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Mycobacterial Diseases

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Perspective

Non-Tuberculous Mycobacteria Isolates in Cystic Fibrosis Patients

Charles S Hill*

Department of Pulmonology, Cambridge Centre for Lung Infection, Harvard University and Papworth Hospital, Cambridge, USA

DESCRIPTION

Cystic Fibrosis (CF) is a genetic disorder characterized by thick, sticky mucus that can clog airways and lead to chronic lung infections. Patients with CF are particularly susceptible to respiratory infections, including those caused by Non-Tuberculous Mycobacteria (NTM). NTM are a diverse group of microorganisms that are widespread in the environment but can pose a significant threat to individuals with compromised lung function.

Understanding Non-Tuberculous Mycobacteria (NTM)

Non-Tuberculous Mycobacteria encompass a wide range of species, with *Mycobacterium Avium* Complex (MAC) and *Mycobacterium abscessus* being the most common culprits in CF-related infections. Unlike *Mycobacterium tuberculosis*, which causes tuberculosis, NTM are considered opportunistic pathogens, meaning they typically infect individuals with weakened immune systems or underlying lung conditions like CF.

These microorganisms are remarkably resilient and can survive in various environments, including soil and water sources. In CF patients, NTM can find refuge in the thick mucus that lines the airways, forming biofilms and evading the immune system's defences.

Challenges posed by NTM in CF

Delayed diagnosis: Diagnosing NTM infections in CF patients can be challenging. Symptoms such as increased cough, fatigue, and weight loss overlap with other CF-related issues, leading to delayed diagnosis.

Chronic infections: Once established, NTM infections in CF patients tend to become chronic. These long-term infections can lead to progressive lung damage, exacerbating the already compromised lung function in CF.

Antibiotic resistance: NTM species have demonstrated varying levels of resistance to commonly used antibiotics. This complicates treatment and necessitates specialized regimens that may involve multiple drugs over extended periods.

Impact on lung transplants: CF patients with NTM infections face additional hurdles when considering lung transplantation. Many transplant centres require patients to be free of active NTM infection before undergoing the procedure.

Clinical impact of NTM

NTM infections can have a profound impact on the clinical course and quality of life of CF patients:

Decline in lung function: NTM infections are associated with a more rapid decline in lung function in CF patients. This accelerated decline can lead to increased respiratory symptoms and the need for more frequent hospitalizations.

Reduced response to CFTR modulators: Emerging CF therapies, such as CFTR modulators, have revolutionized CF management. However, their effectiveness may be compromised in CF patients with concurrent NTM infections.

Psychological stress: Living with chronic NTM infections can take a toll on a CF patient's mental health. The uncertainty, increased treatment burden, and prolonged illness can lead to anxiety and depression.

Increased healthcare costs: Managing NTM infections in CF patients can be expensive due to the need for prolonged and complex treatment regimens. These costs can strain healthcare systems and patients' financial resources.

Diagnosis and treatment

Diagnosing and managing NTM infections in CF patients require a multidisciplinary approach:

Diagnostic challenges: Diagnosing NTM infections often involves a combination of clinical symptoms, imaging, and microbiological cultures. Sputum cultures, bronchoscopies, and radiological imaging may be necessary to confirm the presence of NTM.

Antibiotic therapy: Treatment of NTM infections in CF patients typically involves a combination of antibiotics tailored

Correspondence to: Charles S Hill, Department of Pulmonology, Cambridge Centre for Lung Infection, Harvard University and Papworth Hospital, Cambridge, USA, E-mail: charles.hill@papworth.nhs.uk

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to the specific NTM species and their antibiotic susceptibilities. Therapy can last months to years and may require periodic revaluation.

Airway clearance: Regular airway clearance techniques, such as chest physiotherapy and nebulized hypertonic saline, are essential to help CF patients manage NTM infections and maintain lung health.

Nutritional support: Ensuring that CF patients with NTM infections receive adequate nutrition is vital, as the infections can lead to weight loss and nutritional deficiencies.

Surgical interventions: In some cases, surgical removal of infected lung tissue may be necessary to control NTM infections, particularly when conservative therapies prove ineffective.

Future directions and research

Efforts to improve the diagnosis, treatment, and prevention of NTM infections in CF patients are ongoing:

Diagnostic tools: Researchers are working on developing more rapid and accurate diagnostic tools to facilitate earlier detection of NTM infections in CF patients.

New therapies: Investigational drugs and treatment strategies are being explored to address antibiotic resistance and enhance the effectiveness of NTM treatment in CF patients.

Vaccines: The development of vaccines against NTM species, particularly *M. abscessus*, is an active area of research that could provide a preventive approach.

Improved infection control: Implementing infection control measures in CF clinics and care settings can help reduce the risk of NTM transmission among CF patients.

CONCLUSION

Non-Tuberculous Mycobacteria infections in cystic fibrosis patients represent a formidable challenge. These infections can lead to accelerated lung function decline, increased healthcare costs, and psychological stress for patients and their families. While progress has been made in understanding and managing NTM infections, further research is needed to develop more effective diagnostic tools and treatment regimens. With a multidisciplinary approach, including advances in diagnostics, targeted therapies, and infection control measures, we can work towards reducing the burden of NTM infections in CF patients. As the CF community continues to collaborate and innovate, there is hope for better outcomes and improved quality of life for those living with both CF and NTM infections.