



Gácsér Attila

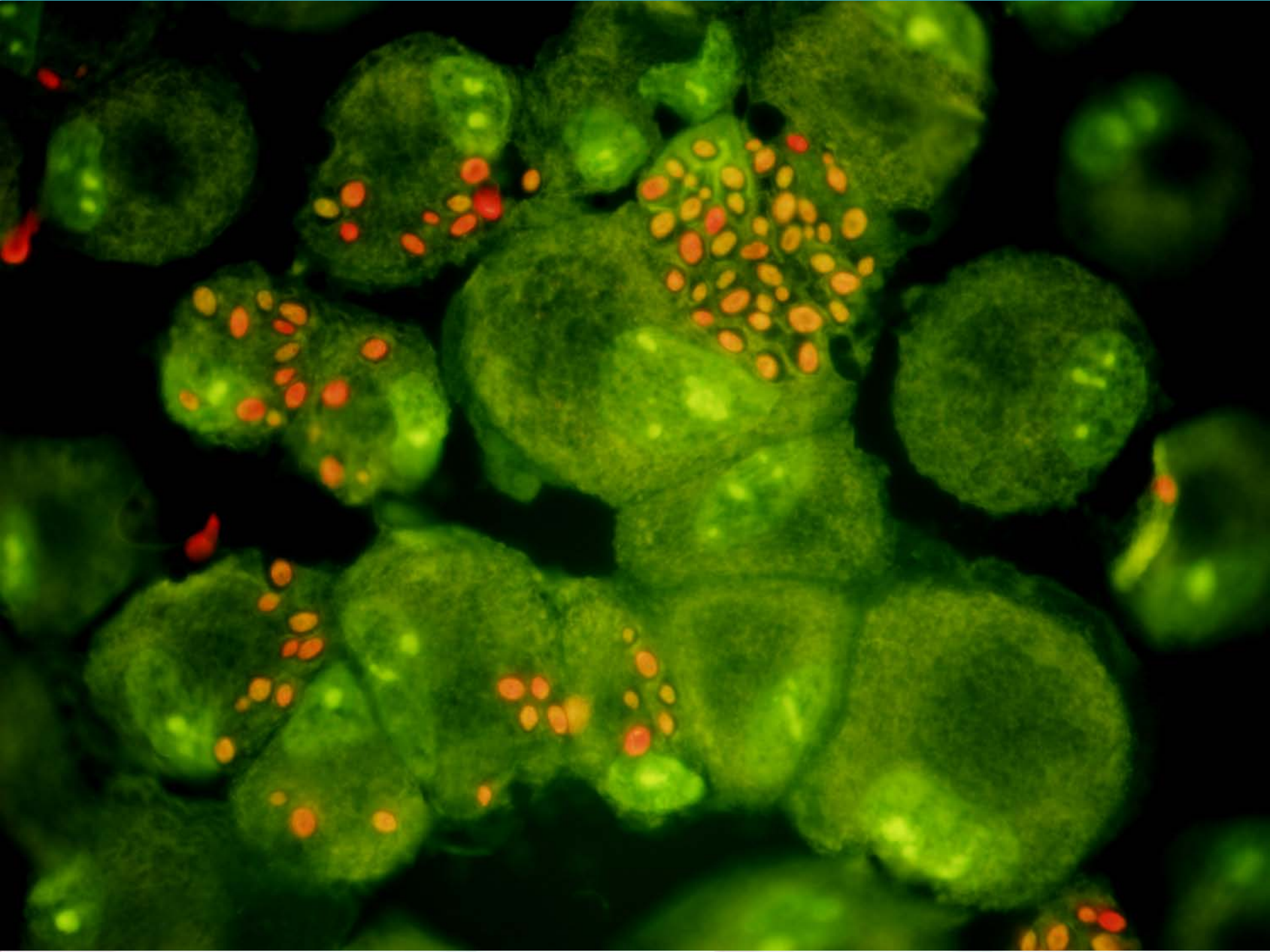
Rejtőzködő gyilkosok: Patogén gombák

Batsányi János Gimnázium, Szakképző Iskola és
Kollégium

Csongrád, 2016. november 30.

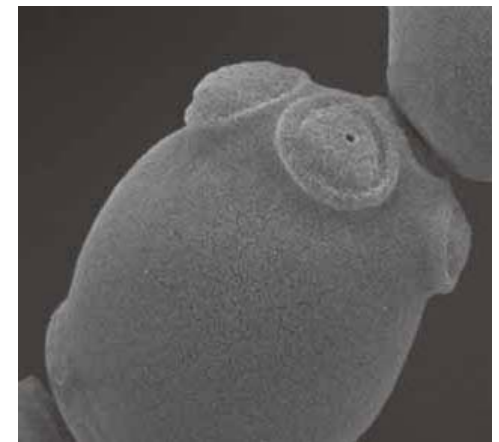
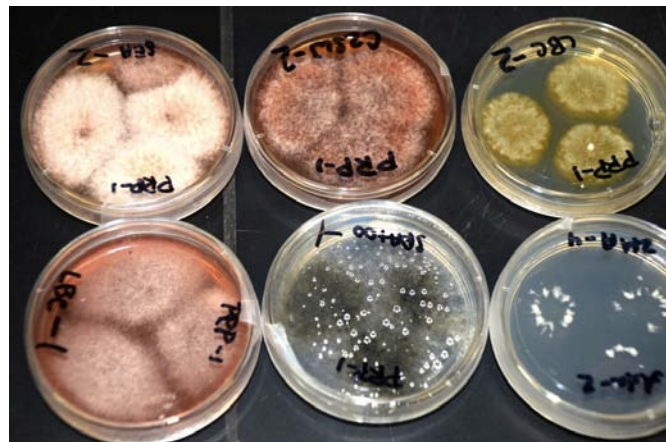
www.meetthescientist.hu





Gombák

A gombák önálló országba tartoznak. Küéönböznek mind a növényektől, mind az állatoktól. Eukarióta élőlények.

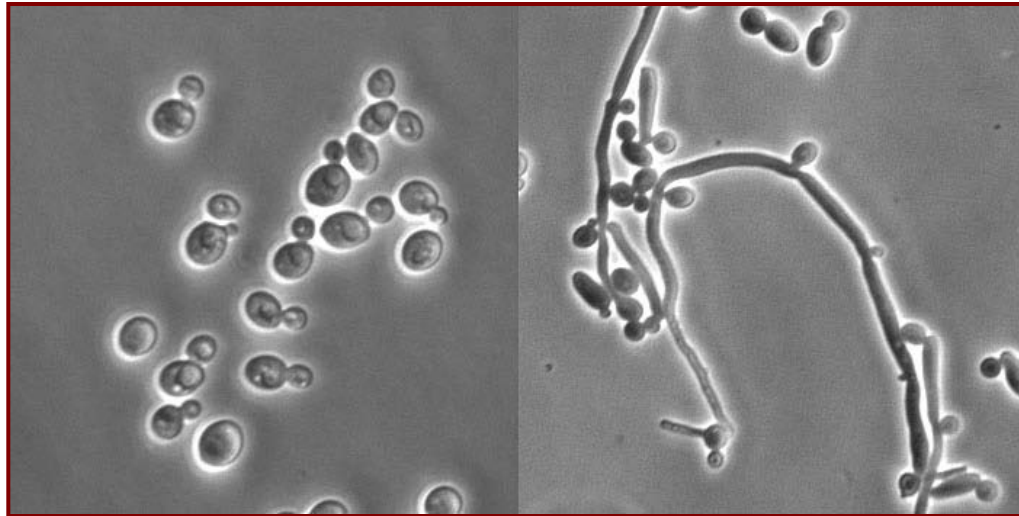


Több mint **150.000** fajuk ismert
feltételezett fajsámuk **5 millió**

Gombák

A gombák országa nagyrészt “rejtett”

Megjelenési formájuk lehet egysejtű vagy fonalas
(megnyúlt sejtek kapcsolata)



Érdekes gombák

Az egyik legnagyobb élőlény a földön egy gomba



Armillaria ostoyae

Washington State, USA

8.5 km²

600 tonna

kb. 2400 éves

“Jó” gombák

Food



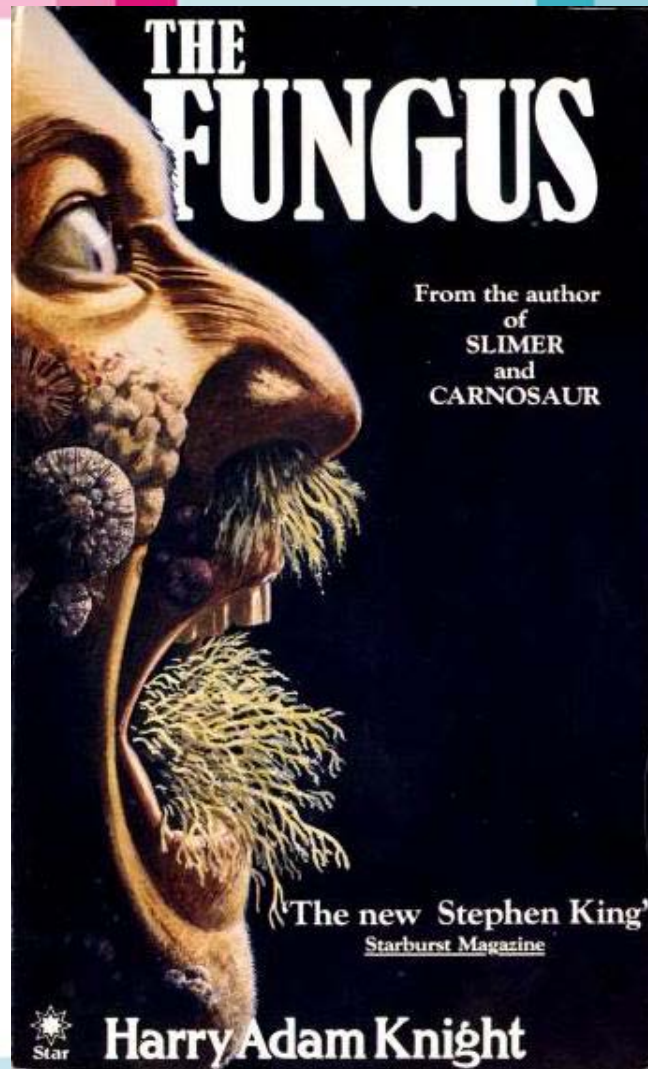
Fermentation



Antibiotics



“Rossz” gombák



A valódi “rossz” gombák

több mint **1 millió** ember vakul meg
gombák okozta keratitiszben évente

Pneumocystis okozta tüdőgyulladás az
AIDS betegséggel született
gyerekek között a vezető halálok

megközelítőleg **1 milliárd** ember szenved
gombák okozta bőrbetegségben vagy allergiában

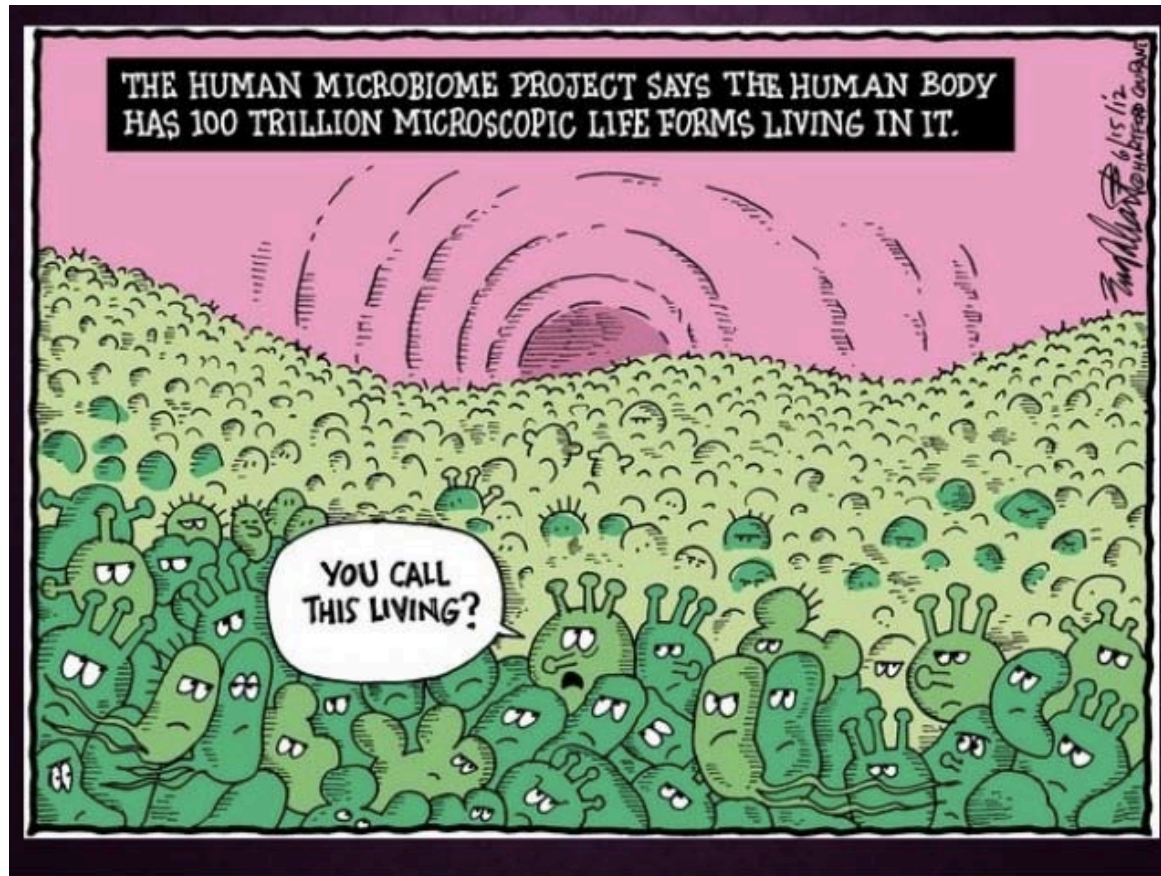
Több mint **300.000** ember
szenved invazív *Candida*
fertőzésben évente

több mint **1 millió** ember esetén alakul ki
gombák miatt meningitisz évente

**A gombás megbetegedések több embert ölnek meg
mint a malária vagy a tuberculozis**

Az utóbbi évek felismerése...

Mikrobiom



Mikrobiom és betegségek

asztma

depresszió


elhízás

diabetesz

reuma

gyulladásos bélbetegség

szív és érrendszeri betegségek



**De mit tudunk a velünk együtt élő gombákról
?**



Albert Einstein College of Medicine, New York, USA



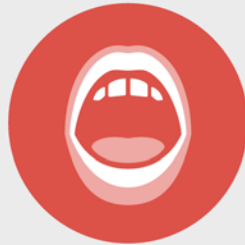
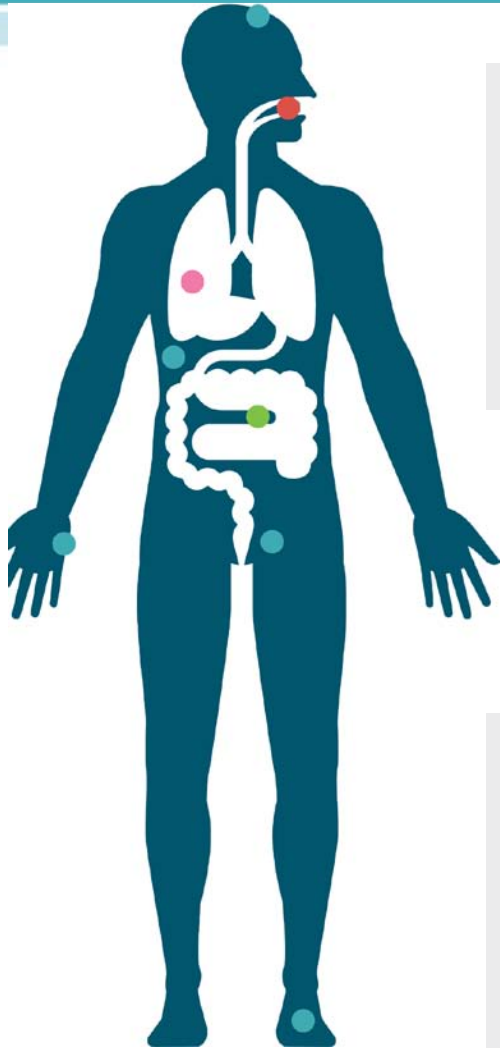
Prof. Joshua D. Nosanchuk
professzor és dékánhelyettes



Albert Einstein College of Medicine, New York, USA



Emberi Mycobiom (gomba-mikrobiom)



ORAL
CAVITY

Genera Identified Potentially pathogenic lineages

- *Alternaria* • *Aspergillus*
- *Aureobasidium* • *Candida*
- *Cladosporium* • *Cryptococcus*
- *Fusarium* • *Gibberella*
- *Glomus* • *Pichia*
- *Saccharomyces*
- *Teratosphaeria*



SKIN

- *Candida* • *Cryptococcus*
- *Debaryomyces*
- *Epidermophyton* • *Malassezia*
- *Microsporium* • *Rhodotorula*
- *Trichophyton* • *Aspergillus*
- *Chrysosporium* • *Epicoccum*
- *Leptosphaerulina* • *Penicillium*
- *Phoma* • *Saccharomyces*
- *Ustilago*



LUNGS

- *Aspergillus*
- *Candida*
- *Cladosporium*
- *Penicillium*
- *Cryptococcus*



GASTROINTESTINAL
TRACT

- *Aspergillus*
- *Candida*
- *Cladosporium*
- *Cryptococcus*
- *Fusarium*
- *Penicillium*
- *Pneumocystis*
- *Mucor*
- *Saccharomyces*

Mi a patogenitás ?

A betegség genezise azaz kiváltása, okozása illetve a kór folyamata .

A patogén: egy olyan organizmus amely betegséget okoz.



A „pékélesztő” patogén?



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Vol. 27, No. 7
 July 1989, p. 1689-1691

Saccharom

Use of Paraffin-Embedded Tissue for Identification of *Saccharomyces cerevisiae* in a Baker's Lung Nodule by Fungal PCR and Nucleotide Sequencing

OSSAMA W. TAW
 Department of Pathology
 Department of Pathology
 Laboratory

Fayyaz, Sridhar Sridhar, and Marina Chermak

Medical Laboratory, Roosevelt Hospital, New York State Department of Health, and Department of Microbiology, School of Public Health, University of New York, and Department of Pathology, Chase Island Hospital, Brooklyn, New York

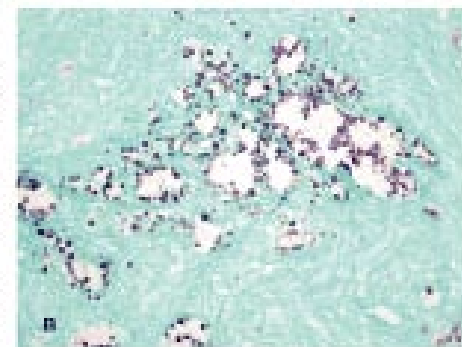
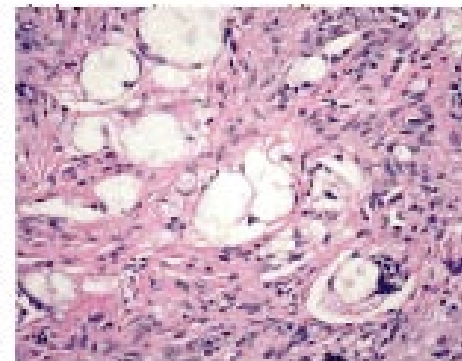
Received 27 November 1988; accepted for publication 14 December 1988; accepted 4 March 1989

A 48-year-old healthy male presented to a bakery with a single lung nodule and underwent two operations to rule out pulmonary carcinoma. Biopsy was positive for yeast cells, which did not match conventional pathogens. PCR analysis of paraffin-embedded tissue and nucleotide sequencing with the small (581-575) internal primer revealed the presence of *Saccharomyces cerevisiae*.

The clinical infection is described in small intestine sections of the l

Identification of fungal pathogens in biological systems frequently requires cultivation of organisms (1). Many pathogens grow up in well-defined, rounded cells, which are characteristic of yeasts (2). This structure is observed in tissues in which the germinating fungus can be cultured in vitro. However, these specimens are not always available for culture. Recently, the application of PCR and nucleotide sequencing has been utilized for identification of pathogenic fungi in histological sections. The paraffin-embedded tissue is used as a source of template DNA for a PCR assay with universal fungal ribosomal gene primers and a nested PCR assay with pathogen-specific primers, and the amplicons are then analyzed by restriction fragment length polymorphism and/or nucleotide sequencing for confirmation of fungal identity (3-7, 8, 11, 12). This approach is very promising in diagnosis, as it can lead to conclusive identification of the causal pathogen independently of histological or culture observations. We describe a case of a lung nodule in a healthy male that proved to be histologically negative for suspected fungal infection and instead revealed histology consistent with an early nodular sarcoidosis (revealed by Papanicolaou and Giemsa stains).

A 48-year-old healthy male was referred to the surgical Chase Island Hospital for a lung nodule observed during a routine chest X-ray done as part of an annual physical examination. The patient was a smoker with no history of lung medical illness. A wedge resection of the lung was performed. A 1.7-cm-diameter solid grayish nodule was present in the lung parenchyma. The edges of the air space were sharply demarcated from the surrounding normal lung parenchyma with no inflammatory infiltrate. Histopathologic examination revealed a well-circumscribed mass composed of a background of fibrotic tissue with a sparsely dense population of uniformity cells composed of an equal admixture of histiocytes and lymphocytes.



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Látunk-e ezen a képen veszélyes kórokozó forrást?



Lactobacillus acidophilus

Barátságos baktérium

Védelmet biztosít más „barátságtalan” betolakodók ellen

Tejsav, hidrogén peroxid termelés

Laktáz enzim termelése ~ tejérzékenység

June 2001, Volume 21, Number 4, Pages 258-260

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Clinical Perinatal/Neonatal Case Presentation *Lactobacillus acidophilus* Sepsis in a Neonate

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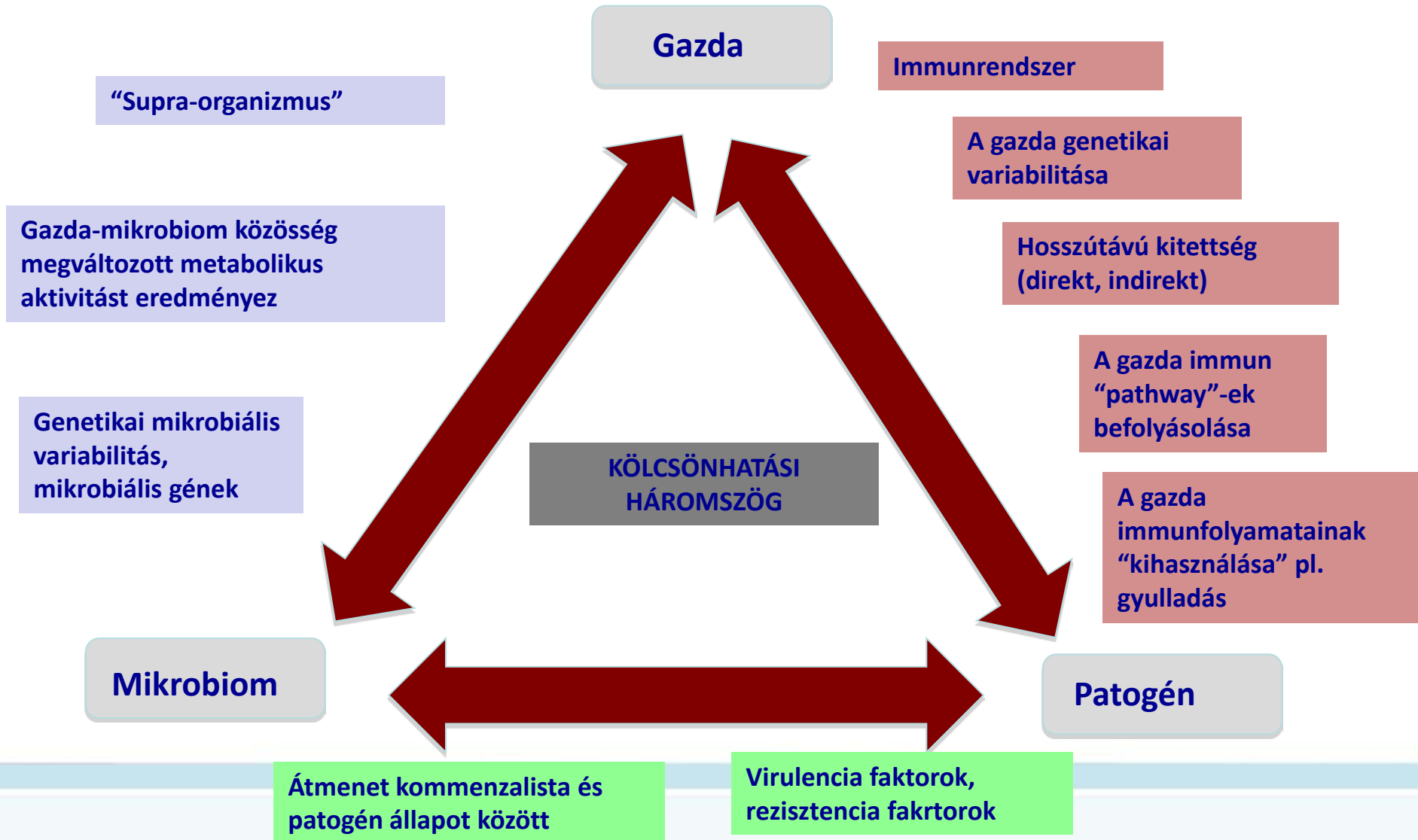
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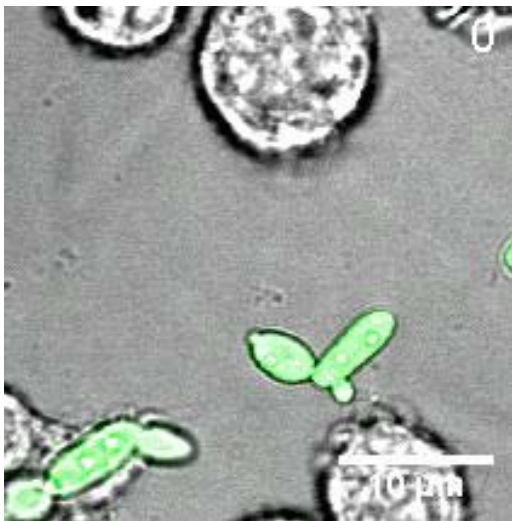
DANGER

A gazda-patogén-mikrobiom-betegség paradigma

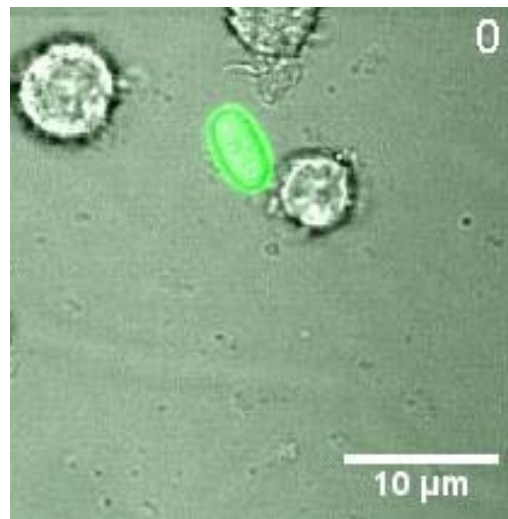


Intracelluláris túlélési stratégiák

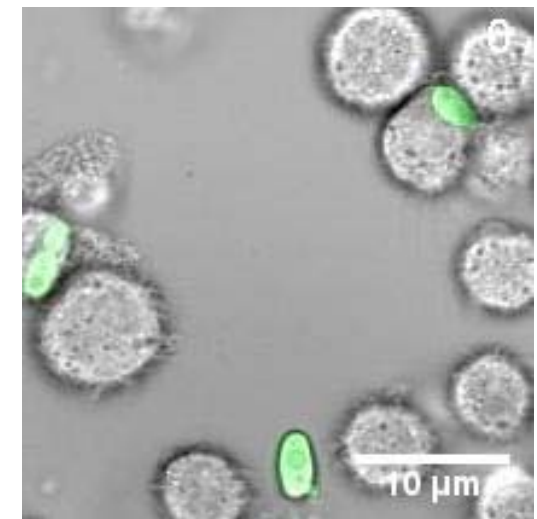
Intracelluláris osztódás



Intracelluláris morfológia váltás



“Exocitózis”



Az emberi immunrendszer



The diagram features a central yellow circle labeled 'Immunrendszer'. Two large red arrows point downwards from the circle, one to the left and one to the right. Each red arrow is supported by two smaller brown lines that branch out from the base of the circle. Below the left red arrow is the text 'külső "ellenségek"', and below the right red arrow is 'belső "ellenségek"'. At the bottom of the diagram, there are two green rectangular boxes: the left one contains 'patogén' and the right one contains 'tumoros sejt'. The background is white with a teal header and a decorative horizontal bar with segments of teal, pink, and light blue.

Immunrendszer

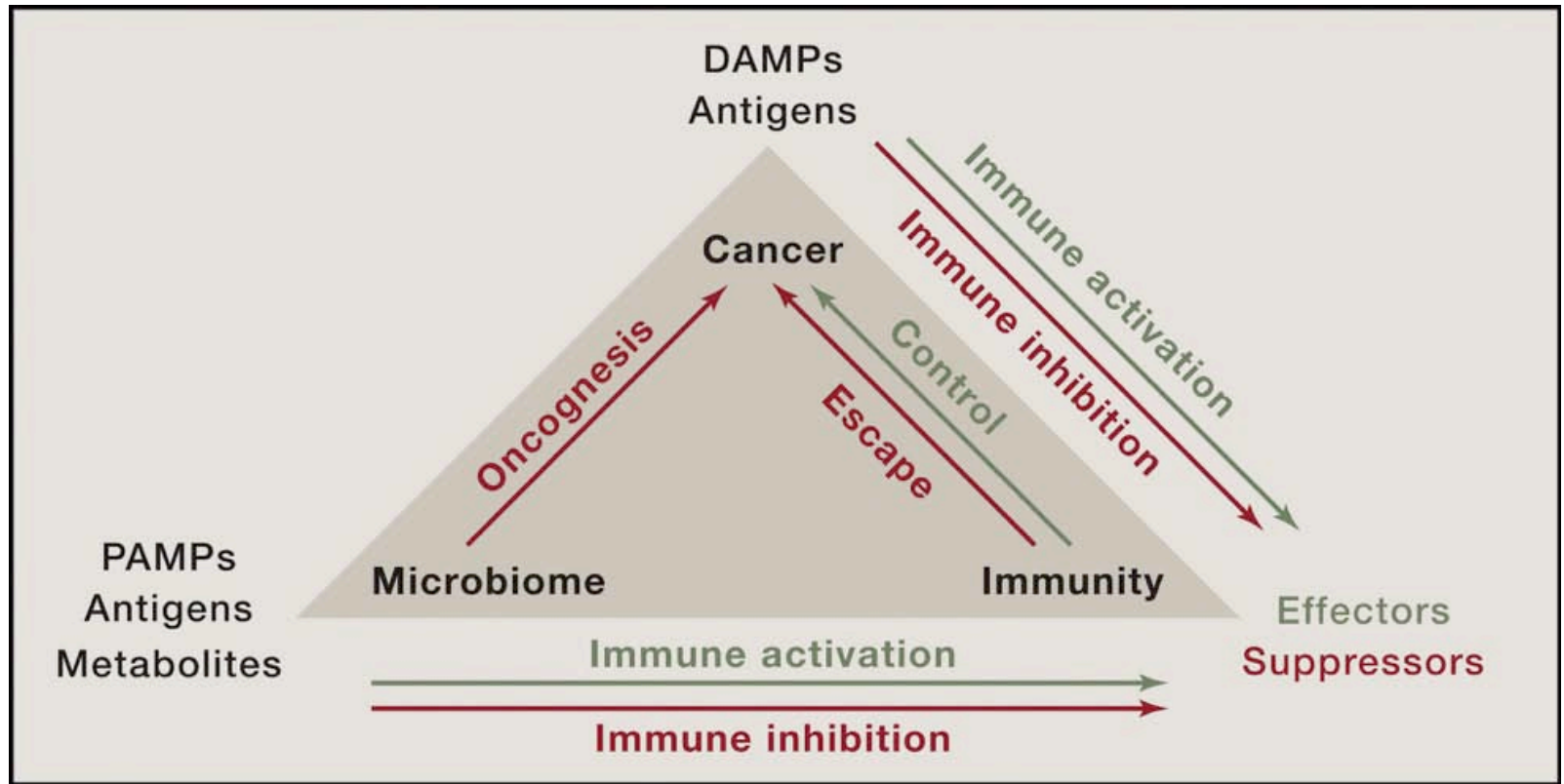
külső "ellenségek"

patogén

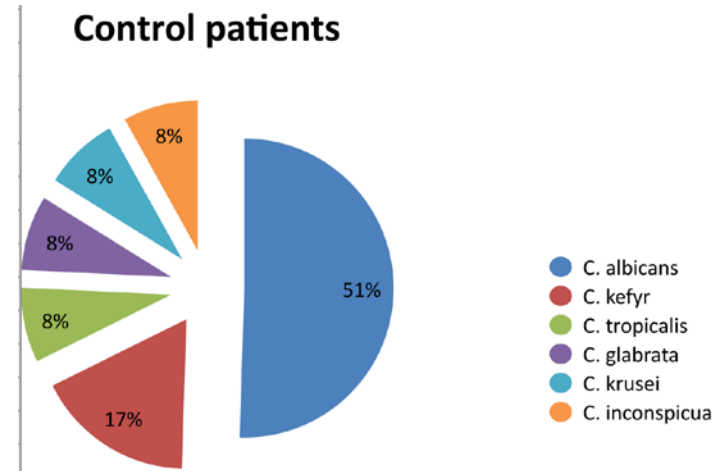
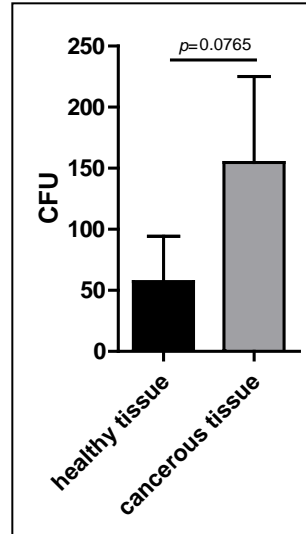
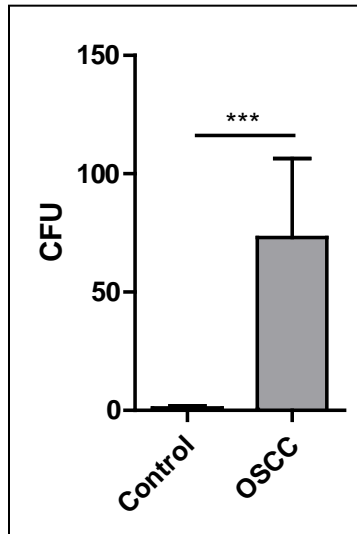
belső "ellenségek"

tumoros sejt

Mikrobiom és tumor



OSCC páciensek „mycobiome” elemzése



- A mycobiom összetétele befolyásolhatja-e a tumoros folyamatok lefolyását
- Lehet-e összefüggés a tumor progressziója és a mycobiom összetétele között?

Prof. Toni Gabaldon

Kvantitatív metagenom analízis



patients samples



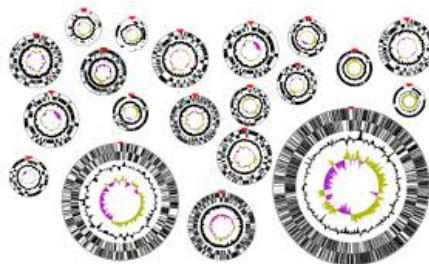
Ion Proton
100Gb/4 hour



large sequence data

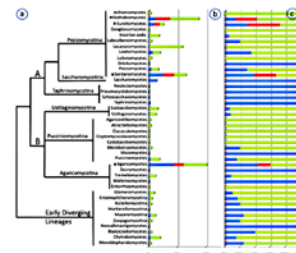


total DNA



known genomes

(1000 Fungal genome project)



Identify relevant
microbial players



Build and test prediction
models

Távlati lehetőségek

hatékonyabb **terápiák**

lehetséges **megelőzési stratégiák**

az **autoimmun betegségek** megelőzése

az **allergia** megelőzése

lehetséges **tumorelles terápia**

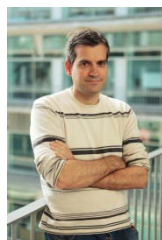
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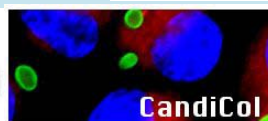


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Köszönöm!

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