Interaction of Environmental B. Cenocepacia Strains with Cystic Fibrosis and Non-Cystic Fibrosis Bronchial Epithelial Cells in Vitro.

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Interaction of environmental *Burkholderia cenocepacia* strains with cystic fibrosis and non-cystic fibrosis bronchial epithelial cells *in vitro*

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*Burkholderia cenocepacia* is an important human pathogen in patients with cystic fibrosis (CF). Non-clinical reservoirs may play a role in the acquisition of infection, so it is important to evaluate the pathogenic potential of environmental *B. cenocepacia* isolates. In this study, we investigated the interactions of two environmental *B. cenocepacia* strains (Mex1 and MCII-168) with two bronchial epithelial cell lines, 16HBE14o− and CFBE41o−, which have a non-CF and a CF phenotype, respectively. The environmental strains showed a significantly lower level of invasion into both CF and non-CF cells in comparison with the clinical *B. cenocepacia* LMG16656T strain. Exposure of polarized CFBE41o− or 16HBE14o− cells to the environmental strains resulted in a significant reduction in transepithelial resistance (TER), comparable with that observed following exposure to the clinical strain. A different mechanism of tight junction disruption in CF versus non-CF epithelia was found. In the 16HBE41o− cells, the environmental strains resulted in a drop in TER without any apparent effect on tight junction proteins such as zonula occludens-1 (ZO-1). In contrast, in CF cells, the amount of ZO-1 and its localization were clearly altered by the presence of both the environmental strains, comparable with the effect of LMG16656. This study demonstrates that even if the environmental strains are significantly less invasive than the clinical strain, they have an effect on epithelial integrity comparable with that of the clinical strain. Finally, the tight junction regulatory protein ZO-1 appears to be more susceptible to the presence of environmental strains in CF cells than in cells which express a functional cystic fibrosis transmembrane regulator (CFTR).

INTRODUCTION

*Burkholderia cenocepacia* belongs to the *Burkholderia cepacia* complex (BCC), which includes at least 17 phenotypically similar species (Vandamme et al., 1997; Mahenthiralingam et al., 2005; Vanlaere et al., 2008, 2009).

†These authors contributed equally to this work.

Abbreviations: BCC, *Burkholderia cepacia* complex; CF, cystic fibrosis; CFTR, cystic fibrosis transmembrane regulator; GAPDH, glyceraldehyde-3-phosphate dehydrogenase; HRP, horseradish peroxidase; JAM-A, junctional adhesion molecule A; TER, transepithelial resistance; ZO-1, zonula occludens-1.

*Burkholderia cenocepacia* is widely distributed in the natural environment, especially in the rhizosphere of crop plants (Vandamme et al., 2003; Chiarini et al., 2006), and it is also an important opportunistic pathogen, causing severe respiratory infections in individuals with cystic fibrosis (CF) (Mahenthiralingam & Vandamme, 2005; Reik et al., 2005). Once acquired, *B. cenocepacia* is rarely eradicated by antibiotic therapy due to its intrinsic antibiotic resistance (Magalhães et al., 2002), and it can be responsible for transmissible infections in individuals with CF (Govan & Deretic, 1996). Infection with *B. cenocepacia* leads to unpredictable outcomes, ranging from asymptomatic carriage to a fulminant...
and fatal pneumonia and sepsis, the so-called ‘cepacia syndrome’ (Govan & Deretic, 1996; Mahenthiralingam et al., 2002). B. cenocepacia adopts versatile lifestyles while infecting the host (Vial et al., 2011). Several virulence determinants that may play a role in the ability of B. cenocepacia to infect and persist in human lung have been proposed (Mahenthiralingam et al., 2005; Loutet & Valzano, 2010), even if no definite role for any of them in human disease has been established (Scordilis et al., 1987; Schwab et al., 2002; Speert, 2001). Elucidating the exact role of virulence factors and pathogenic mechanisms in the progression of lung disease will help to establish whether B. cenocepacia isolates behave as innocent colonizers or become invasive pathogens. The severity of infection has been related to the ability of B. cenocepacia bacteria to invade and survive within respiratory epithelial cells in vitro and cause sepsis, as proven by the correlation between intracellular invasion by B. cenocepacia and infection in an in vivo mouse model (Cieri et al., 2002). Survival and persistence within host cells are also believed to play a key role in pathogenesis (Valzano, 2006). B. cenocepacia forms microcolonies in close proximity to the apical cell surface, followed by invasion and destruction of epithelial cells, which also involves disruption of the glycocalyx and rearrangements of the actin cytoskeleton (Schwab et al., 2002, 2003). Unlike most other pathogens in CF, which typically remain confined to the endobronchial spaces, B. cenocepacia can traverse polarized respiratory epithelium to cause bacteremia and sepsis, showing its potential to disrupt tight junctions (Duff et al., 2006; Kim et al., 2005). These studies suggest that B. cenocepacia bacteria can employ several strategies to breach the epithelial layer in the airways, and this may explain, at least in part, the different clinical outcomes of B. cenocepacia infection in patients with CF (McCLean & Callaghan, 2009).

Potentially pathogenic strains are present in the environment, as proven by the genetic identity between environmental and clinical isolates. In fact, an isolate of B. cenocepacia which was indistinguishable from the PHDC epidemic clonal lineage, using standard typing methods, was detected in an agricultural soil sample (LiPuma et al., 2002; Baldwin et al., 2007). Subsequently, MLST revealed the existence of three distinct genotypes shared by clinical and environmental B. cenocepacia isolates (Baldwin et al., 2007). Infection control measures, including patient segregation, have reduced but not eliminated new infections, and CF patients may occasionally become infected by isolates that show novel fingerprint types (Speert et al., 2002; Mahenthiralingam et al., 2008). The appearance of unique clones in individual patients suggests that acquisition of pathogenic strains likely occurs directly from the natural environment, especially the rhizosphere (Berg et al., 2005). Currently, there is no clear distinction between isolates from environmental or clinical origins, and it is widely accepted that the natural environment is a potential source of BCC acquisition in patients with CF (Mahenthiralingam et al., 2008). It has been found that some phenotypic traits (i.e. biofilm formation, antibiotic susceptibility, exopolysaccharide production) and genetic markers associated with virulence, persistence and transmissibility are also spread among environmental B. cenocepacia isolates (Bevivino et al., 2002; Chiarini et al., 2002, 2004; Baldwin et al., 2004; Pirone et al., 2008), as is the ability to colonize murine lung tissue, by persisting in the lungs of infected mice (Pirone et al., 2008). It has been speculated that B. cenocepacia can colonize both human lung epithelial and plant root cells through similar mechanisms responsible for recognition and adherence to host cells (Cao et al., 2001; Vial et al., 2011). Indeed, environmental B. cenocepacia strains, as well as environmental strains belonging to other BCC species, display an attenuated ability to invade or replicate in cellular models, in comparison with their clinical counterparts (Martin & Mohr, 2000; Keig et al., 2002; Pirone et al., 2008; Zelazny et al., 2009; Vial et al., 2010), but to date, the relationships between environmental bacteria and CF host cells have not been addressed. As suggested by Vial et al. (2011), interactions with abnormal cells may trigger the pathogenic behaviour of B. cenocepacia strains in patients with genetic or immune deficiencies, and this could explain why opportunistic pathogens such as certain B. cenocepacia strains become pathogens in CF disease.

In the present study, we aimed at elucidating the ways by which environmental B. cenocepacia strains express their pathogenic potential by addressing the following questions. Are environmental B. cenocepacia strains able to invade CF bronchial epithelial cells? Can these strains penetrate through the CF epithelium? Do they utilize distinct mechanisms of internalization into host cells in comparison with clinical strains? To address these objectives, we focused our attention on two well-characterized B. cenocepacia strains, isolated from the maize rhizosphere, that have already shown pathogenic potential in both in vitro and in vivo models (Pirone et al., 2008) and which are capable of forming strong biofilms at a level comparable with the clinical B. cenocepacia strain LMG16656 (our unpublished results).

**METHODS**

**Bacterial strains.** Two B. cenocepacia strains of environmental origin and the clinical B. cenocepacia strain LMG16656 were used in this study. The environmental strain Mex1, belonging to B. cenocepacia IIIA, kindly supplied by Jesús Caballero-Mellado (Universidad Nacional Autonoma de Mexico, Cuernavaca), was collected from the rhizosphere of maize cultivated in a field in Mexico (Pirone et al., 2008). The environmental strain MCHI-168, belonging to recA lineage IIIB, was isolated from the rhizosphere of maize plants cultivated in an experimental field located at S. Maria di Galeria, Rome, Italy (Di Cello et al., 1997). A B. cenocepacia strain of clinical origin [the epidemic strain LMG 16656 (recA lineage IIIA)], obtained from the Laboratorium voor Microbiologie collection (LMG, Ghent) and Escherichia coli DH5α were used as positive and negative controls, respectively. All strains were cryopreserved at −80 °C in 30% (v/v) glycerol. Prior to any assay, bacteria were streaked from frozen stock preparations onto Nutrient Agar (NA; Difco) plates and incubated at 30 °C for 24–48 h.
Reagents. All cell cultures and electrophoresis materials were purchased from Sigma, with the following exceptions: Ultrasor G (Invitrogen), Vitrogen (Nutacon). Mouse anti-zona occludens-1 (ZO-1) was purchased from Invitrogen, while rabbit anti-claudin-1, rabbit anti-occludin, and rabbit anti-junctional adhesion molecule A (JAM-A) antibodies were purchased from Zymed Laboratories. Mouse anti-glyceraldehyde-3-phosphate dehydrogenase (GAPDH) was obtained from Millipore. Horseradish peroxidase (HRP)-conjugated anti-mouse antibody was purchased from Pierce (Fisher Scientific). HRP-conjugated anti-rabbit antibody was purchased from BD Pharmingen. FITC-conjugated goat anti-mouse and anti-rabbit antibodies were purchased from Jackson ImmunoResearch.

Cell culture. The non-CF human bronchial epithelial cell line 16HBE14o- (Cozens et al., 1994), and a CF line, CFBE41o−, derived from a CF patient homozygous for the cystic fibrosis transmembrane regulator (CFTR) AF508 mutation (Goncz et al., 1999), were a generous gift from Dr Dieter Gruenert, University of California, San Francisco. The 16HBE14o− cells (passage 2.85 to approx. 2.105) were maintained on Vitrogen/fibronectin-coated flasks in minimum essential medium (MEM) supplemented with 1% l-glutamine, 1% penicillin/streptomycin and 10% FBS (Cozens et al., 1994). CFBE41o− cells (passage 4.85 to 4.105) were also maintained on coated flasks in the same medium, supplemented with 1% non-essential amino acids (Gruenert et al., 2004).

Invasion of epithelial cells. Analysis of the B. cenocepacia–host cell interaction was performed by evaluating the ability of the bacterial cells to invade non-CF and CF epithelial cells. In vitro invasion assays were carried out on the bronchial epithelial cell lines using a ceftazidime–amikacin protection assay with minor modifications (Duff et al., 2006). The 16HBE14o− or CFBE41o− cells were plated on 24-well coated plates (4 x 10⁵ cells per well), cultured for 24 h at 37 °C, 5% CO₂, in medium containing 10% FBS without antibiotics. All bacterial strains were grown to OD₆₀₀ 0.6 and were applied at an m.o.i. of 50:1 bacterial cells per epithelial cell (m.o.i. 10:1) for 2 h. The monolayers were then washed five times with PBS containing 1% BSA for 5 min, and post-fixed in PBS containing 4%, w/v, paraformaldehyde for 90 min. Membranes were blocked in Tris-buffered saline with 5% non-fat dried milk, 0.1% BSA and 0.1% Tween 20 (claudin-1); 5% BSA and 0.1% Tween 20 (JAM-A, ZO-1); 10% non-fat dried milk, 0.1% BSA and 0.1% Tween 20 (occludin); or 5% non-fat dried milk and 0.1% Tween 20 (GAPDH). Blots were incubated with primary antibody (1:500–5000) overnight at 4 °C. Membranes were washed and incubated with goat anti-mouse or anti-rabbit conjugated to HRP for 1 h at room temperature. Proteins were detected by chemiluminescence (Millipore). The density of each individual band was compared with the corresponding control band and normalized against GAPDH (loading control protein) by densitometry using ImageJ (http://rsb.info.nih.gov/ij/). The results were expressed as a change relative to the untreated control.

Immunofluorescence. Monolayers on Transwell inserts were washed with PBS for 5 min prior to permeabilization with cold methanol (–20 °C) for 30 min, and blocked with PBS containing 1%, w/v, BSA for 10 min. The cells were then immunoprobed with 10 µg ml⁻¹ mouse anti ZO-1 antibody for 1 h and subsequently washed three times with PBS/1% BSA for 5 min. The cells were then incubated with FITC-conjugated goat anti-mouse antibody (20 µg ml⁻¹) for 1 h at room temperature, protected from light. The monolayers were washed five times with PBS containing 1% BSA for 5 min, and post-fixed in PBS containing 4%, w/v, paraformaldehyde for 10 min. Filters were then removed from the plastic support, mounted on slides with Vectashield containing DAPI, and examined by confocal microscopy.

Statistical analysis. All quantitative infection assays were performed in triplicate, on three different occasions. Dunn’s multiple comparison method was used to compare the invasiveness of individual strains with that of the negative control. A P value of <0.05 was deemed to be significant in each case. Student’s t tests (two-tailed) were carried out on the TER values of bacteria-treated monolayers relative to the control at individual time points. Differences were considered to be statistically significant if the P value was <0.05.

RESULTS AND DISCUSSION

Invasion of B. cenocepacia strains into 16HBE14o− cells and CFBE41o− cells

The two environmental B. cenocepacia strains MCI-168 and Mex1 were internalized by the bronchial epithelial cell lines 16HBE14o− and CFBE41o− at a level lower than that of the invasive clinical B. cenocepacia LMG16656 strain (Fig. 1). They were more invasive than the negative control (the non-invasive E. coli strain NCIB9413) but less invasive than the positive control (B. cenocepacia LMG16656) (P<0.05). The internalization of the environmental Mex1 strain was 0.167 and 0.23% by 16HBE14o− and CFBE41o− cells, respectively, while internalization of the other environmental strain, MCI-168, was 0.23 and 0.08% into 16HBE14o− and CFBE41o− cells, respectively. Although
environmental strains were significantly less invasive than the clinical strain LMG16656, their invasiveness was independent of the CFTR status of the host cell, as found for the invasive clinical B. cenocepacia strain LMG16656 (Taylor et al., 2010). Indeed, no statistically significant difference between the internalization of either strain by 16HBE14o– relative to CFBE41o– cells (P=0.42 for Mex1 and P=0.32 for MCII-168, respectively) was observed.

**Effect of environmental strains on TER**

Bacterial host cell interactions can involve the disruption of epithelial integrity; this strategy can be used by the bacteria to invade the tissues beneath the epithelial cells. B. cenocepacia strains can disrupt epithelial integrity and open tight junctions of lung epithelial cells, as determined by a drop in TER (Kim et al., 2005; Duff et al., 2006). To investigate whether the environmental strains could also disrupt tight junction integrity, we exposed polarized CFBE41o– and 16HBE14o– cells to the B. cenocepacia environmental strains or the B. cenocepacia clinical strain for 4 h and measured TER. The mean TER at the start of the experiments was 306 ± 16 Ω·cm² for CFBE41o– and 434 ± 13 Ω·cm² for 16HBE14o–. Exposure of both environmental strains (MCII-168 and Mex1) resulted in a significant reduction in TER (P<0.01) over the 4 h period, which was comparable with that observed following exposure to the clinical strain LMG16656 in both cell lines (Fig. 2). The finding that all clinical and environmental B. cenocepacia strains examined reduced the TER of both CF and non-CF cell lines suggests that B. cenocepacia strains, irrespective of their origin, can disrupt the integrity of airway epithelia, and that this effect is also CFTR-independent. These findings are in agreement with several studies in which clinical B. cenocepacia strains have been shown to alter epithelial permeability by the alteration of tight junction organization (Sajjan et al., 2004; Kim et al., 2005; Duff et al., 2006).

### Effect on ZO-1 levels of exposure of lung epithelial cells to environmental B. cenocepacia strains

Tight junctions include a complex of many different proteins, such as ZO-1, JAM-A, occludin and claudins. We have previously shown that some BCC strains have the ability to disrupt tight junctions in CFTR-expressing cells and show a reduction in expression of ZO-1 when cells are exposed to the B. cenocepacia strain BC-7 (Duff et al., 2006). To examine whether the drop in TER following exposure to environmental strains was due to an alteration in tight junction proteins, we extracted the proteins from individual cell monolayers after exposure to the environmental or clinical strains and examined the expression of the individual tight junction proteins by Western blotting. The level of ZO-1 was considerably weaker than that in 16HBE14o– cells when exposed to the clinical strain LMG16656 (Fig. 3a, c). In contrast, despite a strong alteration in TER following exposure to Mex1, no clear alteration in the amount of ZO-1 was detected on Western blots from 16HBE14o– cells exposed to this environmental strain. There was also no apparent alteration in the level of ZO-1 in 16HBE14o– cells when exposed to the other environmental strain, MCII-168 (Fig. 3a).

Constitutive expression of ZO-1 in CFBE41o– cells was considerably weaker than that in 16HBE14o– cells, taking longer exposure times for development of blots, in agreement with earlier studies on CFBE41o– cells (LeSimple et al., 2010) and on ΔF508+/− primary cultures (Coyne et al., 2002), and considerable cleavage of the protein was evident, with prominent immunoreactive bands at 110 and
When CFBE41o− cells were exposed to each of the three B. cenocepacia strains, a clear reduction in the detectable ZO-1 level was observed (P < 0.05), suggesting that the environmental bacterial strains have a stronger effect on ZO-1 in CFBE41o− cells relative to 16HBE14o− cells (Fig. 3b, c).

Immunofluorescence analysis confirmed that the two environmental strains had a slight effect on ZO-1 following 4 h exposure of 16HBE14o− cells, in contrast to the dramatic loss of ZO-1 from the tight junctions of 16HBE14o− cells when exposed to the clinical strain LMG16656 (Fig. 4a–d). Immunostaining of CFBE41o− cells showed a different pattern of expression of ZO-1 relative to the CFTR-expressing cell line. Overall, in control CFBE41o− cells, ZO-1 staining was present in the tight junctions, but it was also diffusely expressed throughout the cell cytoplasm rather than forming contiguous rings, solely at the tight junctions (Fig. 4e). When CFBE41o− cells were exposed to either of the two environmental strains (Mex1 or MCII-168) or to the clinical strain LMG16656, ZO-1-associated immunofluorescence was lost completely from the tight junctions (Fig. 4f–h). Furthermore, the ZO-1 expression and localization in the ΔF508-expressing CFBE41o− cells was more susceptible to the effects of environmental B. cenocepacia strains than the wild-type CFTR-expressing cells, when compared with 16HBE14o− cells.

**Effect of environmental B. cenocepacia strains on claudin-1, JAM-A and occludin**

To examine whether the increased susceptibility to alterations in ZO-1 following B. cenocepacia infection observed...
cells was an effect which was common among tight junction proteins in these cells, additional Western blotting analysis was carried out on JAM-A, claudin-1 and occludin. Neither of the environmental B. cenocepacia strains nor the clinical strain had any effect on claudin-1, JAM-A or occludin in the 16HBE14o- cells (Fig. 5a). In contrast, a 40 % reduction in claudin-1 protein was observed in CFBE41o- cells in response to LMG16656 exposure. This effect was not observed in cells exposed to either of the two environmental strains, Mex1 or MCII-168 (Fig. 5a–b). ZO-1 plays an important role in claudin trafficking to the tight junction (Umeda et al., 2006), and therefore the dramatic loss of ZO-1 in the CFBE41o- cells, which have relatively low basal expression of ZO-1, most likely resulted in this concomitant loss in claudin-1 level. The lack of alteration in occludin in both 16HBE14o- and CFBE41o- cells in this study in response to any of the B. cenocepacia strains was unexpected and in contrast with data shown by Kim et al. (2005), who carried out their study for longer time periods (8 and 24 h). In our experience, continuing bacterial growth to these longer

![Image](image.png)

**Fig. 4.** Effect of exposure to environmental B. cenocepacia strains on expression and distribution of ZO-1 in polarized CF and non-CF bronchial epithelial cells. Immunofluorescent staining for ZO-1 in 16HBE14o- cells (a–d) and CFBE41o- cells (e–h). Clinical B. cenocepacia strain LMG16656T (b, f) and environmental B. cenocepacia strain Mex1 (c, g) or MCII-168 (d, h) were applied for 4 h and compared with control cells treated with LB alone (a, e). The cells were immunostained with anti-ZO-1 antibody, counterstained with DAPI and examined by immunofluorescence microscopy. Magnification, ×400; scale bar, 12 μm.

![Image](image.png)

**Fig. 5.** Effect of environmental B. cenocepacia strains on JAM-A, claudin-1 and occludin expression. (a) Western blot analysis of JAM-A, claudin-1 and occludin in 16HBE14o- and CFBE41o- cells. Cells were treated with medium alone (control, lane 1), and B. cenocepacia strains LMG16656T (lane 2), Mex1 (lane 3) or MCII-168 (lane 4) for 4 h. (b) Densitometric analysis of claudin-1 expression. Band intensities for claudin-1 were determined in two independent experiments. Data were normalized to GAPDH values and are expressed as mean ± SEM percentage change relative to control uninfected cells. Black bars, 16HBE14o- cells; grey bars, CFBE41o- cells. *P<0.05, compared with the control.
time points may result in competition between the bacteria and the polarized human cells for nutrients, and can contribute to non-specific effects.

In the 16HBE14o− cells, the environmental strains, Mex1 and MCII-168, resulted in a drop in TER without any apparent effect on ZO-1 or any other tight junction protein, whilst a significant drop in expression of ZO-1 and a dramatic alteration in its localization were observed following infection with either of the environmental strains in the CFBE41o− cells, suggesting that the mechanisms of tight junction disruption are different in CFTR-expressing epithelia versus CFTR-deficient epithelia. This is in agreement with the finding that defects in CFTR trafficking, such as those documented in ΔF508CFTR-expressing cells, cause alterations of the cytoskeleton (Favia et al., 2010), plasma membrane, or membrane-interacting proteins (Guerra et al., 2005) and tight junctions (LeSimple et al., 2010; Nilsson et al., 2010). To date, trafficking of ΔF508CFTR has been related to some CF defects such as alteration of ceramide metabolism (Becker et al., 2010) and NADPH oxidase activation (Zhang et al., 2008). Herein we suggest that the observed alteration of tight junctions in CF epithelial cells may be responsible for the differential susceptibility to infection by B. cenocepacia strains. ZO-1 regulates tight junction function indirectly because of its anchoring to the cytoskeleton, and it has previously been shown to be altered in CFTR-expressing lung epithelial monolayers after infection with clinical B. cenocepacia strains (Duff et al., 2006). In contrast, Kim et al. (2005) did not show any alteration in ZO-1 expression in 16HBE14o− monolayers infected with a different subset of B. cenocepacia strains. Taking these data together with our previous (Duff et al., 2006) and present results, it can be suggested that ZO-1 expression may be more robust in these CFTR-expressing cells and that its disruption may sometimes be strain-dependent. It is significant that both B. cenocepacia strains that have been associated with altering ZO-1 expression in CFTR-expressing cells, i.e. LMG 16656 and BC-7 (Duff et al., 2006), are clones of strain ET-12 (Mahenthiralingam et al., 2000), which is known to be particularly virulent (Drevinek & Mahenthiralingam, 2010). The exact means by which the bacteria alter the epithelial barrier remain to be elucidated.

Conclusion

Overall, the environmental strains Mex1 and MCII-168 showed less intracellular invasion than the clinical B. cenocepacia strain LMG16656. In spite of this, the environmental strains do appear to have an effect on epithelial integrity similar to that of the clinical strain in both CF and non-CF cells, although the mechanism of tight junction disruption is different. A significant finding is that the tight junction regulatory protein ZO-1 is more susceptible to the presence of environmental strains in CF epithelial cells than in cells which express functional CFTR. The dramatic effect of the two environmental strains on tight junction integrity, and on the presence and distribution of the tight junction protein ZO-1 in CF epithelial monolayers, has important implications for the pathogenicity of these environmental strains in patients with CF. Since the acquisition of clinical strains likely occurs directly from the natural environment, a knowledge of the molecular mechanisms employed by environmental B. cenocepacia bacteria in virulence and pathogenesis is of crucial importance to identify new targets for the rational design of novel molecular strategies to fight the devastating and currently difficult-to-treat infections caused by B. cenocepacia strains.

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Cystic fibrosis (CF) is a genetic disorder that affects the body’s ability to remove mucus from the lungs, pancreas, and other organs. This condition, caused by a mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) gene, leads to thick and sticky mucus, which can cause chronic lung infections, respiratory problems, and other health issues.

Burkholderia cepacia complex (BCC) bacteria are an important group of pathogens that can cause infections in people with CF. These bacteria are opportunistic, meaning they take advantage of the body’s weakened defenses to cause infections.

This article reviews the role of actin filament network in invasion and intracellular survival of Burkholderia cepacia complex species in polarised lung epithelial cells in vitro. It discusses the interaction between the bacteria and the host cell cytoskeleton, emphasizing the importance of understanding this process for developing effective therapeutic interventions.

The authors explore the mechanisms by which BCC bacteria invade and survive within host cells, highlighting the critical role of the actin filament network. They also address the importance of tight junctions in modulating the barrier function of airway epithelial cell monolayers.

Understanding the biology of BCC bacteria and their interactions with the host cell is crucial for the development of novel antimicrobial strategies to combat these infections in CF patients.


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