UNIVERSITÄTS KLINIKUM FRANKFURT

Rehabilitation – mit/trotz Multiresistenter Erreger (MRE) bei CF

Pro / Kontra Diskussion

Michael Hogardt

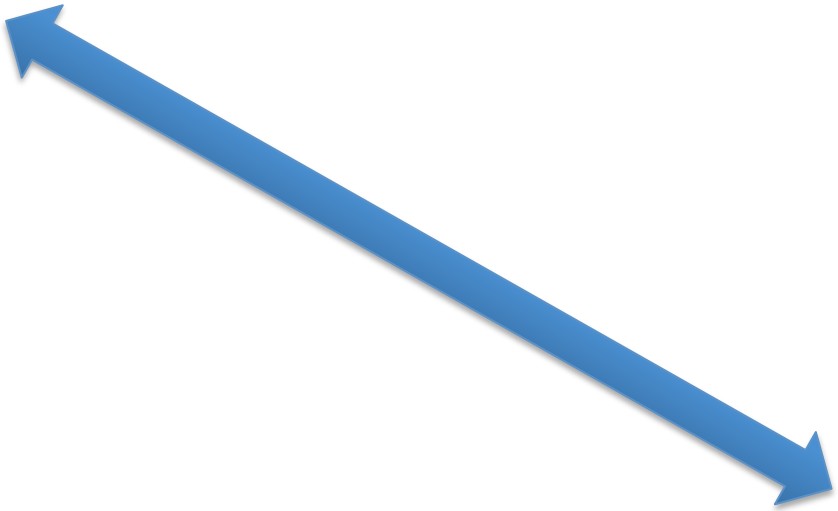
Zentrum der Hygiene
Institut für Medizinische Mikrobiologie
und Krankenhaushygiene

Zusammenfassung inkl. Literaturstellen ohne Bilder

e-mail: michael.hogardt@kgu.de

Rehabilitation mit MRE / MRGN?:

Nutzen (Pro)



Kosten (Kontra)

(Hygiene-) Management MRE:

In §23 Absatz 3 des Infektionsschutzgesetzes (IfSG) heißt es:
„Die Leiter folgender Einrichtungen haben sicherzustellen, dass die nach dem Stand der medizinischen Wissenschaft erforderlichen Maßnahmen getroffen werden, um nosokomiale Infektionen zu verhüten und die Weiterverbreitung von Krankheitserregern, insbesondere solcher mit Resistenzen, zu vermeiden:

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Krankenhäuser, Einrichtungen für ambulantes Operieren,
Vorsorge- oder Rehabilitationseinrichtungen, in denen eine den Krankenhäusern vergleichbare medizinische Versorgung erfolgt
etc.....

Die Einhaltung des Standes der medizinischen Wissenschaft auf diesem Gebiet wird vermutet, wenn jeweils die veröffentlichten Empfehlungen der Kommission für Krankenhaushygiene und Infektionsprävention beim Robert Koch-Institut und der Kommission Antiinfektiva, Resistenz und Therapie beim Robert Koch-Institut beachtet worden sind

https://www.gesetze-im-internet.de/ifsg/

Bundesgesundheitsbl 2009 · 52:689–698
DOI 10.1007/s00103-009-0873-x
Online publiziert: 14. Juni 2009

A. Nassauer · H. Fouquet · M. Mielke
Robert Koch-Institut, Berlin

Zur Beherrschbarkeit von Infektionen – Primum non nocere

Anmerkungen unter Berücksichtigung von Hygienestandards im Arzthaftungsrecht

- der Arzt/Einrichtungsleiter hat ihm obliegende Pflichten auf dem Gebiet der Infektionshygiene einzuhalten
- Hygienestandards sind einzuhalten, und sollen bestimmten Qualitäts-kriterien genügen. Ein gebotenes Tun oder Unterlassen muss nachvollziehbar dargelegt sein.
- als „Haftungsprophylaxe“ ist nachdrücklich zu empfehlen, die gesetzlichen Anforderungen des § 23 IfSG und die genannten Empfehlungen lückenlos einzuhalten und ihre Umsetzung sorgfältig zu dokumentieren.

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY AUGUST 2014, VOL. 35, NO. S1

CYSTIC FIBROSIS FOUNDATION GUIDELINE

Infection Prevention and Control Guideline for Cystic Fibrosis: 2013 Update

Elizabeth A. Bryson, RN, MSN, PPCN-BC, CS;[5] Mary Jo Chambers, LCSW, MSW;[6] Veronica S. Downer, RN;[7] Jill Fliege, APRN;[8] Leslie A. Hazle, MS, RN, CPN, CPHQ;[9] Manu Jain, MD, MS;[10] Bruce C. Marshall, MD, MMM;[11] Catherine O'Malley, RRT-NPS, AS;[12] Suzanne R. Pattee, JD;[13] Gail Potter-Bynoe, BS;[14] Siobhan Reid;[15] Karen A. Robinson, PhD;[16] Kathryn A. Sabadosa, MPH;[17] H. Joel Schmidt, MD;[18] Elizabeth Tullis, MD, FRCPC;[19] Jennifer Webber;[20] David J. Weber, MD, MPH[21,b]

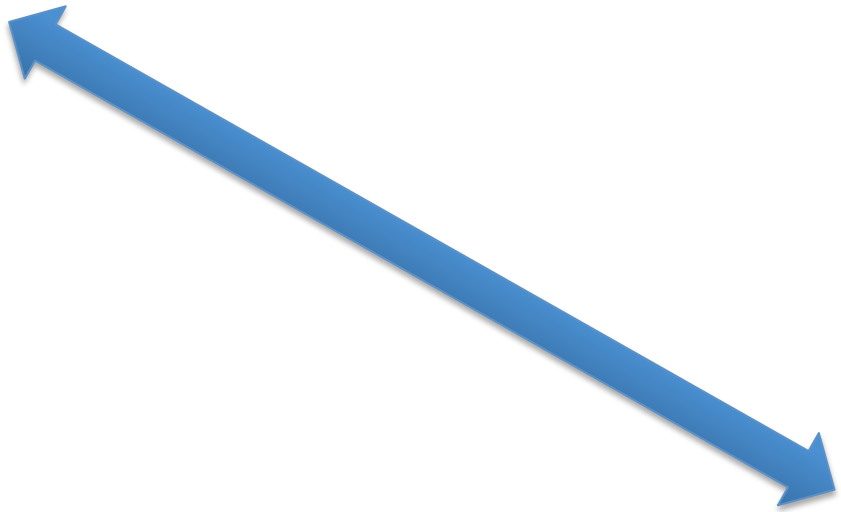
- Die Empfehlungen sind darauf ausgerichtet das Übertragungsrisiko / Infektionsrisiko zu minimieren

Kein Kontakt = Keine Exposition

Keine Patient zu Patient Übertragung („wieviel Übertragung ist akzeptabel“)

Rehabilitation mit MRE / MRGN?:

„Nutzen“ (Pro)



Übertragungen durch MRGN bzw. CF-spezifische Erreger finden sehr wahrscheinlich immer (mal) wieder statt und sind vermeidbar

„Kosten“ (Kontra)

Eur Respir J 2005; 25: 474–481
DOI: 10.1183/09031936.05.00050304

Epidemiology of *Pseudomonas aeruginosa* in a cystic fibrosis rehabilitation centre

S.G. Van daele*, H. Franckx[#], R. Verhelst[¶], P. Schelstraete*, F. Haerynck*, L. Van Simaey[¶], G. Claeys[¶], M. Vaneechoutte[¶] and F. De Baets*

- 71 different *P. aeruginosa* genotypes were identified from 749 isolates.
- 49 patients had one genotype, 20 had two genotypes and 7 had three.
- 44 patients had one or more genotypes in common with other patients (i.e. cluster types)
- most patients were colonised by only one or two P. aeruginosa genotypes and the risk of persistent **patient-to-patient transmission** was low during the study period (**4%**). Most patients with a cluster-type strain carried this strain on arrival, indicating that transmission could have happened in the past. No environmental contamination could be established.

http://www.ncbi.nlm.nih.gov/pubmed/15738291

JOURNAL OF CLINICAL MICROBIOLOGY, Sept. 1993, p. 2320–2326
0095-1137/93/092320-07$02.00/0

Vol. 31, No. 9

Genome macrorestriction analysis of diversity and variability of Pseudomonas aeruginosa strains infecting cystic fibrosis patients.

MARC J. STRUELENS,[1]* VALÉRIE SCHWAM,[1] ARIANE DEPLANO,[1] AND DANIEL BARAN[2]

Unité d'Epidémiologie, Laboratoire de Microbiologie,[1] and Unité de Mucoviscidose, Service de Pneumologie,[2] Hôpital Erasme, 808 route de Lennik, 1070 Brussels, Belgium

Received 4 March 1993/Returned for modification 29 April 1993/Accepted 13 June 1993

Genome macrorestriction fingerprinting with XbaI and DraI was used to analyze the relatedness of 166 Pseudomonas aeruginosa isolates collected from 31 cystic fibrosis patients over a 1- to 20-month period and to correlate their genotype with patterns of resistance to 14 antimicrobial agents. Quantitative comparison of intra- and interpatient similarities of P. aeruginosa macrorestriction patterns disclosed two discrete ranges that clearly discriminated subclonal variation (> 80% relatedness) and clonal diversity (10 to 70% relatedness). Cloning-derived mutants exhibited up to 20% divergence of genomic macrorestriction patterns during the course of chronic colonization of individual patients. Change of susceptibility to multiple antimicrobial agents developed in 50% of sequential pairs of isolates from individual patients. Only 19% of these susceptibility changes were attributable to strain substitution, while the majority (56%) of resistance changes were associated with minor genomic variations of a persistent strain. Sixty-six percent of patients harbored one strain, and 33% carried two strains. Three common strains colonized 5 (28%) of 18 patients attending a cystic fibrosis clinic, and another two strains colonized **two patient pairs (31%) of 13 patients staying at a rehabilitation center, suggesting potential cross-infection in these settings**. By indexing regional polymorphisms throughout the chromosome structure, macrorestriction analysis can monitor subclonal evolution of P. aeruginosa and identify isogenic resistance mutants. Quantitative macrorestriction fingerprinting enables discrimination between clonal variants and clones of distinct origins and should therefore provide a reliable tool for investigating the mode of acquisition of P. aeruginosa in cystic fibrosis patients.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC265754/

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY AUGUST 2014, VOL. 35, NO. S1

CYSTIC FIBROSIS FOUNDATION GUIDELINE

Infection Prevention and Control Guideline for Cystic Fibrosis: 2013 Update

Table 6. Relative Frequency of shared Strains of Different Cystic Fibrosis Pathogens

Species	Frequency[a]	Reference(s)
Pseudomonas aeruginosa	+++	27, 28, 30, 130–132
Burkholderia spp.	+++	27, 133–135
Methicillin-susceptible *Staphylococcus aureus*	+	136, 137
Methicillin-resistant *S. aureus*	++	138, 139
Stenotrophomonas maltophilia	+	140, 141
Achromobacter xylosoxidans	+	142–144
Mycobacterium avium complex	None described	102
Mycobacterium abscessus subsp. *massiliense*	+	66, 129, 145

[a] Frequency (+ to +++) is based on the relative number of published reports.

Saiman *et al.*, 2014

TABLE 5. Modes of Transmission of Potential Pathogens in Cystic Fibrosis

Type of transmission	Mode of transmission	Examples of respiratory tract pathogens	Source
Contact transmission	Direct or indirect contact with infectious secretions	MRSA *Pseudomonas aeruginosa* *Burkholderia* spp. Respiratory syncytial virus	Hands of healthcare workers Shared toys Contaminated respiratory therapy equipment or surfaces
Droplet transmission	Infectious droplets containing pathogens	MRSA *P. aeruginosa* *Burkholderia* spp. Influenza virus Rhinovirus Adenovirus *Mycoplasma* *Bordetella pertussis*	Infectious droplets (general size, >0.5 μm; distance, 3–6 feet [1–2 meters]) travel from respiratory tract of infected person to nasal mucosa, conjunctiva, or mouth of susceptible person during coughing, sneezing, or chest physiotherapy
Airborne transmission	Droplet nuclei arising from desiccation of droplets containing pathogens	*Mycobacterium tuberculosis* Varicella zoster virus Measles virus SARS-CoV	Airborne dissemination of droplet nuclei in respirable range that remain infectious over time and distance; may occur for some pathogens that are usually transmitted by the droplet route under unusual circumstances

NOTE. MRSA, methicillin-resistant *Staphylococcus aureus*; SARS-CoV, severe acute respiratory syndrome coronavirus.

Burkholderia-cepacia-Komplex (Bcc):

2024 U.S. Patienten/1997-2007

FIG. 1. (A) Distribution of *Burkholderia* species among U.S. CF patients. The proportions of CF patients infected with various *Burkholderia* species are shown.

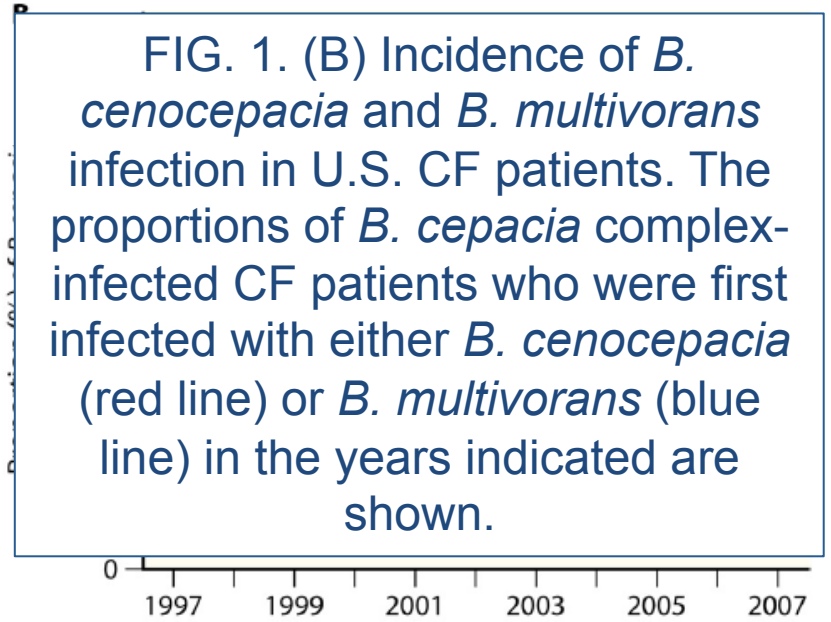
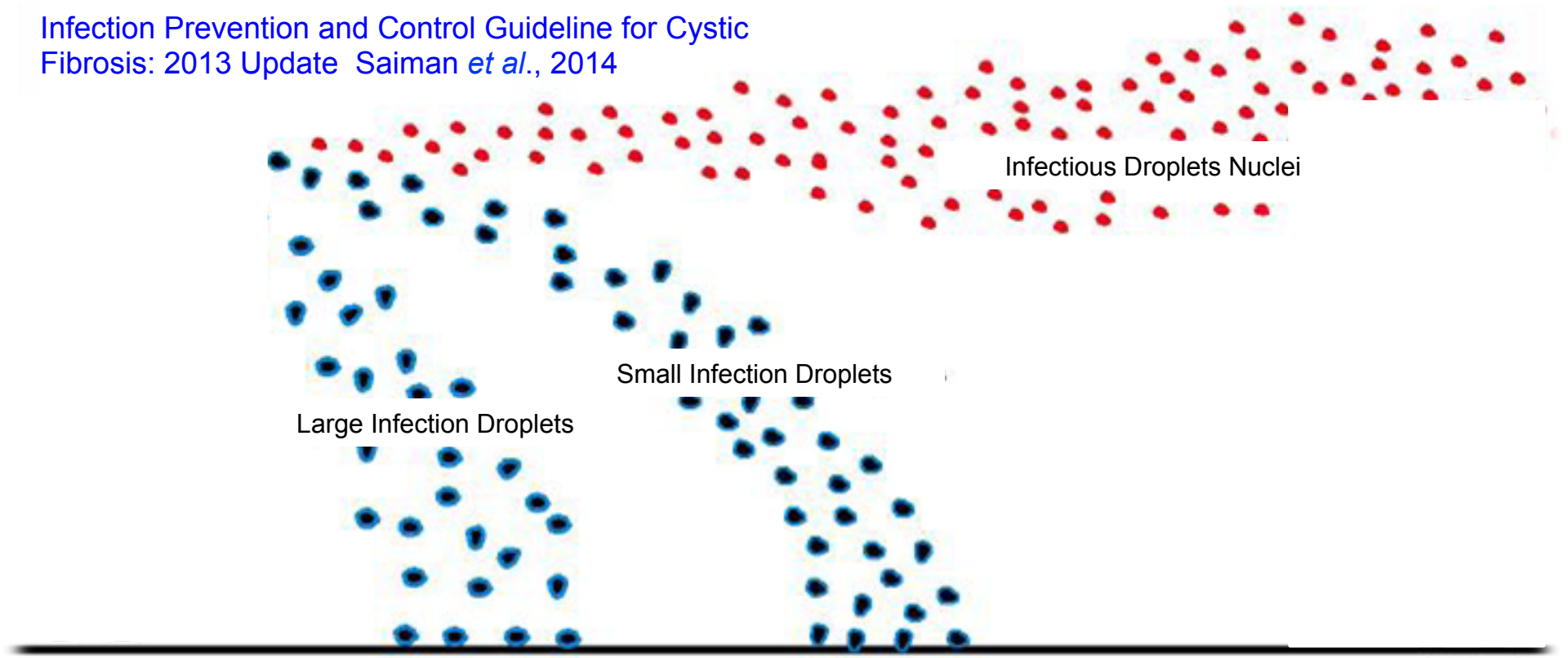


FIG. 1. (B) Incidence of *B. cenocepacia* and *B. multivorans* infection in U.S. CF patients. The proportions of *B. cepacia* complex-infected CF patients who were first infected with either *B. cenocepacia* (red line) or *B. multivorans* (blue line) in the years indicated are shown.

J. L. Puma CLINICAL MICROBIOLOGY REVIEWS, Apr. 2010, p. 299–323
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2863368/

- *B. multivorans* inzwischen (ab ca. 2000) häufiger als *B. cenocepacia* (UK/USA); Erfolg von Hygienemaßnahmen!
- *B. multivorans* Neuinfektionen: unterschiedlichen Sequenztypen (keine Übertragung sondern sporadisch = aus Umwelt)

Infection Prevention and Control Guideline for Cystic Fibrosis: 2013 Update Saiman *et al*., 2014



nach Saiman *et al*., 2014

Front Microbiol. 2014 Apr 3;5:138.

Outbreak of *Achromobacter xylosoxidans* in an Italian Cystic fibrosis center: genome variability, biofilm production, antibiotic resistance, and motility in isolated strains

Maria Trancassini[1†], Valerio Iebba[1*†], Nicoletta Citerà[1], Vanessa Tuccio[1], Annarita Magni[1], Paola Varesi[1], Riccardo V. De Biase[2], Valentina Totino[1], Floriana Santangelo[1], Antonella Gagliardi[1] and Serena Schippa[1]

- From 2005 to 2010 we had an outbreak in *A. xylosoxidans* prevalence in our CF center
- Strains who were resistant to β-lactams antibiotics, showed the specific band related to metal β-lactamase (blaIMP-1),
- The outbreak we had in our center (prevalence from 8.9 to 16%) could be explained by an enhanced adaptation of *A. xylosoxidans* in the nosocomial environment, despite of aggressive antibiotic regimens that CF patients usually undergo.

http://www.ncbi.nlm.nih.gov/pubmed/24772108

Degand *et al. BMC Infectious Diseases* (2015) 15:583
DOI 10.1186/s12879-015-1327-8

Epidemic spread of *Pandoraea pulmonicola* in a cystic fibrosis center

Nicolas Degand[1†], Romain Lotte[1,2,3*†], Célia Decondé Le Butor[1], Christine Segonds[4], Michelle Thouverez[5], Agnès Ferroni[6], Christine Vallier[7], Laurent Mély[7] and Jacqueline Carrère[8]

Abstract

Background: *Pandoraea spp.* are recently discovered bacteria, mainly recovered from cystic fibrosis (CF) patients, but their epidemiology and clinical significance are not well known. We describe an epidemic spread of *Pandoraea pulmonicola* from 2009 in our CF center, involving 6 out of 243 CF patients.

Methods: Bacterial identification used amplified ribosomal DNA restriction analysis (ARDRA), MALDI-TOF mass spectrometry (MALDI-TOF MS) and 16S rDNA gene sequencing. The clonal link between strains was assessed with pulsed field gel electrophoresis (PFGE) using XbaI. Clinical data were gathered for all patients.

Results: The index case was chronically colonized since 2000. The main hypothesis for this bacterial spread was a droplet cross-transmission, due to preventive measures not being strictly followed. Antibiotic susceptibility testing revealed resistance to beta-lactams, ciprofloxacin and colistin. However, there was susceptibility to trimethoprim-sulfamethoxazole. All patients were chronically colonized with *Pseudomonas aeruginosa*, and the acquisition of *P. pulmonicola* resulted in chronic colonization in all patients. Three patients died, and two patients remained clinically stable, whereas one patient had a decline in lung function.

Conclusions: This study, which is the first to describe an epidemic spread of *P. pulmonicola*, notes the potential transmissibility of this bacterial species and the need for infection control measures.

Keywords: *Pandoraea pulmonicola*, Epidemic, Cystic fibrosis

Whole-genome sequencing to identify transmission of *Mycobacterium abscessus* between patients with cystic fibrosis: a retrospective cohort study

Josephine M Bryant*, Dorothy M Grogono*, Daniel Greaves, Juliet Foweraker, Iain Roddick, Thomas Inns, Mark Reacher, Charles S Haworth, Martin D Curran, Simon R Harris, Sharon J Peacock, Julian Parkhill, R Andres Floto

Background

Increasing numbers of individuals with cystic fibrosis are becoming infected with the multidrug-resistant non-tuberculous mycobacterium (NTM) *Mycobacterium abscessus*, which causes progressive lung damage and is extremely challenging to treat. How this organism is acquired is not currently known, but there is growing concern that person-to-person transmission could occur. We aimed to define the mechanisms of acquisition of *M abscessus* in individuals with cystic fibrosis.

- 11 der 31 untersuchten Patienten zeigen nahezu identische NTM-Isolate des *M. abscessus subsp. massiliense* auf Basis eine Genomsequenzierung untersucht) verteilt auf zwei „Cluster“ à 9 und 2 Patienten)
- weniger als 10 Basenunterschiede innerhalb der Cluster
- Keine „offensichtlich“ Quelle (Bronchoskope, Trinkwasserquellen)

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3664974/

Bryant *et al.*, 2013, Lancet 381:1551-60

UNIVERSITÄTS KLINIKUM FRANKFURT

Twenty-Five-Year Outbreak of *Pseudomonas aeruginosa* Infecting Individuals with Cystic Fibrosis: Identification of the Prairie Epidemic Strain

Michael D. Parkins,[a] Bryan A. Glezerson,[a] Christopher D. Sibley,[a] Kristen A. Sibley,[a] Jessica Duong,[a] Swathi Purighalla,[a] Christopher H. Mody,[a] Matthew L. Workentine,[b] Douglas G. Storey,[a] Michael G. Surette,[a,b] Harvey R. Rabin[a]

The University of Calgary, Calgary, Alberta, Canada[a]; McMaster University, Hamilton Ontario, Canada[b]

A novel clone with increased antibacterial resistance, termed the prairie epidemic strain (PES), was found in 29% (31/107 patients) of chronically infected patients referred from multiple CF centers (broad endemic distribution)

Analysis of a long-term outbreak of XDR *Pseudomonas aeruginosa*: a molecular epidemiological study

Matthias Willmann[1,2]*, Daniela Bezdan[3,4], Luis Zapata[3,4], Hana Susak[3,4], Wichard Vogel[5], Klaus Schröppel[1], Jan Liese[1,2], Christopher Weidenmaier[1,2], Ingo B. Autenrieth[1,2], Stephan Ossowski[3,4] and Silke Peter[1,2]

Methods: Whole-genome sequencing

Conclusion: Our results suggest that the initial expansion of dominant sublineages was driven by a few superspreaders, while environmental contamination seemed to sustain the outbreak for a long period (6 years) despite regular environmental control measures.

Willmanns et al., J Antimicrob Chemother 2015; 70: 1322–1330

Spread of colistin resistant non-mucoid Pseudomonas aeruginosa among chronically infected Danish cystic fibrosis patients.

Helle Krogh Johansen [a,b,*], Samuel M. Moskowitz [c], Oana Ciofu [b], Tacjana Pressler [a], Niels Høiby [a,b]

- 1th outbreak (1995-1999) - 27 CF patients involved
- 2nd outbreak (2004...) - spread to ca. 40% of all patients chronically infected with *P. aeruginosa*

Helle Krogh Johansen Journal of Cystic Fibrosis 7 (2008) 391–397
http://www.sciencedirect.com/science/article/pii/S1569199308000106

Wasserhahn	Duschkopf	Schwimmbad	Abfluß

Infect Control Hosp Epidemiol. 2015 Sep;36(9):1058-64. doi: 10.1017/ice.2015.133. Epub 2015 Jun 8.

Whole Genome Sequencing in Real-Time Investigation and Management of a Pseudomonas aeruginosa Outbreak on a Neonatal Intensive Care Unit.

Davis RJ[1], Jensen SO[2], Van Hal S[1], Espedido B[2], Gordon A[3], Farhat R[1], Chan R[1].

One environmental isolate, obtained from a sink in the unit, clustered within the ST253 outbreak strains ➔ identification of putative source

Characteristics of patient-derived/ clinical and environmental *P. aeruginosa* isolates in a POCU during an outbreak in July 2008.

	patient isolates			**environmental isolates**									
isolation date (2008)	7.7.	9.7.	9.7.	28.7.	28.7.	28.7.	28.7.	28.7.	28.7.	28.7.	28.7.	28.7.	28.7.
isolate #[1]	A	B	C	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
room #[2]	3	5	8		IR	5	5	6	8	9		N	4
piperacillin	S	S	S	**R**	**R**	S	S	S	S	**R**	**R**	S	S
piperacillin/tazobactam	S	S	S	S	**R**	S	S	S	S	**R**	S	S	S
ceftazidime	S	S	S	S	S	S	S	S	S	S	I	S	S
cefepime	S	I	S	I	I	S	S	S	S	R	S	S	S
aztreonam	S	I	S	I	I	S	S	S	S	S	S	I	S
imipenem	S	S	S	**R**	**R**	S	S	S	S	S	S	S	S
meropenem	S	S	S	**R**	**R**	S	S	S	S	S	S	S	S
ciprofloxacin	S	S	S	**R**	**R**	S	S	S	S	S	S	S	S
levofloxacin	S	S	S	I	I	S	S	S	S	S	S	S	S
fosfomycin	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	**R**	I	**R**	**R**	**R**
gentamicin	S	S	S	**R**	**R**	S	S	S	S	I	I	I	S
tobramycin	S	S	S	**R**	I	S	S	S	S	I	S	S	S
amikacin	S	S	S	S	S	S	S	S	S	S	S	S	S
RAPD type[3]	1	1	1	n.d.	n.d.	1	2	3	1	n.d.	4	ind.	5
exoS/exoU type[3]	U	U	U	n.d.	n.d.	U	S	U	U	n.d.	U	S	U
array code[3]	EC29	EC29	EC29	n.d.	n.d.	EC29	239A	n.d.	EC29	n.d.	n.d.	n.d.	n.d.

Schneider et al., Pediatr Infect Dis J. 2012;31(6):648-50

Bedeutung der Verordnung über die Qualität von Wasser für den menschlichen Gebrauch (Trinkwasserverordnung 2001) für die Krankenhaushygiene

2.10.1 Wasser für den menschlichen Gebrauch

Wasser für den menschlichen Gebrauch kann grundsätzlich über

- den Ingestionsweg (Trinken)
- den Inhalationsweg (Einatmen)
- den direkten beziehungsweise indirekten Kontakt (zum Beispiel bei Waschen oder Betrieb medizinisch-technischer Geräte) zur Übertragung von Krankheitserregern führen.

Wasser für den menschlichen Gebrauch (hier vor allem: Trinkwasser) ist nicht keimfrei. Die nach der Trinkwasserverordnung vorgeschriebenen Untersuchungen zeigen mit den Indikatoren *E. coli*, coliformen Bakterien, Enterokokken und *P. aeruginosa* nur das mögliche Vorkommen eines eingeschränkten Spektrums von Krankheitserregern (v.a. fäkale Kontamination).
Andere Fakultativ-pathogene Krankheitserreger, die zu nosokomiale Infektionen bei Immunsupprimierten führe können werden nicht erfasst.

Exner Bundesgesundheitsbl - Gesundheitsforsch - Gesundheitsschutz 2004 · 47:384–391

Bundesgesundheitsbl 2010 · 53:357–388
DOI 10.1007/s00103-010-1028-9
Online publiziert: 20. März 2010

Kommission für Krankenhaushygiene und Infektionsprävention beim Robert Koch-Institut (RKI)

Anforderungen an die Hygiene bei der medizinischen Versorgung von immunsupprimierten Patienten

Empfehlung der Kommission für Krankenhaushygiene und Infektionsprävention beim Robert Koch-Institut (RKI)

1 Einleitung und Ziele

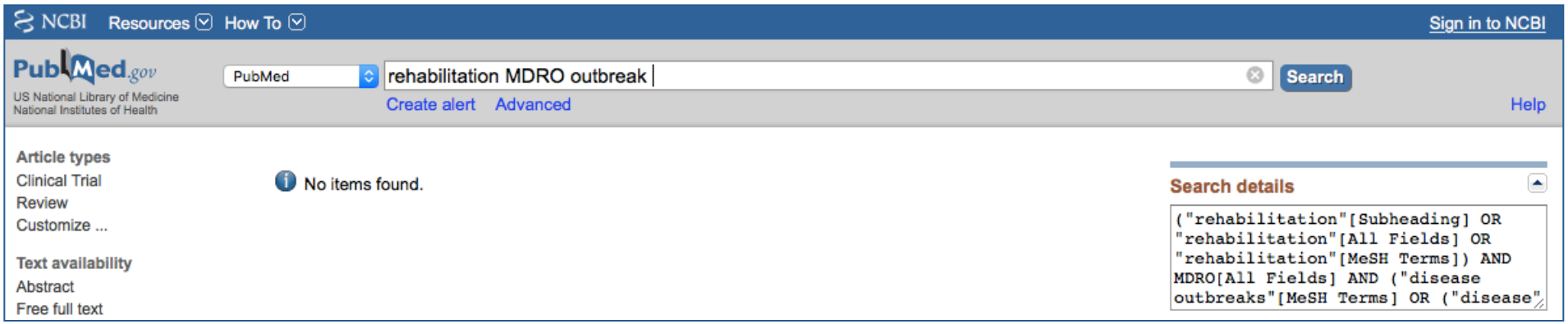
1.1 Hintergrund
1.2 Zielgruppen und Geltungsbereich
1.3 Struktur der Empfehlung
1.4 Bezug zu anderen Empfehlungen der KRINKO

2 Risikocharakterisierung

3.7 Lebensmittel
3.8 Baulich-funktionelle Maßnahmen zur Gewährleistung des protektiven Umfelds
3.9 Anforderungen an die Raumluft
3.10 Anforderungen an die Wasserversorgung
3.11 Anforderungen an den Sanitärbereich
3.12 Anforderungen an die Hygiene bei Umbaumaßnahmen und Abrissarbeiten

CF-Erreger & ‚Emerging Pathogens'

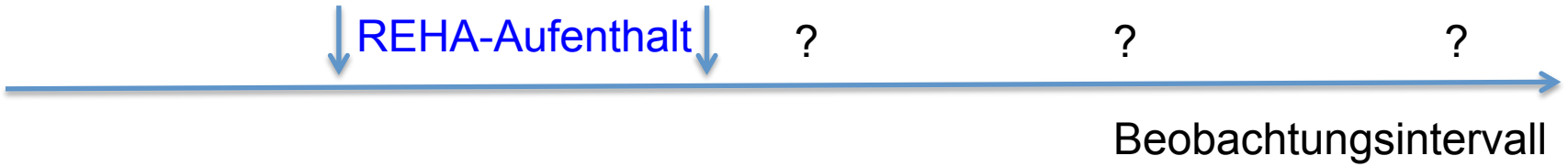
- **klassische CF-Erreger** (PSAE, STAU, BCEP, HI..)
- **zahlreiche Nonfermenter:**
  P. putida, P. fluorescens, P. stutzeri, B. gladioli, Pandorea spp., *Ralstonia* spp., *Chryseobacterium* spp., *Sphingomonas* spp., *Brevundimonas* spp., *Delftia* spp., *Ochrobactrum* spp. *Rhizobium* spp., *Inquilinus limosus*., *Herbaspirillium* spp., *Agrobacterium* spp., *Bordetella hinzii, Bordetella bronchiseptica, Acinetobacter* spp., *A. xylosoxydans, Cupriavidus* spp. .....
- **nicht-tuberkulöse Mykobakterien (NTM)**
- **Pilze:**
  Aspergillus fumigatus, A. flavus, A. niger,.....
  Pseudallescheria boydii/prolificans,
  Exophiala spp., *Trichosporon* spp....etc.



Mikrobiologisches Sreening:

Sensitivität; Spezifität ? (MRSA-Screening ✔)

Mikrobiologische Status Prä/Post Reha:



Multiple Antibiotic–Resistant *Pseudomonas aeruginosa* and Lung Function Decline in Patients with Cystic Fibrosis

Clement L Ren, MD[1], Michael W. Konstan, MD[2], Ashley Yegin, MD[3], Lawrence Rasouliyan,

- 4349 CF-Patienten mit chronischer PA-Infektion (cPA):
  1111 x cPA im Verlauf mit MAR-PA / 3238 x cPA im Verlauf ohne MAR-PA

- **Vergleich mit MAR-PA$^+$/MAR-PA$^-$**
  - niedrigere FEV1
  - häufiger orale u. inhalative AB

- **durchschnittlicher FEV1-Abfall ohne signifikanten Unterschied VOR/NACH MAR-PA Auftreten**
  - −2.22% / Jahr **VOR**
  - −2.43% / Jahr **NACH**
    (≥ 2 Jahre)

Ren *et al., J Cyst Fibros*. 2012 July ; 11(4): 293–299

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4089904/

Figure 3 der Publikation

MAR-PA: Resistenz gegenüber GENTA u./o. TOBRA/AMIK plus Resistenz gegenüber ≥ 1 Anti-Pseudomonas ß-Lactam

Ren *et al., J Cyst Fibros*. 2012 July ; 11(4): 293–299

Published in final edited form as:
Expert Rev Pharmacoecon Outcomes Res. 2010 August ; 10(4): 441–451. doi:10.1586/erp.10.49.

Impact of multidrug-resistant *Pseudomonas aeruginosa* infection on patient outcomes

Elizabeth B Hirsch[1,2] and **Vincent H Tam**[†,1,2]
[1]University of Houston College of Pharmacy, 1441 Moursund Street, Houston, TX 77030, USA
[2]St Luke's Episcopal Hospital, Houston, TX, USA

- Risk factors for multidrug-resistant (MDR) infections include prior use of antibiotics, history of *P. aeruginosa* infection or colonization within the previous year, length of hospital stay, being bedridden or in the intensive care unit, mechanical ventilation, malignant disease and history of chronic obstructive pulmonary disease.
- Inappropriate empirical therapy has been shown to increase mortality in *P. aeruginosa* infection. Worse clinical outcomes may be associated with MDR infections owing to limited effective antimicrobial options. These agents (polymyxins/aminoglycosides) may be associated with severe adverse effects.

Microbial colonization and lung function in adolescent with Cystic fibrosis

Journal of Cystic Fibrosis
www.elsevier.com/locate/jcf

- **Erreger ≈ FEV1 ↓**
  - *P. aeruginosa* (PSAE)
  - MRSA
- **2 Erreger ≈ FEV1 ↓**
  - PSAE + *A. fumigatus*
  - PSAE + STMA
  - PSAE + *B. cepacia*

770 adolescent German/Austrian CF-Patients
(over 10 years observed)

MRSA
PSAE

Hector A, et al, Microbial colonization and lung function in adolescents with cystic fibrosis, J Cyst Fibros (2016), http://dx.doi.org/10.1016/ j.jcf. 2016.01.004

http://www.ncbi.nlm.nih.gov/pubmed/26856310

„P. aeruginosa and MRSA were associated with poorer lung function, whereas H. influenzae was associated with preserved lung function“.

Figure 1 – aus Publikation

Hector A, et al,; J Cyst Fibros (2016)

CF-Erreger & ‚Emerging Pathogens'

- **klassische CF-Erreger** (PSAE, STAU/MRSA, BCEP, HI..)
- **zahlreiche Nonfermenter:**
  P. putida, P. fluorescens, P. stutzeri, B. gladioli, Pandorea spp., *Ralstonia* spp., *Chryseobacterium* spp., *Sphingomonas* spp., *Brevundimonas* spp., *Delftia* spp., *Ochrobactrum* spp. *Rhizobium* spp., *Inquilinus limosus*., *Herbaspirillium* spp., *Agrobacterium* spp., *Bordetella hinzii, Bordetella bronchiseptica, Acinetobacter* spp., *A. xylosoxydans, Cupriavidus* spp. .....
- **nicht-tuberkulöse Mykobakterien (NTM)**
- **Pilze:**
  Aspergillus fumigatus, A. flavus, A. niger,.....
  Pseudallescheria boydii/prolificans,
  Exophiala spp., *Trichosporon* spp....etc.

Rehabilitation Programs for Cystic Fibrosis – View from a CF Center

The Open Respiratory Medicine Journal

M. Griese[*,1,§], P. Busch[1,§], D. Caroli[1], B. Mertens[1], C. Eismann[1], M. Harari[2], H. Staudter[1] and M. Kappler[1]

[1]*Cystic Fibrosis Center, Dr. von Haunersches Kinderspital, University of Munich, Lindwurmstr. 4, D-80337 Munich, Germany*

[2]*Christiane Herzog Dead Sea CF-Climate Therapy Centre and German Medical Center, Dead Sea, Ein Bokek 86930, Israel*

Abstract: *Background*: Rehabilitation programs are comprehensive interventions which effectively improve the health status and reduce costs in chronic respiratory illnesses. Because patients with cystic fibrosis have been discouraged to participate for concerns of microbial cross infection, the efficacy of systematic rehabilitation is unknown for this group.

Methods: We retrospectively studied 142 cystic fibrosis patients aged 2-46 years who participated in rehabilitation programs taking place in Germany/Switzerland and in Israel, focusing on changes in lung function and weight.

Results: During 172 stays in 97 patients in Israel and 68 stays in 45 patients rehabilitating in Germany/Switzerland, overall lung function and weight improved. Outcome did not differ between Israel and German/Swiss sites. Interestingly, lung function improved during the initial phase of the stay, whereas weight gain was sustained throughout. The study uncovered gaps in reporting sufficient individual outcome information back to the admitting centre.

Conclusions: Rehabilitation programs specified for cystic fibrosis patients need to be assessed prospectively to optimize treatment of this life limiting condition.

Griese et al., The Open Respiratory Medicine Journal, 2010, 4,1-8

Rehabilitation Programs for Cystic Fibrosis – View from a CF Center

- educated in personal hygiene measures, including disinfection of hands, no close contact to other participants, and strict usage of personal equipment for inhalation. At all sites the appropriate hygiene surface and cleaning procedures were in place. In all programs the patients usually had private rooms; in case of small children these were shared with a family member accompanying them. Patients usually brought their own personal inhalation devices, sterilizing equipment for these, and their medication with them.
- the hygiene aspect is the key for any future development of up-to-date rehabilitation programs in cystic fibrosis. Our study did not target this issue. We did not systematically investigate our patients directly before and after a stay; however patients were only sent to those rehabilitation sites who were sensitized for the hygiene issue as demonstrated by cohorting all their patients on a time and space basis according to their microbiological status and enforcing hygiene rules in

treatment of this life limiting condition

Schewe D, Kappler M, Griese M. Instructions for infection control in outpatient care of patients with cystic fibrosis. Eur J Med Res 2005; 10(8): 345-51.

Griese et al., The Open Respiratory Medicine Journal, 2010, 4,1-8

Figure 1 der Publikation

Medians and interquartile range of FEV1, FVC, oxygen-saturation and body weight during the seasons 2000/2001, 2001/2002, 2002/2003 and 2003/2004 of the Israel rehabilitation programs.

Zitat: „....Whereas lung function clearly improved during the first week, weight improved continuously over the whole rehabilitation period (Fig. 1). This observation is in agreement with the observation that the gain of weight, but **not** the improvement of FEV1 was **proportional with the duration** of the rehabilitation programs.....“

Griese et al., The Open Respiratory Medicine Journal, 2010, 4,1-8

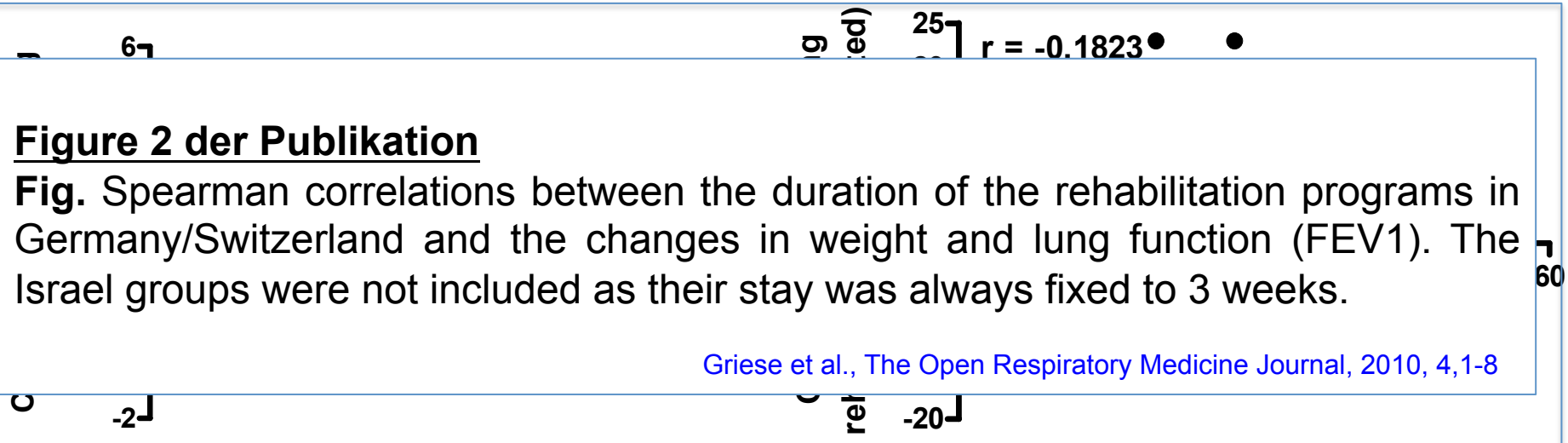


Figure 2 der Publikation

Fig. Spearman correlations between the duration of the rehabilitation programs in Germany/Switzerland and the changes in weight and lung function (FEV1). The Israel groups were not included as their stay was always fixed to 3 weeks.

Griese et al., The Open Respiratory Medicine Journal, 2010, 4,1-8

Tabelle 4 der Publikation:

Differences in Variables Before and After Rehabilitation in All Cystic Fibrosis Patients Included for the Israel, Dead Sea Area (172 Stays) and the German and Swiss Sites (68 Stays)

Zitat: „.....At the Israel site FVC and oxygen saturation improved significantly, whereas at the German sites FEV1 did. In order to better describe individual outcomes, the numbers of patients improving, getting worse or remaining unchanged were assessed (Table **4**). Whereas a **substantial fraction of subjects deteriorated with respect to lung function**, weight clearly improved in the majority of patients, both in the German and Israel sites (Table **4**).....“

Griese et al., The Open Respiratory Medicine Journal, 2010, 4,1-8

Rehabilitation mit MRE / MRGN?:

Nutzen (Pro)

Kosten (Kontra)

?

Vielen Dank

für Ihre Aufmerksamkeit

e-mail: michael.hogardt@kgu.de