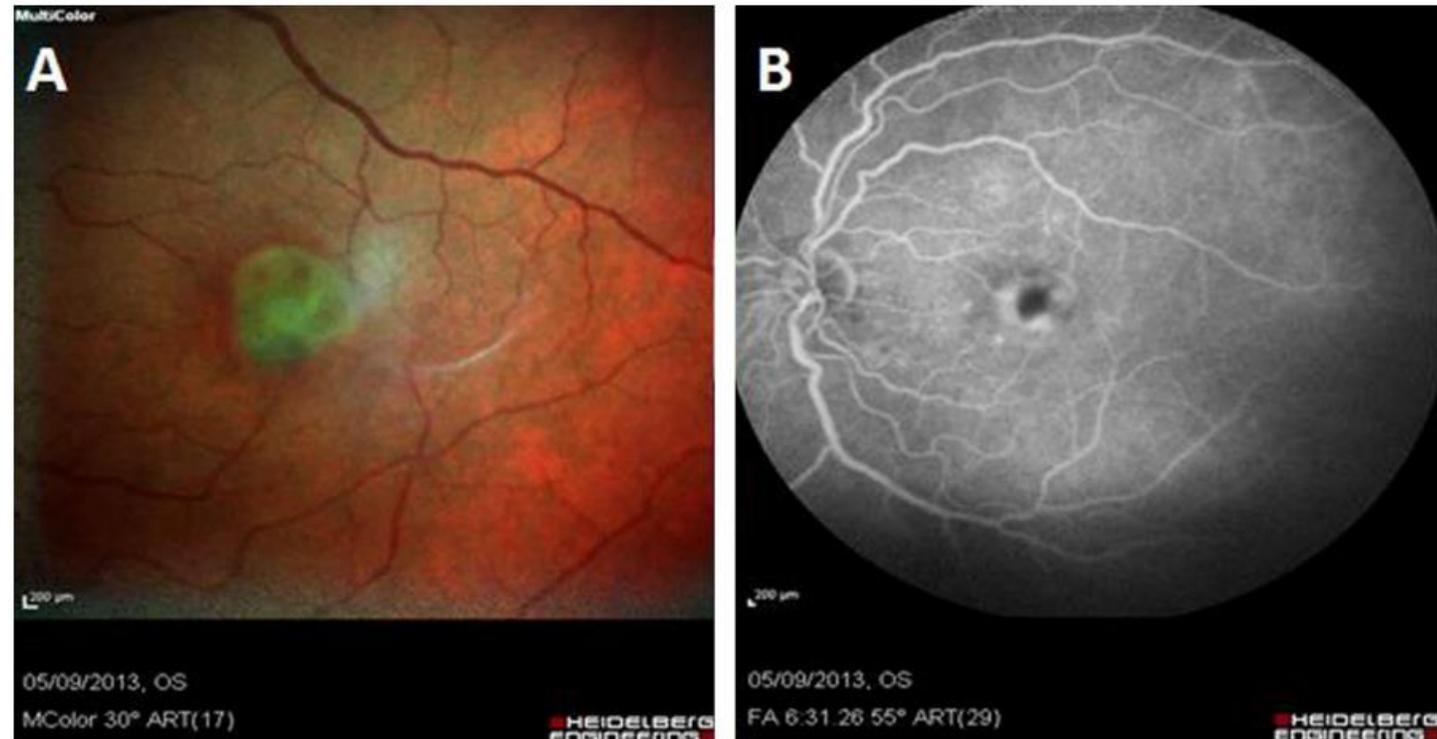
- Infection endovasculaire
  - Endocardite et infection sur matériel intra-cardiaque
  - Infection communautaire/UDI
  - Suspicion si
    - HC persistant +
    - Fièvre persiste malgré antifongiques adaptés
    - Nouveau souffle
    - Nouvelles localisations septiques
  - Facteurs de risque
    - UDI, CTH
    - Chirurgie cardiaque
- Chorioretinite, vitrite



Fig. 1 Lésions cutanées au cours d'une endocardite à *Candida albicans*. Lésion maculopapuleuse de la pulpe du 5<sup>e</sup> doigt et lésions purpuriques multiples de la pulpe de l'index et de la paume de la main

# Endophtalmie/choriorétinite

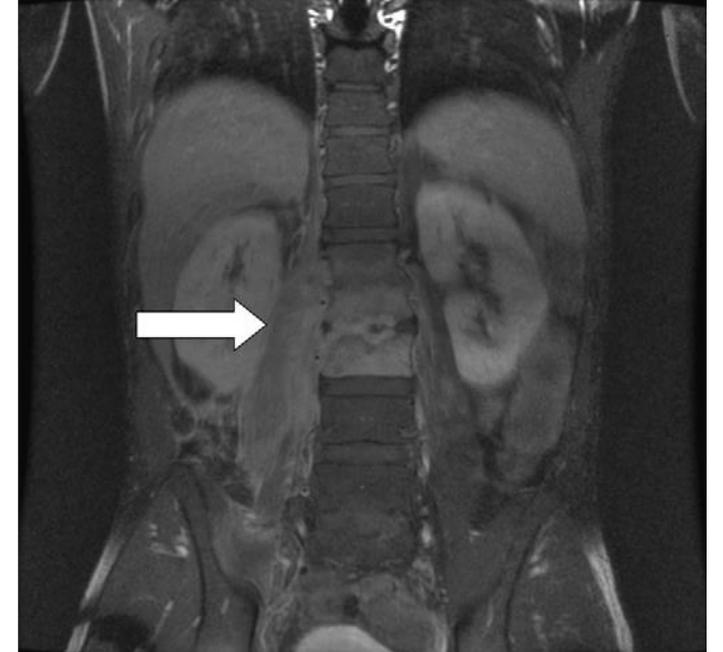
- Lésion secondaire voie hématogène, endogène
- Lésion exc
- Chorioret
- Endophta



**Figure 2.** A: rétinothographie du pôle postérieur de l'œil gauche : foyer chorioretinien maculaire blanc crémeux sans hyalite. B : angiographie à la fluorescéine : imprégnation du foyer rétinocoroïdien.

# Ostéomyélite et spondylodiscite

- Plusieurs semaines après une candidémie
- Candidémie insuffisamment traitée
- Vertèbres, disques, sternum, côtes
- Diabète, déficit immunitaire



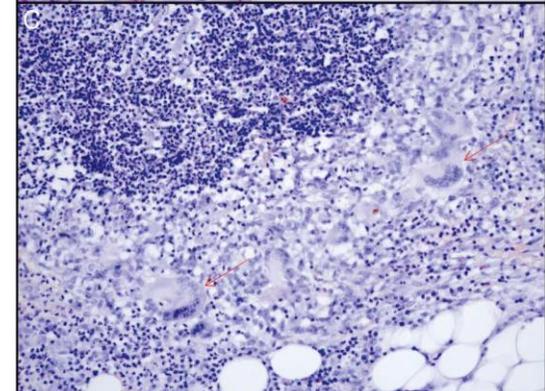
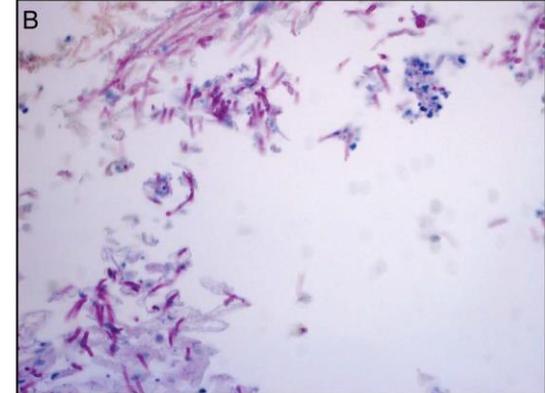
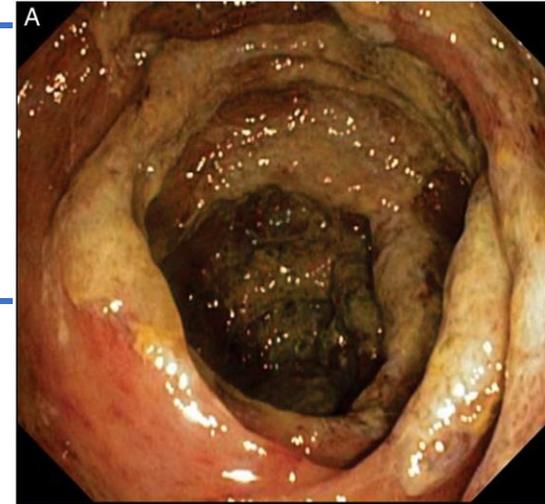
# Candidose chronique disséminée

- Sortie d'aplasie
- Atteinte hépatique chronique
- Douleurs HCD
- Nausées
- Fièvre
- Cytolyse
- Mauvais pronostic
  - Mortalité 90 jours 74%



# Candidose intra-abdominale

- Post-chirurgie ou manipulation abdominale
- Manifestations
  - Péritonite
  - Abscès
  - Suppuration ou nécrose site lâchage, perforation
  - Infections polymicrobiennes
    - *Candida* 20-40%
- Terrain
  - Pancréatite nécrosante
  - Lâchage anastomose
  - Perforation gastro-intestinale récurrente



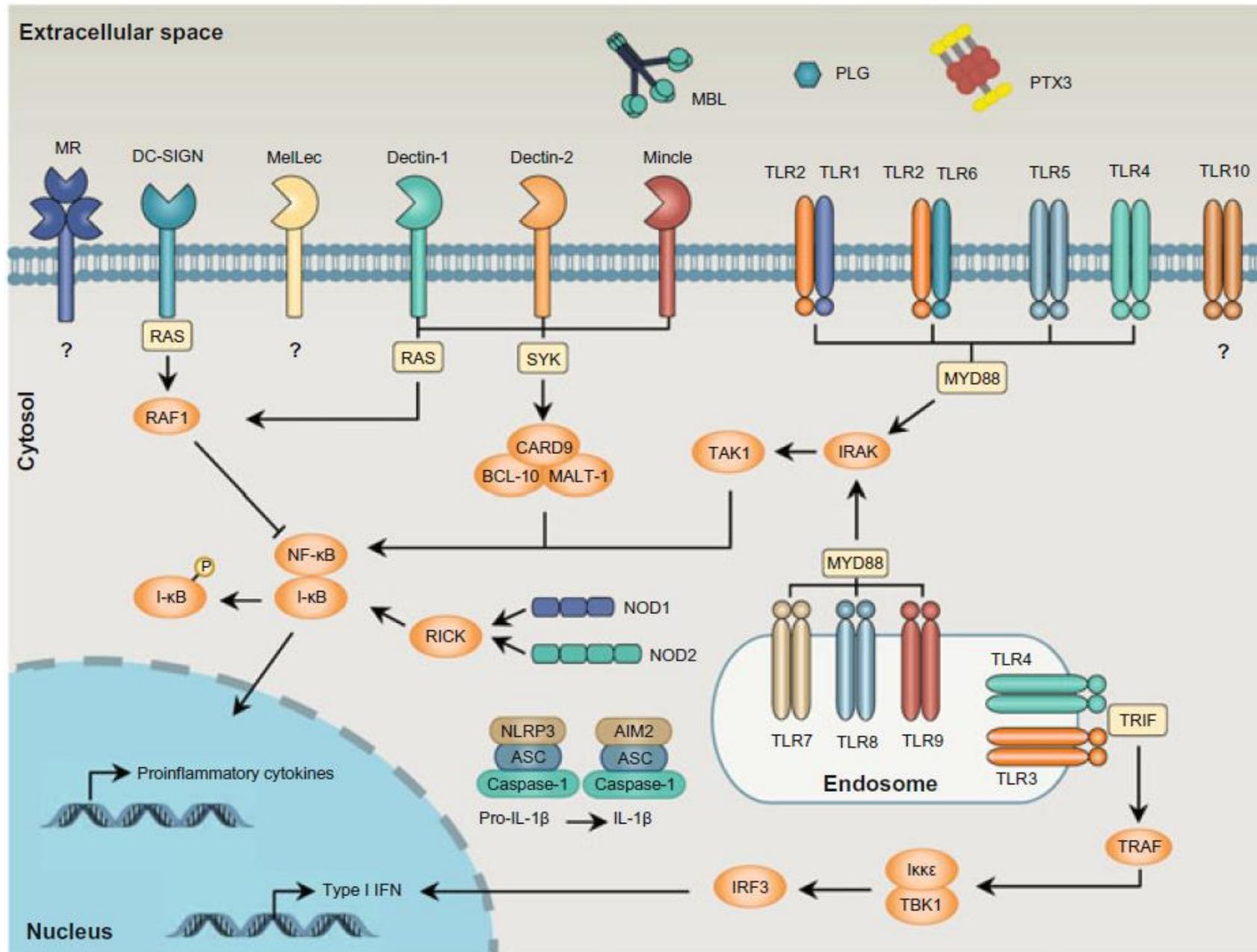
Un seul terrain?

**Table 3. Invasive Episodes of *Candida* Infection in Patients With Interleukin 12R $\beta$ 1 Deficiency**

Documented <i>Candida</i> Infections						
Patient No.	<i>Candida</i> Site	Risk Factor	HAC or CAC	Previous Candidiasis	<i>Candida</i> Species	IFN- $\gamma$ <sup>a</sup>
9	Candidemia with sepsis	Catheter antimycobacterial treatment	HAC	Oral candidiasis, VVC	<i>C. albicans</i>	Yes
9	Gastrointestinal	Laparotomy, antimycobacterial treatment	HAC	Oral candidiasis, VVC	<i>C. albicans</i>	Yes
12	Candidemia with sepsis	Catheter, antimycobacterial treatment	HAC	. . .	<i>C. albicans</i>	No
3	Endocarditis	No	CAC	Oral candidiasis	<i>Candida</i> spp.	No
20	Urine and cerebrospinal fluid	Antimycobacterial treatment, Surgical debridement (dorsolumbar abscess)	HAC	Oral candidiasis	<i>C. albicans</i>	Yes

Abbreviations: CAC, community-acquired candidiasis; HAC, hospital-acquired candidiasis; IFN, interferon; VVC, vulvovaginal candidiasis.

<sup>a</sup> IFN- $\gamma$  treatment at the time of the episodes.



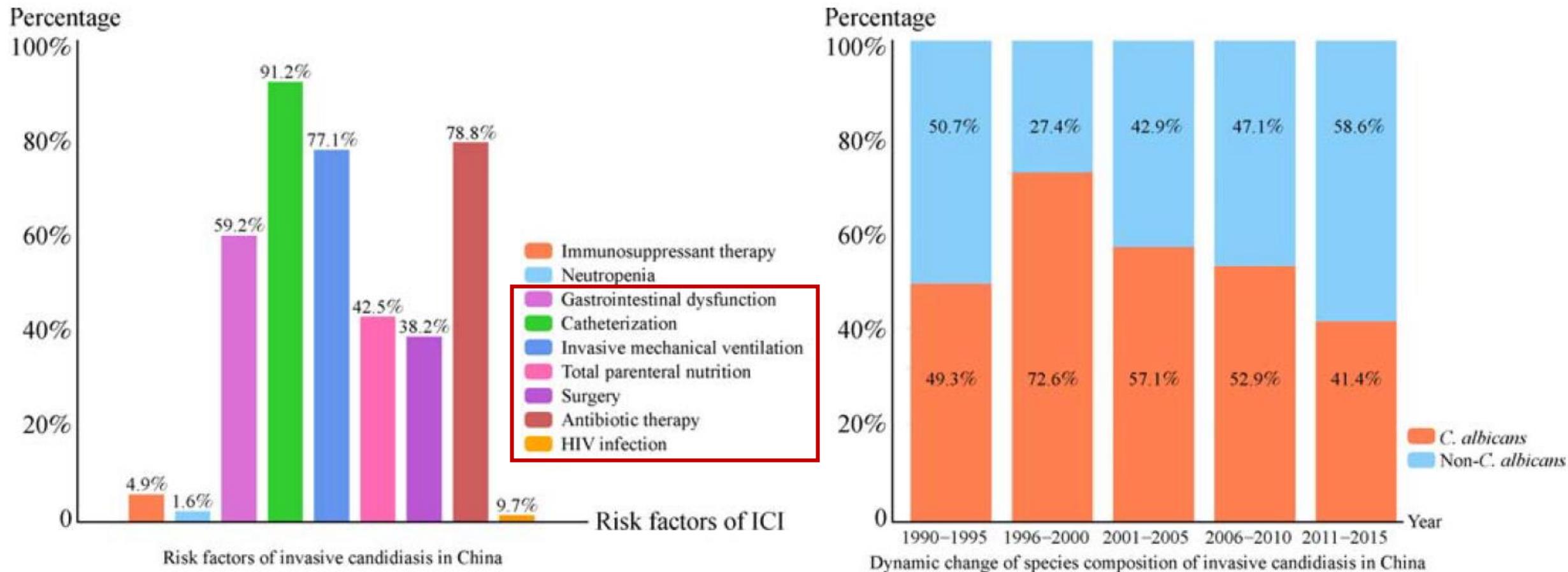


Fig. 3 Risk factors and dynamic change of species composition in invasive candidiasis in China.

## Facteurs prédisposants candidémie

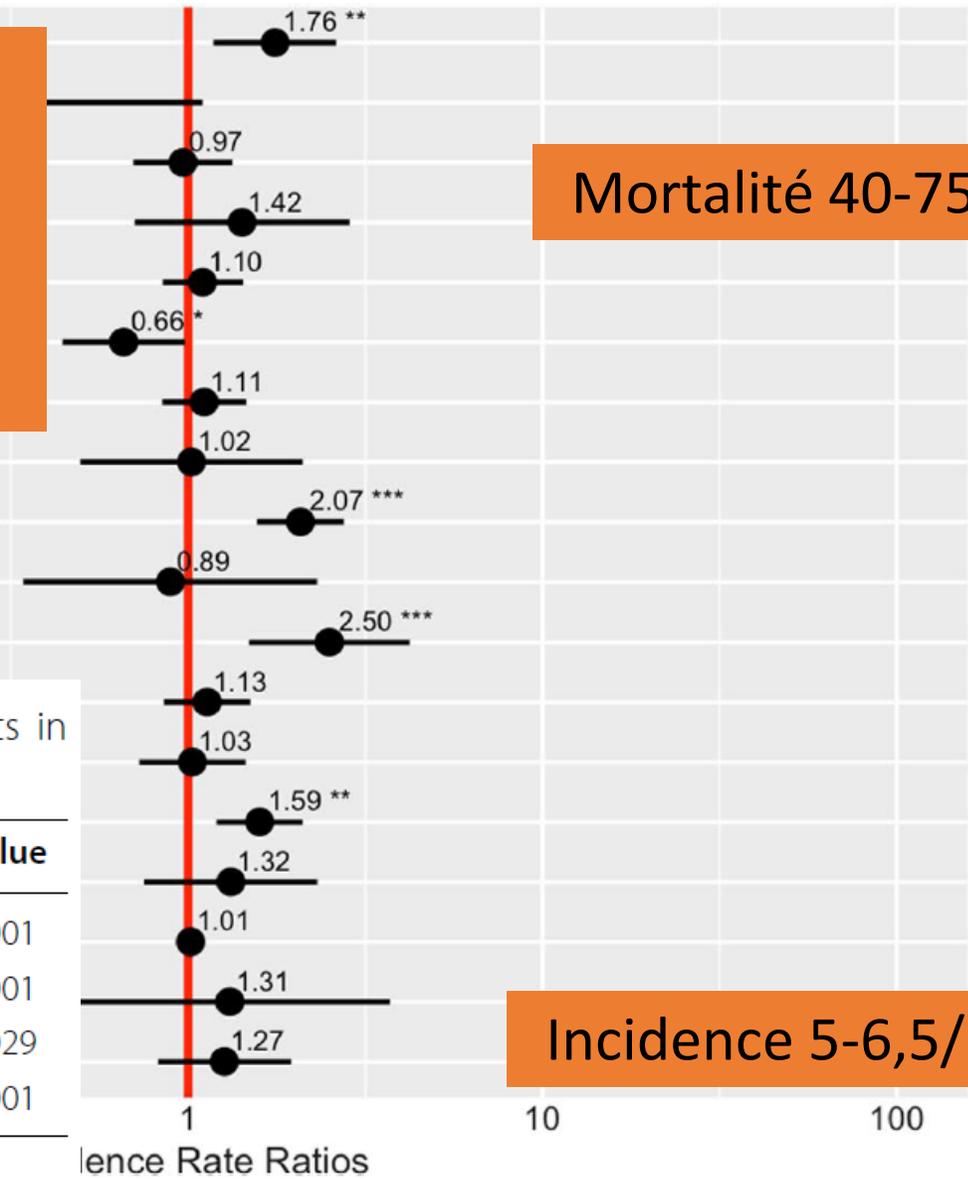
KVC	64,3%
Hospitalisation dans les 90 jours	47,7%
USI dans les 14 jours	45,9%
Diabète	40,3%
Antibiotiques systémiques 2 semaines	79,3%

Neutropenia  
ICU admission  
HIV infection  
Systemic antibiotics

**Table 3** Predictors of mortality among candidemia patients in Alameda County, 2017–2020

Characteristic	RR	95% CI	p-value
ICU admission before culture	1.66	1.28, 2.14	<0.001
Cirrhosis of the liver	1.82	1.36, 2.43	<0.001
Systemic antibiotic therapy	1.84	1.06, 3.17	0.029
Age $\geq$ 65 years	2.01	1.51, 2.68	<0.001

RR risk ratio, CI confidence interval



Mortalité 40-75%

Incidence 5-6,5/100000

**Fig. 5** Summary of unadjusted bivariate analysis of selected risk factors for mortality among candidemia patients in Alameda County, 2017–2020

Table I. Characteristics of the patients with catheter-related infections (CRIs).

Characteristic	No. (%)		Univariate p-value	Multivariate p-value
	CRI due to <i>Candida</i> spp. (n = 41)	CRI due to non- <i>Candida</i> spp. (n = 107)		
<b>Gender</b>			0.74	
Male	27 (65.9)	71 (66.4)		
Female	14 (34.1)	36 (33.6)		
<b>Age* (yr)</b>	67.1 ± 12.7	68.1 ± 14.6	0.69	–
<b>Hospital stay* (days)</b>	48.5 ± 43.5	36.3 ± 37.0	0.09	–
<b>SOFA score*</b>	7.63 ± 3.65	5.92 ± 2.81	0.003	0.02
<b>Platelet concentration* (× 10<sup>4</sup>/μL)</b>	18.6 ± 11.9	18.7 ± 12.0	0.98	–
<b>C-reactive protein concentration* (mg/dL)</b>	6.33 ± 4.69	6.93 ± 6.16	0.58	–
<b>30-day mortality</b>	17 (41.5)	16 (15.0)	0.001	–
<b>Days from disease onset to treatment initiation*<sup>†</sup></b>	1.63 ± 1.27	0.65 ± 1.07	0.00001	–
<b>Underlying factors</b>				
Solid organ malignancy	12 (29.3)	31 (29.0)	0.97	–
Haematologic malignancy	1 (2.4)	8 (7.5)	0.45	–
Liver cirrhosis	6 (14.6)	6 (5.6)	0.09	–
Use of immunosuppressive drugs	11 (26.8)	20 (18.7)	0.28	–
History of surgery	19 (46.3)	47 (43.9)	0.79	–
Receipt of bone marrow or solid-organ transplant	0 (0)	2 (1.9)	0.60	–
<b>Antibiotic treatment</b>				
Antibiotics pretreatment <sup>‡</sup>	40 (97.6)	48 (44.9)	< 0.0001	0.0005
Prolonged use of broad-spectrum antibiotics	12 (29.3)	7 (6.5)	0.0002	0.15
<b>Catheterisation</b>				
Duration of catheter use <sup>§</sup> (days)	17 (7–150)	12 (1–38)	0.001	0.004
Femoral catheterisation	8 (19.5)	8 (7.5)	0.03	0.61
Subclavian catheterisation	1 (2.4)	8 (7.5)	0.25	–
Jugular catheterisation	32 (78.0)	86 (80.4)	0.75	–
Peripheral catheterisation	0 (0)	5 (4.7)	0.16	–
Total parenteral nutrition	41 (100.0)	102 (95.3)	0.32	–

# Patients à haut risque de candidose invasive

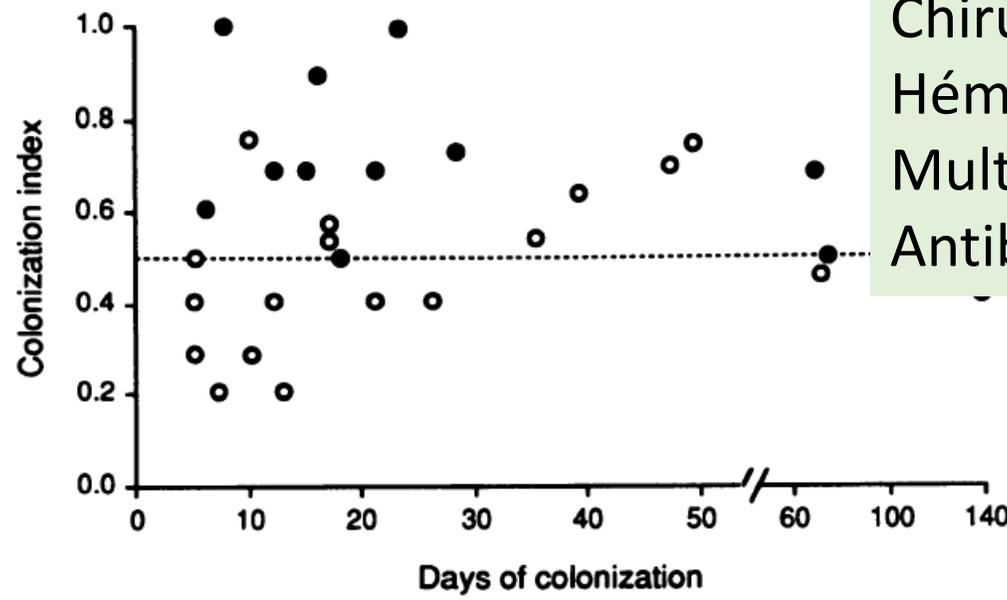
- Age < 1 mois ou > 65 ans
- Patients de réanimation / oncologie
- Hospitalisation prolongée USI
- Sepsis sévère
- Ventilation mécanique
- CVC
- Colonisation plusieurs sites
- Insuffisance rénale/hémodialyse

# Autres facteurs de risque

- Diabète
- Pancréatite
- Chirurgie abdominale extensive
- Nutrition parentérale exclusive
- Antibiothérapie large spectre, prolongée
- Corticothérapie prolongée
- Immunosuppresseurs
- Chimiothérapie
- Neutropénie

En attendant la confirmation, on attend!?

USI  
 Chirurgie  
 Hémodialyse  
 Multiples procédures invasives (CVC...)  
 Antibiotiques à large spectre

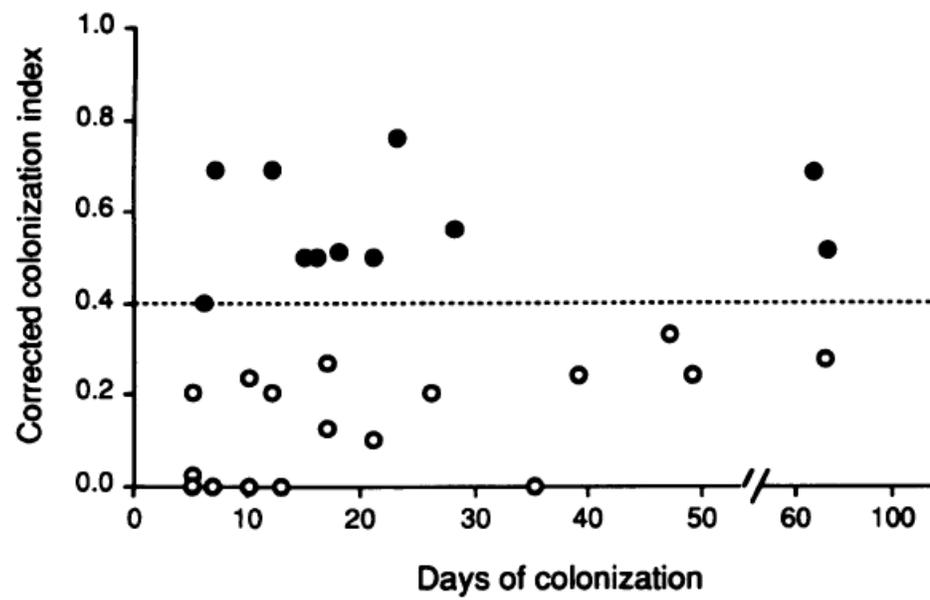


**COLONIZATION PARAMETERS\***

Positive Predictive Value†	Negative Predictive Value
----------------------------	---------------------------

IC = sites +/sites prélevés  
 ICC = sites fortement +/sites +

44	100
50	77
50	68
66	100



Facteurs prédictifs d'infection  
 Étude régression logistique  
 APACHE II OR 1,03  
 ICC OR 4,01

**Colonization Parameters**

No. of distinct body sites colonized with *Candida spp*  
 Two sites or more  
 More than two sites  
 Three sites or more  
 Candida colonization index  
 Candida corrected colonization index

\* Clinical value refers to the calc  
*Candida spp* and *Candida col*  
 as described in the Methods at  
 † Positive and negative predictiv

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Table 2. Results of univariate analysis: Risk factors for invasive candid

Variable	Unifoc Specie
Age, yrs, mean (SD)	
Male/female	
APACHE II score on admission, median (range)	
Length of ICU stay, days, median (range)	
APACHE II score, no. (%)	
<15	
15–25	
>25	
Diagnosis on ICU admission, no. (%)	
Medical	
Surgical	
Trauma	
Underlying disease, no. (%)	

Table 3. Results of multivariate analysis: Risk factors for proven candidal infection in 1,669 adult patients

Variable	Proven Candidal Infection %	p Value	Crude Odds Ratio (95% Confidence Interval)	Adjusted Odds Ratio (95% Confidence Interval)
<b>Surgery on ICU admission</b>	<b>1</b>			
No	6.9			
Yes	16.5	<.001	2.69 (1.76–4.10)	2.71 (1.45–5.06)
<b>Total parenteral nutrition</b>	<b>1</b>			
No	2.8			
Yes	15.5	<.001	6.46 (3.48–11.98)	2.48 (1.16–5.31)
<b>Severe sepsis</b>	<b>2</b>			
No	4.5			
Yes	28.8	<.001	8.63 (5.49–13.56)	<b>7.68 (4.14–14.22)</b>
	<b>1</b>			
	4.2			
	12.3	<.001	3.20 (1.85–5.53)	<b>3.04 (1.45–6.39)</b>

Table 4. Calculation of the Candida score: Variables selected in the logistic regression model

Variable	Coefficient (β)	Standard Error	Wald χ <sup>2</sup>	p Value
<b>Multifocal <i>Candida</i> species colonization</b>	1.112	.379	8.625	.003
<b>Surgery on ICU admission</b>	.997	.319	9.761	.002
<b>Severe sepsis</b>	2.038	.314	42.014	.000
<b>Total parenteral nutrition</b>	.908	.389	5.451	.020
Constant	-4.916	.485	102.732	.000

ICU, intensive care unit.

Candida score = .908 × (total parenteral nutrition) + .997 × (surgery) + 1.112 (multifocal *Candida* species colonization) + 2.038 (severe sepsis). Candida score (rounded) = 1 × (total parenteral nutrition) + 1 × (surgery) + 1 (multifocal *Candida* species colonization) + 2 × (severe sepsis). All variables coded as follows: absent, 0; present, 1.

97 (100)	.380
97 (100)	.292
93 (95.9)	.078
92 (94.8)	.982
68 (70.1)	.053
68 (70.1)	.251
<b>85 (87.6)</b>	<b>&lt;.001</b>
22 (22.7)	.734
<b>29 (29.9)</b>	<b>&lt;.001</b>
<b>63 (64.9)</b>	<b>&lt;.001</b>
17 (17.5) <sup>a</sup>	
69 (71.1) <sup>a</sup>	

202208.37364.7D

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**Candida score > 2,5**

Colonisation > 7 jours USI pour la majorité des patients

Candida score  $\geq 3$   
Sensibilité 61%  
Spécificité 86%  
VPN 92.2%

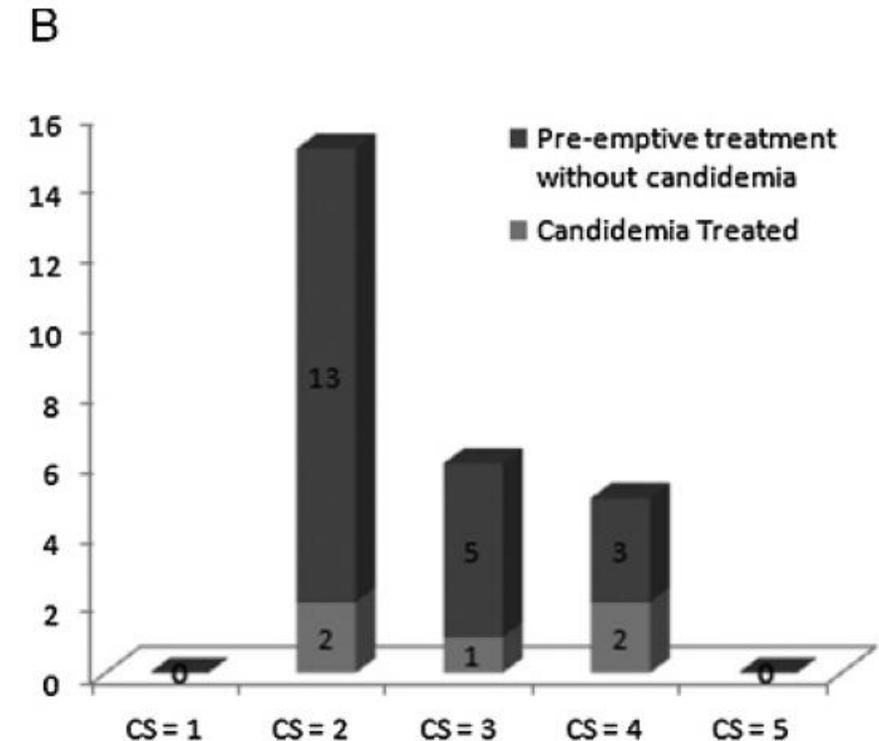
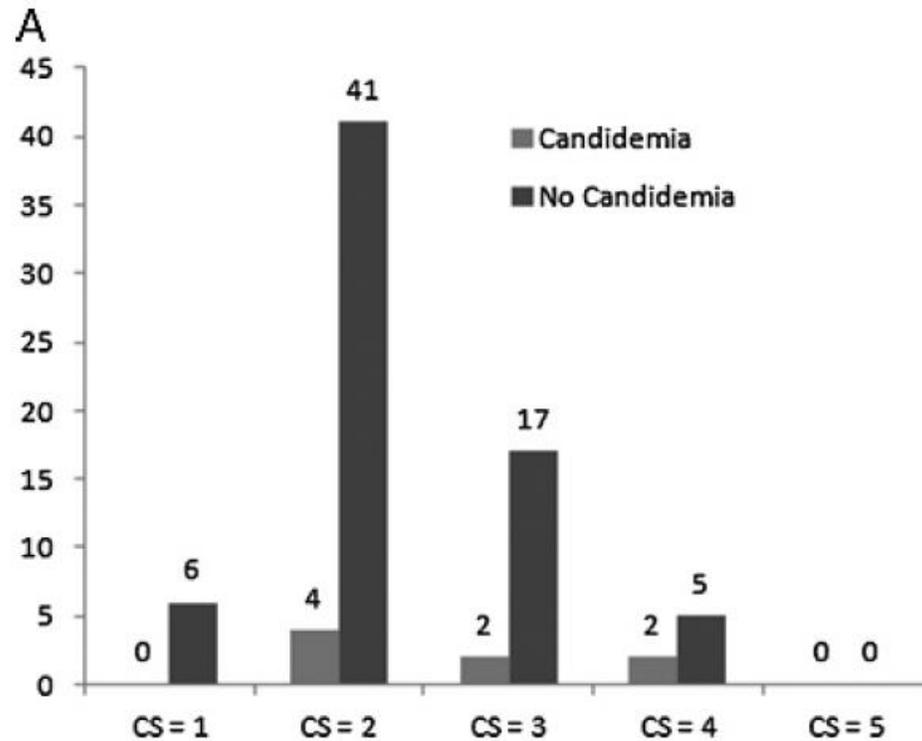
Candida Score in Sepsis

Candidémie = 70-90% des candidoses invasives

**TABLE**

Variable
Candida
Surgery c
Severe se
Total par

<sup>a</sup>Sites other multifoc consist



**Figure 3.** Candidemia and treatment by Candida Score. A shows the distribution of candidemia, and B shows the distribution of the Candida Score among patients who received pre-emptive treatment without candidemia and those who were treated for candidemia.

Retard thérapeutique majeure mortalité  
Cultures temps prolongé  
Traitement empirique sur score et indices



Identified independent determinants

Special score

*Candida* colonisation  
APACHE II score

*Candida* Colonisation Index  $\geq 0.5$   
Corrected *Candida*  
Colonisation Index  $\geq 0.4$

Female gender  
Upper GIT origin of peritonitis  
Intraoperative cardiovascular failure  
Previous antimicrobial therapy at least 48 h before onset of peritonitis  
Invasive mechanical ventilation  $\geq 10$  days  
Nosocomial bacterial infection  
Cardiopulmonary bypass time  $\geq 120$  min  
Diabetes mellitus

The presence of at least three of these factors = grade C score

*Candida* colonisation

Corrected *Candida*  
Colonisation Index  $\geq 0.4$

*Candida* colonisation

*Candida* Colonisation Index  $\geq 0.5$

in the intensive care unit

**W. Nigg<sup>2</sup> and Elisabeth Presterl<sup>1</sup>**

Identified independent determinants

Special score

Age <65 years  
Temperature  $\leq 98^\circ$  F or severe  
altered mental status

Simple equal weight  
risk score 0–6

Cachexia  
Previous hospitalisation within 30 days  
Admitted from other healthcare facility  
Need for mechanically ventilation

51 patients > 18 ans  
Neurochirurgie USI  
Séjours > 7 jours

## Densité de la colonisation facteurs prédictif CI Colonisation multisite facteur de risque indépendant pour candidémie

2, 7038-7047; doi:10.3390/iims12107038

Délais colonisation 6 jours

Risque de décès chez patients souffrant de candidose invasive

=

Risque chez les porteurs de colonisation multisite

### Candidose invasive

= cause de morbi-mortalité importante chez immunodéprimés

Neutropénie sévère

Cancer

Patients en USI

USI néo

USI pédi

Giuseppina

Ilaria Alic

### Facteurs prédisposants retrouvés pour CI

CVC 100%

ATB 80,3%

Diabète 21,3%

Corticothérapie 13,7%

### Facteurs de risque théoriques de candidose invasive

Chimiothérapie

CVC

Séjours prolongé en USI

Immunosuppresseurs pour greffe

Chirurgie abdominale

Colonisation par *Candida*

### Choix des sites à prélever

Écouvillonnage pharyngé

Aspiration trachéale

Suc gastrique

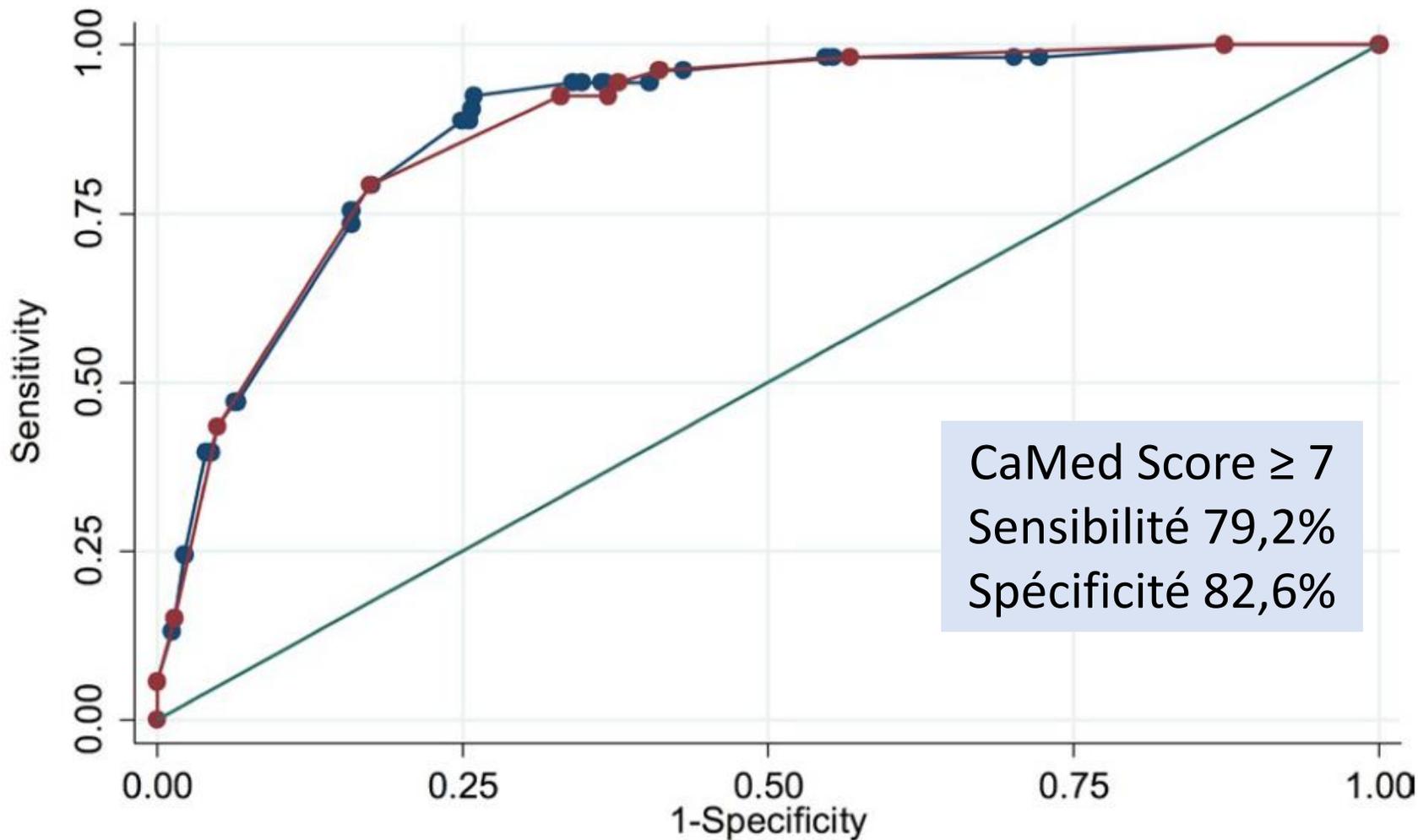
Écouvillon rectal

Aisselles

Urines

HC

568 patient



● Probability score ROC area: 0.883   
 ● Discretized score ROC area: 0.880  
— Reference

coef. logistic regression estimate, Std. Err. standard error, OR: Odds ratio, CI 95%: confidence interval, val 95%.

CI (95%)			
0.2	1	4.36	
0.50	1	6.47	
0.8	5	44.26	01
0.0	2	15.08	01
0.1	1		01

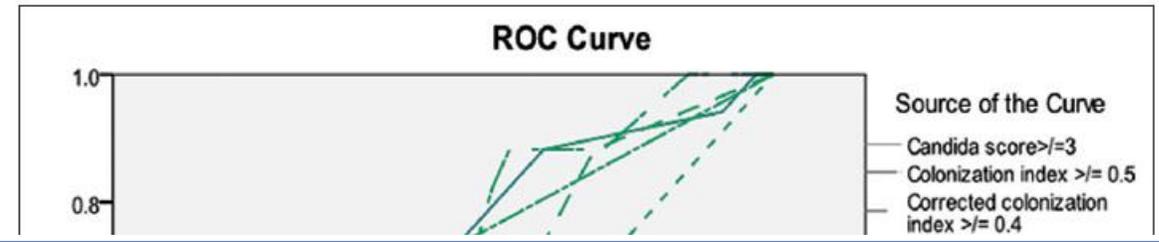
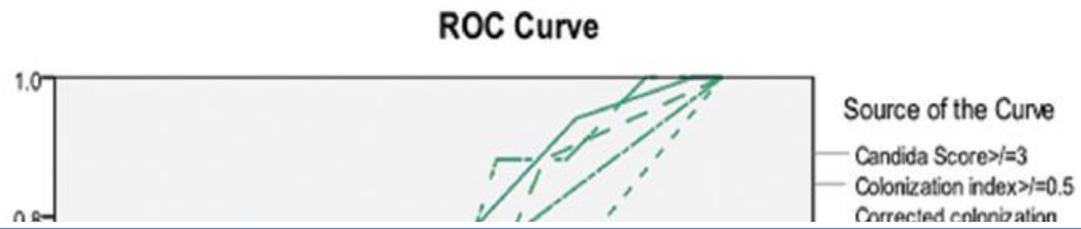
VPP 14%  
VPN 95,6%  
Limiter prescription

Table 2 Post-hoc per

Rule <sup>a</sup>	Rule description	Antibiotique (1-3 jours)	CVC (1-3 jours)	+	≥ 2 parmi	Chirurgie (0-7 jours)	Immunosuppresseurs (0-7 jours)	Pancréatite (0-7 jours)	Dialyse (1-3 jours)	Corticoïdes (3-7 jours)	Relative risk <sup>b</sup>	p-value <sup>c</sup>	Sensitivity	Specificity	PPV	NPV
1 (n=2,889)	Any a (day (day										4.71 (2.45, 9.06)	<0.001	0.89	0.38	0.04	0.99
2 (n=2,879)	Any a ANI at le addi surg use (day										4.14 (2.69, 6.39)	<0.001	0.66	0.69	0.06	0.98
3 (n=2,859)	Any antibiotic use (day 1-3) OR CVC (day 1-3) AND at least two of the following additional risk factors: any surgery (day -7-0); immunosuppressive use (day -7-0); pancreatitis (day -7-0); TPN (day 1-3); any dialysis (day 1-3); steroid use (day -7-3)	303 (10.6)	30 (34.1)	2.3	9.9						4.36 (2.85, 6.67)	<0.001	0.34	0.90	0.09	0.97

IC invasive candidiasis, CVC central venous catheter, TPN total parenteral nutrition, PPV positive predictive value, NPV negative predictive value  
<sup>a</sup> Outcome information was available for a total of 2,890 subjects. Because some of these subjects had missing information for some risk factors, the assessment of performance for each particular rule excluded patients with missing risk factor data that precluded patient risk status ascertainment for that rule  
<sup>b</sup> Relative risk of infection (95% confidence interval) for patients selected by the rule vs. those not selected by the rule  
<sup>c</sup> Cochran-Mantel-Haenszel chi-square test of association between risk factor and infection status

Facteurs étudiés	Sensibilité	Spécificité	VPN	VPP
Antibiotique (1-3 jours) CVC (1-3 jours) + ≥ 2 parmi Chirurgie (0-7 jours) Immunosuppresseurs (0-7 jours) Pancréatite (0-7 jours) Dialyse (1-3 jours) Corticoïdes (3-7 jours) + Séjours en réanimation au moins 4 jours Ventilation ≥ 48 heures CVC (1-3 jours)	50%	84%	72%	67%



**Table 5: Subgroup analysis; n=84 (performance of scores after excluding patients exposed to antifungal therapy in no-invasive candidiasis group)**

	<i>Candida</i> score	CI	CCI	Ostrosky's CPR
Sensitivity percentage (95% CI)	94.1 (71.3-99.8)	58.8 (32.9-81.6)	52.9 (27.8-77.0)	52.9 (22.8-77.0)
Specificity percentage (95% CI)	40.3 (28.5-53.0)	56.7 (44.0-68.8)	77.6 (65.8-86.9)	85.0 (74.3-92.6)
PPV percentage (95% CI)	28.6 (17.3-42.2)	25.64 (13.0-42.1)	37.5 (18.8-59.4)	47.4 (24.5-71.1)
NPV percentage (95% CI)	96.4 (81.6-99.9)	84.4 (70.5-93.5)	86.7 (75.4-94.0)	87.7 (77.2-94.5)
PLR (95% CI)	1.58 (1.25-1.98)	1.36 (0.84-2.20)	2.4 (1.26-4.45)	3.5 (1.72-7.33)
NLR (95% CI)	0.15 (0.02-1.00)	0.73 (0.40-1.33)	0.61 (0.36-1.02)	0.55 (0.33-0.92)
Area under curve (95% CI)	0.70 (0.56-0.84)	0.70 (0.56-0.82)	0.65 (0.50-0.80)	0.72 (0.57-0.87)

Not applicable. PPV: Positive predictive value; NPV: Negative predictive value; PLR: Positive likelihood ratio; NLR: Negative likelihood ratio; CPR: Clinical prediction rule; CI: Colonization index; CCI: Corrected colonization index; 95% CI: 95% confidence interval

**Figure 2:** Receiver operator curve (n = 198) showing discriminatory power of four risk prediction scores

**Figure 3:** Receiver operator curve (subgroup analysis [n = 84]) showing discriminatory power of four risk prediction scores

IQF  
CI: VPP 1-30%  
Spécificité des scores: 50-80

VPP basse  
VPN élevée  
Apport important = exclure la prescription des antifongiques

Outil simple

Avant culture

Pour le groupe intermédiaire,  
cultures souhaitables ou BDG  
pour discuter le traitement

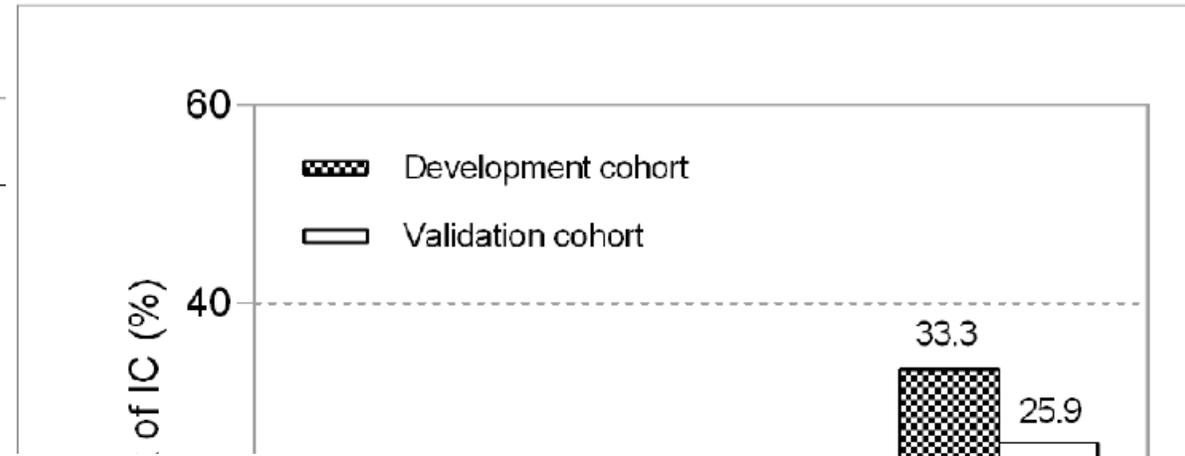
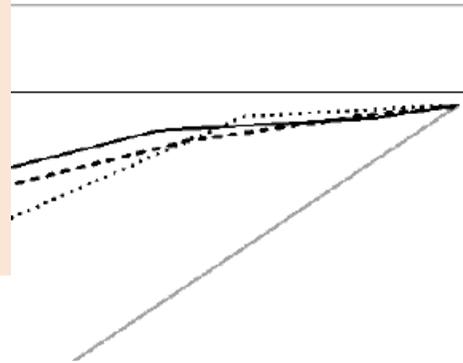


TABLE 2 | ty% 60

TABLE 4 | Performance characteristics of risk-predictive model at different predictive score thresholds.

Characteristic	Predictive score threshold						
	≥1	≥2	≥3	≥4	≥5	≥6	≥7
Percentage of cohort ≥ threshold	91.5	68.4	35.3	15.8	5.5	1.3	0.1
Sensitivity, %	97.8	95.7	82.6	60.9	28.3	17.4	2.2
Specificity, %	9.0	33.5	68.0	87.4	96.0	99.9	100.0
Positive predictive value, %	7.0	9.1	15.3	25.2	33.3	88.9	100.0
Negative predictive value, %	98.3	99.1	98.2	97.0	95.0	94.5	93.6
Likelihood ratio for positive test	1.1	1.4	2.6	4.8	7.1	114.3	—
Likelihood ratio for negative test	0.24	0.13	0.26	0.45	0.75	0.83	0.98

Patients according to the risk score in development and validation cohorts were categorized into low risk (0–2 points), moderate risk (3–4 points), and high risk (5–7 points). Higher points denote a higher risk of intermediate cohort (P for trend=0.007).

# Conclusion

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The poster features a world map background with a dotted grid. At the top, logos for the Tunisian Society of Infectious Pathology and the French Society of Infectious Pathology are displayed. The main title is in large blue font, and the dates and location are in orange. A list of themes is provided in blue text with red diamond bullet points. At the bottom, there is contact information for the organizing committees and a call to action for abstract submission.

La Société Tunisienne de Pathologie Infectieuse & La Société de Pathologie Infectieuse de Langue Française organisent

**32<sup>ème</sup>** Congrès National de la Société Tunisienne de Pathologie Infectieuse  
**2<sup>ème</sup>** Congrès Francophone de Pathologie Infectieuse et de Microbiologie Clinique

Du 5 au 7 Mai 2023  
Hôtel Golden Tulip Taj Sultan Hammamet

**THÈMES**

- ♦ Maladies Tropicales Négligées
- ♦ Pneumonies aiguës communautaires de l'adulte
- ♦ Infections virales émergentes et réémergentes
- ♦ Sepsis
- ♦ Antibiorésistance
- ♦ Candidoses invasives
- ♦ Vaccination
- ♦ Best of Infectiologie

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**1<sup>ère</sup> Annonce**

Submission obligatoire sur le site [infectiologie.org](http://infectiologie.org)  
Dernier délai **15 Mars 2023**

Infection opportuniste grave  
Pronostic sombre si retard ttt

Déséquilibre de la  
flore intestinale

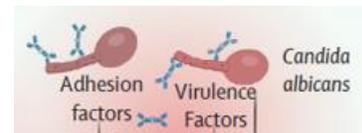
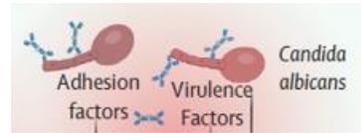
Procédures invasives  
Intubation  
CVC

Patients graves  
Réanimation  
Chirurgie  
Oncologie

Altération immunité  
Congénitale  
Acquise

Clinique non spécifique  
Scores peu fiables

Candidose invasive



Outils diagnostiques rapides