



# Progress Report 2017-2021

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**University Hospital Cologne  
European Confederation of  
Medical Mycology  
ECMM Excellence Center**



# Dear Reader,

We are pleased to present you the ECMM 2017-2021 Report.

The European Confederation of Medical Mycology (ECMM) was instituted at the Institut Pasteur in Paris, France, in 1993. The purpose of the confederation is to foster science and research, to coordinate scientific and clinical activities and to organize mycology conventions and training programs. As the umbrella organization of the European mycological entities and with a global Academy and Excellence Center Initiative in place, the confederation continues to join forces for all scientists interested in human and veterinary medical issues related to mycology.

In order to make it easier to locate mycology experts, the European umbrella organization of the 27 national mycological societies designates European Centers of Excellence. Here in Cologne, such a center was opened with an inaugural symposium at the University Hospital in October 2017. Our working group consists of specialists from various disciplines who work together very closely in diagnosis and therapy. In this report we would like to introduce you to the breadth of our work and our main projects in Cologne.

Much of ECMM's work focuses on standardizing diagnostics and treatment and developing guidelines. By doing so, we thrive to ensure that patients receive the best possible treatment. It is also our goal to allow for conditions that specifically differ by country or region and to support improvements also in Africa, Asia and Latin America. The ECMM Consulting Service, various networks and the EQUAL Scores offer opportunities for prompt and tangible help. We do research in various areas, conduct clinical trials and adapt our research agenda to current or upcoming needs as illustrated by our studies on COVID-19 associated mycoses.

The YoungECMM program is expected to provide a global community for scientists early in their careers. This will ensure the future of the confederation through attracting new talent working in human and veterinary medical mycology. We are proud to actively support the foundation of the YoungECMM program.

In order to share new information on our activities and to disseminate results, we use a variety of social media channels to reach a large audience. We provide a wide range of videos on scientific topics via our own YouTube channel IDIM and our account on the Chinese portal YouKu. Through the FungiScope® Twitter channel, we easily share news and publications.

There is a substantial amount of positive feedback and inquiries related to our work. We feel encouraged to continue to do our best.

Cologne, December 2021



Prof. Oliver A. Cornely



Prof. Gerd Fätkenheuer



Prof. Michael Hallek

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## Executive Board



**Prof. Oliver A. Cornely MD, FECMM**

**Principal Investigator**

Assistant      Sandra Winterhoff

Phone            +49 221 478-855 23

Fax                +49 221 478-143 9770

E-mail            [oliver.cornely@uk-koeln.de](mailto:oliver.cornely@uk-koeln.de)

Twitter           @CornelyOliver



**Philipp Köhler MD, FECMM**

**Principal Investigator**

Phone            +49 221 478-855 23

Fax                +49 221 478-142 8700

E-mail            [philipp.koehler@uk-koeln.de](mailto:philipp.koehler@uk-koeln.de)

Twitter           @KoehlerPh

CECAD Cluster of Excellence – University of Cologne  
Department I for Internal Medicine – University Hospital of Cologne  
ECMM Diamond Excellence Center

## Members of the Cologne ECMM Excellence Center



**Danila Seidel, PhD, FECMM**  
Project Manager

**Phone** +49 221 478-973 43  
**Fax** +49 221 478-143 977 0  
**E-mail** [danila.seidel@uk-koeln.de](mailto:danila.seidel@uk-koeln.de)



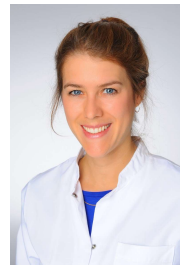
**Jannik Stemler, MD**  
Resident

**Phone** +49 221 478-328 84  
**Fax** +49 221 478-143 048 4  
**E-mail** [jannik.stemler@uk-koeln.de](mailto:jannik.stemler@uk-koeln.de)



**Rosanne Sprute, MD**  
Resident

**Phone** +49 221 478-897 47  
**Fax** +49 221 478-143 977 0  
**E-mail** [rosanne.sprute@uk-koeln.de](mailto:rosanne.sprute@uk-koeln.de)



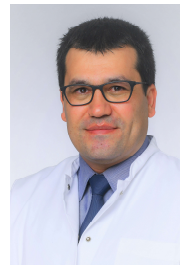
**Sibylle Mellinghoff, MD**  
Resident

**Phone** +49 221 478-328 84  
**Fax** +49 221 478-143 522 6  
**E-mail** [sibylle.mellinghoff@uk-koeln.de](mailto:sibylle.mellinghoff@uk-koeln.de)



**Jon Salmanton-Garcia, PhD**  
Project Manager

**Phone** +49 221 478-322 990  
**Fax** +49 221 478-142 692 9  
**E-mail** [jon.salmanton-garcia@uk-koeln.de](mailto:jon.salmanton-garcia@uk-koeln.de)



**Ertan Sal, MD PhD**  
Resident

**Phone** +49 221 478-322 990  
**Fax** +49 221 478-142 692 9  
**E-mail** [ertan.sal@uk-koeln.de](mailto:ertan.sal@uk-koeln.de)



**Laman Rahimli, MD**  
Resident

**Phone** +49 221 478-322 990  
**Fax** +49 221 478-142 692 9  
**E-mail** [laman.rahimli@uk-koeln.de](mailto:laman.rahimli@uk-koeln.de)



**Susanna Proske, MLA**  
Study Nurse

**Phone** +49 221 478-973 40  
**Fax** +49 221 478-361 1  
**E-mail** [susanna.proske@uk-koeln.de](mailto:susanna.proske@uk-koeln.de)



**Nina Angelstein, RN**

**Study Nurse**

**Phone** +49 221 478-897 57  
**Fax** +49 221 478-847 71  
**E-mail** [nina.angelstein@uk-koeln.de](mailto:nina.angelstein@uk-koeln.de)



**Larisa Idrizovic, PA**

**Study Nurse**

**Phone** +49 221 478-897 57  
**Fax** +49 221 478-847 71  
**E-mail** [larisa.idrizovic@uk-koeln.de](mailto:larisa.idrizovic@uk-koeln.de)



**Stephan Körfggen, RN**

**Study Nurse**

**Phone** +49 221 478-897 57  
**Fax** +49 221 478-847 71  
**E-mail** [stephan.koerfggen@uk-koeln.de](mailto:stephan.koerfggen@uk-koeln.de)



**Tatjana Lammertz, RN**

**Study Nurse**

**Phone** +49 221 478-897 57  
**Fax** +49 221 478-847 71  
**E-mail** [tatjana.lammertz@uk-koeln.de](mailto:tatjana.lammertz@uk-koeln.de)



**Daniela Schönherr, RN**

**Study Nurse**

**Phone** +49 221 478-897 57  
**Fax** +49 221 478-847 71  
**E-mail** [daniela.schoenherr@uk-koeln.de](mailto:daniela.schoenherr@uk-koeln.de)



**Fabian Pult**

**MTA**

**Phone** +49 221 478-855 23  
**Fax** +49 221 478-143 9770  
**E-mail** [fabian.pult@uk-koeln.de](mailto:fabian.pult@uk-koeln.de)

## FungiScope®

*“FungiScope® and its partners contributed substantially to the development of global clinical guidelines.”*



Danila Seidel, PhD

FungiScope® is an ECMM Working Group and a well established registry for invasive fungal infections, having been active for 18 years with partners in 85 countries. FungiScope® is designed to provide advice to clinicians and to investigate the global epidemiology of fungal infections.

The ethics approval was renewed in 2019 to include *Aspergillus* and *Candida* infections, which now enables including all invasive fungal infections except for endemic mycoses. The data quality is assured by the central FungiScope® team of scientists and infectious disease specialists who validate all cases and resolve queries with the respective contributor. Only complete cases are accepted into the registry. If available, the clinical fungal isolate is stored in the Cologne biobank for research purposes including centralized pathogen (re-)identification, and susceptibility testing. If international material shipment is restricted for any reason, it may be sent to one of the FungiScope® regional labs. Currently, there are regional laboratories participating in 6

countries, which are Australia, China, the Czech Republic, India, Russia, and Spain.

To date, approximately 1,700 cases of infections due to rare fungal pathogens are included in the registry, 10% with mixed infections. In addition, >400 *Aspergillus* and >900 *Candida* infections were enrolled.

With the currently ongoing SARS-CoV-2 pandemic, a new field of research has emerged. In FungiScope®, COVID19-associated fungal infections are collected to investigate the role of SARS-CoV-2 as a novel predisposing factor for fungal infections. Suitable diagnostic and therapeutic strategies are being identified.

Within the FungiScope® network, analyses are accomplished in a joint effort involving those who contribute the respective cases. Analyses on the epidemiology of rare fungal infections,<sup>1-10</sup> and treatment strategies<sup>11,12</sup> were published in the past four years. FungiScope® and its partners contributed substantially to the development of global clinical guidelines.<sup>13</sup>

Currently enrolling campaigns are as follows:

**Rare Moulds and other emerging fungi**

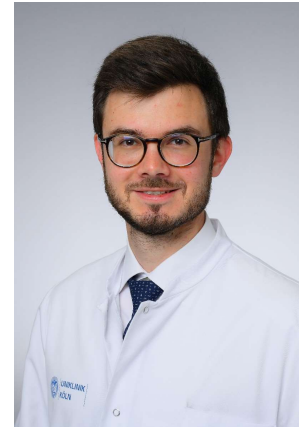
With an increasing number of patients at risk for fungal infections, formerly rare fungal infections are becoming a noticeable health care problem around the world. Treatment is challenging due to intrinsic resistance to several or in some cases all currently available antifungal agents. The epidemiology of those rare fungal infections and geographical differences are not comprehensively understood. Therefore,

infections caused by rare moulds and other rare fungal pathogens are a main focus of research. Clinical data are collected that provide a more detailed overview on diagnostic and therapeutic challenges in different patient populations.<sup>1,2,14,15</sup> The focus is manifold, e.g., the efficacy of certain treatment modalities is investigated as well as specific patient groups at risk are considered for sub-analyses to guide patient management and eventually improve outcomes.



## Aspergillus

*“Cases of invasive aspergillosis [...] have been increasingly noted over the past years around the world [...].”*



Jannik Stemler, MD

### **1. Clinical implications of azole-resistant aspergillosis in hematological malignancy (CLARITY):**

Cases of invasive aspergillosis caused by azole-resistant pathogens have been increasingly noted over the past years around the world but little information is available on how azole resistance affects clinical management and patient outcome.<sup>13</sup> To investigate the clinical impact of azole-resistance, patients with invasive infection caused by azole-resistant or azole-susceptible *Aspergillus* were enrolled. Cases from 19 countries were included. The clinical isolates are available for centralized confirmation of the pathogen, susceptibility testing and sequencing for 25% of cases.

Initiated: 01/2017

250/250 enrolled.

### **2. Evaluation of serum galactomannan as a prognostic marker for clinical response:**

In galactomannan positive invasive aspergillosis, the course of the galactomannan optical density index during treatment is being analyzed to support a new biomarker response tool in these patients.

Initiated: 10/2019

140/200 enrolled.

### **3. Clinical implications of non-*fumigatus* aspergillosis:**

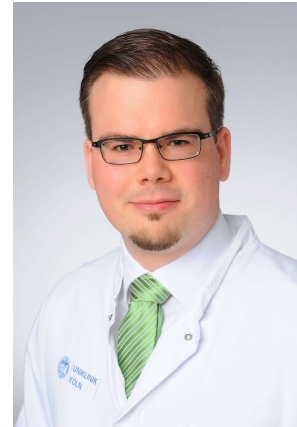
Clinical course of non-*fumigatus* aspergillosis will be investigated to determine the clinical implications of these infections compared to *A. fumigatus* infections. The aim is to include 100 clinical cases to cover a wide range of the heterogeneous patient population at risk for fungal infections.

Initiated: 10/2019

30/100 enrolled.

## Candida

*“Even short treatment delays are associated with higher mortality rates.”*



Philipp Köhler, MD

Invasive *Candida* infections represent an increasing threat to patients and healthcare systems alike. Even short treatment delays are associated with higher mortality rates. Epidemiological shifts towards more resistant *Candida* spp. require diligent surveillance. The trigger to set up the ECMM *Candida* III (Lead: Prof. M. Hoenigl) registry was the emergence of *Candida auris* and the rising antifungal resistance rates in common species, for example of *C. parapsilosis*. ECMM *Candida* III is an online platform looking for international cooperation in order to improve and promote research regarding invasive *Candida* infections. Data is

collected via the General Data Protection Regulation compliant data platform ClinicalSurveys.net, the host software for the electronic case report forms (eCRF) of FungiScope®.

ECMM *Candida* III can be used for a variety of studies from cohort studies on attributable mortality to evaluations of guideline adherence (→ ECMM EQUAL Scores), offering the investigators of all ECMM member countries the opportunity to document and share their cases of invasive *Candida* infection. This platform also enables the monitoring of epidemiology of invasive *Candida* infections, including monitoring of outbreaks.

## Antifungal Resistance: From Surveillance to Treatment (AReST) - A French-German International Study

*“Information on antifungal resistance is actually not available and remains in urgent demand.”*



Laman Rahimli, MD

*Candida glabrata* is the second most-common bloodstream *Candida* species isolated in Europe and North America. This yeast has an intrinsically low susceptibility to fluconazole, with 10–30% of *C. glabrata* isolates harbouring high fluconazole MICs (MIC >32 mg/L). The prevalence of echinocandin resistance varies depending on the geographical location, with Europe showing lower rates (0–9%) compared to the rates of 0–25% in the USA. The emergence of resistant fungi in France and Germany has

been described in few studies, generally restricted to single centres. In Germany, this lack of surveillance programs is pressing. Hospital data are available via the Diagnosis-Related Groups Statistic (DRG), but this provides only limited amount of clinical information for research purposes. Information on antifungal resistance is actually not available and remains in urgent demand to allow healthcare practitioners and policy makers to make the right decisions in the future.

## CPAnet

*“Chronic pulmonary aspergillosis complicates a wide spectrum of underlying lung disease.”*



Danila Seidel, PhD



Rosanne Sprute, MD

Chronic pulmonary aspergillosis complicates a wide spectrum of underlying lung disease of which the most common conditions are pulmonary tuberculosis (PTB), non-tuberculous mycobacterial lung infection, COPD, sarcoidosis, and allergic aspergillosis complicating asthma. CPA can present as an overlap of several forms, which complicates a one-fits-all diagnostic approach. Patients with aspergilloma or other forms of CPA may be asymptomatic and diagnosis is made incidentally. If clinical symptoms are present, they are usually nonspecific and often resemble symptoms seen in underlying conditions.

In 2017, the CPA Research Network (CPAnet) was founded with the contribution of ECMM EC Cologne members. The goal is to broaden the knowledge on the spectrum of diseases combined as CPA. A global registry for centralized collection of clinical cases was launched in 2018.<sup>15</sup> The registry is

maintained by the ECMM EC Cologne team. It runs without an endpoint and allows retrospective and prospective case entries. A follow-up of at least 10 years for each patient is intended. Intermittent updates on treatment and response are requested at 6 months and two years after diagnosis of CPA for prospectively enrolled subjects. CPAnet and thus the registry is open to everyone who is interested in researching CPA. Within the growing network first results have been published in a joint effort, presenting risk factors and diagnosis of 74 CPA cases.<sup>16</sup> Utilizing the worldwide collaborative network of the ECMM, CPAnet and the registry would like to invite additional reference centers to become an active partner of CPAnet. This will help to increase the number of patients needed in order to comprehensively investigate diagnostic strategies and to formulate therapeutic options in CPA.

## The Global Guideline Program – One World One Guideline

*“Prevalence of invasive fungal infections is on the rise.”*

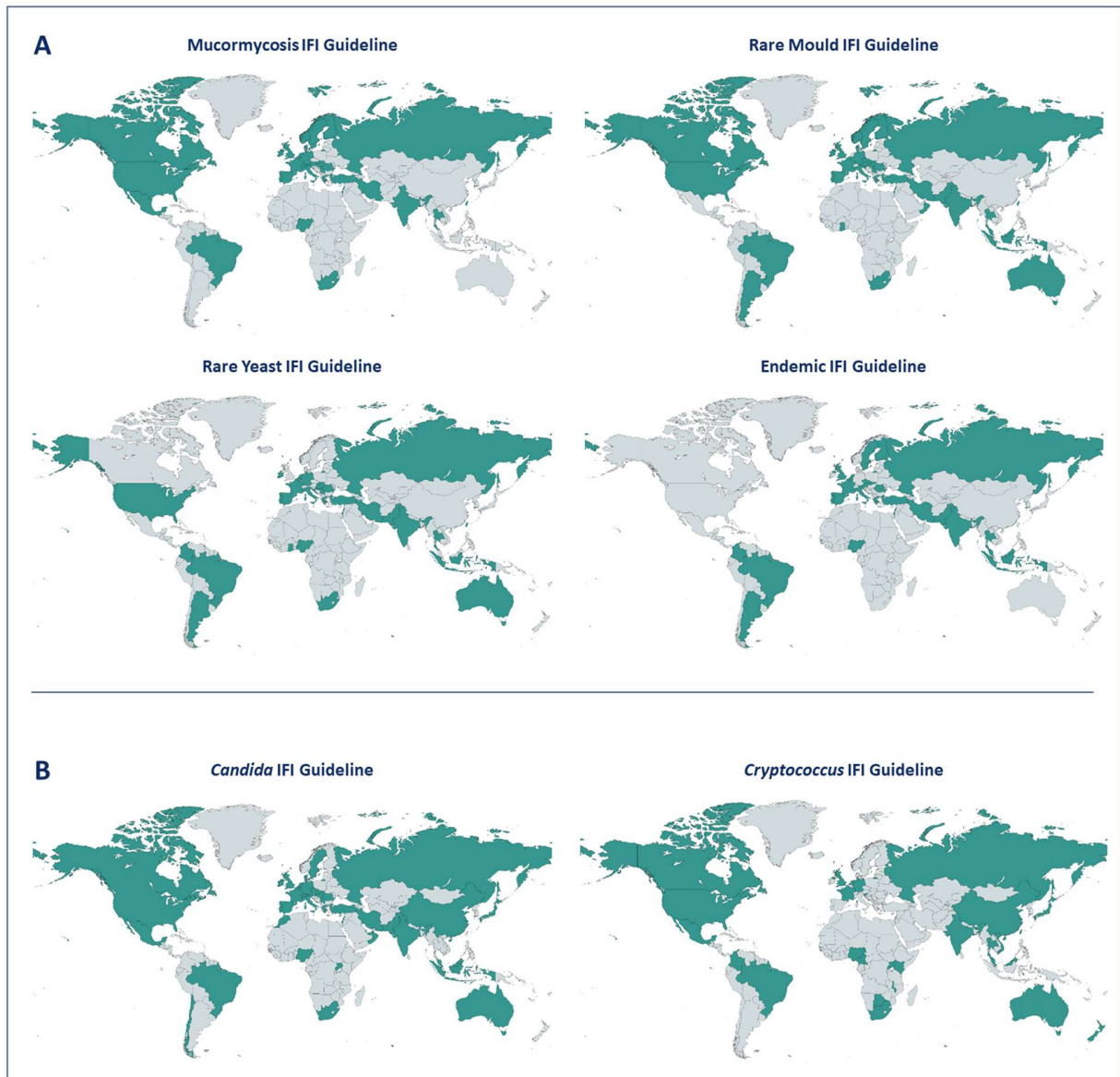


Prof. Oliver A. Cornely, MD

In the context of a growing population of immunocompromised patients at risk for opportunistic infections, prevalence of invasive fungal infections is on the rise. While new diagnostic and therapeutic options are now available to tackle invasive fungal infections, up-to-date guidance for the correct use in the clinical setting is urgently needed. Against that background, ECMM

has embarked on an unprecedented orphan diseases guidance initiative to connect professionals worldwide (Figure 1) and to develop a global guidance for diagnosis and management of invasive fungal infections. So far, five guidelines have been published, with an anticipated publication of the guidelines for *Cryptococcosis* and *Candida* diseases in 2022.

Year of publication	Guideline
2019	Mucormycosis (with MSG-ERC)
2020	CAPA (adapted methodology)
2021	Rare Moulds Endemic Mycoses Rare Yeast
~2022	<i>Cryptococcus</i> <i>Candida</i>
~2023	<i>Aspergillus</i>



**Figure 1: One World One Guideline Project.**

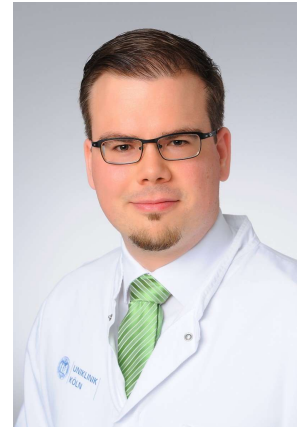
**A.** World maps displaying countries that endorse the guidelines on Mucormycosis, Rare Mould Infections, Rare Yeast Infections, and Endemic Mycoses. Colored regions indicate countries where scientific societies endorsed the respective guideline.

Mucormycosis: 53 scientific societies from 34 countries; Rare Mould IFI: 55 scientific societies from 39 countries; Rare Yeast IFI: 45 scientific societies from 32 countries; Endemic IFI: 36 scientific societies from 28 countries.

**B.** World maps of countries that contribute to the *Candida* and *Cryptococcus* IFI guidelines (currently under development). Countries highly in color indicate contributors or authors of these guideline projects. *Candida* IFI: 104 authors and contributors from 46 countries; *Cryptococcus* IFI: 62 authors and contributors from 28 countries.

## Local Structures, Diagnostic and Treatment Algorithms

*“Two algorithms [...] have been implemented throughout the University Hospital of Cologne.”*



Philipp Köhler, MD

To enable structured and uniform diagnostic and treatment strategies we implemented two algorithms which have been implemented throughout the University Hospital of Cologne.

### **1) Management Pathway “Febrile Neutropenia”**

The ECMM EC of the University Hospital of Cologne provides a diagnostic and treatment algorithm for patients with febrile neutropenia which is constantly updated according to evidence from the literature. The most recent update is from June 2021 and can be found in English DOI 10.4126/FRL01-006419168 and German 10.4126/FRL01-006415278.

### **2) Management Pathway “Mucormycosis”**

Due to the highly complex clinical management of mucormycosis, a separate diagnostic and treatment pathway has been developed in 2020, the most recent update dates from May 2021 and is available in German language (DOI 10.4126/FRL01-

006427997 and English 10.4126/FRL01-006428487).

With the presence of a multidisciplinary group in charge of managing fungal infections (comprised of infectious diseases specialists, microbiologists, pathologists, clinical pharmacologists, radiologists, ENT surgeons and visceral and thoracic surgeons) immediate expertise for treatment of complicated fungal infections is available 24/7 at our hospital.

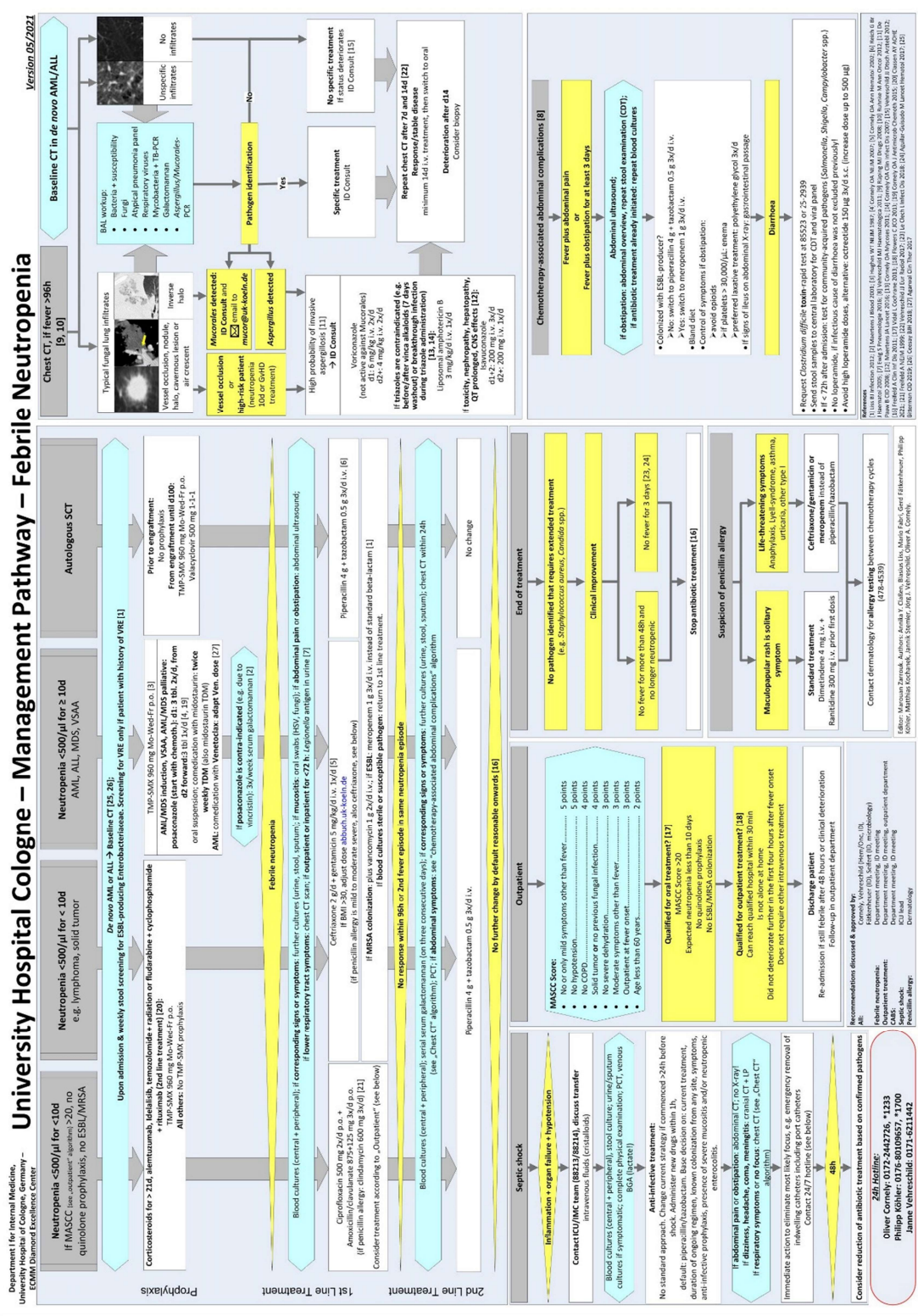
Standard therapeutic drug monitoring is offered with a validated LC-MS/MS method for

- Isavuconazole
- Itraconazole
- OH-Itraconazole
- Posaconazole
- Voriconazole

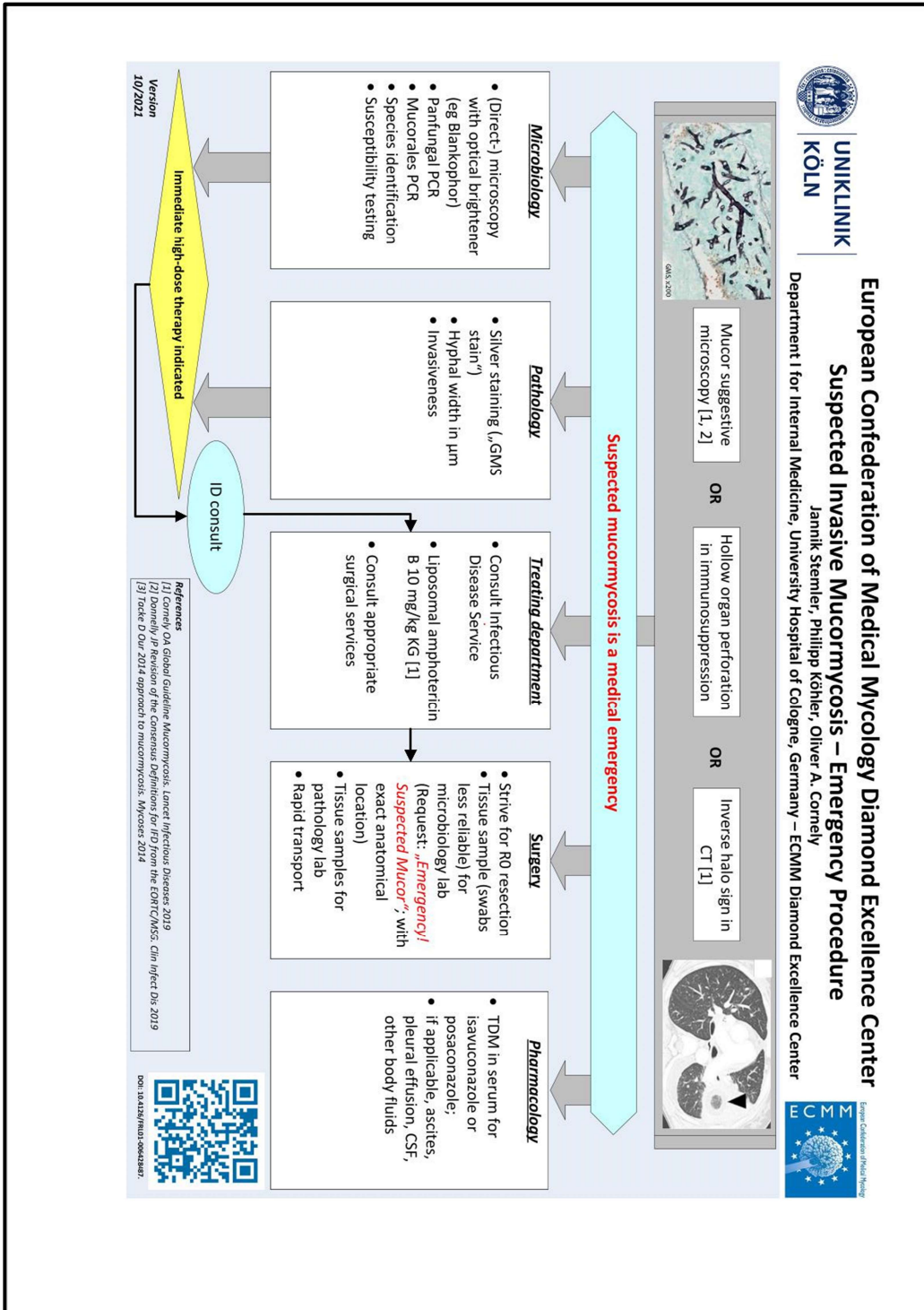
and a defined standard of care with the treatment algorithms provided below. Echinocandin TDM is planned to be established for clinical routine.

# University Hospital Cologne – Management Pathway – Febrile Neutropenia

Department for Internal Medicine, University Hospital of Cologne, Germany – ECMM Diamond Excellence Center





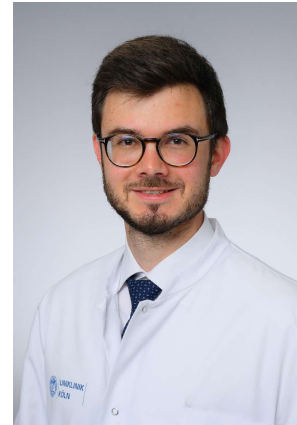


For a better view, both graphs can also be found as **annexes** at the beginning of the report.

## Antifungal Prophylaxis in Acute Myeloid Leukaemia treated with Novel Agents

*“In a joint venture [...] the Cologne ECMM EC develops a guideline on antifungal prophylaxis in recipients of immunomodulators or novel antineoplastic drugs [...].”*

Triazole based antifungal prophylaxis in acute myeloid leukaemia (AML) has become more complex: novel targeted AML therapies<sup>17</sup> interact with CYP3A4 inhibition of triazoles which results in higher exposure of those novel therapies and potentially increased toxicity. At UHC, we established a LC-MS/MS TDM method for midostaurin, a novel FLT3-tyrosine kinase inhibitor for patients with FLT3-positive AML. Currently, we are performing a prospective clinical observational trial in AML patients who receive both triazoles and midostaurin with twice weekly plasma level measurements to assess the interaction potential and interaction-related toxicity. First results are expected in 2022. Furthermore, we aim to establish TDM methods for other novel targeted therapies in the treatment of AML such as gilteritinib, ivosidenib, sorafenib, and



Jannik Stemler, MD

venetoclax among others. In a joint venture with the European Hematology Association (EHA) the Cologne ECMM EC develops a guideline on antifungal prophylaxis in recipients of immunomodulators or novel antineoplastic drugs.

Prospective studies have determined the diagnostic and prognostic value of baseline chest computed tomography (BCT) in patients with *de novo* acute leukaemia to detect invasive fungal disease (IFD) early. BCT has become a standard-of-care in hematology centres.<sup>18</sup> Since June 2019, BCT is routinely performed at University Hospital of Cologne. We aim to retrospectively assess all patients with *de novo* acute leukaemia who received BCT to determine incidence of IFD at diagnosis and to assess prognosis and outcome of these patients.

## EQUAL Scores

*“To date, the ideal diagnostic and therapeutic approach to IFIs is difficult to achieve.”*



Prof. Oliver A. Cornely, MD

Invasive fungal infections (IFIs) pose substantial threats for haematological malignancy patients. To date, the ideal diagnostic and therapeutic approach to IFIs is difficult to achieve. Clinicians may avoid invasive diagnostic and treatment algorithms in a seriously ill patient. Laboratory-based mycologists may not receive the appropriate samples and pathologists may not receive any sample at all, since invasive procedures are precluded. Recent clinical guidelines on the management of IFIs recommend multiple diagnostic and therapeutic decisions, reflecting the extraordinary complexity. When IFIs are suspected in a given patient, it

may appear unlikely that all the provided recommendations from guidelines are available at hand for clinicians. Moreover, it is unknown to what extent clinicians adhere to current guidelines and whether mortality is linked to avoiding invasive diagnostic procedures or whether guideline adherence affects outcomes at all. We developed a total of 84 scores for four different manifestations of invasive fungal infections (Aspergillosis, Candidemia, Cryptococcosis & Mucormycosis) to quantify guideline adherence. A fifth EQUAL Score for Scedosporiosis/Lomentosporiosis has been accepted for publication.<sup>19</sup>

**EQUAL Score Cards are accessible under the listed DOI numbers in the following languages:**

Country	Aspergillosis	Candidaemia	Cryptococcosis	Mucormycosis
<b>Albanian</b>	10.4126/FRL01-006414591	10.4126/FRL01-006414592	10.4126/FRL01-006414593	10.4126/FRL01-006414594
<b>Azerbaijani</b>	10.4126/FRL01-006423009	10.4126/FRL01-006423010	10.4126/FRL01-006423011	10.4126/FRL01-006423012
<b>Bulgarian</b>	10.4126/FRL01-006425084	10.4126/FRL01-006425087	10.4126/FRL01-006425088	10.4126/FRL01-006425089
<b>Chinese</b>	10.4126/FRL01-006420313	10.4126/FRL01-006420314	10.4126/FRL01-006421107	10.4126/FRL01-006420315
<b>Czech</b>	10.4126/FRL01-006418897	10.4126/FRL01-006417275	10.4126/FRL01-006418977	10.4126/FRL01-006418898
<b>Danish</b>	10.4126/FRL01-006430393			10.4126/FRL01-006430392
<b>Dutch</b>		10.4126/FRL01-006417827	10.4126/FRL01-006417826	
<b>English</b>	10.4126/FRL01-006411745	10.4126/FRL01-006411743	10.4126/FRL01-006414360	10.4126/FRL01-006411740
<b>French</b>	10.4126/FRL01-006414359	10.4126/FRL01-006414358		10.4126/FRL01-006411705
<b>German</b>	10.4126/FRL01-006411744	10.4126/FRL01-006411742	10.4126/FRL01-006414890	10.4126/FRL01-006411741
<b>Greek</b>	10.4126/FRL01-006414822	10.4126/FRL01-006414823	10.4126/FRL01-006414824	10.4126/FRL01-006414825
<b>Hungarian</b>	10.4126/FRL01-006411047	10.4126/FRL01-006410985	10.4126/FRL01-006414895	10.4126/FRL01-006411048
<b>Italian</b>	10.4126/FRL01-006410983	10.4126/FRL01-006410880	10.4126/FRL01-006415280	10.4126/FRL01-006410982
<b>Kurdish</b>	10.4126/FRL01-006414074	10.4126/FRL01-006414075	10.4126/FRL01-006415030	10.4126/FRL01-006414073
<b>Persian</b>	10.4126/FRL01-006423142	10.4126/FRL01-006423145	10.4126/FRL01-006423144	10.4126/FRL01-006423143
<b>Polish</b>	10.4126/FRL01-006414817	10.4126/FRL01-006414818	10.4126/FRL01-006415032	10.4126/FRL01-006409360
<b>Portuguese</b>	10.4126/FRL01-006412048	10.4126/FRL01-006411861	10.4126/FRL01-006414558	10.4126/FRL01-006412047
<b>Romanian</b>	10.4126/FRL01-006414819	10.4126/FRL01-006414820	10.4126/FRL01-006418060	10.4126/FRL01-006414821
<b>Russian</b>	10.4126/FRL01-006409505	10.4126/FRL01-006409501	10.4126/FRL01-006414894	10.4126/FRL01-006409504
<b>Serbo-Croatian</b>	10.4126/FRL01-006414505	10.4126/FRL01-006414506	10.4126/FRL01-006418560	10.4126/FRL01-006414507
<b>Spanish</b>	10.4126/FRL01-006411830	10.4126/FRL01-006410984	10.4126/FRL01-006415031	10.4126/FRL01-006411829
<b>Swedish</b>	10.4126/FRL01-006417859	10.4126/FRL01-006417860	10.4126/FRL01-006429844	10.4126/FRL01-006417861
<b>Turkish</b>	10.4126/FRL01-006411826	10.4126/FRL01-006411827	10.4126/FRL01-006414876	10.4126/FRL01-006411828

**2018 EQUAL 曲霉病评分: ECMM 学会评分**  
 改编自目前指南, 用于临床侵袭性肺曲霉病诊治的质量评估

Cornely OA<sup>1,2</sup>, Köhler P<sup>1,2</sup>, Mellingshoff SC<sup>1,2</sup>, Yao Zhang<sup>3</sup>  
<sup>1</sup> Department I for Internal Medicine, Excellence Center for Medical Mycology (ECMM), University of Cologne, Germany <sup>2</sup> CECAD Cluster of Excellence, University of Cologne, Germany <sup>3</sup> Department of Infectious Diseases, Zhongshan Hospital, Fudan University, People's Republic of China. DOI: 10.4126/FRL01-006420313



**背景**  
 EQUAL 曲霉病评分衡量并汇总了理想的侵袭性肺曲霉病诊治要素。EQUAL 评分反应了目前指南的最强推荐建议。评分卡是评价指南执行情况和支持抗真菌药物管理的快速参考。

最大评分	如培养阳性	如难治性病例	如培养阳性且为难治性病例
诊断	10	12	13
治疗		5	
随访		7	
总分	22	24	25

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 1. Patterson et al. *Clin Infect Dis* 2016; 2. Liss et al. *Mycoses* 2015; 3. Vehreschild et al. *Eur Radiol* 2017; 4. Ullmann et al. *Clin Microbiol Infect* 2018.

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 2020年04月





**2018 EQUAL 曲霉病评分**

诊断	中性粒细胞减少 >10 日或同种异基因造血干细胞移植 → 预防性抗真菌或每周 2-3 次行 GM 筛查	3
	持续发热 72-96 小时 → CT 扫描	3
	肺浸润 → 支气管肺泡灌洗	1
	- 半乳甘露聚糖	1
	- 直接显微镜检, 包括荧光染色; Calcofluor white, Uvitex 2B 或 Blancophor	1
	- 培养	1
	- 真菌 PCR (全套、曲霉、毛霉)	1
	培养中曲霉生长	1
	- 鉴定至种水平	1
	- 药敏试验	1
治疗	难治性病例 → 组织学	1
	- 银染色	1
	- PAS	1
随访	- 可见菌丝 → 分子诊断	1
	一线治疗:	
	- 艾沙康唑 或 伏立康唑 或 ——既往预防性抗真菌治疗后 ——两性霉素 B 脂质体或卡泊芬净	5
	- 使用伏立康唑但未进行治疗药物监测 (目标谷浓度 1-5.5mg/L)	-1
随访	- 第 7 日行 CT 扫描	2
	- 第 14 日行 CT 扫描	3
	- 第 21 日或 28 日行 CT 扫描	2

**EQUAL Score Card Aspergillosis example Chinese**

**EQUAL Candida Score 2018: An ECMM Score Derived From Current Guidelines to Measure QUALity of Clinical Candidemia Management**

Mellingshoff SC<sup>1,2</sup>, Rutz J<sup>2</sup>, Köhler P<sup>1,2</sup>, Cornely OA<sup>1,2</sup>  
<sup>1</sup> Department I for Internal Medicine, Excellence Center for Medical Mycology (ECMM), University of Cologne, Germany, <sup>2</sup> CECAD Cluster of Excellence, University of Cologne, Germany  
 DOI: 10.4126/FRL01-006411743



**Background**  
 The EQUAL Candida Score weighs and aggregates factors recommended for the ideal management of candidemia and provides a tool for antifungal stewardship as well as for measuring guideline adherence. Current guidelines provided by the European Society for Clinical Microbiology and Infectious Diseases<sup>1,5</sup> and by the Infectious Diseases Society of America<sup>3</sup> were reviewed and the strongest recommendations for management quality selected as basis for this scoring tool.

**Maximum Score**

Non-CVC carriers		CVC carriers	
Diagnosis	10	Diagnosis	10
Treatment	7	Treatment	10
Follow-up	2	Follow-up	2
<b>Total</b>	<b>19</b>	<b>Total</b>	<b>22</b>



**References**  
 1. Mellingshoff et al. *Mycoses* 2018; 2. Koehler et al. *Mycoses* 2014; 3. Pappas et al. *Clin Infect Dis* 2016; 4. Cuenca-Estrella et al. *Clin Infect Dis* 2012; 5. Cornely et al. *Clin Microbiol Infect* 2012; 6. Muñoz et al. *Diagn Microbiol Infect Dis* 2017; 7. Andes et al. *Clin Infect Dis* 2012.

**EQUAL Candida Score 2018<sup>1,2</sup>**

Diagnosis	Initial blood culture (40mL) <sup>3,4</sup>	3
	Species identification <sup>3,4</sup>	3
	Susceptibility testing <sup>3,4</sup>	2
	Echocardiography <sup>4,5</sup>	1
	Ophthalmoscopy <sup>5,6</sup>	1
Treatment	Echinocandin treatment <sup>3,5</sup>	3
	Step down to fluconazole depending on susceptibility result <sup>3,5</sup>	2
	Treatment for 14 days after first negative follow-up culture <sup>3,5</sup>	2
	CVC carriers*: CVC removal <sup>3,5,7</sup> ≤ 24 hours from diagnosis > 24 < 72 hours from diagnosis	3 2
Follow-Up	Follow-up blood culture (at least one per day until negative) <sup>3,5</sup>	2

\* CVC carriers receive extra points, total score thus differs in Non-CVC vs. CVC carriers

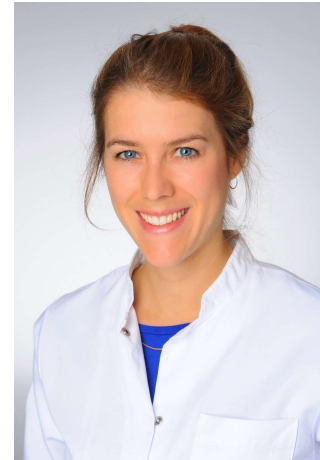
UNIKLINIK KÖLN  
 December 2018

**EQUAL Score Card Candidaemia example English**

## PACIFIC – ImPACt on Invasive Fungal Infections by Immune Checkpoint Inhibition

*“Results will serve to better understand the role of immune checkpoints in fungal infections.”*



Sibylle Mellinghoff, MD

Based on preclinical studies, there is significant evidence for immunosuppression as a detrimental factor during invasive fungal infections (IFI). Targeting immune checkpoints which may reverse hyporesponsiveness of the innate and adaptive immune system during IFI could be of benefit for these patients. However, any such therapy needs to be individualized based on the immune status of each patient. The first patient treated with an immune checkpoint inhibitor for fungal infection was reported in 2017. A benefit of immune checkpoint inhibitors in fungal infections other than mucormycosis can be assumed, but needs further investigation.

While Spec *et al.* have already reported an increased level of PD1-expression on T-cells during candidemia, this was only a small subset of patients (n=27) and a correlation between PD1-expression level and outcome

was missing. In addition, checkpoint expression in the microenvironment of ICI would be of utmost interest. We therefore conduct a prospective observational trial exploring immune checkpoint expression levels in IFI. Results will serve to better understand the role of immune checkpoints in fungal infections. A subsequent clinical trial may evaluate the administration of immune checkpoint inhibitors in selected patients with IFI in the future.

Within the project, we have collected 24 samples from patients with candidemia and 22 samples from patients with invasive aspergillosis. A sample collection from patients with mucormycosis is ongoing. Analyses are currently in progress. In addition, we have successfully treated a mucormycosis patient with nivolumab.<sup>20</sup>

## Clinical Trials at the ECMM EC Cologne

Since January 2017 a total of 9 clinical trials have been initiated at the ECMM EC Cologne with a total of 46 patients being included in those Phase I to III trials. Currently, 6 clinical trials are actively recruiting at the ECMM EC Cologne. Furthermore, active support and trial lead of studies endorsed by the ECMM is

provided. The Director and the Deputy Director of the Cologne ECMM EC serve on several Data Review Committees, Data Safety Monitoring Boards or as Principal Investigators, and National or International Study Coordinators of the below mentioned trials.

Study title	Recruitment period at ECMM EC Cologne
A Phase 3 Randomized Study of the Efficacy and Safety of Posaconazole versus Voriconazole for the Treatment of Invasive Aspergillosis in Adults and Adolescents (Phase 3; Protocol No MK-5592-069) P06200	Oct 2013 - Feb 2020
Open-Label Study to Evaluate the Efficacy and Safety of SCY-078 in Patients with Fungal Diseases that are Refractory to or Intolerant of Standard Antifungal Treatment (FURI) FURI (SCY-078-301)	Since Oct 2017
An Open Label, Multicenter Study to Determine the Safety and Pharmacokinetics of Intravenous and Oral APX001 in Patients Undergoing Chemotherapy for Acute Myeloid Leukaemia with Neutropenia APX001-103	Oct 2017 - Jan 2019
An Open-Label Study to Evaluate the Efficacy and Safety of APX001 in Non-Neutropenic Patients with Candidemia, with or without Invasive Candidiasis, Inclusive of Patients with Suspected Resistance to Standard of Care Antifungal Treatment APX001-201	Mar 2019 - Apr 2020
A Multicenter, Randomized, Double-Blind Study to Evaluate the Safety and Efficacy of the Combination Therapy of SCY-078 with Voriconazole in Patients with Invasive Pulmonary Aspergillosis (SCYNERGIA)	Since May 2020
A Phase 3, Multicenter, Randomized, Double-Blind Study of the Efficacy and Safety of Rezafungin for Injection Versus the Standard Antimicrobial Regimen to Prevent Invasive Fungal Diseases in Adults Undergoing Allogeneic Blood and Marrow Transplantation (RESPECT)	Since Jan 2021
A Phase 2, Open-Label Study to Evaluate the Safety and Efficacy of APX001 in the Treatment of Patients with Invasive Mold Infections Caused by <i>Aspergillus</i> Species or Rare Molds APX001-202	Since Feb 2021
A Phase 3, Multicenter, Randomized, Double-blind Study of the Efficacy and Safety of Rezafungin for Injection versus Intravenous Caspofungin Followed by Optional Oral Fluconazole Step-down in the Treatment of Subjects with Candidemia and/or Invasive Candidiasis (RESTORE)	Since May 2021
An open-label single-arm Phase IIb study of F901318 as treatment of invasive fungal infections due to <i>Lomentospora prolificans</i> , <i>Scedosporium</i> spp., <i>Aspergillus</i> spp., and other resistant fungi in patients lacking suitable alternative treatment options (FORMULA)	Since Jun 2021

## YoungECMM

*“The program is expected to provide a global community for scientists early in their career working in human and veterinary medical mycology.”*



Rosanne Sprute, MD



Danila Seidel, PhD

Under the direction of members of the ECMM EC Cologne, the YoungECMM program is currently being set up. The program is expected to provide a global community for scientists early in their career working in human and veterinary medical mycology, from laboratory-based scientists to clinicians.

Several benefits and resources will apply to members, including publication and travel awards, opportunities to participate in the YoungECMM social program at the TIMM congress, and the privilege to submit to the

journal *Mycoses* with two reviews that have been obtained prior submission.

A subcommittee for the YoungECMM Program will consist of four members, two of whom will be from the ECMM Excellence Center in Cologne (Chair: Rosanne Sprute, Treasurer: Danila Seidel). It is planned to introduce the YoungECMM program at the ECMM Council Meeting in Aberdeen in October 2021.



## YouTube Channel "IDIM - Infectious Diseases in Motion"

*"Social media are crucially important in today's world."*



Jon Salmanton-García, PhD

Social media are crucially important in today's world. A great portion of internet users rely on social media on a daily basis and numbers are ever increasing. Apart from videos directed at the general public, our Excellence Center creates videos for professional audiences and clinicians in the field of infectious diseases. These videos are prepared based on the recent publications from our team or collaborative teams and provide a summary of the respective publication (Table 1).

How important these videos are for clinicians was demonstrated in Covid-19 Associated Mucormycosis (CAM) in India and

neighbouring countries. While the number of fatal fungal infections affecting Covid-19 patients was rapidly increasing, there were serious misconceptions about CAM in the lay press, which reflected the need for correct information from reliable sources. Our Excellence Center prepared multiple videos on the topic of Mucormycosis that got attention among clinicians in the countries dealing with CAM. Our Excellence Center also contacted the presidents of the hematology societies of Bangladesh, Bhutan, India, Pakistan, and Sri Lanka to accelerate the dissemination of these videos more efficiently among local networks in these countries.

**Table 1: List of the IDIM YouTube channel videos for clinicians and experts in the field of infectiology**

1	IDIM - Breakthrough – IFI
2	IDIM - Cytokines - Immunologic Markers for Invasive Mold Infections
3	IDIM - ECMM CandiReg Ready to Use Platform for Outbreaks and Epidemiological Studies
4	IDIM - ECMM MSG-ERC Mucor Guideline – Published
5	IDIM - ECMM One World One Guideline - Cryptococcosis Methods Tutorial
6	IDIM - ECMM One World One Guideline - Training March 2018
7	IDIM - ECMM-ISHAM: Baseline Chest CT in High-Risk Hematology Patients - A Survey of the ECMM and the ISHAM
8	IDIM - ECMM-ISHAM: One World One Guideline <i>Candida</i> Infections, Methods Tutorial
9	IDIM - ECMM: EQUAL Scores Aspergillosis
10	IDIM - ECMM: EQUAL Scores Candidiasis
11	IDIM - ECMM: EQUAL Scores Mucormycosis
12	IDIM - FungiScope: Búsqueda de pacientes con infección invasiva debida a <i>Paecilomyces</i> spp.
13	IDIM - FungiScope: Call for IFIs due to <i>Paecilomyces</i> or <i>Purpureocillium</i> spp.
14	IDIM - FungiScope: Characterization and outcome of invasive infections due to <i>Paecilomyces variotii</i>
15	IDIM - FungiScope: COVID-19-Associated Pulmonary Aspergillosis
16	IDIM - FungiScope: IAPA - Influenza Associated Invasive Aspergillosis
17	IDIM - FungiScope: Introduction- Global Registry for Emerging Fungal Infections
18	IDIM - FungiScope: Invasive infections with <i>Purpureocillium lilacinum</i>
19	IDIM - FungiScope: Invasive Mucormycosis - Standard Treatment vs. Posaconazole New Formulations
20	IDIM - FungiScope: Invasive Scedosporiosis and Lomentosporiosis - Epidemiology Risk Factors – Prognosis
21	IDIM - FungiScope: Needles in a haystack - Needles in a haystack: Extremely rare invasive fungal infections reported in FungiScope -Global Registry for Emerging Fungal Infections
22	IDIM - FungiScope: Presentación - Presentación del Registro FungiScope TM
23	IDIM - FungiScope: Risk factors and mortality in invasive <i>Rasamsonia</i> spp. Infections
24	IDIM - FungiScope: Transdiaphragmatic Mucormycosis



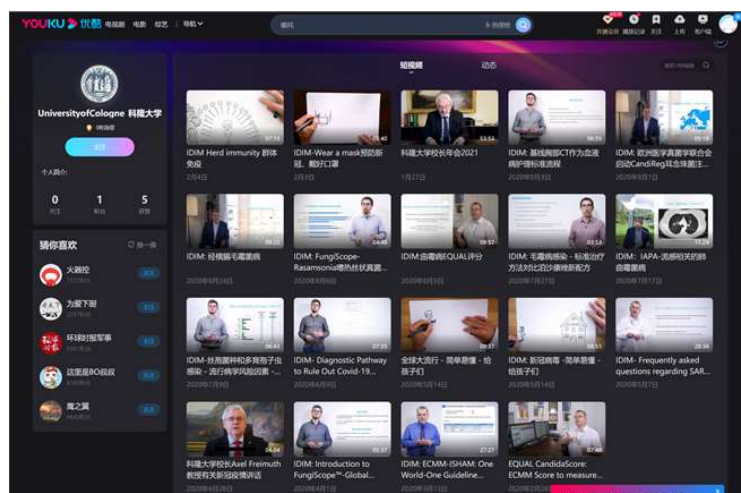
Example of an IDIM video

## YouKu Channel

*“Since YouTube is not publicly available in China, YouKu serves as an important information channel [...].”*

For our international outreach, we try to leverage social media to a maximum in order to extend our audience to as many countries as possible. Whereas our YouTube channel reliably provides information for Europe, YouTube is not publicly available in China. There is a platform similar to Youtube called YouKu in China for Asian users. YouKu (Chinese 优酷, Pinyin yóukù "excellent and cool") is a video portal based in Beijing in the People's Republic of China. YouKu allows users to upload videos regardless of their length. With the exception of the “Investor

Relations” area, the website is exclusively in Chinese. At the beginning of 2010, the portal had 384 million users according to the China Network Information Centre (CNIC). This number shows how popular YouKu is and that it is worthwhile using the platform. Our YouKu account currently contains 17 videos from FungiScope®. Through YouKu FungiScope® keeps its partners and target groups in China up to date. Our YouKu account was created in 2020. The University of Cologne Regional Office in Beijing, China is instrumental for this service.



## ECMM Consulting Service

*“EC Cologne played a coordinating role in founding the ECMM Expert Consultation Service to provide expert help [...].”*

Difficult to treat invasive fungal infections require prompt consultation of an infectious diseases expert to improve treatment outcome and increase survival rates. The ECMM EC Cologne played a coordinating role in establishing the ECMM Expert Consultation Service which provides expert help free of charge for medical centers around the globe seeking advice. The ECMM Expert Consultation Service provides recommendations and broad expertise on difficult-to-treat invasive fungal infections (e.g., azole-resistant *Aspergillus* species, *Candida auris*, mucormycosis etc.) to improve the diagnostic and therapeutic management and hence outcomes. The expert consult collaborates and networks with other appointed ECMM ECs that represent an integral part of the service. Our

initiative aims for a global outreach through video conferencing between ECMM Excellence Centers and treating physicians. FungiScope® registries are used to structure case information and to evaluate the impact of the collegial advice system at regular intervals. The advice given follows recent guidelines and EQUAL Scores are being used to measure guideline adherence. Infectious diseases expert consultation should be an integral component of care for patients with difficult-to-treat invasive fungal infections. The ECMM Expert Consult addresses this need at a global scale.<sup>21</sup>

Since 2017 the ECMM EC Cologne has provided expert guidance through 300 local, 150 national and 70 international consultations.

## COVID-19 Associated Mycoses

*“With the support of the ECMM the EC Cologne was among the first to report COVID-19 associated mycoses.”*

With support of the ECMM EC Cologne several series were published on COVID-19 associated mycoses.<sup>22,23</sup>

### *Aspergillus*

SARS-CoV-2 causes direct damage to the airway epithelium enabling *Aspergillus* invasion.<sup>24</sup> The - to our knowledge - first ever published report of COVID19 associated pulmonary aspergillosis (CAPA) has raised concerns about worsening the disease course in COVID-19 and increasing mortality.<sup>25</sup> In addition, the first cases of CAPA caused by azole-resistant *Aspergillus* have also been reported. The ECMM EC Cologne served as lead in developing the 2020 ECMM/ISHAM consensus statement on defining and managing CAPA. This consensus statement was prepared and endorsed by experts from several other medical mycology societies.<sup>26</sup> Our aim was to provide definitions for clinical research and up-to-

date clinical management recommendations on the diagnosis and treatment of CAPA. Three different grades were proposed (i.e., possible, probable, and proven CAPA) to enable researchers to homogeneously classify patients in registries and interventional clinical trials. The “possible” category was implemented due to the fact that, so far, diagnostic bronchoscopy in patients with COVID-19 has played a minor role due to its nature of aerosol generation and high risk of viral transmission<sup>27</sup> Besides, the testing of the retrieved specimens lacks validation.<sup>28</sup> Over time, new insights will help to further improve the definitions and the management algorithms.<sup>26,29</sup>

### *Candida*

Invasive infections with *Candida* spp. are increasingly recognized as a complication in

critically ill COVID-19 patients, but knowledge on this fungal superinfection is

sparse. Well-designed epidemiologic studies are needed to define the true burden of disease and to identify key factors of invasive candidiasis in patients with COVID-19. To evaluate epidemiology, relevant predisposing factors, performance of diagnostic tools, treatment option and outcome of this fungal complication, we will collect > 500 COVID-associated candidiasis cases and perform a retrospective analysis.

### **Mucormycosis**

COVID-19 associated mucormycosis (CAM) has become an increasing health threat in India and neighbouring countries making it to prime-time news in early 2021. Uncontrolled diabetes, the liberal use of corticosteroids and COVID-19 associated immune response modulations are factors predisposing for rhino-orbital cerebral mucormycosis. CAM was sporadically reported from other countries, but a comprehensive overview on predisposing factors, clinical manifestation and outcome of COVID-19 patients with mucormycosis was lacking. Initiated by the ECMM and ISHAM, patients with the respective diagnosis were identified through the FungiScope®, ECMM and ISHAM networks.

Data will be collected via an electronic case report form in the FungiScope® *Candida* registry, which was designed as a platform for international cooperation to improve research on invasive *Candida* infections.<sup>30</sup> With this study, we aim to understand the full extent of candidiasis in the setting of severe COVID-19 and to determine the best management for affected patients.

FungiScope® supported the effort by collecting relevant clinical information of published and unpublished cases diagnosed in April 2021 or earlier.<sup>31</sup>

Only a few cases of CAM have been reported in Europe, so that robust figures on incidence and prevalence of CAM are not available up to now. Therefore, a European survey has been developed to map distribution of cases across Europe. The ECMM and FungiScope® networks were activated to collect data on prevalence and clinical information on individual patients. This initiative is still ongoing. The campaign for CAM cases in Germany was spearheaded by the FungiScope® team.

## Fungus-reactive T Cells

*“The lack of reliable in vitro diagnostics (IVD) delays diagnosis and treatment and limits epidemiological knowledge.”*

Invasive fungal infections (IFI) caused by *Aspergillus*, *Candida* and *Mucorales* are with a cause of substantial mortality. Acute myeloblastic and acute lymphoblastic leukaemia (AML/ALL) patients and allogeneic haematopoietic stem cell (HSCT) recipients are at high risk of IFI due to prolonged neutropenia and administration of glucocorticosteroids and immunosuppressants. The lack of reliable in vitro diagnostics (IVD) delays diagnosis and treatment, and limits epidemiological

knowledge. In our lab we use fungus-reactive peripheral blood T-cells to identify pathogens via the specific immune response to *Aspergillus* and *Candida* species and *Mucorales*. Fungus-specific T-helper cells sensitively react to changes in fungus-host interaction and lead antifungal immunity which can be monitored. We also use this technique to diagnose and follow-up on patients with hepatosplenic candidiasis.

## Capacity Mapping of Africa and Asia

*“[...] Both continents have to face not only the thread of endemic mycoses, but also the reduced access to health and social support systems.”*

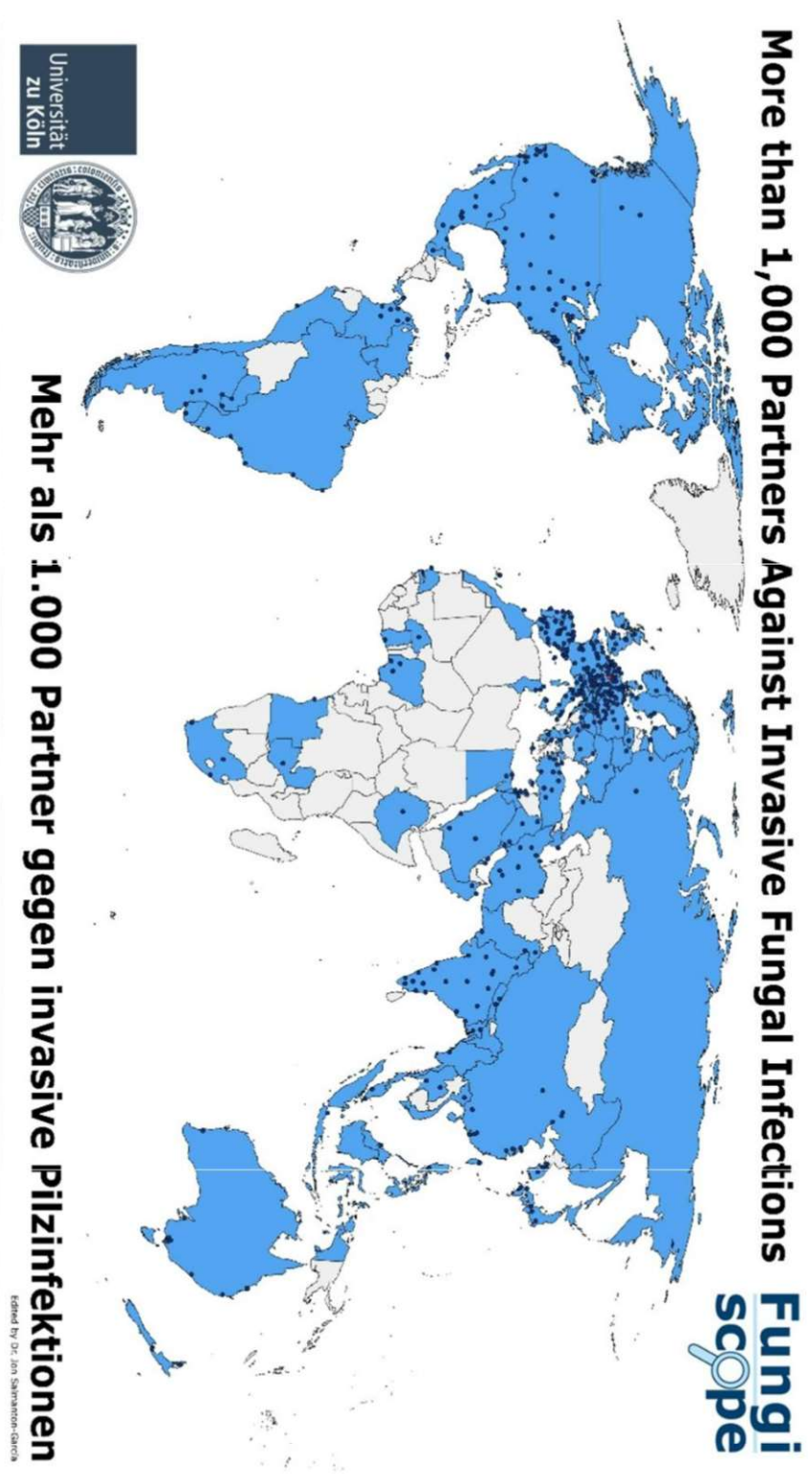


Jon Salmanton-García, PhD

Today, Africa and Asia are home to up to three quarters of the world population,<sup>32</sup> with climate conditions that predispose for invasive fungal infections (IFI). In addition to mycoses reported in other parts of the world,<sup>13,33-36</sup> large regions on both continents not only face the threat of endemic mycoses,<sup>37</sup> they also suffer from limited access to health care and social support systems, along low income,<sup>38</sup> a substantial amount of people living in rural areas,<sup>39,40</sup> or a substantial number of individuals with comorbidities predisposing to IFIs.<sup>4,41-44</sup> In this joint initiative of ECMM and ISHAM, the main goal is to depict the current IFI diagnostic capacity for Africa and Asia via an online questionnaire accessible via [www.clinicalsurvey.net](http://www.clinicalsurvey.net). Different aspects regarding the IFI diagnostic procedures are

displayed, such as a) perceptions on IFI in the respective institution, b) microscopy, c) culture and fungal identification, d) serology e) antigen detection f) molecular tests or g) therapeutic drug monitoring (TDM). Experts in medical mycology (directors, infection control practitioners, professors, attending physicians and infectious diseases specialists or laboratory professionals) are approached via email and social media (LinkedIn, Twitter) in order to obtain answers from as many sites as possible. We also solicit feedback from every single region in each of the countries. Currently, the outcome from the African survey is under review in *The Lancet Microbe*, whereas the data collection for Asia is on-going as of September 9th, 2021.





Map with all collaborators in mycology (1055 sites)

# APPENDIX

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# Curriculum Vitae of the Principal Investigators

## Prof. Dr. med. Oliver A. Cornely MD, FECMM, FAAM, FIDSA, FACP

CECAD Cluster of Excellence – University of Cologne  
University Hospital of Cologne, Department I for Internal Medicine  
Kerpener Str. 62, 50937 Cologne, Germany  
Phone: +49 221 478-85523; E-mail: [oliver.cornely@uk-koeln.de](mailto:oliver.cornely@uk-koeln.de); <https://tinyurl.com/cornelylab>

### Education, Career History & Professional Experience

Since 2014 University Professor (W3), Director & Chair Translational Research Institute, CECAD (Cluster of Excellence in Cellular Stress Responses in Aging-associated Diseases), University of Cologne  
Since 2014 Scientific Director, Clinical Trials Center Cologne (CTCC)  
2008-2014 Associate Professor  
2007-2014 Medical Director, Clinical Trials Center Cologne (CTCC), University of Cologne  
2006 Board Certification Infectious Diseases  
2005 Board Certification Hematology and Oncology  
2001 Board Certification Internal Medicine  
1999 Board Certification Emergency Medicine

### Main Research Activities and Achievements

2020 Highly Cited Researcher, Top 1% in Web of Science  
2019 Academic Advisor, National Fungal Diseases Surveillance Net (NFD-Net), China  
2018 Consultant, WHO Global Antimicrobial Resistance Surveillance System (GLASS) Program for Global Resistance Development  
2018 British Medical Association Book Award for the Oxford Textbook of Medical Mycology  
2018 Highly Cited Researcher, Top 1% in Web of Science  
2014 Prof. Pushpa Talwar Memorial Oration, Postgraduate Institute, Chandigarh, India  
2009 Faculty Prize for Outstanding Publication of the Year 2007 – Faculty of Medicine, University of Cologne, Germany



## **PD Dr. med. Philipp Köhler MD, FECMM**

University Hospital of Cologne, Department I for Internal Medicine  
Kerpener Str. 62, 50937 Cologne, Germany  
Phone: +49 221 478-85523; E-mail: [philipp.koehler@uk-koeln.de](mailto:philipp.koehler@uk-koeln.de)

### **Education, Career History & Professional Experience**

2021	Habilitation / postdoctoral qualification
2021	Board Certification Infectious Diseases
2020	Board Certification Intensive Care Medicine
2019	Board Certification Internal Medicine, Hematology and Oncology
2019	Fellow of the European Confederation of Medical Mycology (FECMM)
2018	Board Certification Emergency Medicine
2013	Medical thesis
2012	Medical licence / approbation
2006-2012	Medical studies

### **Main Research Activities and Achievements**

2019	Young Investigator Award 2019 for Clinical Mycology of the German-speaking Mycological Society e. V.
2018	British Medical Association Book Award for the Oxford Textbook of Medical Mycology

## Publications of the ECMM EC Cologne 2017 - 2021

### Original Articles

1. Zhang, J., Zhang, Y. Y., Wu, D. P., Cao, G. Y., Hamed, K., Desai, A., Aram, J. A., Guo, X., Fayyad, R. & Cornely, O. A. Clinical experience with isavuconazole in healthy volunteers and patients with invasive aspergillosis in China, and the results from an exposure-response analysis. *Mycoses* 64, 445-456 (2021). doi:10.1111/myc.13233
2. Wunsch, S., Zurl, C., Strohmaier, H., Meinitzer, A., Rabensteiner, J., Posch, W., Lass-Flörl, C., Cornely, O., Pregartner, G., König, E., Feierl, G., Hoenigl, M., Prattes, J., Zollner-Schwetz, I., Valentin, T. & Krause, R. Longitudinal Evaluation of Plasma Cytokine Levels in Patients with Invasive Candidiasis. *J Fungi* 7 (2021). doi:10.3390/jof7020101
3. Wingen-Heimann, S. M., Cornely, O. A., Vehreschild, M. J. G. T., Wisplinghoff, H., Franke, B., Schons, M., von Bergwelt-Baildon, M., Scheid, C. & Vehreschild, J. J. **Clinical and pharmaco-economic evaluation of antifungal prophylaxis with continuous micafungin in patients undergoing allogeneic stem cell transplantation: A six-year cohort analysis.** *Mycoses* 64, 437-444 (2021). doi:10.1111/myc.13232
4. Steenwyk, J. L., Mead, M. E., de Castro, P. A., Valero, C., Damasio, A., Dos Santos, R. A. C., Labella, A. L., Li, Y., Knowles, S. L., Raja, H. A., Oberlies, N. H., Zhou, X., Cornely, O. A., Fuchs, F., Koehler, P., Goldman, G. H. & Rokas, A. **Genomic and Phenotypic Analysis of COVID-19-Associated Pulmonary Aspergillosis Isolates of *Aspergillus fumigatus*.** *Microbiol Spectr*, e0001021 (2021). doi:10.1128/Spectrum.00010-21
5. Sprute, R., Salmanton-García, J., Sal, E., Malaj, X., Racil, Z., Puig, C. R. D., Falces-Romero, I., Barac, A., Desoubeaux, G., Kindo, A. J., Morris, A. J., Pelletier, R., Steinmann, J., Thompson, G. R., Cornely, O. A., Seidel, D., Stemler, J. & Grp, F. E. I. W. **Invasive infections with *Purpureocillium lilacinum*: clinical characteristics and outcome of 101 cases from FungiScope (R) and the literature.** *J Antimicrob Chemother* 76, 1593-1603 (2021). doi:10.1093/jac/dkab039
6. Sprute, R., Salmanton-García, J., Sal, E., Malaj, X., Falces-Romero, I., Hatvani, L., Heinemann, M., Klimko, N., Lopez-Soria, L., Meletiadi, J., Shruti, M., Steinmann, J., Seidel, D., Cornely, O. A. & Stemler, J. **Characterization and outcome of invasive infections due to *Paecilomyces variotii*: analysis of patients from the FungiScope (R) registry and literature reports.** *J Antimicrob Chemother* 76, 765-774 (2021). doi:10.1093/jac/dkaa481
7. Sprute, R., Cornely, O. A., Chen, S. C., Seidel, D., Schuetz, A. N. & Zhang, S. X. **All You Need To Know and More about the Diagnosis and Management of Rare Yeast Infections.** *Mbio*, e0159421 (2021). doi:10.1128/mBio.01594-21
8. Salmanton-García, J., Sprute, R., Stemler, J., Bartoletti, M., Dupont, D., Valerio, M., García-Vidal, C., Falces-Romero, I., Machado, M., de la Villa, S., Schroeder, M., Hoyo, I., Hanses, F., Ferreira-Paim, K., Giacobbe, D. R., Meis, J. F., Gangneux, J. P., Rodríguez-Guardado, A., Antinori, S., Sal, E., Malaj, X., Seidel, D., Cornely, O. A., Koehler, P., Confederation, F. E. & Worki, I. S. H. A. M. **COVID-19-Associated Pulmonary Aspergillosis, March-August 2020.** *Emerg Infect Dis* 27, 1077-1086 (2021). doi:10.3201/eid2704.204895
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- pulmonary aspergillosis in critically ill coronavirus disease 2019 patients- a multinational observational study by the European Confederation of Medical Mycology.** *Clin Microbiol Infect* (2021). doi:10.1016/j.cmi.2021.08.014
10. Kron, F., Wingen-Heimann, S. M., Jeck, J., Lazzaro, C., Cornely, O. A. & Thielscher, C. **Principal-agent theory-based cost and reimbursement structures of isavuconazole treatment in German hospitals.** *Mycoses* **64**, 86-94 (2021). doi:10.1111/myc.13192
  11. Koehler, P., Cornely, O. A. & Kochanek, M. **Bronchoscopy safety precautions for diagnosing COVID-19 associated pulmonary aspergillosis-A simulation study.** *Mycoses* **64**, 55-59 (2021). doi:10.1111/myc.13183
  12. Jeck, J., Wingen-Heimann, S. M., Thielscher, C., Kron, A., Bonn, J., Jakobs, F., Grau, S., Enoch, D. A., Micallef, C., Cornely, O. A. & Kron, F. **Reimbursement of innovative pharmaceuticals in English and Spanish hospitals-The example of isavuconazole.** *Mycoses* (2021). doi:10.1111/myc.13336
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  14. Budin, S., Salmanton-Garcia, J., Koehler, P., Stemler, J., Cornely, O. A. & Mellingshoff, S. C. **Validation of the EQUAL Aspergillosis Score by analysing guideline-adherent management of invasive pulmonary aspergillosis.** *J Antimicrob Chemoth* **76**, 1070-1077 (2021). doi:10.1093/jac/dkaa518
  15. Brockhoff, R. A., Hicks, S. R., Salmanton-García, J., Dušek, D., Stahl, J. P., Beeching, N. J. & Cornely, O. A. **Training in infectious diseases across europe in 2021 - A survey on training delivery, content and assessment.** *Clin Microbiol Infect* (2021). doi:10.1016/j.cmi.2021.07.033
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- Lomentospora prolificans infections in pediatric patients: Analysis of 55 cases from FungiScope (R) and the literature.** *Int J Infect Dis* **92**, 114-122 (2020). doi:10.1016/j.ijid.2019.12.017
21. Schwartz, S., Cornely, O. A., Hamed, K., Marty, F. M., Maertens, J., Rahav, G., Herbrecht, R. & Heinz, W. J. **Isavuconazole for the treatment of patients with invasive fungal diseases involving the central nervous system.** *Med Mycol* **58**, 417-424 (2020). doi:10.1093/mmy/myz103
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  26. Koehler, P., Mellinghoff, S. C., Stemler, J., Otte, F., Berkhoff, A., Beste, N., Budin, S., Cornely, F. B., Evans, J. M., Fuchs, F., Pesch, L., Rebholz, A. W., Reiner, O., Schmitt, M., Schuckelt, J., Spiertz, A., Salmanton-Garcia, J., Kron, F. & Cornely, O. A. **Quantifying guideline adherence in mucormycosis management using the EQUAL score.** *Mycoses* **63**, 343-351 (2020). doi:10.1111/myc.13047
  27. Koehler, P., Denis, B., Denning, D. W., Gangneux, J. P., Hoenigl, M., Kontoyiannis, D. P., Krause, R., Lagrou, K., Lass-Flörl, C., Maertens, J., Marekovic, I., Meis, J. F., Molina, J. M., Plesko, S., Prattes, J., Rath, P. M., Rautemaa-Richardson, R., Richardson, M., Segal, E., Seidel, D., Spriet, I., Steinmann, J., Verweij, P. E., Cornely, O. A. & Mycolog, E. C. M. **European confederation of medical mycology expert consult-An ECMM excellence center initiative.** *Mycoses* **63**, 566-572 (2020). doi:10.1111/myc.13076
  28. Koehler, P., Cornely, O. A., Bottiger, B. W., Duse, F., Eichenauer, D. A., Fuchs, F., Hallek, M., Jung, N. M., Klein, F., Persigehl, T., Rybniker, J., Kochanek, M., Boll, B. & Shimabukuro-Vornhagen, A. **COVID-19 associated pulmonary aspergillosis.** *Mycoses* **63**, 528-534 (2020). doi:10.1111/myc.13096
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31. Cornely, F. B., Cornely, O. A., Salmanton-Garcia, J., Koehler, F. C., Koehler, P., Seifert, H., Wingen-Heimann, S. & Mellinghoff, S. C. **Attributable mortality of candidemia after introduction of echinocandins.** *Mycoses* **63**, 1373-1381 (2020). doi:10.1111/myc.13177
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41. Buchta, V., Bolehovska, R., Hovorkova, E., Cornely, O. A., Seidel, D. & Zak, P. **Saprochaete clavata Invasive Infections - A New Threat to Hematological-Oncological Patients.** *Front Microbiol* **10** (2019). doi:10.3389/fmicb.2019.02196
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312. Cornely, O. A., Koehler, P., Mellingshoff, S. & Arikian-Akdagli, S. **"EQUAL" Aspergilloz Skoru 2018: İnvazif Pulmoner Aspergillozda Klinik Yönetimin Kalitesini Belirlemek Amacıyla Güncel Kılavuzlar Kullanılarak Geliştirilmiş Avrupa Tıbbi Mikoloji Konfederasyonu ("ECMM") Skoru**. Turkish ver. (ZB Med, Publisso - Fachrepositorium Lebenswissenschaften, 2018). doi:10.4126/FRL01-006411826
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## Lectures

316. Koehler, P. **"IFD prophylaxis and management – Cologne, Germany"** in *Mycology*, 21.06.2021, Virtual conference

317. Koehler, P. **"ICU admission of hematological patients during the pandemic: Who to admit and what's the prognosis?"** in *EHA2021 Virtual Congress - European Hematology Association*, 21.06.2021, Virtual conference
318. Koehler, P. **"COVID-19-associated pulmonary aspergillosis (CAPA): Definition, diagnosis and treatment"** in *Pfizer – Shape Series Suspecting IMD in a changing landscape with emerging patient populations (SHAPE)*, 21.06.2021, Virtual conference
319. Koehler, P. **"Session: Invasive fungal infections in critical care - Title: Critical care management of Influenza and COVID-19-associated pulmonary aspergillosis"** in *ECCMID 2021*, 21.06.2021, Virtual conference
320. Koehler, P. **"COVID-19 associated pulmonary aspergillosis (CAPA) - Definition, diagnosis and treatment"** in *BioRad*, 21.06.2021, Virtual conference
321. Koehler, P. **"CAPA, what we have learned in the last year?"** in *Coloquio Latinoamericano de Enfermedades Criticas CLIC 2021*, 21.06.2021, Virtual conference
322. Cornely, O. A. **"Case based discussion on Invasive Mold infections: The right patient for the "Latest Azole"** in *Pfizer Medical Affairs India Virtual Train The Trainer Cresemba Launch Symposium*, 29.01.2021, Virtual conference
323. Cornely, O. A. **"Best treatment options for COVID Associated Pulmonary Aspergillosis CAPA"** in *Saudi Society of Critical Care*, 30.03.2021, Virtual conference
324. Cornely, O. A. **"Global standard of antifungal prophylaxis: Posaconazole in hematology patients"** in *MSD Japan - Posaconazole Symposium Japan*, 17.04.2021, Virtual conference
325. Cornely, O. A. **"Konzepte zur Leitlinienentwicklung in der Infektiologie - Fokus ECMM"** in *PEG Bad Honnef-Symposium 2021*, 20.04.2021, Virtual conference
326. Cornely, O. A. **"Kompetenzfeld Klinische Studien (QB1)"** in *Uniklinik Köln*, 15.06.2021, Virtual conference
327. Cornely, O. A. **"Emerging fungal pathogens 2021"** in *KIT 2021*, 19.06.2021, Virtual conference
328. Cornely, O. A. **"DZIF-Standortpräsentation Bonn-Köln"** in *DZIF-Retreat 2021*, 21.06.2021, Virtual conference
329. Cornely, O. A. **"The Latest Azole: Changing the way we manage IMIs"** in *Pfizer Medical Affairs India Virtual Train The Trainer Cresemba Launch Symposium*, 29.01.2021, Virtual conference
330. Cornely, O. A. **"Therapie nosokomialer Infektionen"** in *Uniklinik Köln - Vorlesung Praktisches Jahr*, 08.02.2021, Virtual conference
331. Cornely, O. A. **"Infektionskrankheiten & Personalisierte Medizin"** in *Konferenz des Internationalen Konsortiums für personalisierte Medizin (ICPerMed)* 26.02.2021, Virtual conference
332. Cornely, O. A. **"What Can We Do Better for Our Patients with Invasive Mold Disease (IMD)?"** in *Plenary lecture at Taiwan Infectious Disease Society Annual Meeting*, 20.03.2021, Virtual conference
333. Cornely, O. A. **"Newer antifungals in the pipeline"** in *MYCOCON 2021*, 27.03.2021, Virtual conference
334. Cornely, O. A. **"Where is the place of isavuconazole in our hematology patients at highest risk"** in *ID & Hema departmental webinar at King Abdul Aziz Medical City*, 08.04.2021, Virtual conference
335. Cornely, O. A. **"Overview of Medical Mycology European Guidelines"** in *Institut Pasteur Course for Medical Mycology*, 14.04.2021, Virtual conference
336. Cornely, O. A. **"Pilzinfektionen (10)"** in *Infektio Update 2021*, 08.05.2021, Virtual conference
337. Cornely, O. A. **"Management invasiver Pilzinfektionen"** in *DGHO - Virtueller 17. Trainingskurs für Klinische Infektiologie in der Hämatologie und Onkologie*, 29.05.2021, Virtual conference

338. Cornely, O. A. **"Treatment algorithms and risk factors that can influence the decision and choice of antifungal"** in *REACH Summit - Hematology and BMT*, 19.06.2021, Virtual conference
339. Cornely, O. A. **"TI CTU Präsentation"** in *DZIF-Retreat 2021*, 21.06.2021, Virtual conference
340. Cornely, O. A. **"Rational approach to appropriate antifungal therapy: Guideline recommendations & Practical considerations"** in *Cresemba Webinar*, 23.07.2021, Virtual conference
341. Cornely, O. A. **"Therapie invasiver Pilzinfektionen 2021 (State of the Art)"** in *Campus Infektiologie 2021*, 29.08.2021, Hohenkammer
342. Koehler, P. **"Diagnostik und Therapie von Pilzinfektionen"** in *Akademie für Fort- und Weiterbildung; GPR-Klinikum, Akademisches Lehrkrankenhaus der JG-Universität Mainz*, 21.06.2021, Rüsselsheim, Germany
343. Koehler, P. **"CAPA Management Guidance"** in *ECMM Webinar on COVID-19 associated Aspergillosis: Immunology, Diagnosis and Treatment*, 21.06.2021, Virtual conference
344. Koehler, P. **"Pilzinfektionen"** in *InfektioUpdate*, 21.06.2021, Wiesbaden, Germany
345. Koehler, P. **"Vorsitz: Register und Kohorten"** in *DMykG*, 21.06.2021, Virtual conference
346. Koehler, P. **"IAPA and CAPA – the Old and New Kid on the Block"** in *2. Münchner Mykologisches Meeting M3 - Neue Erkenntnisse aus dem Bereich der invasiven Pilzinfektionen*, 21.06.2021, Virtual conference
347. Koehler, P. **"Immunologische Parameter in der Pilzdiagnostik – T Zellen"** in *AmBisome Advisory Board Pädiatrie/Immunologie*, 21.06.2021, Virtual conference
348. Koehler, P. **"Covid-19 und Fadenpilzinfektionen"** in *Webinar der Sektion Antimykotische Therapie der Paul-Ehrlich-Gesellschaft für Chemotherapie e.V.*, 21.06.2021, Virtual conference
349. Koehler, P. **"Defining and Managing COVID-19 Associated Pulmonary Aspergillosis: The 2020 ECMM/ISHAM Consensus Criteria"** in *Mycology 2020 - Aspergillosis and COVID-19: lessons learned in diagnosis and treatment*, 21.06.2021, Virtual conference
350. Koehler, P. **"Klinik invasiver Pilzinfektionen Lungenpathologie"** in *57. Symposium der Internationalen Akademie für Pathologie e.V.*, 21.06.2021, Virtual conference
351. Koehler, P. **"Die Immunologie in der Diagnostik und Therapie von Pilzinfektionen – Immunologische Parameter in der Pilzdiagnostik"** in *GILEAD AmBisome Advisory Board Pädiatrie/Immunologie*, 21.06.2021, Virtual conference
352. Koehler, P. **"Covid-19 Associated Pulmonary Aspergillosis (CAPA) - Wieviel Zeit bleibt für eine erfolgreiche Therapie?"** in *GILEAD - AmBisome Advisory Board Intensivmedizin: Aspergillose bei kritisch Kranken: Offene Fragen*, 21.06.2021, Virtual conference
353. Koehler, P. **"New antimycotics: rezafungin"** in *DMykG*, 21.06.2021, Virtual conference
354. Koehler, P. **"COVID -19 assoziierte pulmonale Aspergillose (CAPA) - Definition, Diagnostik und Therapie"** in *CME Fortbildung Pfizer Pharma*, 21.06.2021, Virtual conference
355. Koehler, P. **"Diagnostik und Therapie von Pilzinfektionen"** in *Infektionsakademie*, 21.06.2021, Duisburg, Germany
356. Koehler, P. **"Pilzinfektionen"** in *Infektionsakademie Spring School*, 21.06.2021, Cologne, Germany
357. Koehler, P. **"Invasive Aspergillosen - Epidemiologie, Diagnostik und Therapie"** in *60. Kongress der Deutschen Gesellschaft für Pneumologie und Beatmungsmedizin*, 21.06.2021, Munich, Germany
358. Koehler, P. **"My personal 2019 view on mucormycosis"** in *DMykG*, 21.06.2021, Mannheim, Germany
359. Koehler, P. **"ECMM CANDIDA III Study"** in *TIMM*, 21.06.2021, Nizza, France

360. Koehler, P. **"Invasive Aspergillose bei Influenza-Patienten auf der Intensivstation"** in *1. Münchner Mykologisches Meeting M<sup>3</sup> von unterschätzten Risikofaktoren zum Notfall*, 21.06.2021, Munich, Germany
361. Koehler, P. **"Pro - Empirische Echinocandintherapie bei Sepsis - ein Muss!"** in *Pro & Contra Experten-Workshop „Infektionen in der Intensivmedizin“*, 21.06.2021, Cologne, Germany
362. Koehler, P. **"Systemische Mykosen"** in *Seminarzyklus „Infektiologie“ – Landesapothekerkammer*, 21.06.2021, Hessen, Germany
363. Koehler, P. **"Immunologic Markers for Treatment Stratification in Invasive Mold Infection"** in *TIMM*, 21.06.2021, Nizza, France
364. Koehler, P. **"Abdominal Candidiasis in ICU patients"** in *TIMM*, 21.06.2021, Nizza, France
365. Cornely, O. A. **"Patient-centric strategy for management of mould infections"** in *Pfizer ACE Summit Meeting*, 14.02.2019, Vienna, Austria
366. Cornely, O. A. **"Pilzinfektionen bei neutropenen Patienten"** in *Fortbildung Pilzinfektionen bei neutropenen Patienten*, 22.01.2019, Siegen, Germany
367. Cornely, O. A. **"Invasive Pilzinfektionen - Diskussion mit Fallbeispielen (2)"** in *Gilead Campus Infektiologie 2019*, 25.08.2019, Seeon, Germany
368. Cornely, O. A. **"Invasive Fungal Infections in Neutropenic Patients under Profilaxy with Triazolics"** in *Care XI Meeting "Continuing Antifungal Research and Education"*, 27.04.2019, Sao Paulo, Brasil
369. Cornely, O. A. **"Medical Mycology in Europe: structures, challenges and opportunities"** in *Medical Mycology Course Institut Pasteur*, 25.03.2019, Paris, France
370. Cornely, O. A. **"Mucormycosis (2)"** in *TIMM 2019 - Plenary Session: "One World One Guideline ECMM MSG-ERC (EFISG) ISHAM Guidelines initiative"*, 12.10.2019, Nice, France
371. Cornely, O. A. **"C. difficile infections: New treatment paradigm"** in *Hot Topics in Infectious Diseases in India (HTIDI)*, 08.06.2019, Mumbai, India
372. Cornely, O. A. **"IFI in the immunocompromised host"** in *Hot Topics in Infectious Diseases in India (HTIDI)*, 08.06.2019, Mumbai, India
373. Cornely, O. A. **"Global guideline for the diagnosis and management of mucormycosis (2)"** in *DMykG Jahrestagung 2019*, 06.09.2019, Mannheim, Germany
374. Cornely, O. A. **"Defining breakthrough invasive fungal infection"** in *DMykG Jahrestagung 2019*, 06.09.2019, Mannheim, Germany
375. Cornely, O. A. **"Pilzinfektionen (6)"** in *Infektio Update 2019*, 25.05.2019, Mainz, Germany
376. Cornely, O. A. **"Advances and challenges of IFI management in hemato-oncology"** in *Advances and Challenges of IFI Management in Hemato-Oncology*, 21.03.2019, Ljubljana, Slovenia
377. Cornely, O. A. **"Konflikte zwischen Standards der Hämatologie und der Infektiologie"** in *108. AML-CG Studientreffen*, 24.05.2019, Leverkusen, Germany
378. Cornely, O. A. **"Current approaches to study efficacy in rare invasive fungal infections (2)"** in *Israeli ID Society Annual Conference*, 16.05.2019, Kfar Blum, Israel
379. Cornely, O. A. **"Update Mykologie (2)"** in *12. Deutsches Infektiologie-Update*, 07.12.2019, Hamburg, Germany
380. Cornely, O. A. **"Unterschiedliche Ansprechraten der Antimykotika bei Schimmelpilzinfektionen"** in *Gilead Advisory Board Meeting*, 13.02.2019, Frankfurt, Germany
381. Cornely, O. A. **"Mistakes we haematologists can avoid today, and in the future"** in *EBMT Cresemba Satellite Symposium*, 24.03.2019, Frankfurt, Germany
382. Cornely, O. A. **"Global epidemiology trends of IA and IM infections in haematology"** in *EBMT Pfizer Advisory Board Meeting*, 24.03.2019, Frankfurt, Germany

383. Cornely, O. A. **"Current approaches to study efficacy in rare invasive fungal infections (1)"** in *2nd Antifungal Drug Symposium Duke University*, 10.05.2019, Durham, United States
384. Cornely, O. A. **"Update Pilzinfektionen (1)"** in *16. Kölner Antibiotikatag*, 26.01.2019, Cologne, Germany
385. Cornely, O. A. **"Aktuelles aus dem Reich der Pilze"** in *Rotary Club Köln Ville*, 18.01.2019, Cologne, Germany
386. Cornely, O. A. **"Pilzinfektionen (7)"** in *Fortbildung Pilzinfektionen Viszeralchirurgie Uniklinik Köln*, 07.10.2019, Cologne, Germany
387. Cornely, O. A. **"State-of-the-Art Therapie von Pilzinfektionen"** in *16. Trainingskurs für Klinische Infektiologie in der Hämatologie und Onkologie*, 04.05.2019, Bonn, Germany
388. Cornely, O. A. **"Infektionen bei Krebspatienten"** in *DGHO Roadmap* 14.03.2019, Berlin, Germany
389. Cornely, O. A. **"Vorstellung AGIHO"** in *DGHO Jahrestagung 2019 - AGIHO Symposium*, 13.10.2019, Berlin, Germany
390. Cornely, O. A. **"Managing Invasive Aspergillosis in the Era of Triazole Resistance"** in *Biannual Congress of the Brazilian Society of Infectious Diseases (INFECTO 2019) - Satellite Symposium: "Invasive Fungal Infections"*, 12.09.2019, Belém, Brasil
391. Cornely, O. A. **"ESCMID guidelines for fungal diseases"** in *Biannual Congress of the Brazilian Society of Infectious Diseases (INFECTO 2019)*, 12.09.2019, Belém, Brasil
392. Cornely, O. A. **"Importance of antifungal prophylaxis"** in *MSD Expert Input Forum - Noxafil Tab Launch*, 20.06. - 21.06.2019, Beirut, Lebanon
393. Cornely, O. A. **"Role of Posaconazole tablet formulation in antifungal prophylaxis"** in *MSD Expert Input Forum - Noxafil Tab Launch*, 20.06. - 21.06.2019, Beirut, Lebanon
394. Cornely, O. A. **"From bench to bedside and beyond: the growing evidence of antifungal prophylaxis"** in *MSD AP ID Forum "Infections in the immunocompromised patients"*, 30.06.2019, Bangkok, Thailand
395. Cornely, O. A. **"Why immunocompromised patients fail to respond to antifungals"** in *ATHENA 2019 - Session: Lessons from the management of difficult infections in the ICU* 20.11.2019, Athen, Greece
396. Cornely, O. A. **"New antifungals (APX001, F901318, AmB Cochleate, SCY078, VL2397)"** in *ATHENA 2019 - Session: Fungal Infections*, 21.11.2019, Athen, Greece
397. Cornely, O. A. **"What can we do better for our patients with IMD?"** in *ECCMID Pfizer Symposium "Advance your thinking on invasive mould disease"*, 14.04.2019, Amsterdam, Netherlands
398. Koehler, P. **"Pro - Die Candidurie beim Intensivpatienten muss immer antimykotisch behandelt werden"** in 21.06.2021, Cologne, Germany
399. Koehler, P. **"Immune Parameters to Diagnose Mucormycosis"** in *Gilead Expertenforum*, 21.06.2021, Frankfurt, Germany
400. Koehler, P. **"Prophylaxe, Diagnostik und Therapie invasiver Mykosen"** in *Trainingskurs: Rationale Diagnostik und Therapie von Infektionen in der Hämatologie und Onkologie*, 21.06.2021, Cologne, Germany
401. Cornely, O. A. **"Management of invasive fungal infections in the haematology setting"** in *Singapore Society of Hematology (SSH) Annual Update*, 19.05.2018, Singapore
402. Cornely, O. A. **"Invasive Pilzinfektionen - Diskussion mit Fallbeispielen (1)"** in *Gilead Campus Infektiologie 2018*, 26.08.2018, Seeon, Germany
403. Cornely, O. A. **"Epidemiology and choice of the best treatment for managing Candidaemia"** in *Hospital Forum on Candidaemia/Invasive Candidiasis*, 15.09.2018, Sao Paulo, Brazil

404. Cornely, O. A. **"Focus on Mucormycosis"** in *Pfizer Isavuconazole Medical Advisory Board Meeting*, 10.07.2018, Paris, France
405. Cornely, O. A. **"Prophylaxe und Therapie von Pilzinfektionen"** in *AML Studientreffen*, 27.04.2018, Münster, Germany
406. Cornely, O. A. **"Welche Antimykotika vor der Zulassung verändern unsere Therapiepfade"** in *DGIM 2018*, 15.04.2018, Mannheim, Germany
407. Cornely, O. A. **"Prophylaxestrategien in der Hämatologie und Onkologie"** in *DGIM 2018*, 16.04.2018, Mannheim, Germany
408. Cornely, O. A. **"Pilzinfektionen (5)"** in *Infektio Update 2018*, 09.06.2018, Mainz, Germany
409. Cornely, O. A. **"Therapeutic Drug Monitoring of Antifungal Compounds in Real Life (1)"** in *ECCMID 2018 - MSD Satellite Symposium*, 21.04.2018, Madrid, Spain
410. Cornely, O. A. **"Pro/con debate: Isavuconazole (not amphotericin B) as primary treatment for mucormycosis"** in *ECCMID 2018*, 24.04.2018, Madrid, Spain
411. Cornely, O. A. **"Therapeutic Drug Monitoring of Antifungal Compounds in Real Life (2)"** in *APCCMI-ICC Conference 2018 - MSD Symposium*, 01.09.2018, Hong Kong, China
412. Cornely, O. A. **"Update Mykologie - Neue Entwicklungen 2018 mit Relevanz für die Patientenversorgung"** in *11. Deutsches Infektiologie Update*, 08.12.2018, Hamburg, Germany
413. Cornely, O. A. **"Early response predictors" in der antimykotischen Therapie: Bildgebung bei neutropenischen vs. nicht-neutropenischen Patienten"** in *Gilead AmBisome Advisory Board*, 19.01.2018, Frankfurt, Germany
414. Cornely, O. A. **"New Antifungals in the pipeline"** in *Postgraduate Education Course*, 19.09.2018, Delhi, India
415. Cornely, O. A. **"Update: Pilzinfektionen (4)"** in *15. Kölner Antibiotikakongress*, 27.01.2018, Cologne, Germany
416. Cornely, O. A. **"Posaconazol in der Prophylaxe von Pilzinfektionen: ist nach einer Dekade schon alles erreicht?"** in *KIT 2018*, 21.06.2018, Cologne, Germany
417. Cornely, O. A. **"Antifungale Therapie der (nahen) Zukunft: Was versprechen die neuen Substanzen?"** in *KIT 2018*, 22.06.2018, Cologne, Germany
418. Cornely, O. A. **"Invasive Aspergillose und Mukormykose – Herausforderungen bzgl. Diagnostik und Therapie in der Hämatookologie"** in *KIT 2018 - Pfizer Symposium*, 22.06.2018, Cologne, Germany
419. Cornely, O. A. **"Best practices in Management of invasive fungal infections"** in *Astellas Lecture Tour - Asia*, 17.05.2018, Chennai, India
420. Cornely, O. A. **"Bezlotoxumab: an update"** in *MSD Zinplava Advisory Board Meeting*, 11.07.2018, Bern, Switzerland
421. Cornely, O. A. **"The role of Posaconazole in high risk patients management"** in *Annual Congress of the Lebanese Society of Infectious Diseases*, 23.02.2018, Beirut, Libanon
422. Cornely, O. A. **"Stewardship of antifungal: Neutropenic and non-Neutropenic patients"** in *Astellas Speaker Tour - Asia*, 18.05.2018, Bangkok, Thailand
423. Cornely, O. A. **"Challenge in management of invasive candidiasis and individualized antifungal therapy"** in *Astellas Lecture Tour - Asia*, 18.05.2018, Bangkok, Thailand
424. Cornely, O. A. **"Isavuconazole: A novel triazole in our armamentarium"** in *ICHS 2018 - Pfizer Symposium*, 19.06.2018, Athens, Greece
425. Cornely, O. A. **"Place of fidaxomicin and bezlotoxumab in the treatment of Clostridium difficile infections"** in *Annual Meeting of the Dutch Society for Microbiology*, 27.03.2018, Arnheim, Netherlands

426. Cornely, O. A. **"New patient management opportunities in the fight against invasive mould disease (IMD)"** in *ISHAM 2018 - Pfizer Cresemba Symposium*, 01.07.2018, Amsterdam, Netherlands
427. Cornely, O. A. **"Outcome and treatment of Aspergillus terreus infections"** in *ISHAM 2018*, 02.07.2018, Amsterdam, Netherlands
428. Koehler, P. **"Diagnosis and monitoring of CPA by Aspergillus-reactive T cells, Immunphenotyping of Patients and Impact of Immune Checkpoint Inhibition on CPA"** in *First CPAnet Symposium*, 21.06.2021, Borstel, Germany
429. Koehler, P. **"Fungus-reactive T cells for Diagnosing and Monitoring of Invasive Fungal Infections"** in *TIMM 2017*, 21.06.2021, Belgrad, Serbia
430. Cornely, O. A. & Verweij, P. **"Study protocol azole resistant A. fumigatus (Europe)"** in *2nd Duden Conference*, 21.01.2017, Berg en Dal, Netherlands
431. Cornely, O. A., Khanna, N. & Mueller, N. **"First Isavuconazole experiences in Switzerland + Germany – case presentations"** in *Basilea Swiss Isavuconazole Advisory Board Meeting*, 12.07.2017, Bern, Switzerland
432. Cornely, O. A. **"Fungal infections management in patients with hematologic malignancies (1)"** in *MSD Lectour Tour - South Korea*, 13.09.2017, Seoul, South Korea
433. Cornely, O. A. **"Fungal infections management in patients with hematologic malignancies (2)"** in *MSD Lecture Tour - South Korea*, 14.09.2017, Seoul, South Korea
434. Cornely, O. A. **"Welches Antimykotikum in welcher Situation - Diskussion mit Fallbeispielen (2)"** in *Gilead Campus Infektiologie 2017*, 27.08.2017, Seeon, Germany
435. Cornely, O. A. **"Intraabdominal candidiasis - Is it mandatory to perform antifungal sensitivity in all laboratories"** in *Indian Association of Medical Microbiology Conference*, 24.11.2017, Ranchi, India
436. Cornely, O. A. **"New Antifungals"** in *Indian Association of Medical Microbiology Conference*, 26.11.2017, Ranchi, India
437. Cornely, O. A. **"New advances in Anti-fungal therapy - including ECIL-6 guidelines update"** in *Basilea Talk - East Midlands Antifungal Update*, 14.03.2017, Nottingham, United Kingdom
438. Cornely, O. A. **"Neue Antimykotika - Stand der klinischen Entwicklung"** in *DMykG Jahrestagung 2017*, 02.09.2017, Münster, Germany
439. Cornely, O. A. **"Pilznachweis - Was nun?"** in *DGIM 2017*, 01.05.2017, Mannheim, Germany
440. Cornely, O. A. **"Current standards in invasive candidemias"** in *Set-up for collaborative CTUs* 22.11.2017, Kochi, India
441. Cornely, O. A. **"Developing treatment options for orphan diseases"** in *Symposium Kaohsiung Medical University*, 07.05.2017, Kaohsiung, Taiwan
442. Cornely, O. A. **"Update Mykologie (1)"** in *10. Deutsches Infektiologie Update*, 02.12.2017, Hamburg, Germany
443. Cornely, O. A. **"Fungal infections management in patients with hematologic malignancies (3)"** in *MSD Lectour Tour - South Korea*, 14.09.2017, Goyang-si, South Korea
444. Cornely, O. A. **"Therapie nachgewiesener Infektionen mit Candida, Aspergillus und Mucorales"** in *50 Jahre PEG - Workshop* 11.04.2017, Frankfurt, Germany
445. Cornely, O. A. **"Infektionsprophylaxe bei ALL: Altbewährtes und neue Ansätze"** in *ALL Academy - Management der ALL des Erwachsenen*, 22.09.2017, Frankfurt, Germany
446. Cornely, O. A. **"Prophylaxis of Invasive Fungal Infections in High Risk Patients"** in *INFOCUS 2017 - MSD Symposium*, 16.11.2017, Curitiba, Brazil

447. Cornely, O. A. **"The management of breakthrough fungal infections in patients with hematologic cancer: A case-based discussion"** in *INFOCUS 2017*, 17.11.2017, Curitiba, Brazil
448. Cornely, O. A. **"Prophylactic Antifungal Stewardship in Hematologic and Transplant Patients"** in *INFOCUS 2017*, 18.11.2017, Curitiba, Brazil
449. Cornely, O. A. **"Update: Pilzinfektionen (3)"** in *14. Kölner Antibiotikakatag*, 28.01.2017, Cologne, Germany
450. Cornely, O. A. **"Pilzinfektionen der Lunge"** in *Qualitätszirkel Pneumologie Köln-Bonn*, 26.04.2017, Cologne, Germany
451. Cornely, O. A. **"Pilzinfektionen (4)"** in *Infektio Update 2017*, 13.05.2017, Cologne, Germany
452. Cornely, O. A. **"Early Management Strategies for IFI in high risk patients"** in *ISAAR-ICIC Conference 2017 - MSD Symposium*, 15.09.2017, Busan, South Korea
453. Cornely, O. A. **"Experiences from FungiScope© - an international register for rare fungal infections"** in *FungiNet Kick-off Meeting* 20.03.2017, Borstel, Germany
454. Cornely, O. A. **"Erfahrungen mit Candidämie-Studien"** in *DZIF-BfArM Workshop*, 23.06.2017, Bonn, Germany
455. Cornely, O. A. **"State-of-the-art: Therapie Pilzinfektionen (2)"** in *14. Trainingskurs für Klinische Infektiologie in der Hämatologie und Onkologie*, 01.07.2017, Bonn, Germany
456. Cornely, O. A. **"Latest guidelines (ECIL-6, upcoming ESCMID) + treatment algorithm Cologne"** in *Basilea Swiss Isavuconazole Advisory Board Meeting*, 12.07.2017, Bern, Switzerland
457. Cornely, O. A. **"Definitions of invasive aspergillosis and outcome measures"** in *2nd Duden Conference*, 20.01.2017, Berg en Dal, Netherlands
458. Cornely, O. A. **"Where to place isavuconazole in the antifungal treatment pathways"** in *Basilea European Field Force Meeting*, 25.01.2017, Barcelona, Spain
459. Cornely, O. A. **"The role of new azoles"** in *ATHENA 2017*, 29.11.2017, Athens, Greece

## Interviews

460. Cornely, O. A. **"Pilzinfektionen bei Menschen"** in *Radio Corax* by J. Klosa, Radio, 2021
461. Cornely, O. A. **"Bedeutung der Pilze für die globale Gesundheit?"** in *Zeit Online* by H. Lesch, Online Magazin, 2021
462. Cornely, O. A. **"Was es mit der mysteriösen Pilzerkrankung in Indien auf sich hat"** in *Der Spiegel* by I. Berres, Online Magazin, 2021
463. Cornely, O. A. **"Interview: Health documentary - fungal diseases"** in *Hong Kong eHealth* by V. Chan, Online Magazin, 2021
464. Cornely, O. A. **"Mukormykose Infektionen Indien"** in *Zeit Online* by H. Lesch, Online Magazin, 2021
465. Cornely, O. A. **"Mukormykosen bei Corona-Patientinnen und - Patienten"** in *RedaktionsNetzwerk Deutschland (RND)* by L. Beigel, Online Magazin, 2021
466. Cornely, O. A. **"Why new Antifungals are desperately needed"** in *In Depth, Medical* by H. Albert, 2020
467. Cornely, O. A. **"Best Practice in Oncology"** in *Zeitschrift Best Practice Onkologie* by S. Kempe, 2020
468. Cornely, O. A. **"Mukormykose Behandlung"** in *Köln Campus Radio* by S. Rihic, 2019
469. Cornely, O. A. **"Umgang mit Candida auris in der Praxis"** in *Spektrum.de* by C. Ring, 2019
470. Cornely, O. A. **"Telefoninterview DLF "Modify Studien"** in *Deutschlandfunk* by A. Reuning, 2018
471. Cornely, O. A. **"Telefoninterview Apothekenumschau "Pilzerkrankungen"** in *Apothekenumschau* by J. Rudolf, 2018



472. Cornely, O. A. ["Live Interview - DLF/Sprechstunde "Saccharomyces boulardii"](#) in *Deutschlandfunk* by multipl., 2018
473. Cornely, O. A. ["Interview "ECMM Excellence Center Zertifizierung Uniklinik Köln"](#) in *SWR2* by multipl., 2017

## Videos

474. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: Transdiaphragmatic Mucormycosis](#). 2020
475. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: ECMM-ISHAM - One World One Guideline "Candida Infections, Methods Tutorial"](#). 2020
476. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: ECMM CandiReg - Ready to Use Platform for Outbreaks and Epidemiological Studie](#). 2020
477. Stemler, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: Baseline Chest CT in High-Risk Hematology Patients : a Survey of the ECMM and the ISHAM](#). 2020
478. Stemler, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: Invasive Scedosporiosis and Lomentosporiosis: Epidemiology - Risk Factors - Prognosis](#). 2020
479. Stemler, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: FungiScope Introduction: Global Registry for Emerging Fungal Infections](#). 2020
480. Salmanton-Garcia, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: FungiScope Introduction: Presentación del Registro FungiScope™](#). 2020
481. Hoenigl, M., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: Cytokines - Immunologic Markers for Invasive Mold Infections](#). 2020
482. Garcia-Vidal, C., Verweij, P. E., Salmanton-Garcia, J., Meijer, E. F. J., Gangneux, J.-P., White, L., Hoenigl, M., Koehler, P. & Thielebeule, J. [IDIM: ECMM Webinar - COVID19 associated Aspergillosis : immunology, diagnosis and treatment](#). 2020
483. Cornely, O. A. & Thielebeule, J. [ECMM Webinar, COVID19 associated Aspergillosis: Immunology, Diagnosis and Treatment](#). 2020
484. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: One World One Guideline - Cryptococcosis Methods Tutorial](#). 2019
485. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: EQUAL Scores - Mucormycosis](#). 2019
486. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: EQUAL Scores - Aspergillosis](#). 2019
487. Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: ECMM MSG-ERC Mucor Guideline - Published](#). 2019
488. Thielebeule, J. & Cornely, O. A. [IDIM: IAPA - Influenza Associated Invasive Aspergillosis](#). 2019
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490. Thielebeule, J. & Cornely, O. A. [IDIM: Breakthrough - IFI](#). 2019
491. Salmanton-Garcia, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: FungiScope - Risk factors and mortality in invasive \*Rasamsonia spp.\* infections](#). 2019
492. Salmanton-Garcia, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: FungiScope - Call for IFIs due to \*Paecilomyces\* or \*Purpureocillium spp.\*](#) 2019
493. Salmanton-Garcia, J., Thielebeule, J., Sprute, R. & Cornely, O. A. [IDIM: FungiScope - Búsqueda de pacientes con infección invasiva debida a \*Paecilomyces spp.\*](#) 2019
494. Salmanton-Garcia, J., Thielebeule, J. & Cornely, O. A. [IDIM: Invasive Mucormycosis - Matched-paired analysis of patients treated for invasive mucormycosis : standard treatment vs. MoveOn](#). 2019

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496. Salmanton-Garcia, J., Sarfert, D., Thielebeule, J. & Cornely, O. A. [IDIM: Risk factors and mortality in invasive Paecilomyces/Purpureocillium spp. infection : analyses of cases in the FungiScope registry and from the literature.](#) 2019
497. Thielebeule, J. & Cornely, O. A. [IDIM: ECMM One World One Guideline - Training March 2018.](#) 2018
498. Cornely, O. A. & Thielebeule, J. [ECMM 2017 Symposium Zertifizierung der Uniklinik Köln als Exzellenzzentrum durch die ECMM.](#) 2017

## Leaflets

499. Cornely, O. A. & Seidel, D. [FungiScope - Global Emerging Fungal Infection Registry.](#) University Hospital of Cologne, 2018. doi:10.4126/FRL01-006430081
500. Cornely, O. A. & Seidel, D. [FungiScope - Registro de Enfermedades Fúngicas Emergentes.](#) University Hospital of Cologne, 2017. doi:10.4126/FRL01-006430082
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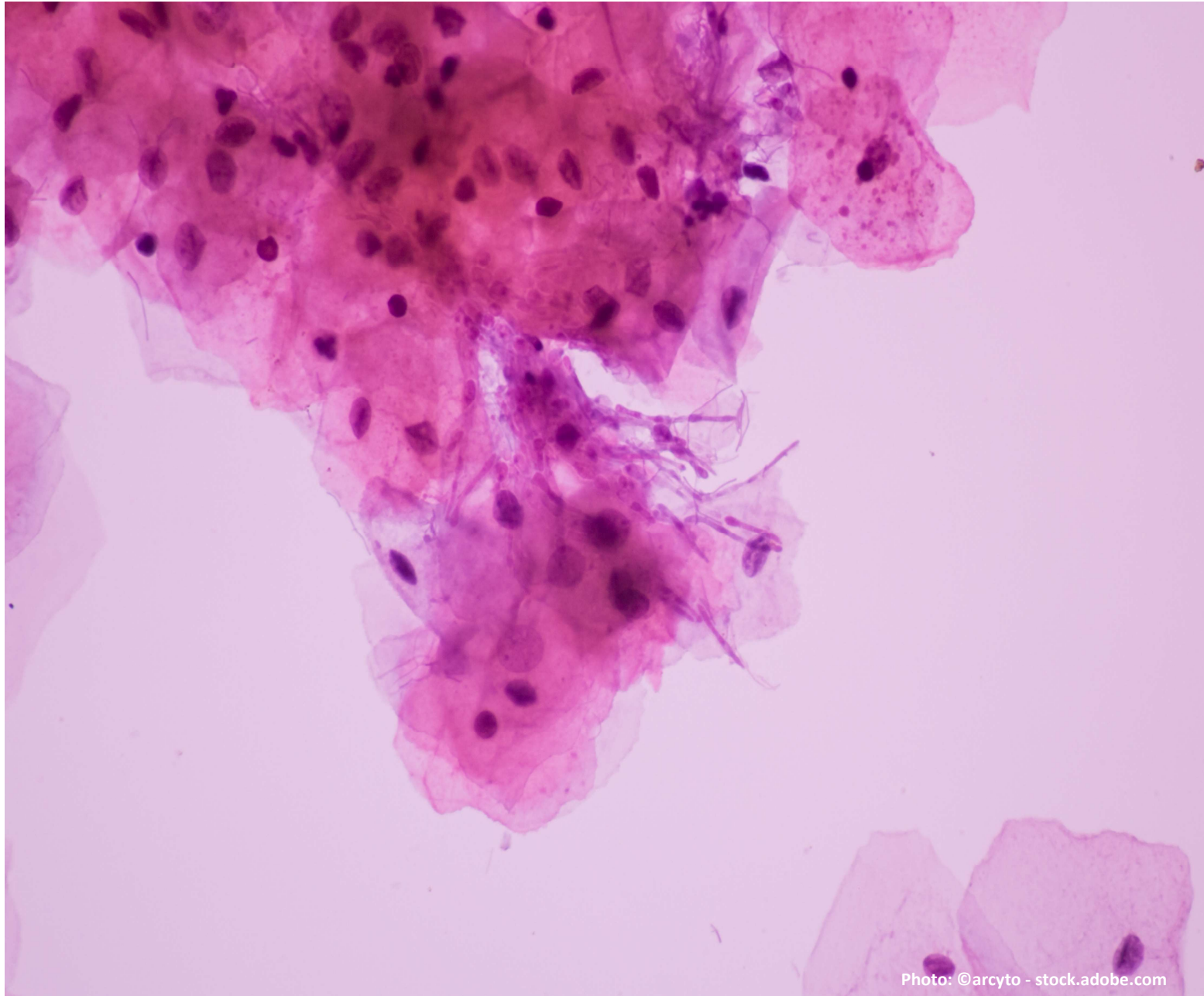


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## Progress Report 2017-2021

University Hospital Cologne

European Confederation of Medical Mycology  
ECMM Excellence Center

Joseph-Stelzmann-Straße 26  
50931 Cologne, Germany

<https://www.ecmm.info/>

@eurconfmedmycol



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