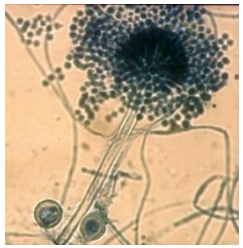
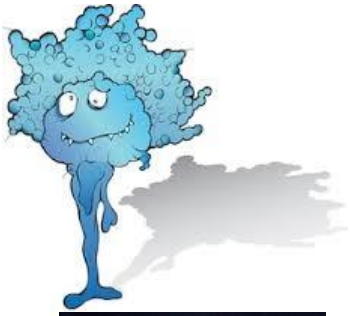
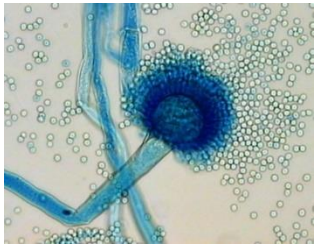
Aspergillosi

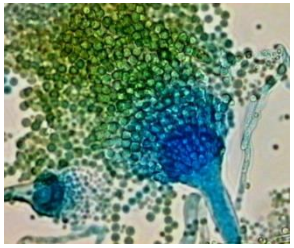
Update in MICROBIOLOGIA

GIULIANA LO CASCIO









Esistono più di 300 specie di Aspergillus….

Coinvolti nella salute pubblica

BENEFICI: Molti Aspergillus species sono utilizzati nell'industria alimentare e farmaceutica grazie al loro ricco profile enzimatico. ES. *Aspergillus niger* nella produzione di acido citrico, amilasi, pectinase, proteasi; *A. terreus* usato per la produzione di Ipocolesterolemizzante lovastatina; *A. oryzae* usato per la fermentazione della soia per la salsa di soia e del riso per il sake.

MALEFICI: Vari livelli di danno, uomo- animale-ambiente

Aspergillo approccio One Health: Patogeno dell'uomo, degli animali, dell'ambiente

Micosi invasive: effetto della medicina moderna…

Prevalenza in aumento per incremento degli immunocompromessi

- neoplasia
- trapianto di midollo
- trapianto d'organo solido
- HIV
- malattie infiammatorie corniche/STEROIDI
- età geriatrica

… e degli avanzamenti diagnostico tecnologici che negli ultimi anni hanno coinvolto anche il laboratorio di micologia

Update

120.000 specie di miceti descritte

Stimate 4 milioni di specie fungine esistenti

Regno dei funghi quello con maggiore diversità fra gli Eukarya

Hawksworth. Microbiol Spectr. 2017

Checinska Sielaff *et al. Microbiome* (2019) 7:50
https://doi.org/10.1186/s40168-019-0666-x

Microbiome

RESEARCH Open Access

Characterization of the total and viable bacterial and fungal communities associated with the International Space Station surfaces

Aleksandra Checinska Sielaff[1,10†], Camilla Urbaniak[1†], Ganesh Babu Malli Mohan[1], Victor G. Stepanov[2], Quyen Tran[2], Jason M. Wood[1], Jeremiah Minich[3], Daniel McDonald[4], Teresa Mayer[1], Rob Knight[4,5,6], Fathi Karouia[7,8,9], George E. Fox[2] and Kasthuri Venkateswaran[1*]

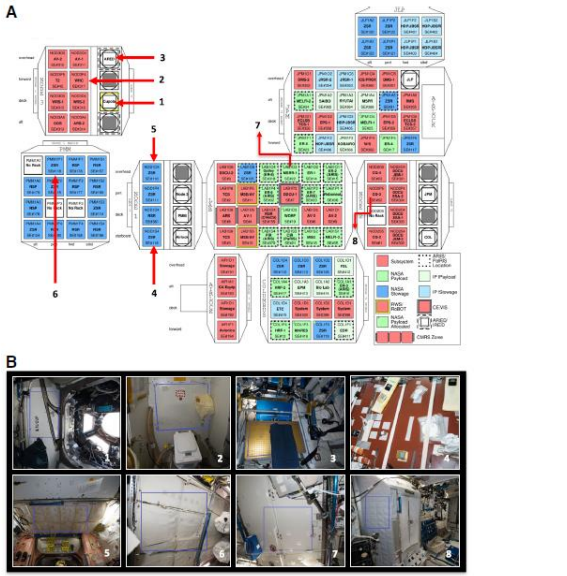
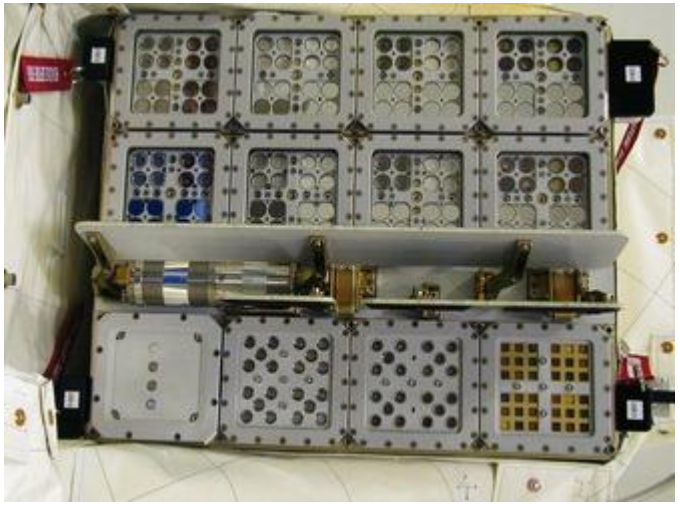


Fig. 1 Illustration of the eight locations sampled on the ISS over three flight sampling sessions. **a** Schematic of the US module of the ISS depicting various nodes and modules. The red arrows point to locations sampled during this study. **b** Detailed images of the sampled area at each location as outlined by blue lines. Location #1, port panel next to cupola (Node 3); location #2, waste and hygiene compartment (node 3); location #3, advanced resistive exercise device (ARED) foot platform (node 3); location #4, dining table (node 1); location #5, zero G stowage rack (node 1); location #6, permanent multipurpose module (PMM) port 1 (PMM); location #7, panel near portable water dispenser (LAB); and location #8, port crew quarters, bump out exterior aft wall (node 2)



ISS036E28777

AMBIENTE

Suolo

Computer e smartphone

Acqua stagnante

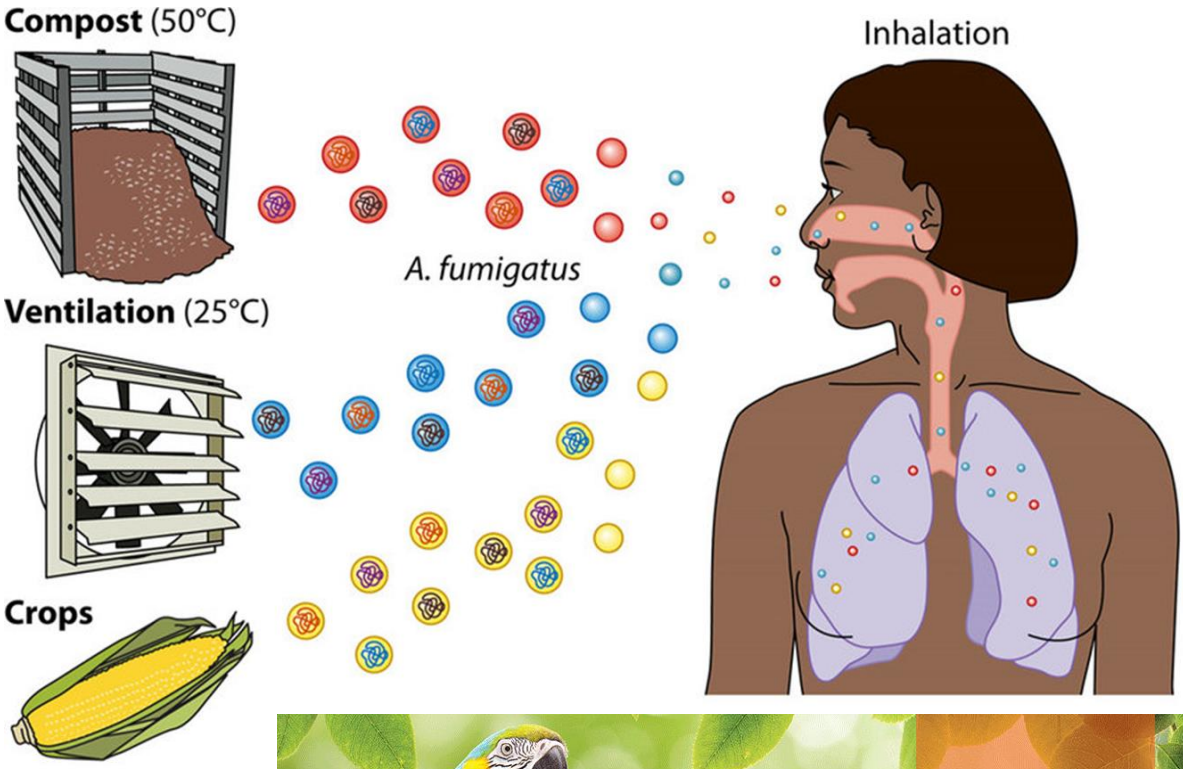
Materiale organico in decomposizione, compost

Concentazione spore nell'aria fino a 10^6 conidi/m^3

Impianti di condizionamento

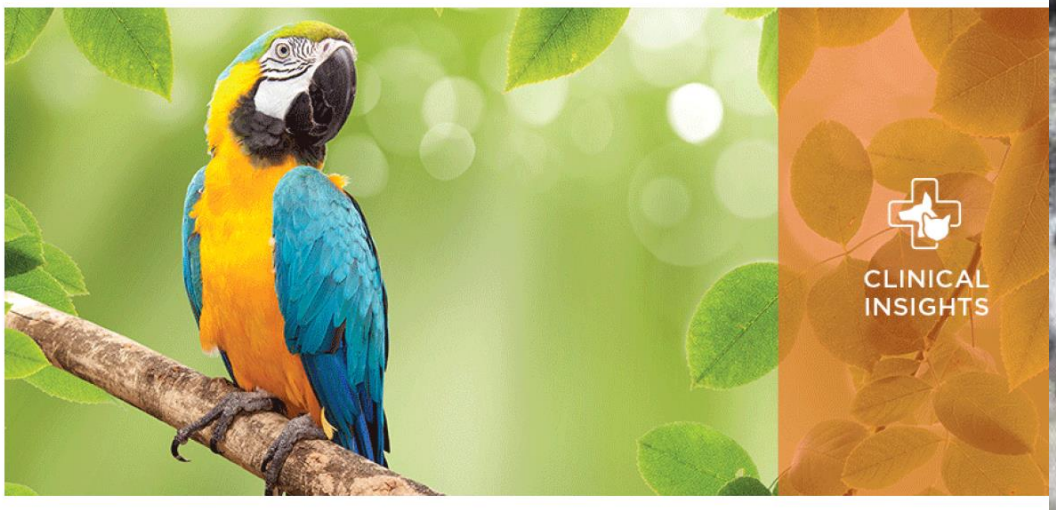
Silos per conservazione sementi o foraggio


The One Health Triad
Healthy People
Healthy Environments
Healthy Animals


Compost (50°C)
Ventilation (25°C)
Crops
A. fumigatus
Inhalation
Factors: temperatu


CLINICAL
INSIGHTS

Avian Aspergillosis: What Every Veterinarian Needs to Know



Risk Factors for Avian Aspergillosis[1,4,5]

- Stress
- Environmental conditions
- Inappropriate husbandry
- Nutritional deficiencies
- Immunosuppression
- Corticosteroid use
- Long-term antibiotic use
- Wild-caught animal
- Trauma
- Physical exertion (eg, migration)
- Toxicosis
- Genetics (eg, inbreeding)
- Preexisting disease

Fatal *Aspergillus flavus* rhinitis with gastrointestinal gaseous distension in a Cape porcupine

J Vet Diagn Invest. 2019

Aspergillosi nasale canina

In ambito zootecnico

Gentilmente concessa da A. Prigitano- FIMUA 2018 Pesaro

Journal of Medical Microbiology (2014), 63, 464–470

Environmental contamination by *Aspergillus* spp. in laying hen farms and associated health risks for farm workers

Claudia Cafarchia,[1] Antonio Camarda,[1] Roberta Iatta,[1] Patrizia Danesi,[2] Vincenza Favuzzi,[1] Giancarlo Di Paola,[1] Nicola Pugliese,[1] Anna Caroli,[1] Maria Teresa Montagna[3] and Domenico Otranto[1]

Samples	Positive/total (%)	Population (SD)°
Group I (air samples)	30/57 (52.6)	670 (152.7)[d]
Group II (pooled faeces)	38/69 (55.1)[a]	1.2×10^4 (38249)[def]
Group III (poultry feedstuffs)	6/19 (31.6)[a]	1.9×10^3 (3640)[e]
Group IV (farm workers)	11/60 (55.5)	2.9 (2.1)[f]
Pharyngeal swabs	1/20 (5)[bc]	1
Nasal swabs	8/20 (40)[b]	3.4 (2.8)
Ear swabs	7/20 (35)[c]	2.7 (1.7)

Nessuna aspergillosi nelle galline.

Sì la colonizzazione umana

Aspergillus fumigatus 27.3 %

Aspergillus flavus 6.3 %

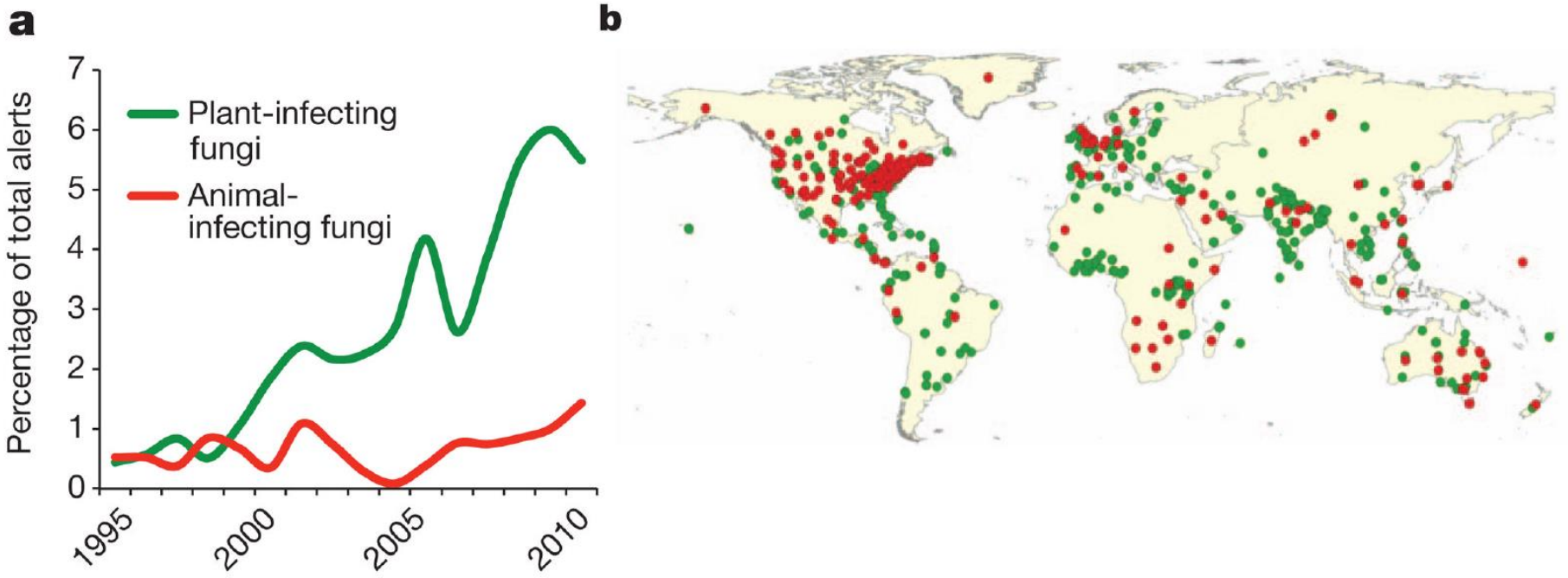
Gentilmente concessa da A. Prigitano- FIMUA 2018 Pesaro

Published in final edited form as:
Nature. ; 484(7393): . doi:10.1038/nature10947.

Emerging fungal threats to animal, plant and ecosystem health

Matthew C. Fisher[1], **Daniel. A. Henk**[1], **Cheryl J. Briggs**[2], **John S. Brownstein**[3], **Lawrence C. Madoff**[4], **Sarah L. McCraw**[5], and **Sarah J. Gurr**[5]

[1]Department of Infectious Disease Epidemiology, Imperial College, London W2 1PG, UK

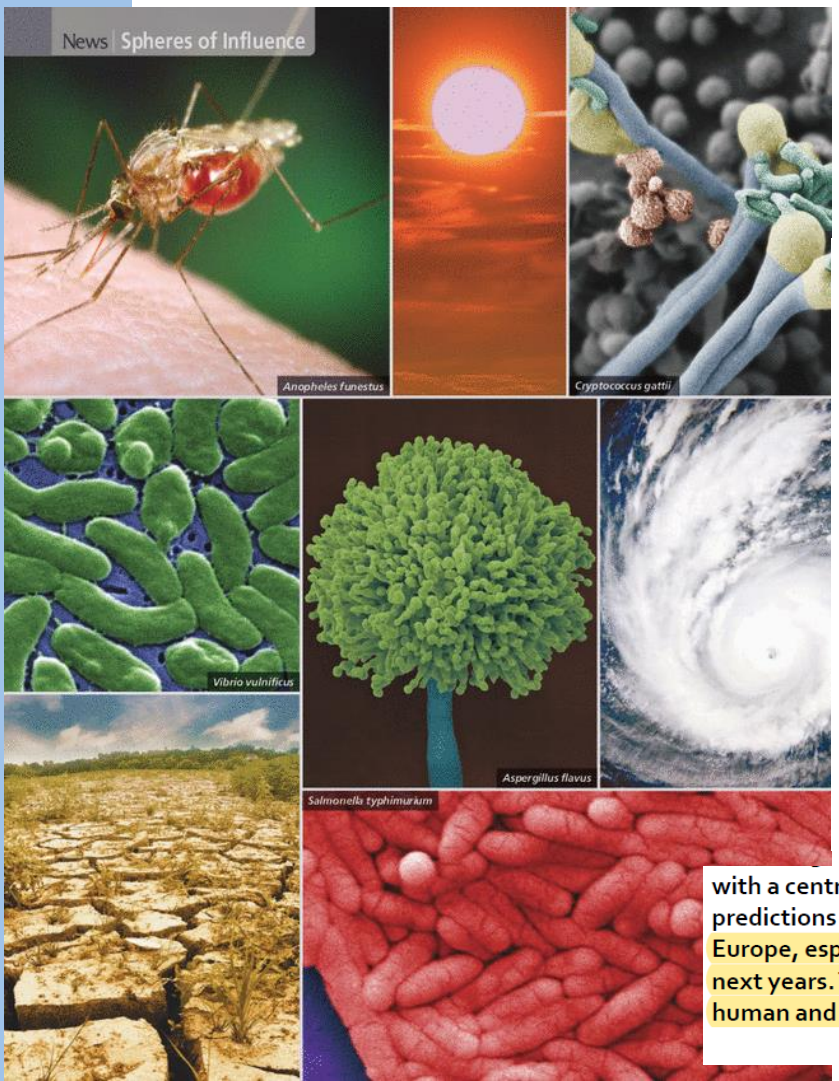


Patogeno per le piante

FIGURE 2 - Pathogenicity of *Aspergillus* to sisal. **A**. Sisal plantlet with advanced symptoms of the disease; **B**. Plantlet inoculated with *Aspergillus niger* on the left and control at the right; **C**. Section of the stem of a diseased plantlet showing the red color characteristic of the disease; **D**. Section of the stem of an uninoculated plantlet.

Cambiamenti climatici

Aumento di temperature
Uragani



www.nature.com/scientificreports

SCIENTIFIC REPORTS

OPEN

Aflatoxin B_1 contamination in maize in Europe increases due to climate change

Received: 09 December 2015
Accepted: 24 March 2016

P. Battilani[1], P. Toscano[2], H. J. Van der Fels-Klerx[3], A. Moretti[4], M. Camardo Leggieri[1], C. Brera[5], A. Rortais[6], T. Goumperis[6] & T. Robinson[6]

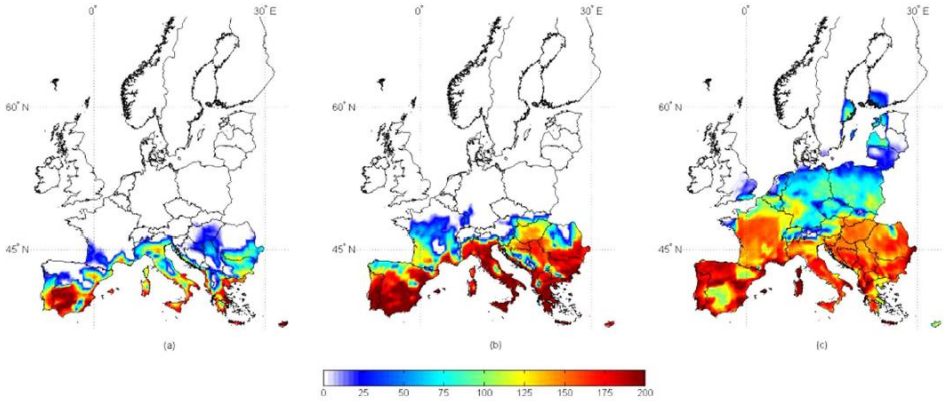


Figure 1. Risk maps for aflatoxin contamination in maize at harvest in 3 different climate scenarios, present, +2 °C, +5 °C. Mean daily data used as input result from 100-year run of the predictive model AFLA-maize in 2254 geo-referenced points throughout Europe, in the 3 scenarios. The scale 0–200 refers to the aflatoxin risk index (AFI), output from the predictive model; increasing the (present (a), +2°C (b), +5°C (c)) number, the risk of contamination increases. Maps generated using Mathworks, Matlab. Computer Program, 2012 http://it.mathworks.com/.

with a central point each. Climate data were generated for each point, linked to predictive models and predictions were run consequently. Aflatoxin B_1 is predicted to become a food safety issue in maize in Europe, especially in the +2 °C scenario, the most probable scenario of climate change expected for the next years. These results represent a supporting tool to reinforce aflatoxin management and to prevent human and animal exposure.

FUNGICIDI in uso in agricoltura

Classificazione della Commissione Comunità Europea (11/12/2006)

Inorganici: zolfo, rame

Carbammati e ditiocarbammati

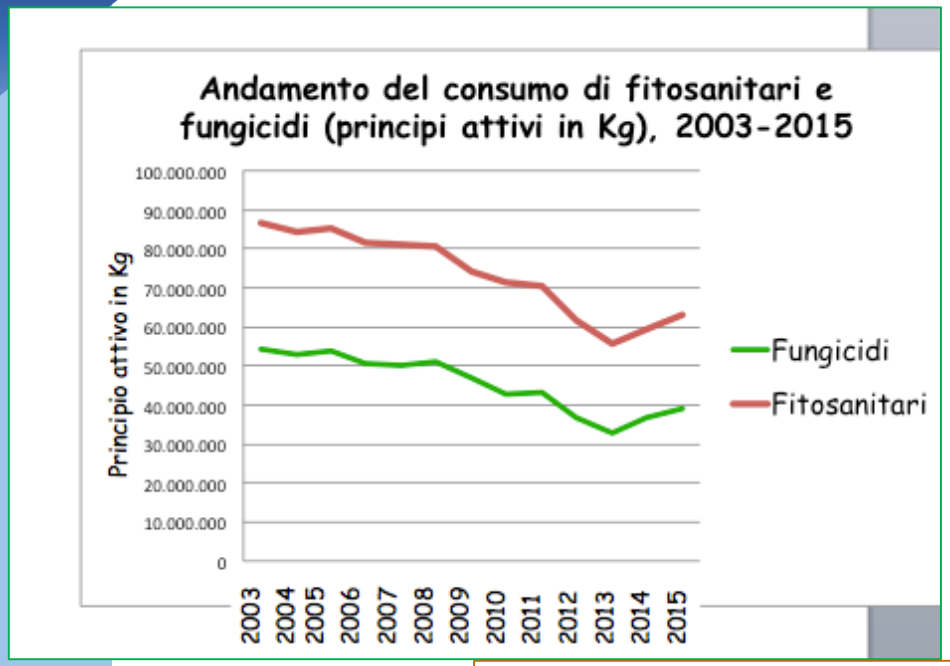
Benzimidazoli

Imidazoli e triazoli: difenoconazolo, epoxiconazolo, fenbuconazolo, flusilazolo, exaconazolo, propiconazolo, tebuconazolo, tetraconazolo

Morfoline

Altri: azotoalifatici, ammidici, anilidici, aromatici, dicarbossimidici, dinitroanilinici, dinitrofenolici, fosforganici, ossazolici, fenilpirrolici, ftalimmidici, pirimidinici, chinolinici, chinonici, strobilurinici

ITALIA



2003-2015

-50% Insetticidi

-30% Erbicidi

-30% Fungicidi

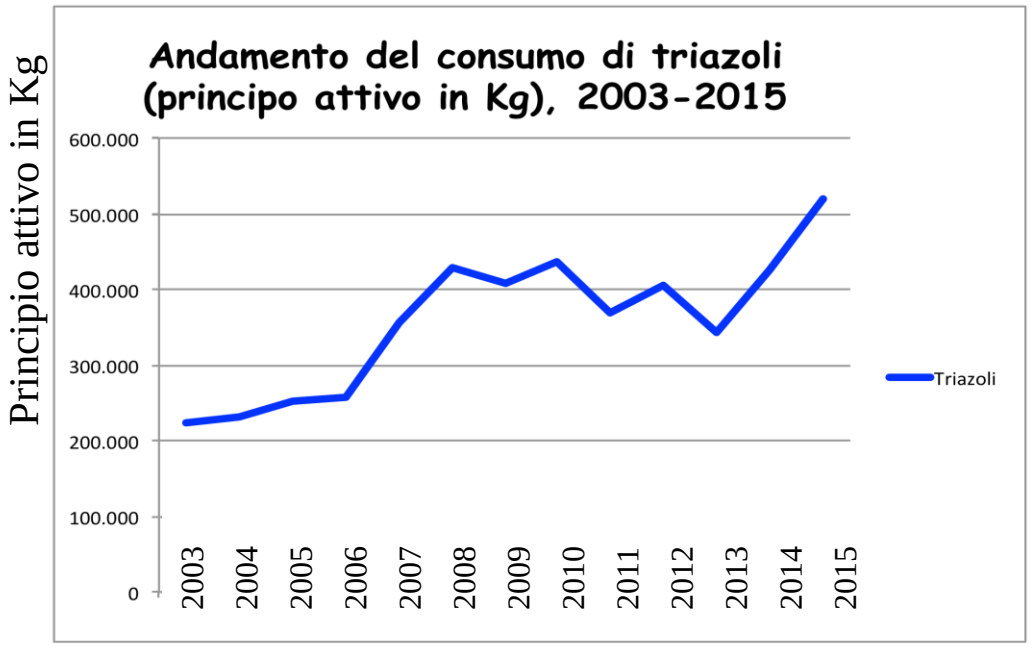
2003-2015

-40% Zolfo

-30% Rame

-23% Solforganici

+133% Triazoli



Gentilmente concessa da A. Prigita
Pesaro

UPDATE in DIAGNOSTICA

Table 1. Underlying clinical conditions and the associated risk of invasive aspergillosis.

Condition (age limits)	Approximate incidence of disease %	Risk category
Hematological malignancy (>16 years)		
Acute myeloid leukemia and myelodysplastic syndrome	8–12	High
Acute lymphatic leukemia	4–6	Moderate
Chronic myeloid leukemia	2.5	Low
Chronic lymphatic leukemia	0.5	Low
Lymphoma	1	Low
Hodgkin's disease	0.3	Low
Multiple myeloma	0.3	Low
Aplastic Anaemia (1–75 years)	15	High
Stem cell transplantation (NS)		
Autologous	2–6	Low
Allogeneic	5–26	High
Solid organ transplantation (NS)		
Kidney/pancreas	0–4	Low
Liver	1–7	Low/moderate
Heart/lung	1–15	Moderate/high
Small bowel	0–10	Limited data
Critical Illness (NS)	0.3–6	Low

Criteri cl

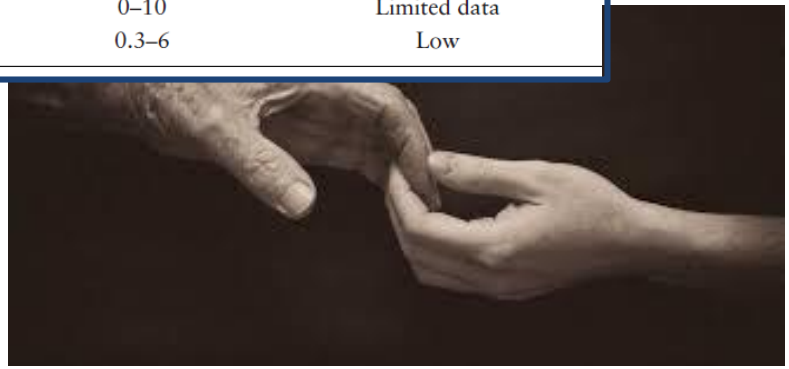
Evidenze

Evidenze

Col

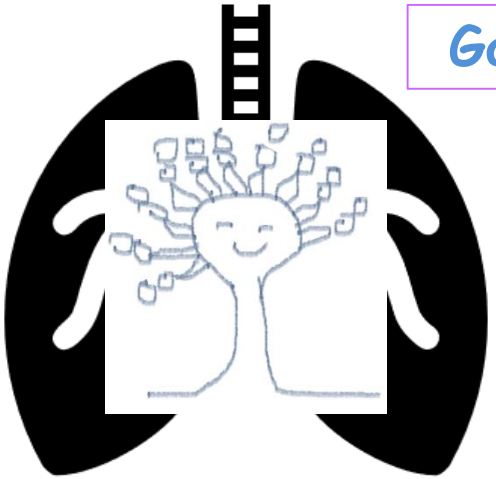
Biomarcatori

Biologia molecolare



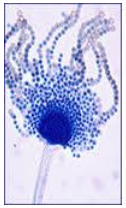
Diagnostica non colturale

(1,3)-B-D-Glucano



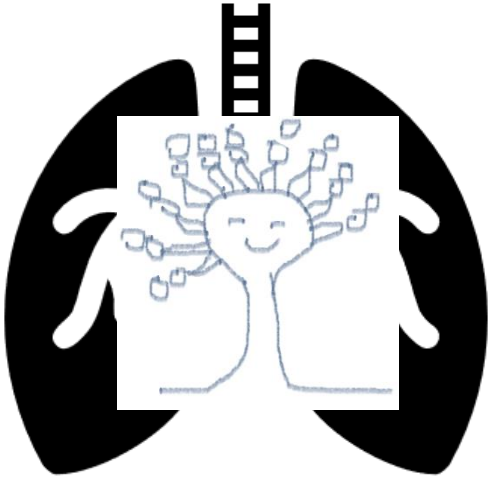
Galattomannano

Ag aspergillare-Immunocromatografia



Molecolare

Diagnostica non colturale



Galattomannano

Monitoraggio utile per screening: Sens 60%-Spec 80-95%

Misurazioni seriali permettono di valutare esito prognostico

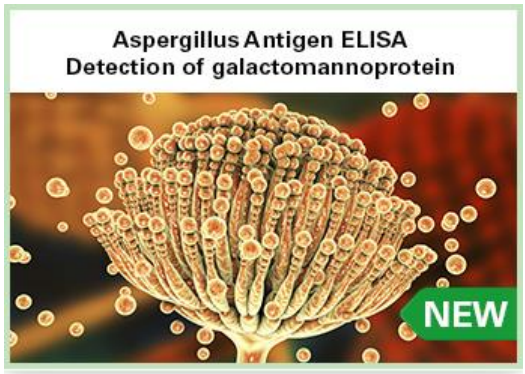
BUONO

- **Se riduzione >35% nella I°settimana**
- **Se NEGATIVIZZA durante trattamento**

INFAUSTO

- **Se si ha aumento dopo due settimane**

Galattomannoproteina



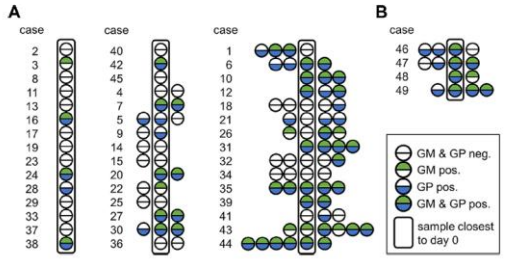
EUROIMMUN
a PerkinElmer company

AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Clinical Microbiology®

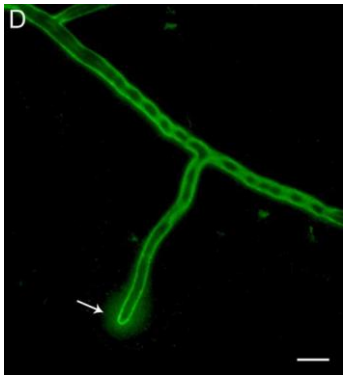
MYCOLOGY

Evaluation of a Novel *Aspergillus* Antigen Enzyme-Linked Immunosorbent Assay

Karl Dichtl,[a] Ulrich Seybold,[b] Steffen Ormanns,[c] Heidi Horns,[d] Johannes Wagener[a,e,f]

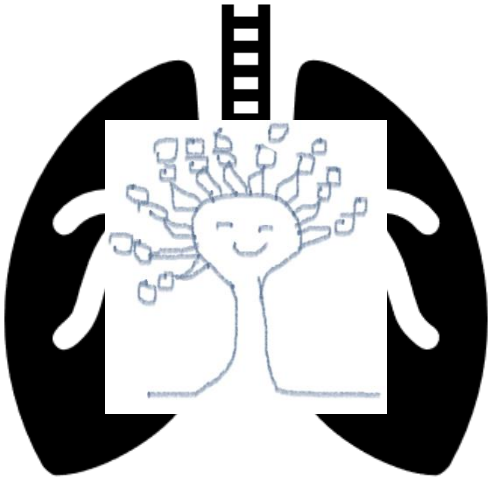


Nuovo ELISA con Ab IgG3 JF5 diretto verso glicoproteina extracellulare, **Galattomannoproteina,** prodotta all'apice ifale

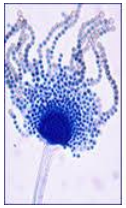


Risultati di sensibilità sovrapponibili a Platelia, migliore specificità
Maggiore sensibilità in pazienti non ematologici
Non cross reazione con Altri funghi

Diagnostica non colturale



Ag aspergillare- Immunocromatografia

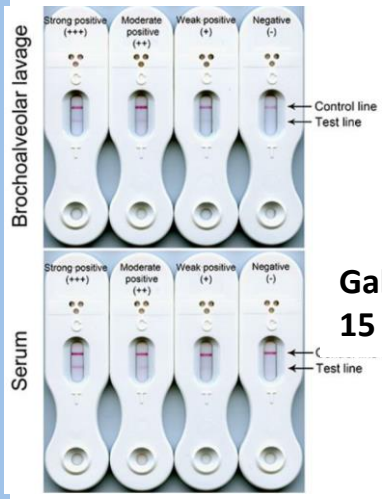


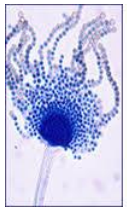
mycoses
Diagnosis, Therapy and Prophylaxis of Fungal Diseases
Original article

Mycoses, 2015, **58**, 461–469

Diagnostic accuracy of the *Aspergillus*-specific bronchoalveolar lavage lateral-flow assay in haematological malignancy patients

Juergen Prattes,[1] Michaela Lackner,[2] Susanne Eigl,[1,3] Frederike Reischies,[1] Reinhard B. Raggam,[4] Christoph Koidl,[5] Holger Flick,[3] Robert Wurm,[3] Michael Palfner,[3] Albert Wölfler,[6] Peter Neumeister,[6] Christopher R. Thornton,[7] Robert Krause,[1] Cornelia Lass-Flörl[2] and Martin Hoenigl[1,3,8]





IMMY

olm

Galattomannoproteina 15 min

ELSEVIER
Contents lists available at ScienceDirect
Clinical Microbiology and Infection
journal homepage: www.clinicalmicrobiologyandinfection.com
CMI CLINICAL MICROBIOLOGY AND INFECTION
ESCMID

Research Note

Respiratory specimens and the diagnostic accuracy of *Aspergillus* lateral flow assays (LFA-IMMY™): real-life data from a multicentre study

C. Lass-Flörl [1,*], G. Lo Cascio [2], M. Nucci [3], M. Camargo dos Santos [4], A. Lopes Colombo [4], M. Vossen [5], B. Willinger [5]

Polisaccaride Galattomannano 30 min

Sens	Spec	VPP	VPN
71	76	35	94

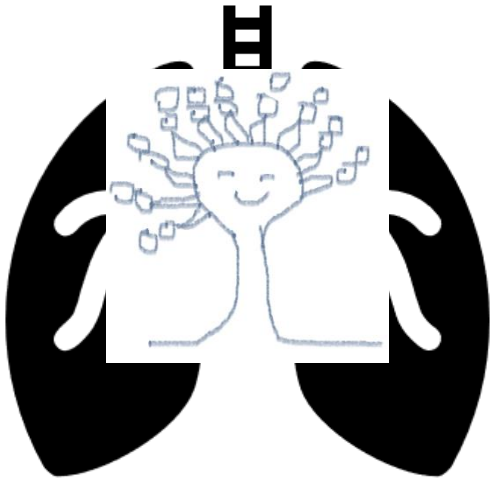
Aspergillus positivity in BAL	Sens	Spec	VPP	VPN
Solo Microscopia	90	84	89	85
Microscpia e coltura	92	91	92	91

Galattomannano

OR

Ag aspergillare-Immunocromatografia

(1,3)-B-D-Glucano



Diagnostic Microbiology and Infectious Disease 93 (2019) 44–53

Contents lists available at ScienceDirect

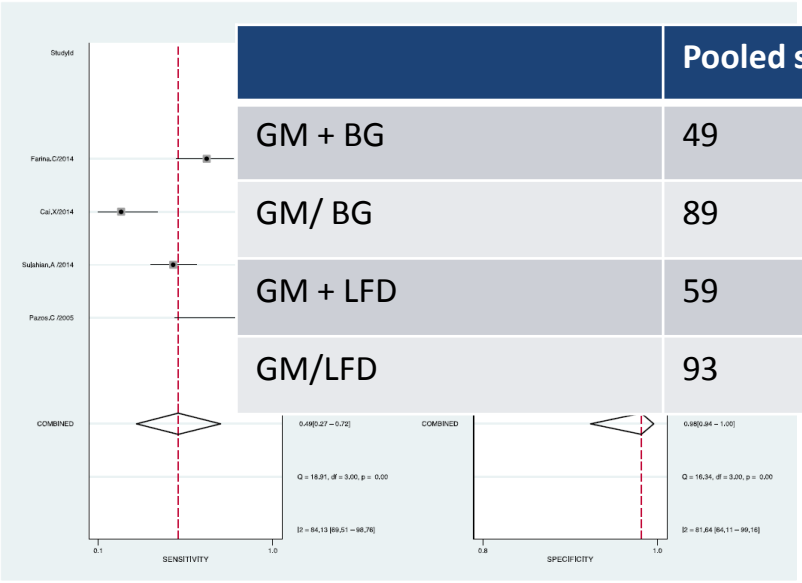
Diagnostic Microbiology and Infectious Disease

journal homepage: www.elsevier.com/locate/diagmicrobio

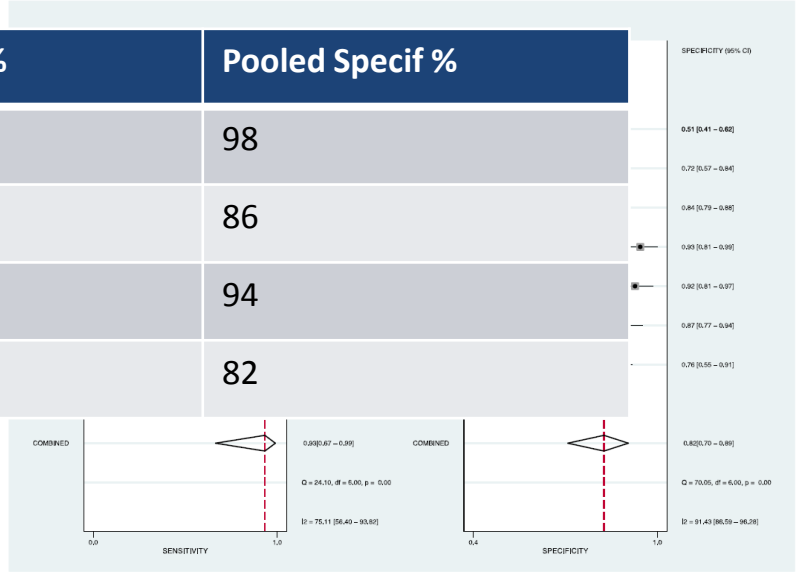
The performance of galactomannan in combination with 1,3-β-D-glucan or aspergillus-lateral flow device for the diagnosis of invasive aspergillosis: Evidences from 13 studies

Li Zhang *, Zhusheng Guo, Shujin Xie, Jing Zhou, Guiling Chen, Jianbo Feng, Ya Huang

	Pooled sens %	Pooled Specif %
GM + BG	49	98
GM/ BG	89	86
GM + LFD	59	94
GM/LFD	93	82



GM+ BG



GM+ LFD

AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Clinical Microbiology®

MYCOLOGY

Evaluation of Mass Spectrometry-Based Detection of Panfungal Serum Disaccharide for Diagnosis of Invasive Fungal Infections: Results from a Collaborative Study Involving Six European Clinical Centers

Marjorie Cornu,[a] Boualem Sendid,[a] Alexandre Mery,[b] Nadine François,[a] Malgorzata Mikulska,[c] Valérie Letscher-Bru,[d] Elena De Carolis,[e] Lauro Damonti,[f] Marie Titecat,[g] Pierre-Yves Bochud,[f] Alexandre Alanio,[h,i,j] Maurizio Sanguinetti,[e] Claudio Viscoli,[c] Raoul Herbrecht,[k] Yann Guerardel,[b] Daniel Poulain[a]

J Clin Microbiol 57:e01867-18.

invasive candidiasis (IC; *n*26 patients)

invasive aspergillosis (IA; *n*19)

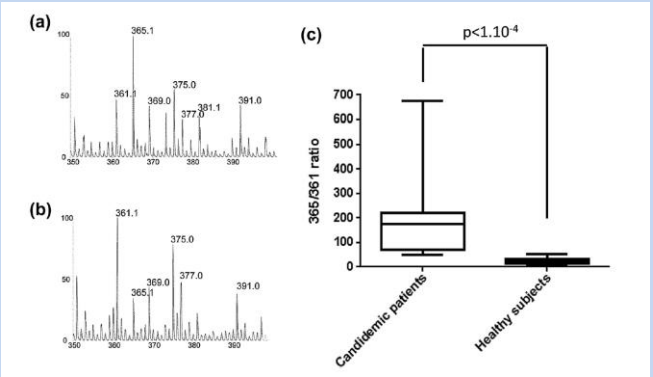
mucormycosis (MM; *n*23)

Diagnosis: detection of mannan (Man) or galactomannan (GM), respectively, associated with detection of (1,3)--D-glucan (BDG) in both infections.

MM was detected by quantitative real-time PCR (qPCR).

Preliminary evidence for a serum disaccharide signature of invasive *Candida albicans* infection detected by MALDI Mass Spectrometry

B. Sendid[1,2,3], J. Poissy[1,3,4], N. François[2,3], A. Mery[5], S. Courtecuisse[6,7], F. Krzewinski[6,7,8], S. Jawhara[1,3], Y. Guerardel[6,7,10] and D. Poulain[1,2,3,9,10]



Clin Microbiol Infect 2015; **21**: 88.e1–88.e6

Evaluation of Mass Spectrometry-Based Detection of Panfungal Serum Disaccharide for Diagnosis of Invasive Fungal Infections: Results from a Collaborative Study Involving Six European Clinical Centers

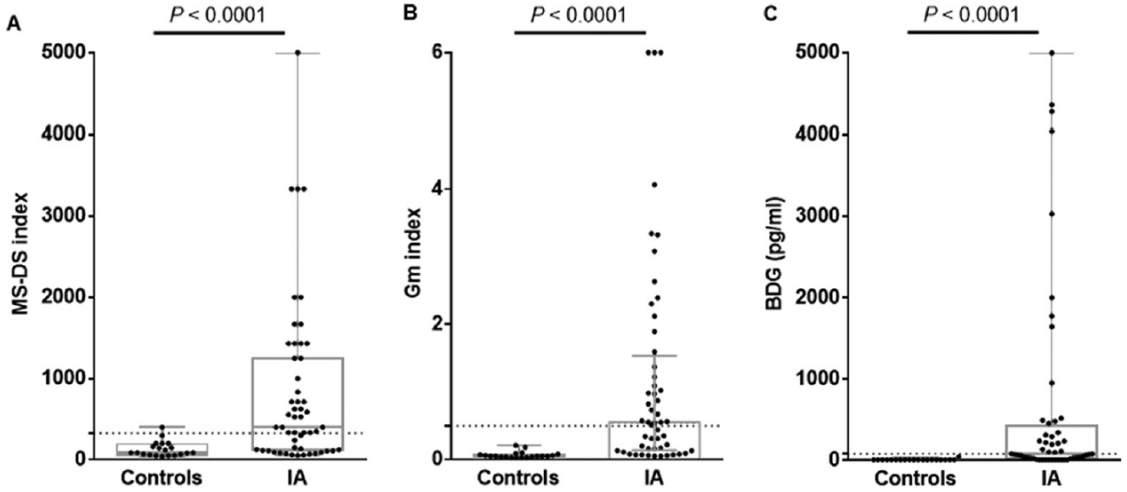
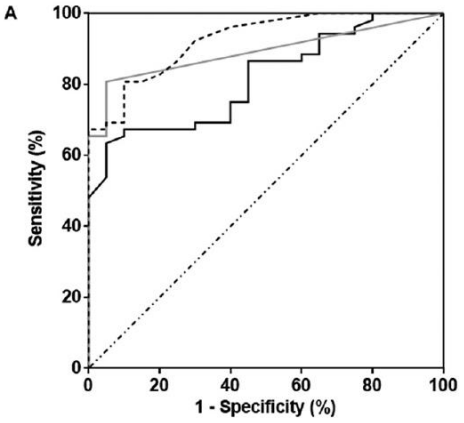


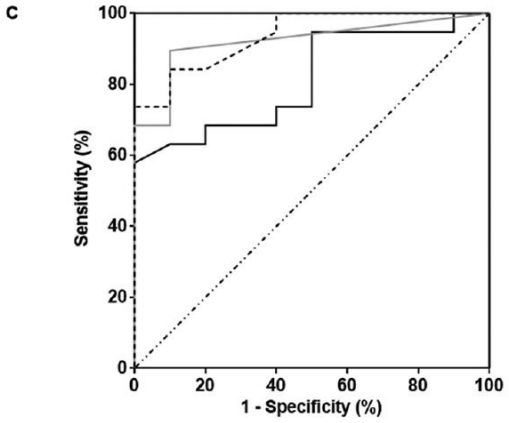
FIG 4 Distribution of MS-DS indexes (A), GM indexes (B), and BDG concentrations (C) in patients with invasive aspergillosis (IA) and controls. The patient and control groups were compared using the Mann-Whitney test (significant at $P \leq 0.05$). The dotted lines represent the cutoff values for each biomarker.

For Invasive Aspergillosis…

All tests discriminated sera from IA patients from sera from neutropenic controls (*P*0.0009).

For IA, MS-DS sensitivity and specificity were 64% and 95%, respectively.





B

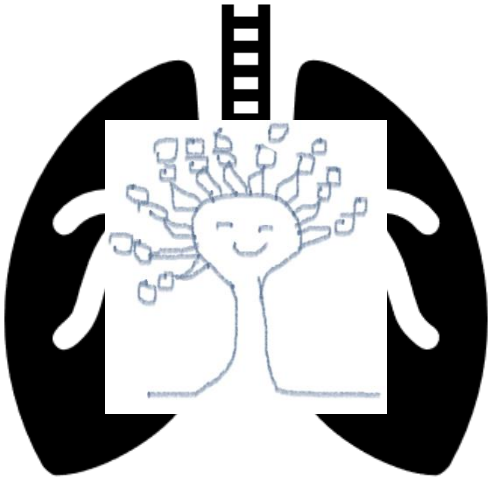
Test	Cut-off	Sensitivity	Specificity	AUC
GM	0.5	53.9	100.0	0.926
BDG	80	50.0	100.0	0.891
MS-DS	325	63.5	95.0	0.816
MS-DS*	325	63.5	100.0	0.864

D

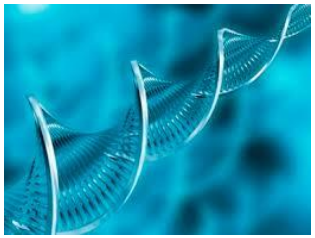
Test	Cut-off	Sensitivity	Specificity	AUC
GM	0.5	71.1	100.0	0.937
BDG	80	57.9	100.0	0.921
MS-DS	325	63.2	95.0	0.813
MS-DS*	325	63.2	100.0	0.862

FIG 5 (A, C) ROC curves for serum (A) and patients (C) for invasive aspergillosis (IA). (B, D) Sensitivity/specificity values according to preestablished cutoff values for each biomarker for analysis of serum (B) and patients (D). MS-DS*, results obtained by exclusion of the control who developed IA 2 months later. Gray, dashed, and black lines, results for BDG detection, GM detection, and MS-DS, respectively.

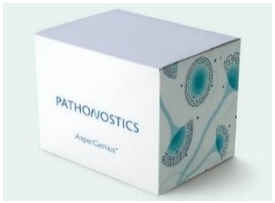
Diagnostica non colturale



Molecolare



Esistono molti kit disponibili



Pathonostic Aspergenius

Adamtec MycoGENIE

Renishaw Fungiplex

Aspergillus ELITe MGB kit

Bosphore Aspergillus det kit

FALSI POSITIVI	FALSI NEGATIVI
Contaminazione durante la lavorazione	Limite di rilevazione/ basso biomarker circolante
Colonizzazione	Terapia antifungina

CE-IVD marked

AsperGenius®: a multiplex Real Time PCR assay for the detection of *Aspergillus fumigatus* and identification of azole resistance markers.

Diagnostic specimens

- Bronchoalveolar lavage (BAL) samples from hematology patients
- Bronchoalveolar lavage (BAL) samples from intensive care unit patients

Species multiplex

- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Aspergillus* species
- Internal Amplification Control (IAC)

Resistance multiplex

- L98H
- Tandem repeat 34
- T289A
- Y121F

CYP51A

JCM

Analytical and Clinical Evaluation of the PathoNostics AsperGenius Assay for Detection of Invasive Aspergillosis and Resistance to Azole Antifungal Drugs during Testing of Serum Samples

The commercially developed PathoNostics AsperGenius species assay is a multiplex real-time PCR capable of detecting aspergillosis and genetic markers associated with azole resistance. The assay is validated for testing bronchoalveolar lavage fluids, replacing the requirement for culture and benefiting patient management. Application of this assay to less invasive, easily obtainable samples (e.g., serum) might be advantageous. The aim of this study was to determine the analytical and clinical performance of the AsperGenius species and resistance assays for testing serum samples. For the analytical evaluations, serum samples were spiked with various concentrations of *Aspergillus* genomic DNA for extraction, following international recommendations. For the clinical study, 124 DNA extracts from 14 proven/probable invasive aspergillosis (IA) cases, 2 possible IA cases, and 33 controls were tested. The resistance assay was performed on *Aspergillus fumigatus* PCR-positive samples when a sufficient fungal burden was evident. The limits of detection of the species and resistance assays for *A. fumigatus* DNA were 10 and ≥75 genomes/sample, respectively. Nonreproducible detection at lower burdens was achievable for all markers. With a positivity threshold of 39 cycles, the sensitivity and specificity of the species assay were 78.6% and 100%, respectively. For 7 IA cases, at least one genetic region potentially associated with azole resistance was successfully amplified, although no resistance markers were detected in this small cohort. The AsperGenius assay provides good clinical performance with the added ability to detect azole resistance directly from noninvasive samples. While the available burden will limit application, it remains a significant advancement in the diagnosis and management of aspergillosis.

Ripetizione in tandem di 34 paia di basi nel promotore del gene cyp51A accoppiata a mutazione puntiforme dello stesso gene che porta una sostituzione aminoacidica nel codone 98 (TR34/L98H)

ORIGINE AMBIENTALE
Esposizione a fungicidi triazolici
usati in campo agricolo

AMERICAN THORACIC SOCIETY DOCUMENTS

Microbiological Laboratory Testing in the Diagnosis of Fungal Infections in Pulmonary and Critical Care Practice

An Official American Thoracic Society Clinical Practice Guideline

Chadi A. Hage, Eva M. Carmona, Oleg Epelbaum, Scott E. Evans, Luke M. Gabe, Qusay Haydour, Kenneth S. Knox, Jay K. Kolls, M. Hassan Murad, Nancy L. Wengenack, and Andrew H. Limper; on behalf of the American Thoracic Society Assembly on Pulmonary Infections and Tuberculosis

THIS OFFICIAL CLINICAL PRACTICE GUIDELINE OF THE AMERICAN THORACIC SOCIETY WAS APPROVED MAY 2019

- In patients with severe immunocompromise, such as those with hematological malignancy or recipients of hematological stem cell or solid organ transplants who are suspected of having IPA, we recommend the inclusion of *Aspergillus* PCR in BAL testing as part of the evaluation (*strong recommendation, high-quality evidence*).

- In patients with severe immunocompromise, such as those with hematological malignancy or recipients of hematological stem cell or solid organ transplants, who are suspected of having IPA, we recommend the use of blood or serum *Aspergillus* PCR testing (*strong recommendation, high-quality evidence*).

ISHAM

Rev

Di

co

Ros
Tho
and

High Risk Patients
undergoing remissio
and allogeneic bone
recipients on GVHD

Single POSITIVE PCR or Antigen[a]

Await further repeat results

Single PO
PCR and A

Furth
diagnostic
up (CT/B
only βD
Consider
fungal aeti

No profilassi

Patients with symptoms suggestive of fungal infection (Table 2) or CT evidence of possible disease including patients on mould active prophylaxis with suspected breakthrough infection

Aspergillus **PCR and antigen from blood and specimens from suspected sites of infection** (respiratory [BALF], CSF sinus apspirate etc)

POSITIVE result

NEGATIVE result

Commence antifungal treatment

Consider other fungal aetiologies
Extend diagnostic work up

After 12-14 days treatment:

- Monitor galactomannan to assess response
- If CT normal or non-specific:
- stop treatment when negative
- If CT confirms IFD stop after 2 consecutive negatives one week apart
- Consider need for secondary prophylaxis

after 2 consecutive negatives and reintroduce PCR and antigen screening.

Con profilassi

frontiers in Microbiology

ORIGINAL RESEARCH
published: 15 March 2019
doi: 10.3389/fmicb.2019.00512

Mycobiome Sequencing and Analysis Applied to Fungal Community Profiling of the Lower Respiratory Tract During Fungal Pathogenesis

*Lisa R. McTaggart[1], Julia K. Copeland[2], Anuradha Surendra[3], Pauline W. Wang[2,4], Shahid Husain[5,6], Bryan Coburn[5,6,7], David S. Guttman[2,4] and Julianne V. Kus[1,7]**

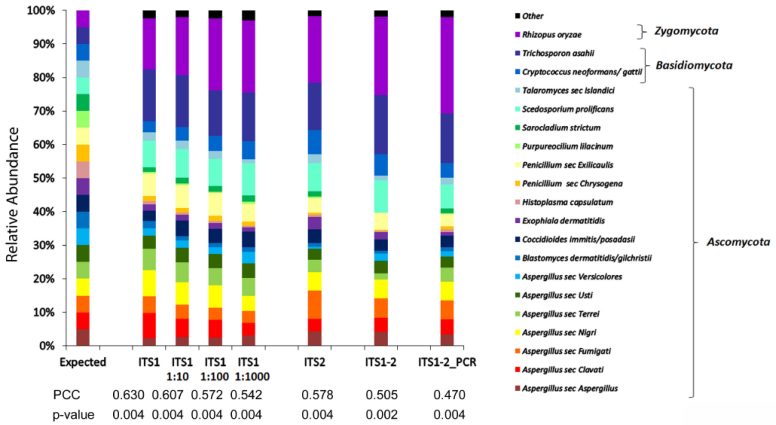


FIGURE 1 | Comparison of mycobiome profiles fungal species of MC1 generated at different concentrations or using different targets. Histogram of relative abundances of each fungal species detected using ITS1 and serial dilutions (1:10, 1:100, 1:1000) of DNA or using alternate targets ITS1, ITS2, ITS1-2, or a mixture of equal concentrations of ITS1 and ITS2 PCR products (ITS1-2 PCR). Pearson Correlation Coefficients (PCCs) suggest that the ITS1 relative abundance profile more closely approximates the expected profile compared to ITS2, ITS1-2, or ITS1-2_PCR. The taxon relative abundance remains relatively consistent over a broad range of input concentrations.

Aspergillosi invasive: resistenza

Problema emergente

Drug Resistance Updates 12 (2009) 141–147

Contents lists available at ScienceDirect

Drug Resistance Updates

journal homepage: www.elsevier.com/locate/drup

Azole-resistance in *Aspergillus*: Proposed nomenclature and breakpoints

Paul E. Verweij[a], Susan J. Howard[b], Willem J.G. Melchers[a], David W. Denning[b,*]

[a] *Department of Medical Microbiology, Radboud University, Nijmegen Medical Centre, The Netherlands*
[b] *The National Aspergillosis Centre, The University of Manchester and University Hospital of South Manchester, Manchester, United Kingdom*

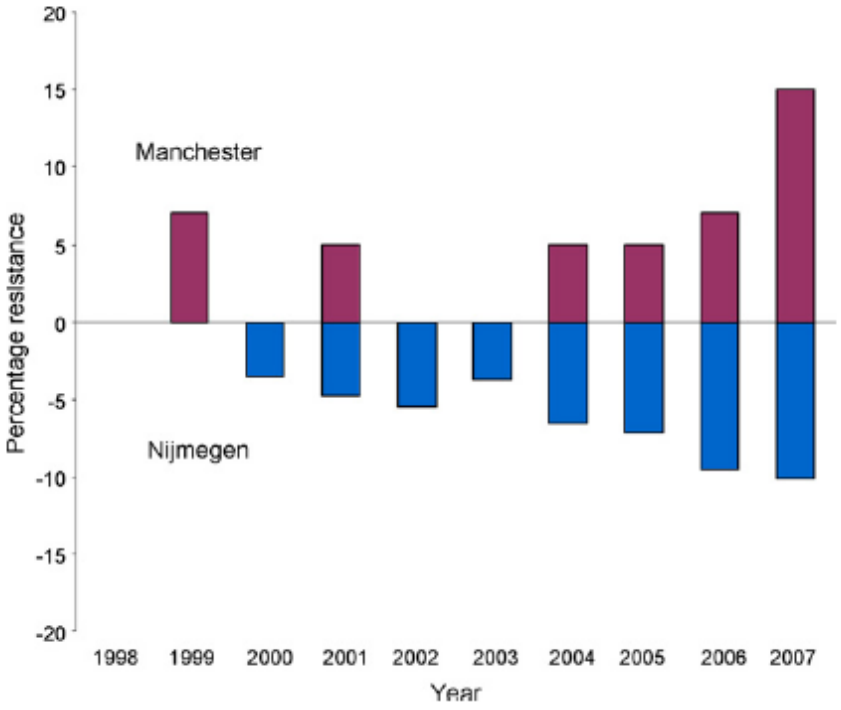
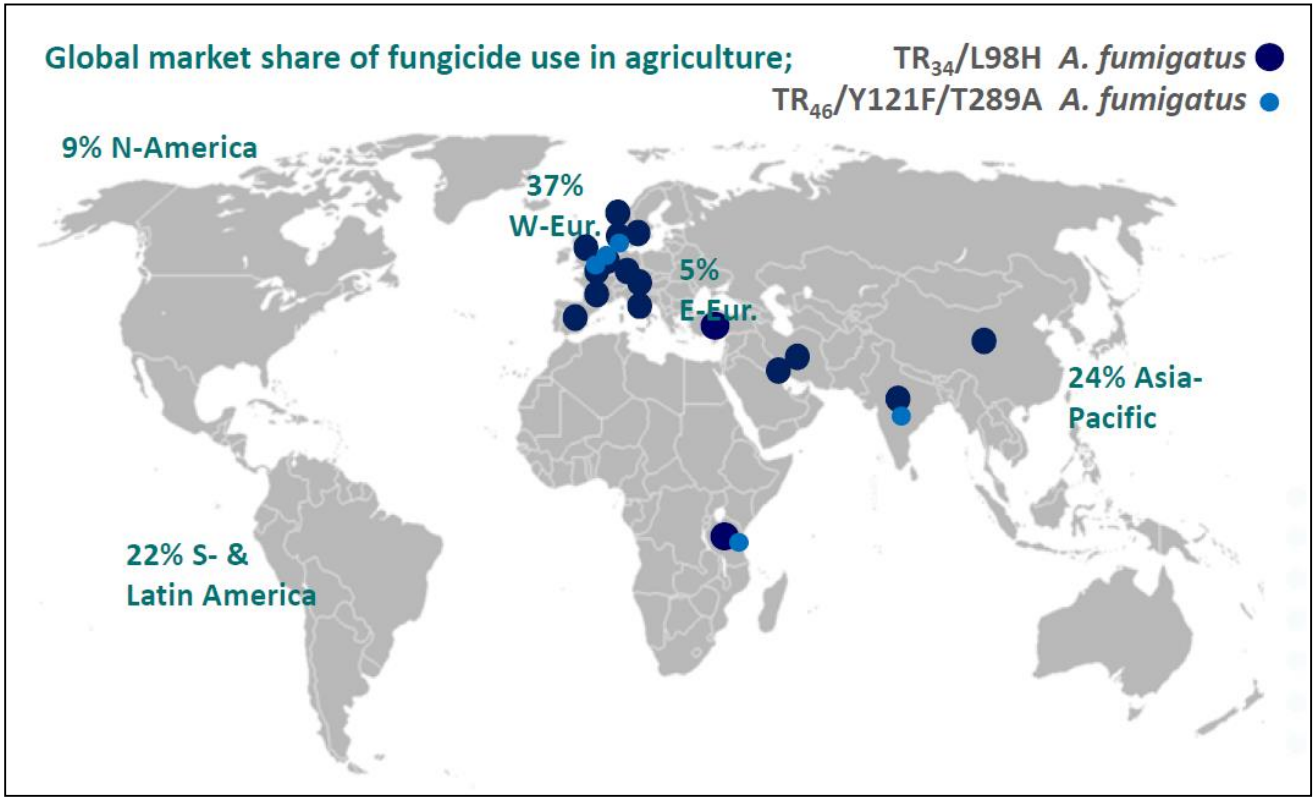


Fig. 1. Percentage of patients with azole-resistant *A. fumigatus* strains in Manchester, United Kingdom, and Nijmegen, the Netherlands (1998–2007).

Uso di fungicidi e R agli azoli di *A. fumigatus*



Chowdhary Plos One 2012, Chowdhari JAC 2014, Badali Mycoses 2013, Rath AAC 2012, Stenvold Current Fungal Infections Reports 2012.

Sviluppo di resistenza ai triazoli in *A. fumigatus*

Paziente ← **Ambiente**

Antifungini triazolici in terapia

G54E/K/R/V/W
G138C/R
M220I/K/R/T/V/W
G448S

Fungicidi triazolici in agricoltura

TR34/L98H

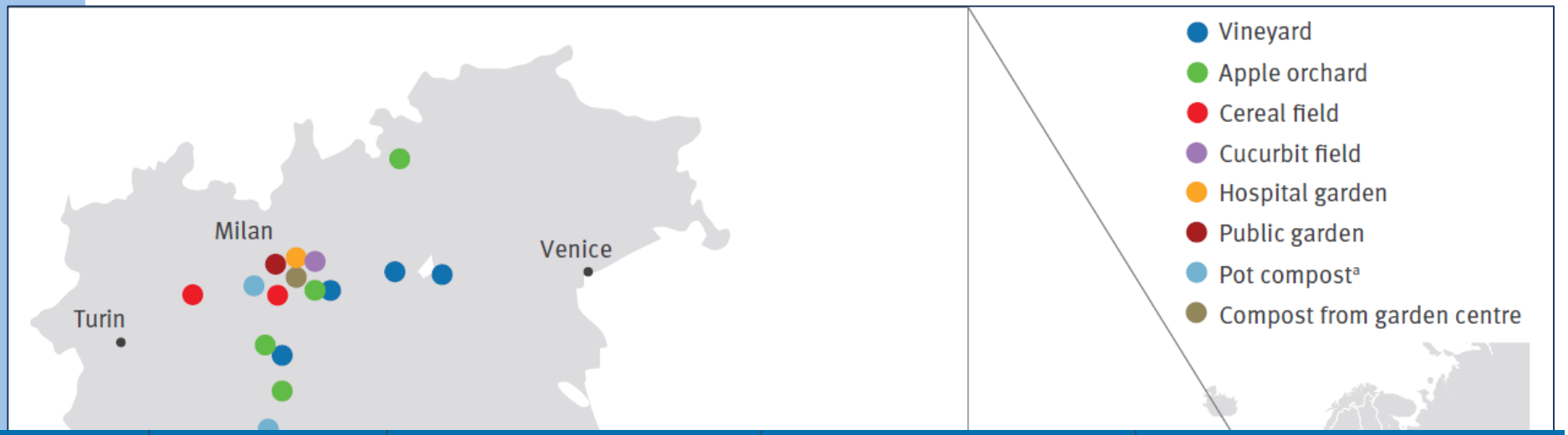
TR46/Y121F/T289A

A. FUMIGATUS AZOLO RESISTENTE NELL'AMBIENTE IN ITALIA

Euro Surveill. 2014;19(12):pii=20747

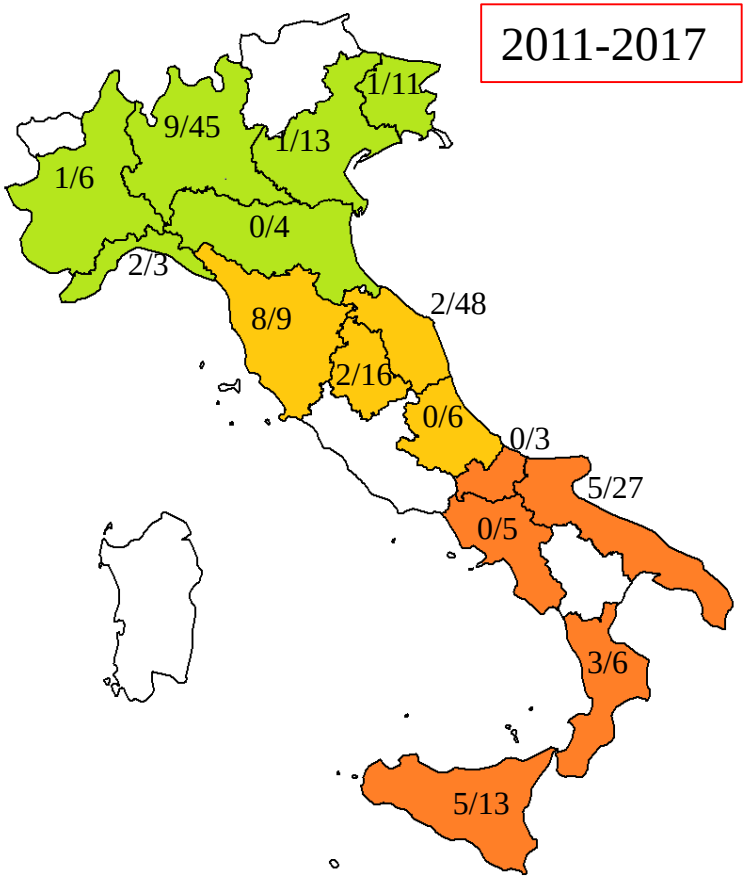
Azole-resistant Aspergillus fumigatus in the environment of northern Italy, May 2011 to June 2012

A Prigitano[1], V Venier[1], M Cogliati[1], G De Lorenzis[2], M C Esposto[1], A M Tortorano (annamaria.tortorano@unimi.it)[1]



Isolate number	Sample source	MIC (mg/L) determined by EUCAST			MIC (mg/L) determined by Etest			Mutation in *cyp51A*
		ITZ[a]	POS[a]	VRC[a]	ITZ[a]	POS[a]	VRC[a]	
11-0087A	Rose pot compost	>16	1	2	>32	1	1	TR34/L98H
11-0088E	Rose pot compost	>16	2	1	16	0.5	1	None
11-0099A	Cucurbit fields	>16	2	2	>32	1	2	TR34/L98H
11-0104A	Cucurbit fields	>16	1	2	>32	0.5	2	TR34/L98H
11-0104B	Cucurbit fields	>16	1	2	>32	0.5	2	F46Y; M172V; N248T; D255E
11-0104D	Cucurbit fields	>16	1	2	>32	1	1	TR34/L98H
11-0317C	Cucurbit fields	>16	2	2	>32	0.5	0.5	TR34/L98H
11-0317D	Cucurbit fields	>16	1	1	>32	0.5	1	TR34/L98H
11-0396	Apple orchard	>16	2	2	>32	0.5	1	TR34/L98H

A. FUMIGATUS AZOLO RESISTENTE NELL'AMBIENTE IN ITALIA



17,5% campioni positivi per *A. fumigatus* resistente

16,1 % Nord

15,2 % Centro

24,1,2 % Sud

Olanda 20,4%
Italia NORD 16,1 %
Italia Centro 15,2%
Italia Sud 24,2%
Danimarca 8%
Tanzania 20%
Colombia 33%

Prigitano A., J. Global. Antimicrob. Resist. 2019

Home Environment as a Source of Life-Threatening Azole-Resistant *Aspergillus fumigatus* in Immunocompromised Patients

Rose-Anne Lavergne,[1,2] Taieb Chouaki,[3,4] Ferry Hagen,[8] Bénédicte Toublanc,[6] Hervé Dupont,[5,7] Vincent Jounieaux,[6] Jacques F. Meis,[8,9] Florent Morio,[1,2] and Patrice Le Pape[1,2]

Ambiente domestico come sorgente di infezione

Table 1. Description of the Localization of Sampling and Resistance Investigation Results

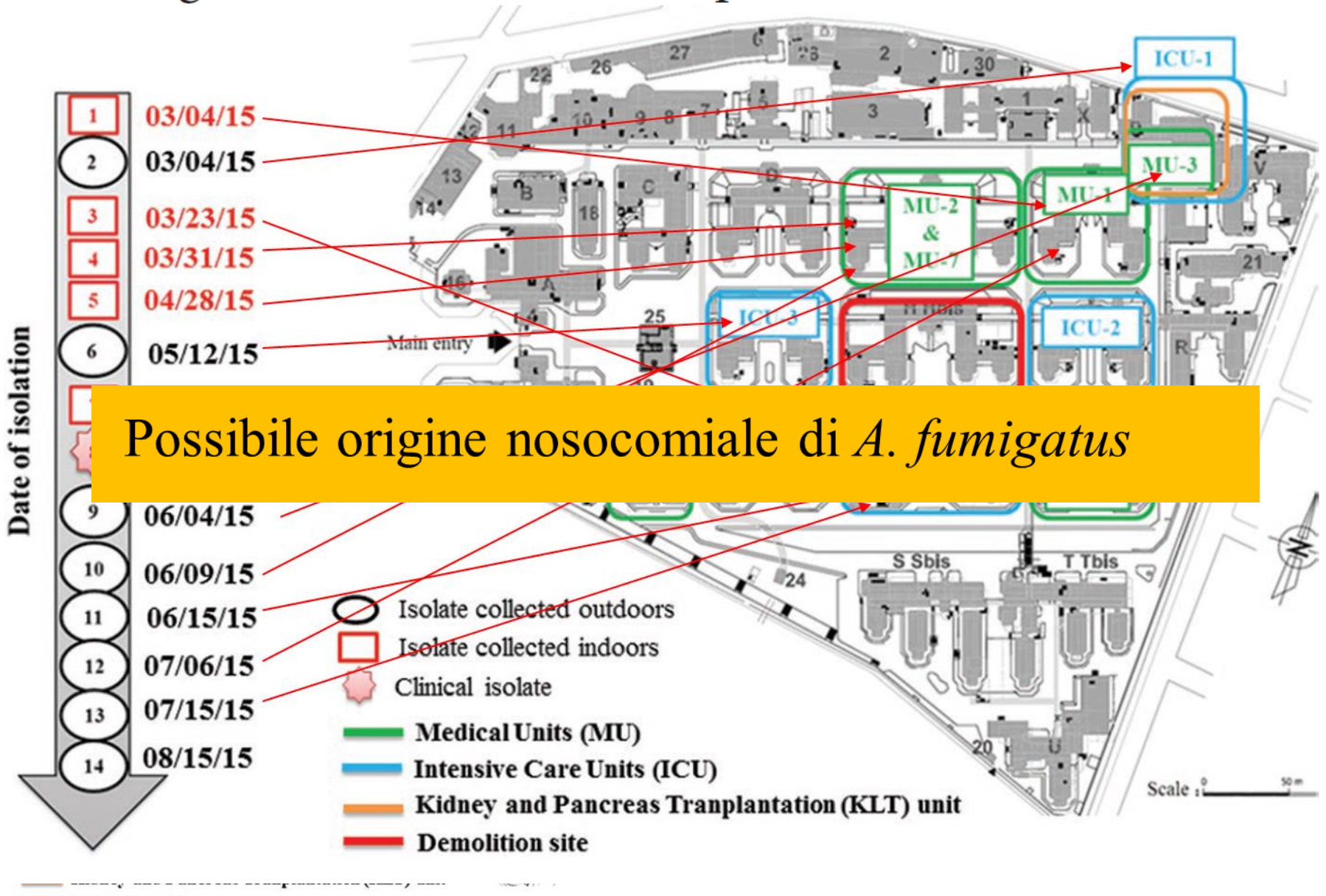
	Sabouraud		Itraconazole 4 mg/L		Voriconazole 4 mg/L			STR*Af* Genotyping								
Location	No. of Samples	No. of Positive Samples	No. of Positive Samples	No. of Colonies	No. of Positive Samples	No. of Colonies	*CYP51A* Mutations[a]	No. of Isolates[b]	2A	2B	2C	3A	3B	3C	4A	4B	4C
Barley field	2	2	0		1	5	TR_{34}/L98H	4	14	20	17	31	11	10	8	14	20
Corn field	5	5	0		0												
Wheat field	6	6	0		0												
Garden	11	5	2	>10	2	>10	TR_{46}/Y121F/T289A	6	10	20	12	43	8	11	12	9	20
Living room	3	0															
Bedroom	2	1	1	>10	1	>10	TR_{46}/Y121F/T289A	5	10	20	12	43	8	11	12	9	20
Bathroom	3	1	1	4	1	9	TR_{46}/Y121F/T289A	5	10	20	12	43	8	11	12	9	20
Basement	2	1	1	>10	1	>10	TR_{46}/Y121F/T289A	5	10	20	12	43	8	11	12	9	20
Clinical isolate	1						TR_{46}/Y121F/T289A	1	10	20	12	43	8	11	12	9	20

[a] Up to 5 colonies per sample were subjected to *CYP51A* gene and its promoter sequencing.

[b] Genotyping was restricted to isolates growing on Sabouraud agar plates supplemented with voriconazole.

CID 2017:64:76-78

Investigation of the Relationships Between Clinical



Possibile origine nosocomiale di *A. fumigatus*

Demolition site

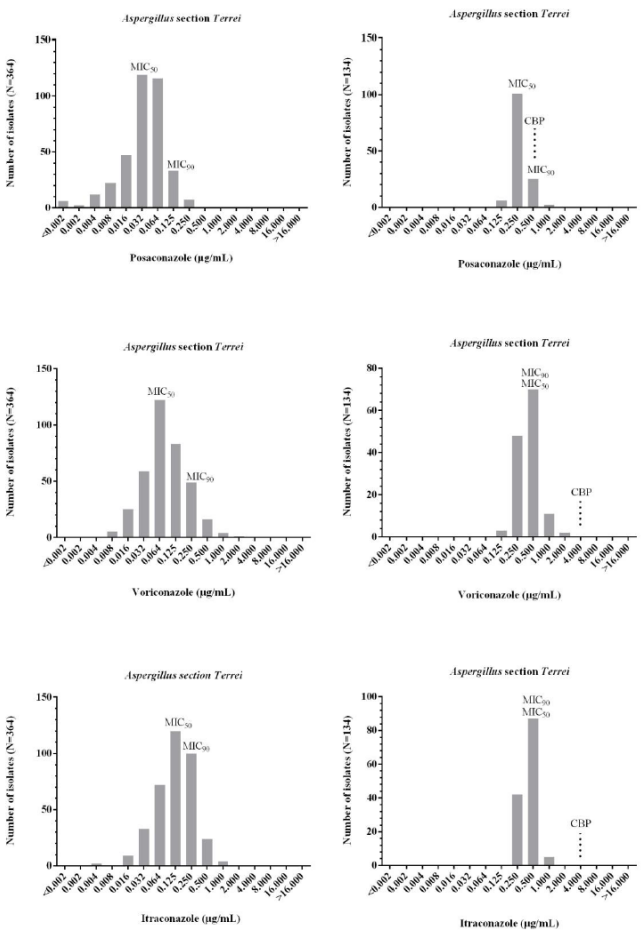
frontiers

Zoran et al.Frontiers in Microbiology 2018

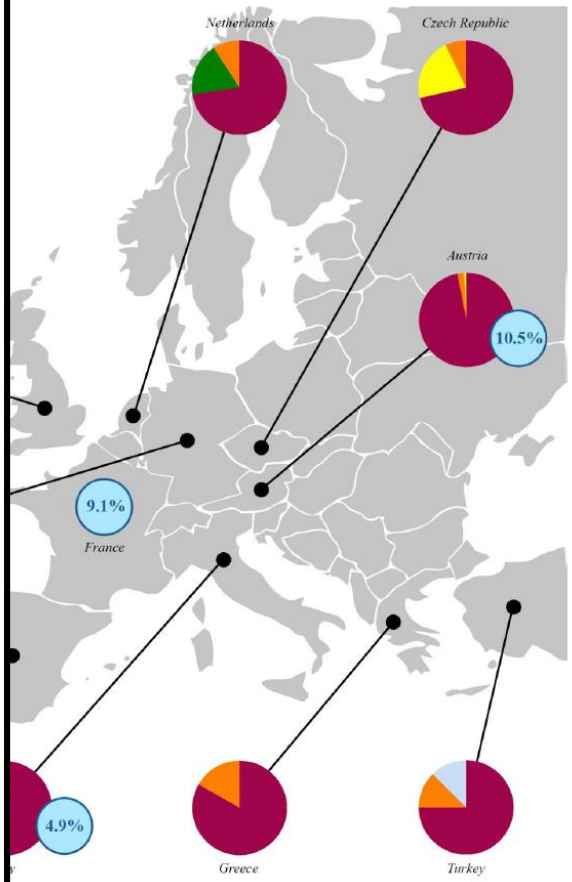
Azole-resistance in *Aspergillus terreus*

problem or a rare phenomenon?

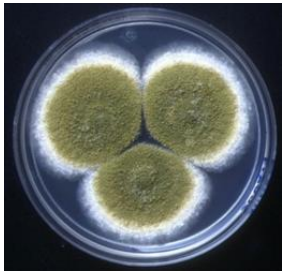
**Figure 2. MIC distribution of itraconazole, voriconazole, and posaconazole against *Aspergil*
section *Terrei*, obtained by ETest®(a-c) and EUCAST method (d-f).**



**bution of species (circles) and relative percentage of
to EUCAST clinical breakpoints see Table 2) isolates per
es) in respect to all investigated isolates.**



Take home message



Aspergillosi è ancora un grave problema in patologia umana

La visione ONE HEALTH ci ricorda che siamo strettamente connessi all'ambiente, oggi sottoposto a numerose sollecitazioni anche di CAMBIAMENTI CLIMATICI

Il fenomeno della Resistenza agli antimicotici è in costante aumento, necessario incrementare conoscenze e arginarne la diffusione.

Le società scientifiche hanno il compito di intervenire in maniera incisiva nella formazione continua, per diffondere e condividere percorsi diagnostico/terapeutici rapidi ed efficaci.

Necessaria sorveglianza epidemiologica e provvedere a studi di resistenza Nazionali