Journal of Infectious Diseases: Prevention and Control

Extended Abstract
Vol. 2, Iss. 3
2019

Microbial Interactions 2019: Longitudinal sampling of the aerodigestive microbiome in people with cystic fibrosis-Hafez Al-Momani- Hashemite University, Jordan

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Cystic fibrosis (CF) is a genetic disorder that mostly affects the lungs, but also the pancreas , liver , kidneys, and bowel. Long-term problems include breathing difficulties and coughing up mucus as a result of frequent lung infections. Many signs and symptoms may include infections with the sinus, slow growth, fatty stool, finger and toe clubbing and infertility in most males. Different people can have symptoms of different degrees. Cystic fibrosis is an inherited illness which affects the lungs and digestive system. When mucus clogs the lungs, breathing can get really hard for a human. The thick mucus also allows germs to thrive and multiply, leading to infections and inflammation and often leading to severe damage to the lungs and respiratory failure. The buildup of mucus in the pancreas prevents digestive enzymes from being released which help the body break down food and absorb important nutrients. Cystic fibrosis in a gene called CFTR (cystic fibrosis transmembrane conductance regulator) is caused by a change, or mutation. This gene controls the salt and fluid flows within and out of your cells. If the CFTR gene is not working the way it should be, a sticky mucus is building up in your body. To get CF, both of your parents must inherit the mutated copy of the gene. Ninety percent of those affected by the F508del mutation have at least one copy. People with CF are often malnourished and growing poorly. The thick mucus can also block the liver bile duct, which can cause liver disease in some people with CF. CF may have an impact on men's desire to have children. CF has no impact on sexual growth in either men or women, however. Babies with CF are growing, evolving and doing what other infants do. CF children go to school, play sports and get driver's licenses. People with CF are allowed to go to college, pursue successful careers and have their own families. Today, more than half of people with CF are 18 years of age or older, due to improved medical treatments and care. Many people with CF can expect healthy living and fulfilling life in their 30s, 40s and beyond. A full CF diagnostic evaluation will include a sweat chloride test, a genetic or carrier test and a clinical examination at a CF Foundation-accredited treatment centre. Most children are now screened for CF by newborn screening at birth, and the majority are diagnosed with age 2. Some people with CF are however diagnosed as adults. A physician seeing CF symptoms will order a sweat test and a genetic test to confirm the diagnosis. People of all ages with CF have to follow a regular treatment routine to stay healthy. In addition to a diet and exercise program, there are medicines that help clear the dense, sticky mucus from the airways and minimize inflammation, antibiotics to treat CF lung infections and new therapies for imprinting the defective CFTR protein in CF.

The body develops thick and sticky mucus that can block the pancreas and clog the lungs. Cystic fibrosis (CF) can be life-threatening and people with the condition tend to have a life span that is shorter than normal. CF is a genetic disorder that primarily affects the lungs and digestive system, but it can lead to fatal complications such as hepatitis and diabetes. The faulty gene responsible for CF results in the production of thicker, more sticky mucus than normal. It's hard to cough the mucus out of the lungs. This can make it hard to breathe and lead to severe lung infections. The mucus also interferes with pancreatic function by preventing the proper breaking down of food by the enzymes. The result is digestive problems which could lead to malnutrition. This mucus thickening may also cause male infertility by blocking the deferens vas, or the tube which carries the sperm from the tests to the urethra. Lung obstruction by CF increases the risk of lung infections such as bronchitis and pneumonia because it creates optimal conditions for pathogens to grow. Pancreatic obstruction can lead to malnutrition, and poor growth. It was also linked to an increased risk of diabetes and osteoporosis. CF isn't currently being cured. However, medication can control the disease 's symptoms, and improve the quality of life. Symptoms

This work is partly presented at 14th International Conference on Microbial Interactions & Microbial Ecology during August 19-20, 2019 held at August 19-20, 2019

can vary and plans for treatment will be individualised. There are alternate ways to treat CF which do not involve the airways. Implanted devices can allow the frequent and routine administration of drugs for long-term access to the bloodstream. They can make more effective and less intrusive management of a chronic condition such as CF.

Introduction: The importance of researching gastrointestinal pathophysiology, lung infection and non-tuberculosis mycobacterium (NTM) are universally recognised by carers, healthcare professionals and people with CF. We studied the aerodigestive microbiome in CF, providing the first longitudinal data of which we are aware.

Methods: Bacterial communities were collected from sputum and gastric juices from thirteen CF patients who were fed with a PEG tube; these samples were cultured then identified using the 6S rRNA gene sequencing technique. Symptoms of extraoesophageal reflux were recorded and after six months, further samples were collected. Models simulating gastric and lung environments were used to evaluate the effect of varying the levels of bile acids, pepsin and pH on Pseudomonas aeruginosa (Pa) isolated from patients.

Results: Identical strains of Pa and NTM were identified in gastric and lung samples from patients with symptoms of extraoesophageal reflux. Temporal repeated samples showed variability in overall bacterial diversity, which was more pronounced in sputa compared to gastric juice. Gastric bile and pepsin levels were associated with Pa biofilm formation.

Discussion: While identical microbiology in sputum and gastric juice can be accounted for by expectorate being swallowed, the aerodigestive microbiomes in patients who test negative for Pa and NTM in sputum, can test positive for these pathogens in the gastric compartment. This indicates the stomach can be a pathogenic reservoir. The route of transmission may be facilitated by reflux and potential aspiration of gastric juice. This gut to lung transfer of pathogenic organisms requires further research.

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