Recovery of *Burkholderia cenocepacia* strain PHDC from cystic fibrosis patients in Europe

T Coenye, T Spilker, A Van Schoor, J J LiPuma, P Vandamme

**Background:** *Burkholderia cenocepacia* can cause life threatening respiratory tract infections in patients with cystic fibrosis (CF). Although *B cepacia* complex organisms only infect a relatively small proportion of these patients, they have a significant impact on survival and numerous reports have provided evidence for patient to patient spread and nosocomial transmission. Isolates belonging to all nine *B cepacia* complex species have been recovered from the sputum of patients with CF, but recent large scale surveys in several countries have shown that, although there are national differences, most patients are infected with *B cenocepacia* (formerly known as *B cepacia* genomovar III). Several widespread *B cenocepacia* strains have been described, including ET12 and PHDC. While isolates belonging to the transatlantic ET12 clone infect many patients in Canada and the UK, isolates belonging to the PHDC clone (this designation is based on the two cities in the USA where the strain was first reported as an infecting organism in patients with CF) appear to be dominant among CF patients in the mid-Atlantic region of the USA. Subsequent molecular epidemiological studies have shown that *B cenocepacia* strain PHDC can also be found in agricultural soil in New York State and is much more commonly found in CF patients in the USA than was initially appreciated. In the present study we compared *B cenocepacia* isolates recovered from CF patients receiving care in several European countries and strains isolated from other clinical samples and the environment, with reference isolates from the epidemic *B cenocepacia* strain PHDC which has so far only been recovered from CF patients and soil in the USA.

**Methods:** A large collection of *B cenocepacia* isolates, including a large number recovered from CF patients receiving care in several European countries, Canada and the USA, were genotyped by means of randomly amplified polymorphic DNA typing (RAPD) and rep-PCR using the BOX-A1R primer (BOX-PCR).

**Results:** Nineteen *Burkholderia cenocepacia* isolates cultured from clinical samples in Europe (18 recently recovered from CF patients in France and Italy and one recovered in 1964 from urine in the UK) showed RAPD fingerprinting patterns that were similar to patterns obtained from isolates of *B cenocepacia* strain PHDC. Subsequent analysis of these isolates using BOX-PCR confirmed that the European isolates and strain PHDC represent the same clone.

**Conclusion:** Strain PHDC represents a second transatlantic *B cenocepacia* clone capable of colonising patients with CF.
fingerprint patterns that were very similar to PHDC reference isolates (similarity >77%, fig 1). Of these 19 European PHDC isolates, seven were isolated from CF patients receiving care in France while 11 were recovered from CF patients receiving care in four different Italian CF centres (which were geographically separated). Both groups of isolates were obtained in the course of recent national surveillance studies (P Vandamme, unpublished data). The remaining isolate was recovered from the urine of a child in the UK in 1964. All isolates were recovered from different patients.

DISCUSSION
To date, the best studied B cepacia complex strain is B cenocepacia strain ET12. This strain was found to be predominant among CF patients in Canada and supposedly spread to the UK by patient to patient transmission at CF summer camps. Few other strains infecting large numbers of patients attending more than one or a few centres have been described, but these appear to be geographically more restricted. Our data indicate that strain PHDC represents a second transatlantic B cenocepacia clone. To our knowledge, the isolate recovered from urine in the UK in 1964 represents the oldest identified PHDC isolate. The identification of PHDC isolates in clinical samples obtained in different hospitals located in different cities in three different countries in Europe (some cities are located almost 3000 km apart) over a time span of nearly four decades again confirms that this clone is much more widespread than previously appreciated. The introduction of infection control measures (including segregation of infected patients) has drastically reduced, but not eliminated, person to person transmission of B cepacia complex organisms, suggesting that new infections may be caused by organisms acquired from the environment. So far, B cenocepacia strain PHDC has been recovered from agricultural soil in the USA, whether it also can be found in soil in Europe requires further study. It seems unlikely that the epidemiology of PHDC can be explained by patient to patient transmission alone. Its presence in CF patients in Western and Southern Europe and North America suggests acquisition from the environment on a number of occasions, possibly followed by local dissemination by patient to patient contact. A role for inter-patient spread has been shown by previous epidemiological studies. It should be clear that more work is required to obtain a comprehensive picture of the worldwide epidemiology of B cenocepacia strain PHDC. As detailed epidemiological data were not available for the isolates included in the present study, the epidemiology of this clone needs to be investigated in more detail in future studies.

The present study again highlights the utility of various genotyping methods for B cepacia complex organisms. Although RAPD fingerprinting is easy to perform, its reproducibility can be rather low which may render the interpretation of RAPD pattern differences cumbersome. BOX-PCR, although somewhat more time consuming, has the advantage of being more reproducible, thus allowing it to be used in global epidemiological investigations involving large numbers of isolates collected over a longer time frame and a wider geographical area. We have previously shown that results obtained with BOX-PCR are generally in good agreement with those obtained with macrorestriction digests followed by PFGE. However, PFGE is more time consuming and more expensive than BOX-PCR and, for answering global epidemiological questions (especially those involving larger number of isolates), BOX-PCR might be considered the typing method of choice. We were able rapidly to screen a large collection of European B cenocepacia isolates and to identify reliably isolates that belonged to the PHDC lineage using a combination of two rapid and inexpensive typing methods.

ACKNOWLEDGEMENTS
The authors thank E Bingen, S Campana, S Stefani, and G Taccetti for depositing strains in their collection.

REFERENCES
The role of pneumonectomy in non-tuberculous mycobacterial infections


Surgery has a role in the treatment of patients with atypical mycobacteria who fail medical treatment or have extensive disease localised to one lung. This case series reports over 15 years of experience from the Fukujuji Hospital, Tokyo, reviewing 53 patients who required pulmonary resection for resistant non-tuberculous mycobacterial infections. Of these, 11 underwent pneumonectomy. Patients were selected for pulmonary resection if they met the diagnostic criteria recommended by the American Thoracic Society for non-tuberculous mycobacterial disease and had sufficient cardiopulmonary reserve. The 11 chosen for pneumonectomy had multiple cavities in one lung or destruction of an entire lung. Four of the 11 had evidence of lesions in the contralateral lung; 10 had Mycobacterium avium and one had M abscessus.

There was no operative mortality. A major complication of pneumonectomy is bronchopleural fistula, especially for right pneumonectomy. In this series bronchopleural fistula occurred in three patients (27%), all right sided, detected on the chest radiograph before the patient developed symptoms, repaired and without subsequent empyema. These fistulae occurred from 2 weeks to 3 months postoperatively. Other postoperative complications included respiratory failure (1) and empyema (1). All patients became sputum negative after surgery with seven kept on chemotherapy for at least 6 months. The other four did not tolerate chemotherapy. Two patients died, both of respiratory failure, one 11 months postoperatively and the other 4 years later in the presence of recurrent disease.

Pneumonectomy has a role in the treatment of resistant non-tuberculous mycobacterium in patients with one lung severely affected. The majority of patients become sputum negative with continuing chemotherapy and the most common complication is bronchopleural fistula.

G Price
Senior House Officer, London Chest Hospital, London, UK;
graniaprice@doctors.org.uk
Recovery of *Burkholderia cenocepacia* strain PHDC from cystic fibrosis patients in Europe

T Coenye, T Spilker, A Van Schoor, J J LiPuma and P Vandamme

*Thorax* 2004 59: 952-954
doi: 10.1136/thx.2003.019810

Updated information and services can be found at:
[http://thorax.bmj.com/content/59/11/952](http://thorax.bmj.com/content/59/11/952)

These include:

**References**
This article cites 14 articles, 6 of which you can access for free at:
[http://thorax.bmj.com/content/59/11/952#BIBL](http://thorax.bmj.com/content/59/11/952#BIBL)

**Email alerting service**
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Topic Collections**
Articles on similar topics can be found in the following collections

- Cystic fibrosis (525)
- TB and other respiratory infections (1273)

Notes

To request permissions go to:
[http://group.bmj.com/group/rights-licensing/permissions](http://group.bmj.com/group/rights-licensing/permissions)

To order reprints go to:
[http://journals.bmj.com/cgi/reprintform](http://journals.bmj.com/cgi/reprintform)

To subscribe to BMJ go to:
[http://group.bmj.com/subscribe/](http://group.bmj.com/subscribe/)