Secretion of *Aspergillus fumigatus* during coughing in cystic fibrosis patients

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Introduction

- Progressive lung injury in cystic fibrosis (CF) can lead to chronic colonization with bacteria and fungi.
- For bacteria safety measures to prevent patient-to patient transmission during coughing are taken.
- Fungal cross-infection is thought not to occur, however no studies have examined this so far.

Objective

- To evaluate if secretion of *Aspergillus fumigatus* occurs during coughing in CF patients

Material and Methods

- During two visits, adult CF patients colonized with *A. fumigatus* were asked to cough on two different agar plates.
- Agar plates used were sabouraud dextrose agar with chloramphenicol and columbia III agar.
- Sputum samples were collected simultaneously and used as measure of concomitant colonization.
- If *A. fumigatus* was cultured in both the cough plate and the sputum sample, short-tandem-repeat (STR) genotyping of all colony-forming-units was performed.
- Identical STR genotypes on cough plate and sputum sample were deemed as definitive proof of secretion.

Results

- Thirty cough-plates and sputum cultures were collected from 15 patients. Eighteen sputum samples were positive with *A. fumigatus*. **(Table 1)**
- Three out of 18 (17%) positive sputum cultures also showed *A. fumigatus* on the cough plate.
- Transmission frequencies of bacterial pathogens were: *Pseudomonas aeruginosa*, 67% (10 out of 15); *Staphylococcus aureus*, 19% (3 out of 16); *Stenotrofomonas maltophilia*, 0%.
- Cough secretion of *A. fumigatus* was proven in 2 patients. **(Figure 1)**

Conclusions

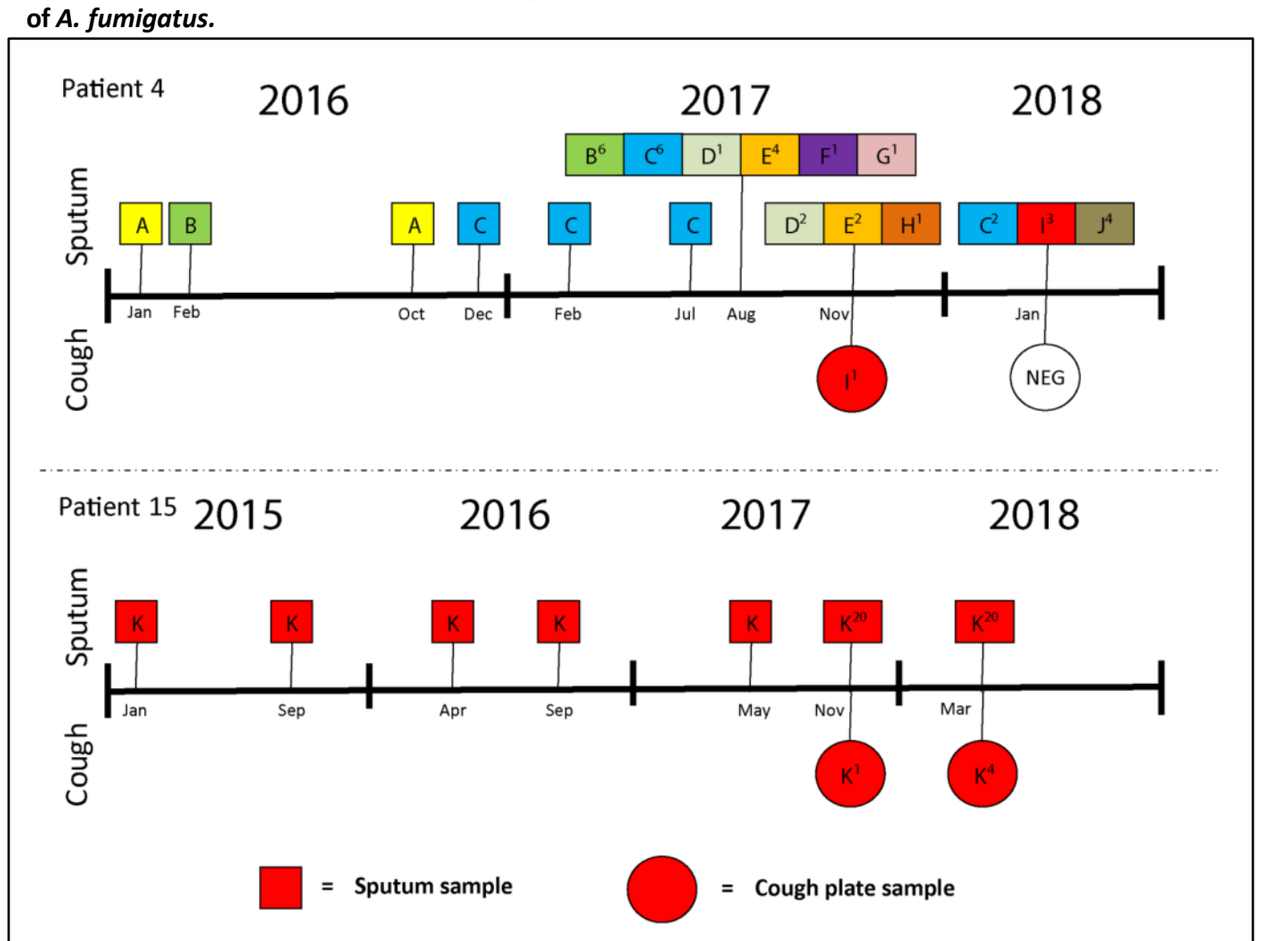
- **Cough secretion of *A. fumigatus* occured in colonized CF patients.**
- **Patient-to-patient transmission is theoretically possible.**
- **Additional research is necessary to determine whether additional infection prevention measures are needed.**

Table 1 - Characteristics of included CF patients and results of cough plates and sputum cultures.

	Patient characteristics						Cough plate				Sputum culture			
	Age	*Sex*	*FEV1%*	*Peakflow*	*AB?*	*AM?*	*A.fum*	*P.aer*	*S.aur*	*S.mal*	*A.fum*	*P.aer*	*S.aur*	*S.mal*
1	23	f	85%	7.9 L/s	Yes	No	- / -	+ / -	- / -	- / -	- / -	+ / +	+ / +	+ / -
2	20	f	101%	8.6 L/s	Yes	No	- / -	- / -	- / -	- / +	- / ND	- / ND	+ / ND	+ / ND
3	22	f	74%	7.9 L/s	Yes	No	- / -	- / -	- / +	- / -	+ / +	- / -	+ / +	- / -
4	20	m	61%	7.4 L/s	Yes	No	+ / -	- / -	- / -	- / -	+ / +	- / -	+ / +	- / -
5	49	f	74%	7.7 L/s	No	No	- / -	- / -	- / -	- / -	+ / -	- / -	+ / +	- / -
6	43	f	82%	7.2 L/s	Yes	No	- / -	- / -	- / -	- / -	+ / +	+ / +	- / -	- / -
7	26	m	106	10.9 L/s	Yes	No	- / -	- / -	+ / +	- / -	+ / ND	- / ND	+ / ND	- / ND
8	39	f	33%	5.7 L/s	Yes	No	- / -	- / -	- / +	- / -	+ / +	- / -	- / -	+ / +
9	49	m	31%	3.4 L/s	Yes	No	- / -	+ / +	- / -	- / -	+ / +	+ / +	- / -	- / -
10	22	m	41%	7.8 L/s	Yes	No	- / -	+ / +	- / -	- / -	+ / -	+ / +	+ / +	- / -
11	58	f	79%	5.1 L/s	Yes	No	- / -	- / -	- / -	- / -	- / -	+ / +	+ / -	- / -
12	31	m	41%	5.3 L/s	Yes	No	- / -	+ / +	+ / +	- / -	- / +	- / +	- / +	- / -
13	51	f	26%	3.5 L/s	Yes	No	- / -	+ / +	- / -	- / -	- / -	+ / +	+ / +	- / -
14	30	m	50%	8.7 L/s	Yes	No	- / -	+ / +	- / -	- / -	+ / +	+ / +	- / -	- / +
15	27	f	102%	8.4 L/s	Yes	No	+ / +	- / -	- / -	- / -	+ / +	- / -	- / -	- / -

FEV1, forced expiratory volume in the first second; %Pred, percentage of predicted; AB?, Antibiotic use?; AM?, antimycotic use?; spp., species; *A.fum*, *Aspergillus fumigatus*; *P.aer*, *Pseudomonas aeruginosa*; *S.aur*, *Staphylococcus aureus*; *S.mal*, *Stenotrofomonas maltophilia*; f, female; m, male; L, liter; s, second; -, cough plate or culture negative; +, cough plate or culture positive; ND, not determined.

Figure 1 - Graphical representation of the genotyping results of the two patients with cough secretion of *A. fumigatus*.



All A. fumigatus were genotyped prospectively from August 2017, all colony forming units were saved for genotyping up to a maximum of 20 colonies. A.fumigatus isolates of the five last sputum cultures (1 per culture) before August 2017 were retrospectively genotyped. Isogenic isolates are identified by a unique letter and color. The red color points out isogenic strains found both in the sputum culture and cough plate. The superscripted number shows the number of isogenic isolates within one culture, for example B6 means that 6 isogenic isolates with genotype B were found in that sputum culture. Sputum, sputum culture; Cough, cough plate; NEG,negative.

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