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**Oliver A. Cornely**

on behalf of The ECMM/ISHAM Working Group



**Fungiscope**

**Rare Invasive Fungal Infection in India**



Factors that are prerequisites for the development of IFI

- Exposure to fungi
- Host acquisition of potential pathogen
- Competition with microbial flora
- Disruption of skin or mucous membrane barriers
- Sufficient growth to overcome host defenses

Risk factors

- Prolonged immunosuppression (HIV/AIDS, cancer, SOT, HSCT)
- central venous catheter, mechanical ventilation, parenteral nutrition, burns
- Diabetes mellitus
- Broad-spectrum antibiotics



## Yeast

Candida  
Cryptococcus  
Trichosporon

## Dimorphic fungi

Histoplasma capsulatum  
Blastomyces dermatitidis

## Molds

Aspergillus  
Fusarium  
Mucormycosis  
Absidia  
Mucor  
Rhizopus  
Cunninghamella  
Scedosporium  
Dematiaceous moulds  
Alternaria  
Exophiala

Increasing number of patients at risk for fungal infections worldwide  
→ **Increasing incidence of invasive infections caused by rare fungi**



- Collect epidemiological and clinical data on invasive infections caused by emerging fungal pathogens
- Provide data for analysis of risk factors and treatment strategies to guide treatment recommendations
- Build a biobank of emerging fungi
- Collaborate with other groups for joint analyses



## Improvement in the outcome of invasive fusariosis in the last decade

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- N=233 cases
- 11 countries
- Death associated with:
  - Corticosteroids (HR 2.11, 95% CI 1.18–3.76,  $p$  0.01)
  - Persistent neutropenia (HR 2.70, 95% CI 1.57–4.65,  $p$  <0.001)
  - D-AmB (HR 1.83, 95% CI 1.06–3.16,  $p$  0.03)



## Inclusion

Invasive fungal infection documented by at least one of the following

- Culture
- Histology
- Antigen detection
- PCR-based detection of fungal DNA

## Exclusion

- Infection due to *Aspergillus*, *Candida*, *Cryptococcus neoformans*, *Pneumocystis jiroveci*
- Endemic fungal infection such as coccidioidomycosis or histoplasmosis
- Colonisation or other non-invasive infection



***Aspergillus***



[www.fungiscope.net](http://www.fungiscope.net)



Registration and Password Acquisition

[register@fungiscope.net](mailto:register@fungiscope.net)



Electronic Case Report Form



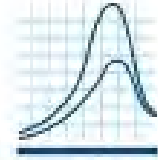
Diagnostics



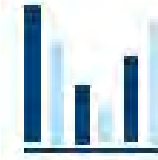
FungiThek  
Culture/Biopsy  
Banking



FungiQuest  
Database  
Search



Therapeutic  
Drug  
Monitoring



Statistical  
Analysis



CLINICALSURVEYS.NET



Add a new patient

Start the survey

- ✓ Risk Factors
- ✓ Diagnostic Procedures
- ✓ Clinical Signs and Symptoms
- ✓ Site of Infection
- ✓ Mycological Evidence
- ✓ Treatment
- ✓ Outcome

**Risk Factors**

Which risk factors were present?

**Immunosuppression**

- Chemotherapy
- Hematopoietic stem cell transplantation (HSCT)
- HIV/AIDS
- Solid organ transplantation
- Other disorder requiring any kind of immunosuppression (including steroids)

**Trauma/Intervention**

- Burn
- Major surgery (not including surgery as part of antifungal therapy)
- Trauma

**Chronic disease/behavioral factor**

- Alcoholism
- Chronic liver disease
- Chronic pulmonary disease
- Chronic renal disease
- Diabetes mellitus
- IV drug user
- Premature birth

**Other**

- Other risk factor (please specify)
- No risk factor identified

Please specify the underlying disease requiring chemotherapy:

Acute Lymphoblastic Leukemia

Please specify the type of chemotherapy:

anthracycline, prednisone

**Primary course or relapse?**

- Primary course
- First relapse
- Second or later relapse
- not applicable

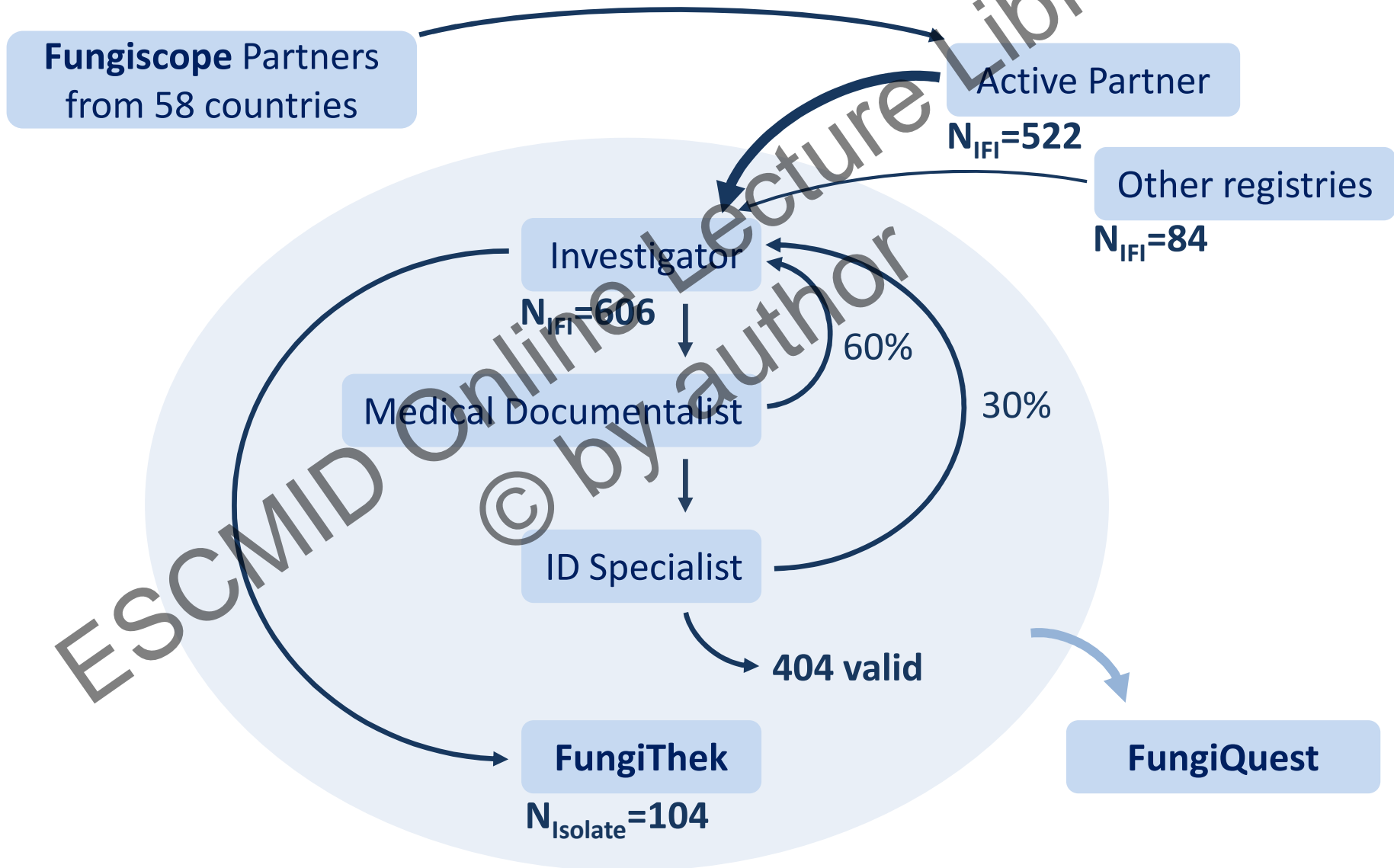
**Was the patient neutropenic within the last four weeks prior to or at diagnosis of the fungal infection?**  
(Absolute neutrophils count < 500 or leukocytes < 1000)

From	Day	Month	Year
	10	Feb	2014
To	17	Feb	2014

**Did the patient receive growth factors?**

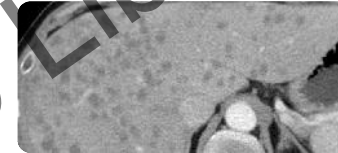
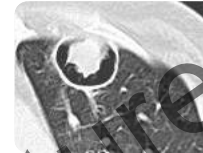
- Experimental CSF (specify):
- G-CSF
- GM-CSF
- M-CSF
- Multiple CSF
- No







Diagnosis of rare IFI



Central storage of isolates

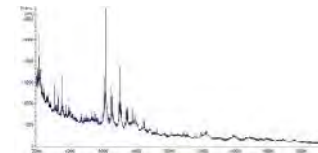
Diagnostic laboratories



Macroscopic and  
microscopic  
identification

```
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CATGCTGTTTCAGGACTACCCGCTGAACTTCGATCGATGAGAGAC
```

Sequencing



Mass Spectrometry

Reference database

Link specimens to clinical and demographic data  
Manage requests for specimen use



Diagnosis of rare IFI



[www.fungiquest.net](http://www.fungiquest.net)  
Search the database



Browse through cases



FungiScope® is a global research project of the German Mycological Society, the ISHAM, the ECMM, and other international mycological societies. We collect clinical characteristics, culture and tissue samples of patients with rare fungal diseases. The aim is to create a network of interested researchers, allowing them to share experiences and samples to ultimately improve diagnosis and treatment of these rare infections.

If you'd like further information on the project or would like to register, visit our site [www.fungiscope.net](http://www.fungiscope.net).

**Looking for a specific pathogen? Search our database through FungiQuest™ now! Or jump directly to some of our interesting cases, e.g. [Rhizopus](#), [Fusarium](#), [Scedosporium](#), or [Trichosporon](#).**

*When searching e.g. for Lichtheimia, remember aliases, in this case Absidia and Mycocladus, to retrieve information on older cases.*

*Note: Search query must contain at least 5 characters.*

 Search the FungiScope® database for: **Fusarium**

Pathogen	Risk Factors	Site	Empirical Agents	Targeted Agents
Fusarium solani	Diabetes mellitus	Eyes		Other;_Please_specify, Fluconazole
fusarium solani	Hematopoietic stem cell transplantation (HSCT)	Deep soft tissues, e.g. muscles, Skin, Disseminated	Voriconazole, Liposomal_amphotericin_B, Caspofungin	Voriconazole



Please note that we are currently rebuilding our database and that FungiQuest™ therefore only provides information on about 30% of our cases. Also note that some of these cases were transferred from an older version of our database and not all information has yet been correctly formatted.

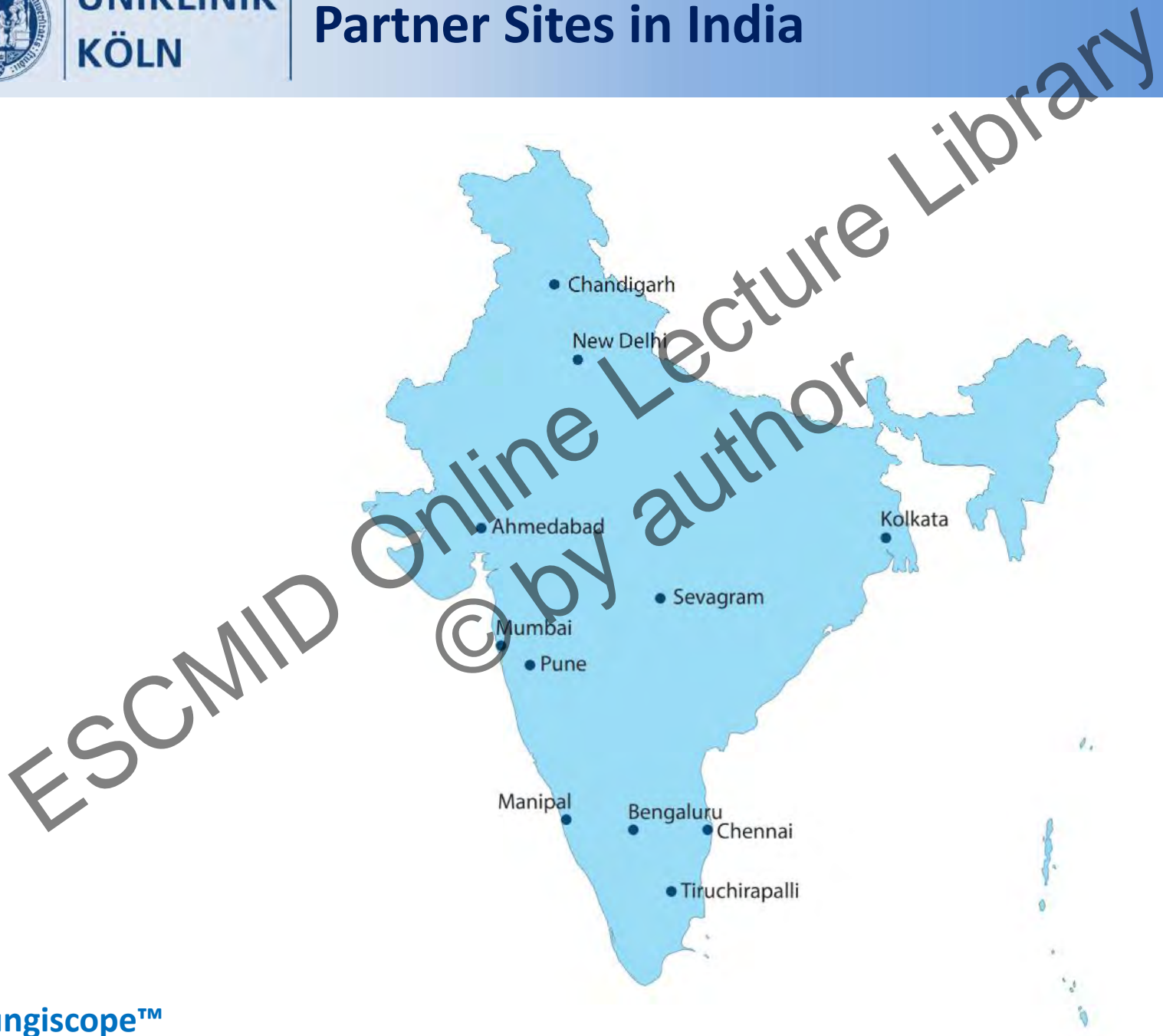
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ID	Pathogen	Culture	PCR	Risk Factors	Site	Empirical Agents	Targeted Agents	Surgery	Response	Survived	Last observed
15	Fusarium solani	X		Diabetes mellitus	Eyes		Other; Please specify, Fluconazole	therapeutic keratoplasty	Stable	Yes	2009
30	fusarium solani	X		Hematopoietic stem cell transplantation (HSCT)	Deep soft tissues, e.g. muscles, Skin, Disseminated	Voriconazole, Liposomal amphotericin B, Caspofungin	Voriconazole	No	Deterioration_or_failure	No	2010
32	Fusarium aqueductum	X		Chronic pulmonary disease, Diabetes mellitus	Lungs, Disseminated		Voriconazole, Voriconazole	No	Partial_response	Yes	2009
33	Fusarium species	X		Diabetes mellitus	Deep soft tissues, e.g. muscles, Disseminated			surgical debridement	Unknown	Yes	2007
34	Fusarium solani	X		Chemotherapy, Hematopoietic stem cell transplantation (HSCT), Diabetes mellitus	Bloodculture, Bones, Deep soft tissues, e.g. muscles, Lungs, Disseminated		Liposomal amphotericin B, Voriconazole	No	Deterioration_or_failure	No	2008
35	fusarium dimerum	X		Major surgery (not including surgery as part of antifungal therapy), Chronic renal disease	Lungs, Disseminated			No	Complete_response	Yes	2009



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## Partner Sites in India





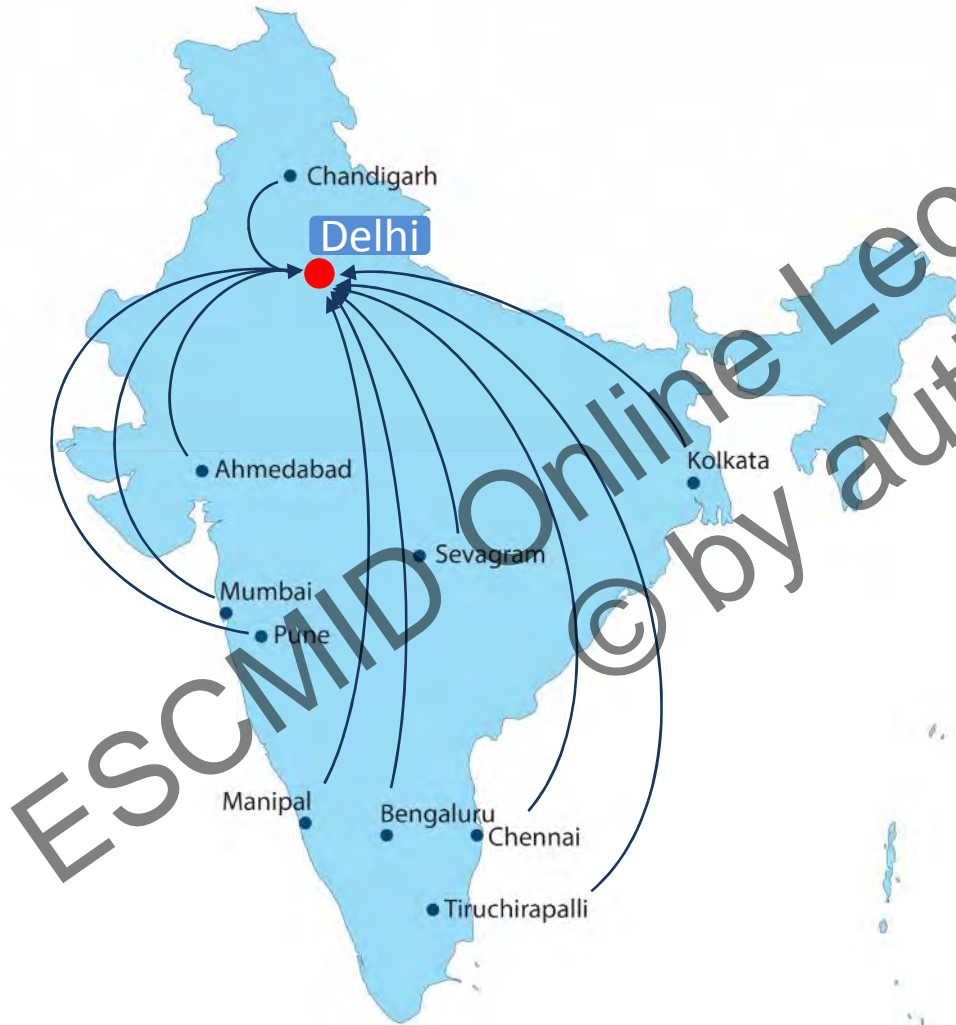
# Slide nur zur Info





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# Central Laboratory in India



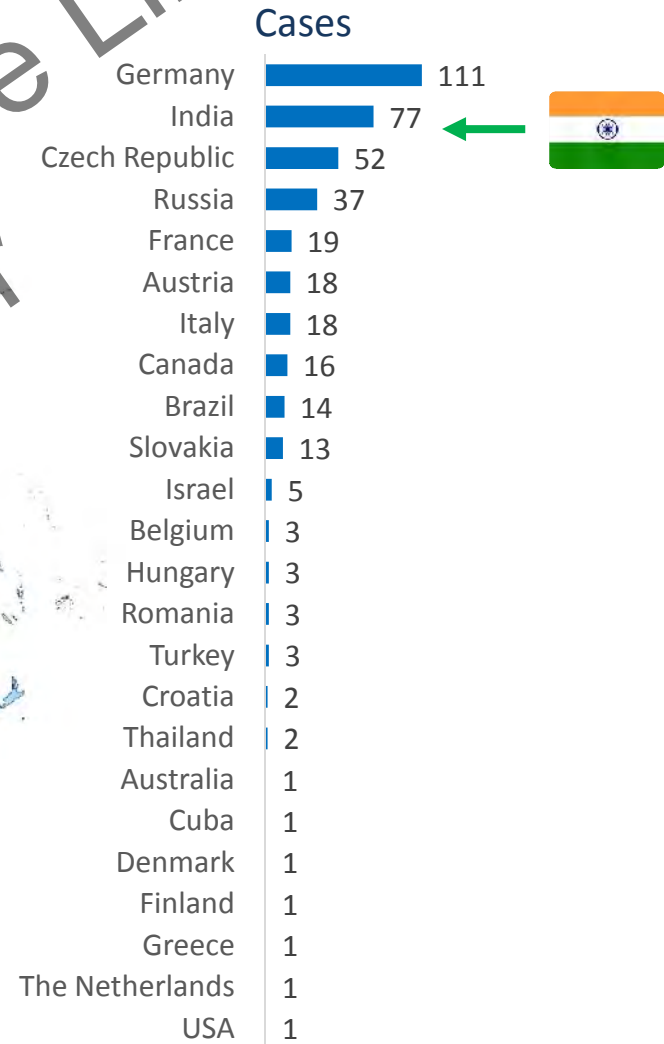
**Anuradha Chowdary**

Vallabhbhai Patel Chest Institute  
Department of Medical Mycology  
University of Delhi  
Delhi

[dranuradha@hotmail.com](mailto:dranuradha@hotmail.com)



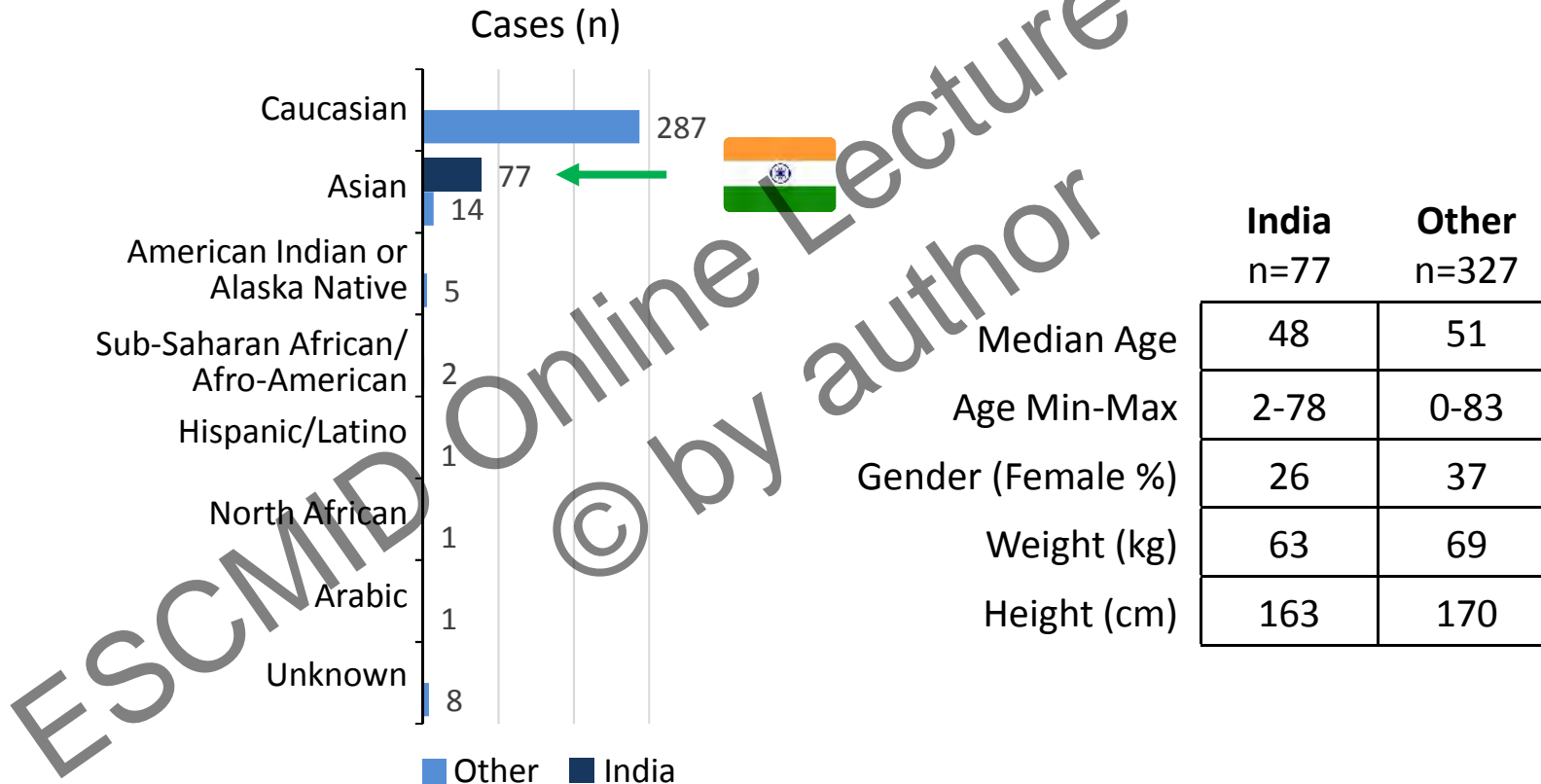
# 404 Valid Cases from 24 Countries







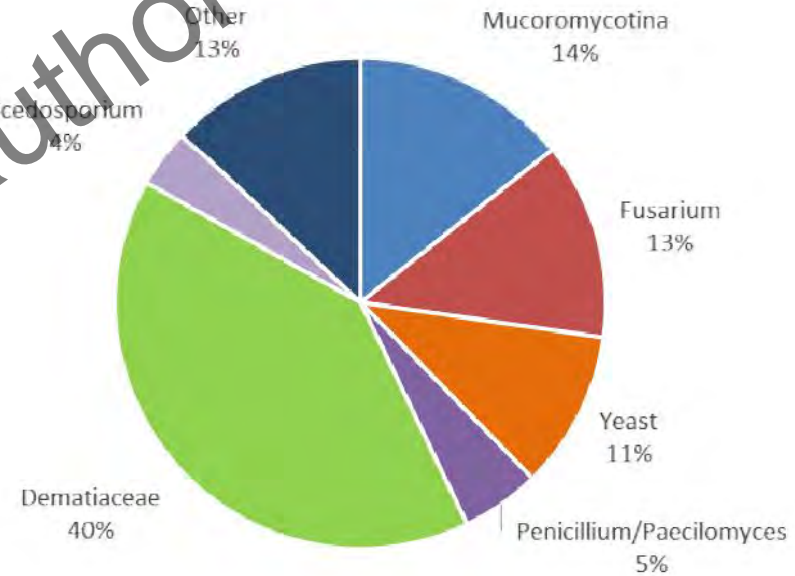
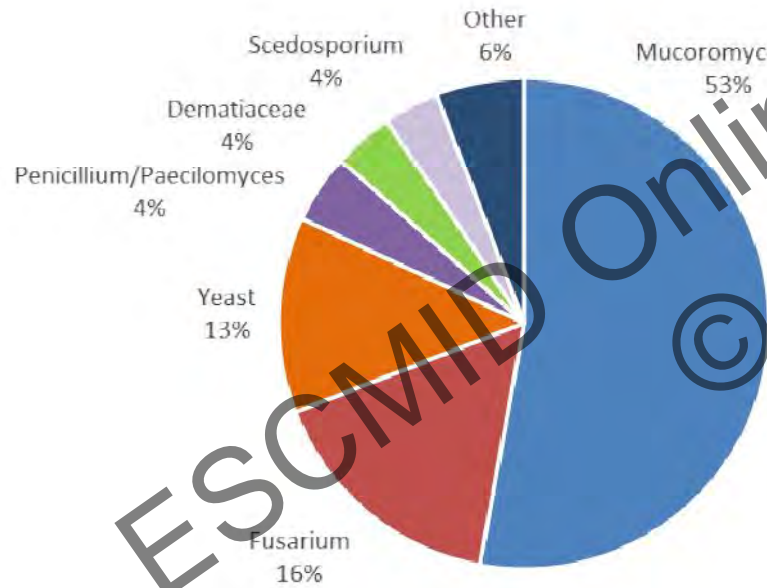
# 404 Cases – Demographic Features





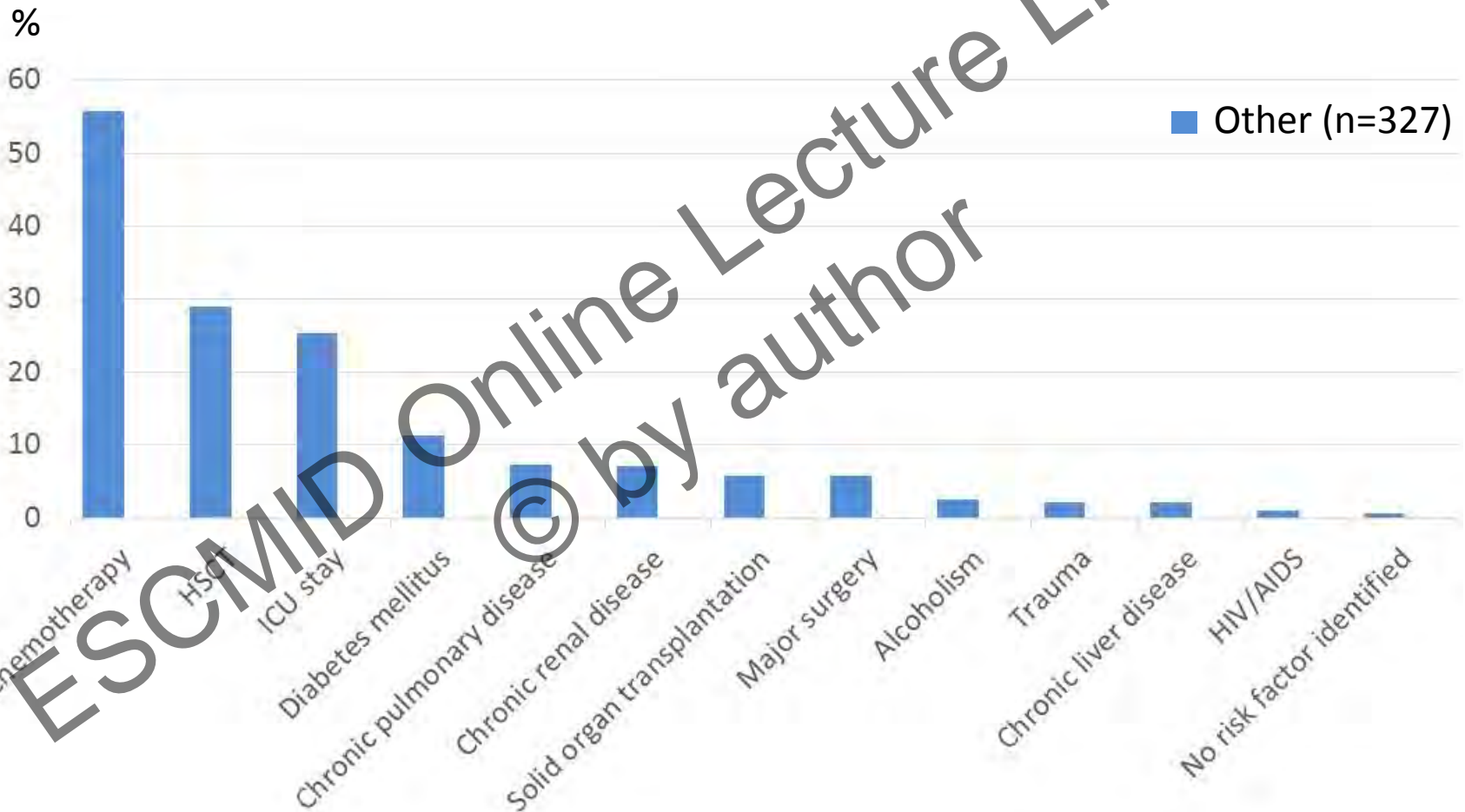
327 cases from countries other than India

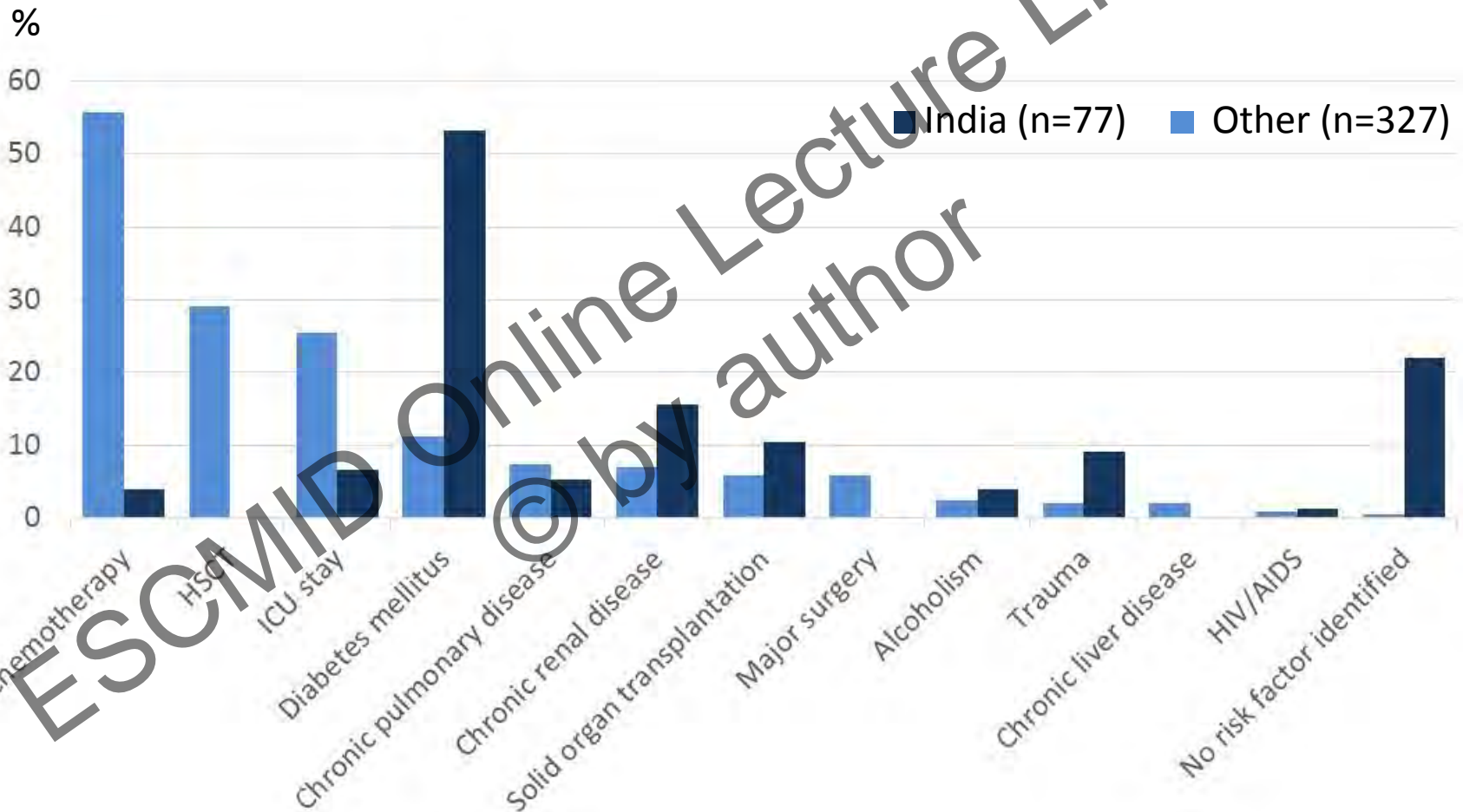
77 cases from India

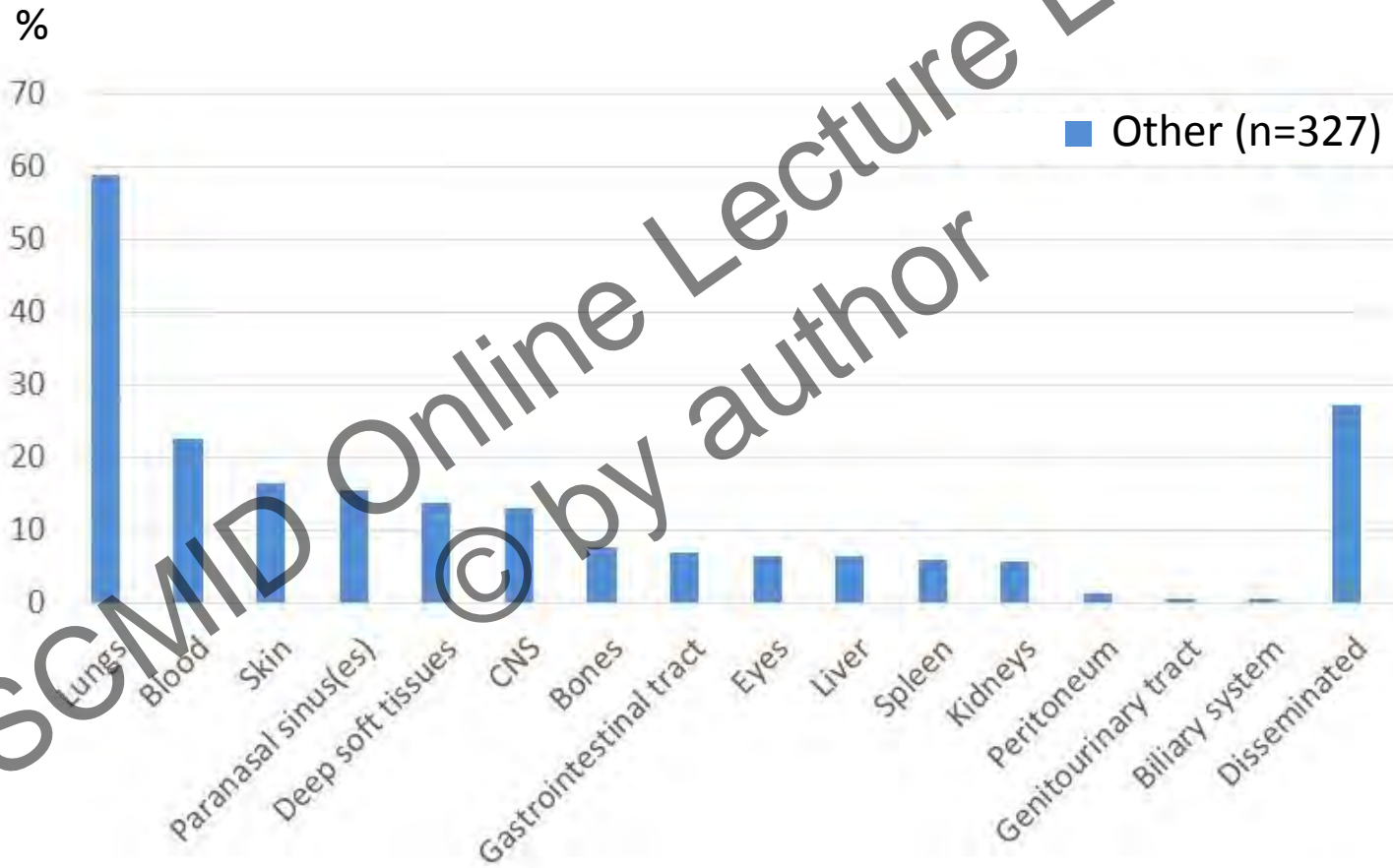


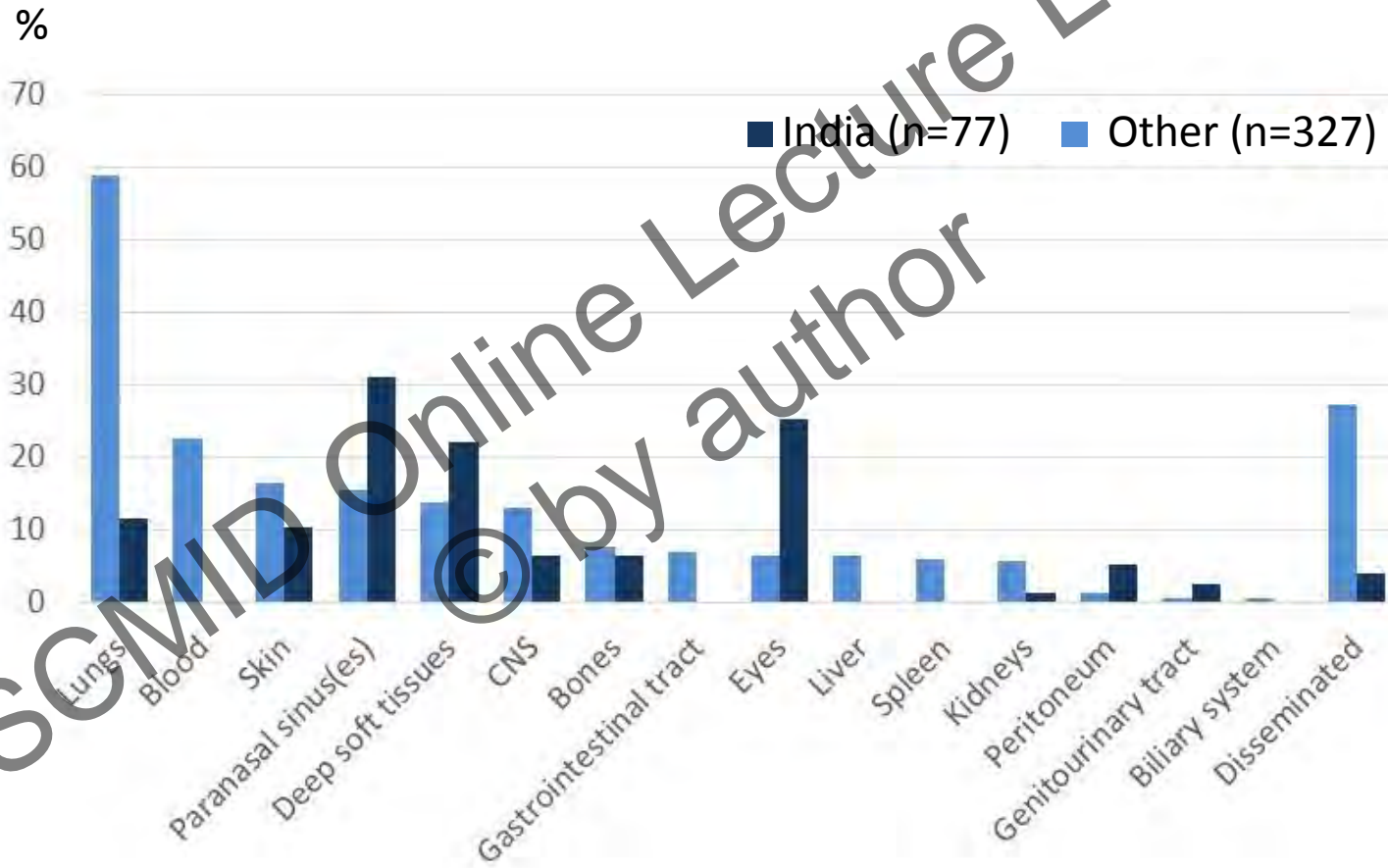


## Risk Factors in 327 Cases (other than India)



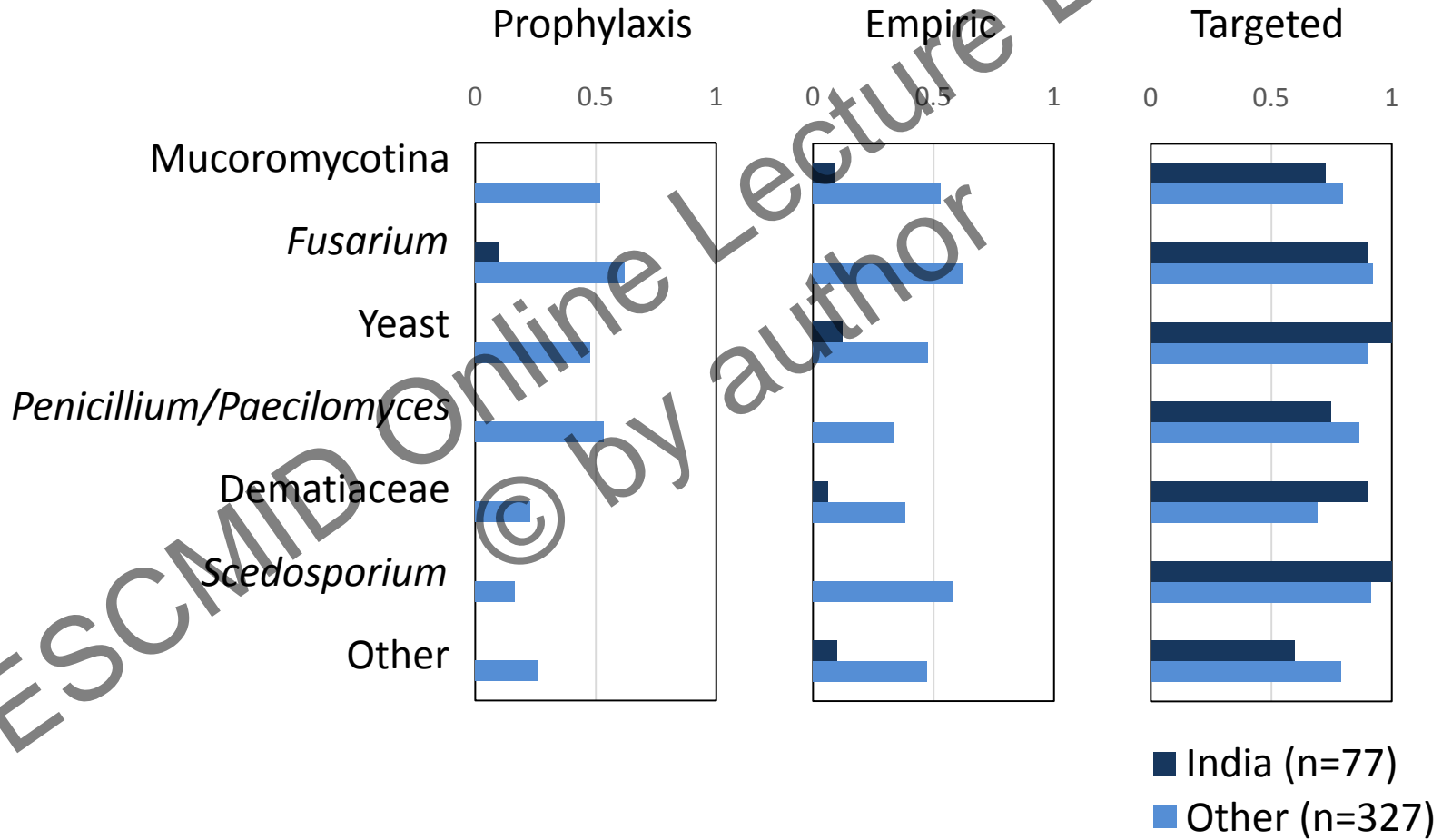


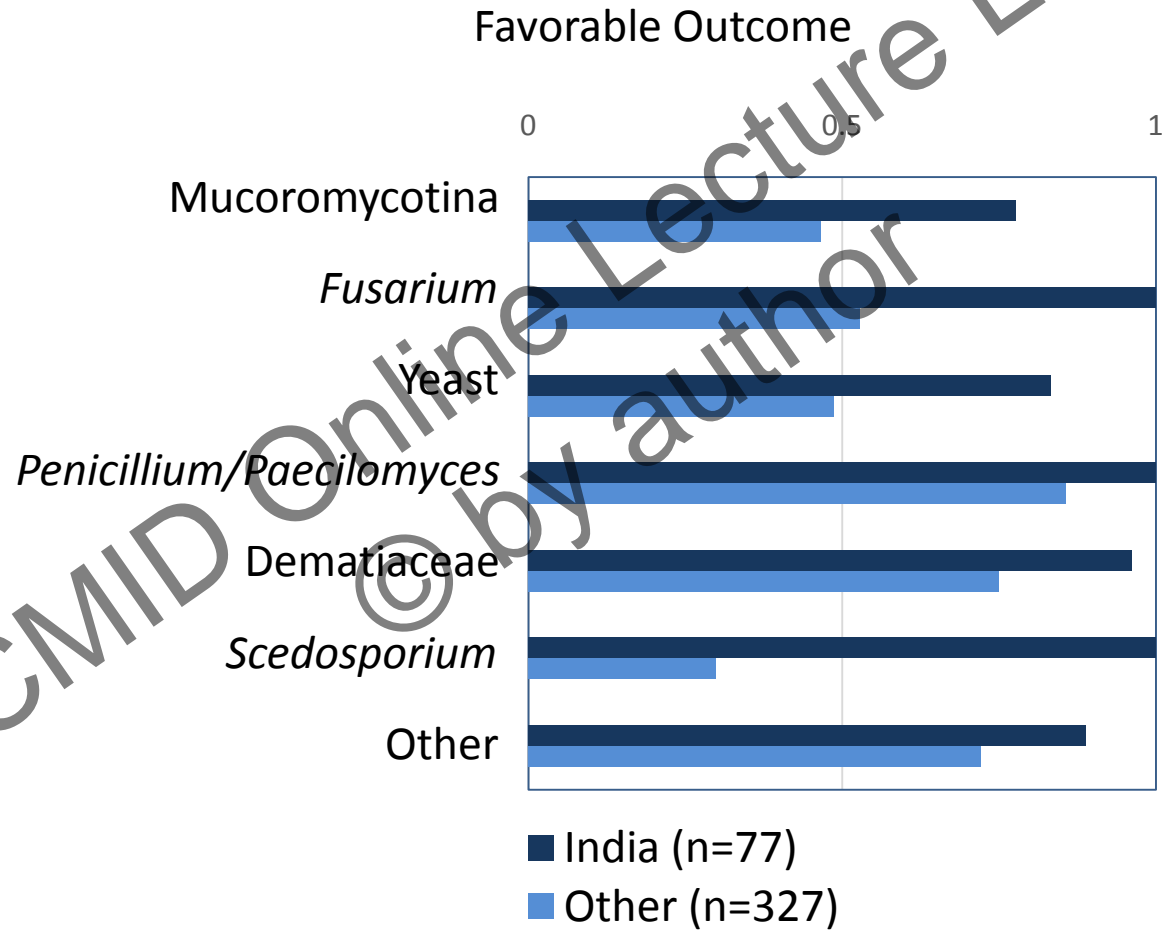




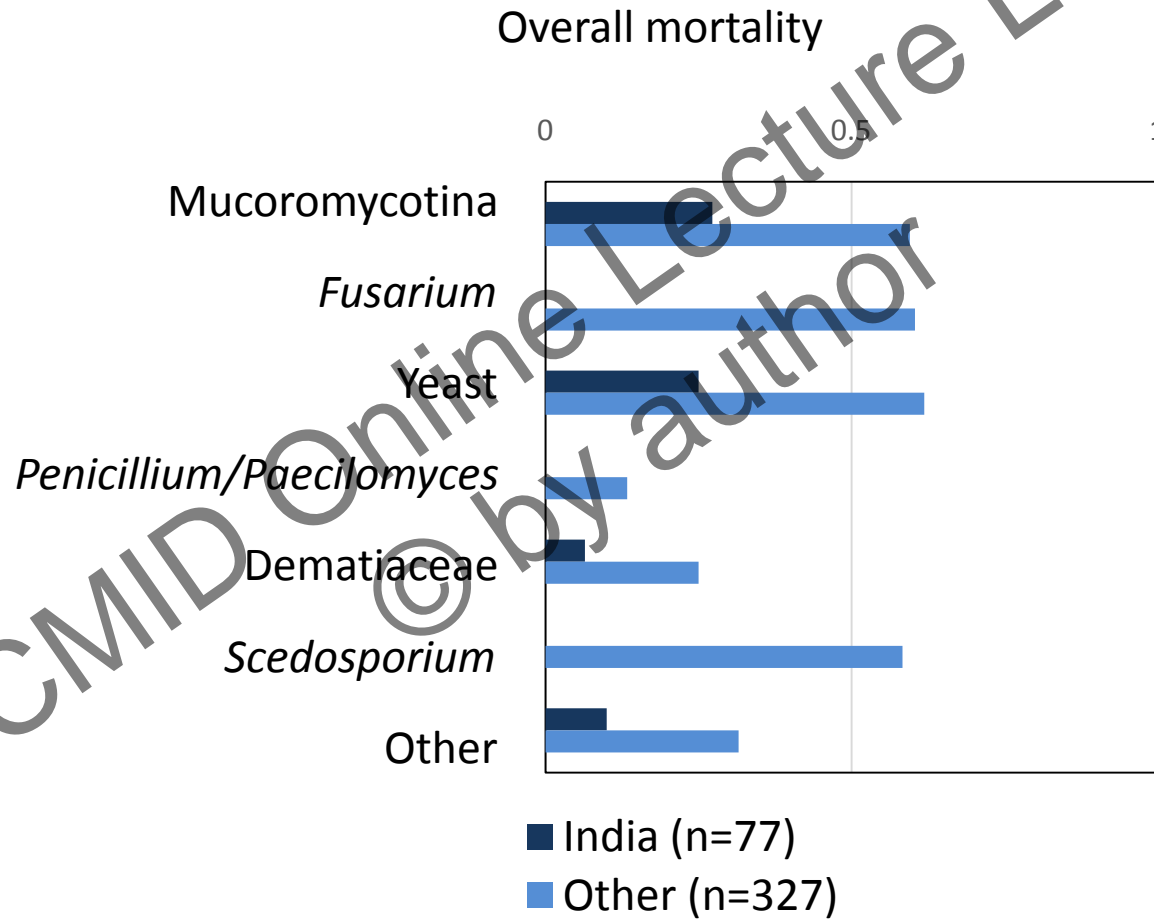


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Fungiscope provides

- A platform for fruitful collaboration
- Efficient method for collecting patient information
- Immediate diagnostic and therapeutic services

# Fungi scope

Global Emerging Fungal Infection Registry

Initiated in 2003

ISHAM and ECMM Working Group

[www.fungiscope.net](http://www.fungiscope.net)



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**Astellas Pharma, Gilead Sciences, MSD/Merck, and Pfizer Pharma GmbH**

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## Become a Fungiscope Collaborator



Global Emerging Fungal Infection Registry

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ISHAM  
INTERNATIONAL SOCIETY FOR  
HUMAN AND ANIMAL MYCOLOGY



Send an Email to [register@fungiscope.net](mailto:register@fungiscope.net)  
to contribute your rare cases of invasive fungal infection

e.g.

*Acremonium, Alternaria, Bipolaris, Cladospo-  
rium, Cryptococcus other than  
neoformans, Culvalaria, Exophiala, Fusariu-  
m, Geotrichum, Paecilomyces, Penicillium,  
Phialophora, Scedosporium, Trichoderma, T-  
richosporon*