Mycoplasma pneumoniae and walking pneumonia



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This paper will discuss the atypical bacterium *Mycoplasma Pneumoniae* (*M. pneumoniae*) that triggers Walking Pneumonia. *M. pneumoniae* is a pathogen common among humans causing a respiratory infection in the lungs. Research on the discovery and history, taxonomy and classification, cell biology, signs and symptoms, transmission, diagnosis and treatment, and prevention of Walking Pneumonia was completed. With the growing population of the world, *M. pneumoniae* is likely to been seen more often. Physicians and those who self-diagnose often under diagnose *M. pneumoniae*. By the end of this paper, there should be a better understanding of *M. pneumoniae*.

The discovery of mycoplasma first happened in 1898 by Edmond Nocard and Constant Roux ² . They were the first to isolate the bacterium within a culture. In 1944, a scientist name Monroe A. Eaton was able to isolate the bacteria in a patient and called the bacterium Eaton Agent ¹ . Afterwards it was rename Mycoplasma (myces meaning a fungus and plasma meaning a form). Originally, *M. pneumoniae* was thought to be a virus or a fungus. The terms Atypical Pneumonia or Walking Pneumonia were given for the public knowledge. These names are because the pneumonia was not reacting to antibiotics like penicillin ² . Studies completed later in 1963, showed the virus to be a bacterium ² . The bacterium discovered can cause an upper and lower respiratory infection of the lungs. The seriousness of pneumonia can range from mild to severe if not treated correctly. *M. pneumoniae* has a very precise scientific classification. The Domain is Cellular Organisms, Kingdom Bacteria, Division Tenericutes, Class Mollicutes, Order Mycoplasmatales, https://assignbuster.com/mycoplasma-pneumoniae-and-walking-pneumonia/

Family Mycoplasmataceae, and Genus Mycoplasma⁴. Cellular Organisms are the most basic form of life. Most organisms classified in this domain will have a nucleus, cytoplasm, organelles, and surrounded by a cell membrane. The Kingdom Bacteria is one-celled organism, without a chlorophyll, the bacteria can multiply using simple division, and are extremely small so it can only be seen using oil-emersion on a microscope ⁴. Division is the next step and *M. pneumoniae* is listed under Tenericutes. The definition of Tenericutes is a bacterium that has cells bounded by a plasma membrane 4 . The Class Mollicutes is a bacterium that is lacking a cell wall. Bacterium is between 0. 2-0. 3 μ m, which is extremely tiny ⁴. Order is the next step down and *M*. pneumoniae falls under Mycoplasmatales. Mycoplasmatales is defined as gram-negative and nonsporing bacteria⁴. The Family Mycoplasmataceae is a microorganism that relates to both and bacteria and a virus. In addition, this bacterium is non-motile, can have complex life cycles, and usually only found in humans ⁴. The final step down is Genus. Mycoplasma is combination of all the information listed first. The taxonomy of M. *pneumoniae* is explained as a one-celled organism bacterium lacking a cell wall, without a chlorophyll, multiplies using simple division, cells bounded by a plasma membrane, surrounded by a cell membrane, and is only seen using oil emersion of a microscope. The full Binomial name is *Mycoplasma* pneumoniae.

Following classification is the cell biology of *M. pneumoniae.* With Mycoplasma, being one of the smallest bacterium it is challenging to culture. With a microscopic bacterium and the nonexistence of a cell wall, it prevents

scientist from performing the staining by gram's stain ⁷. The lack of a strong cell wall allows the bacteria to change its size and shape to match the surrounding conditions. The only way for *M. pneumoniae* to continue cell morphology, is because of a fibrous cytoskeleton (fibrous proteins) with is the cell membrane. It is also a self-limiting bacterium, which is a disease limited by its own individualities and can't be influence by any outside source 7. With the self-limiting bacterium, the disease has a definite limited course. With this type of cell structure, it is impossible for the bacterium to live outside of a human host. *M. pneumoniae* is a pathogen and parasite because of its inability to live outside of a human host. Mycoplasma cells have a spherical cell structure. Because the type of cell and cell structure, Mycoplasma is directly connected to a gram-positive stain ⁶. When the bacteria is placed in an agar plate, colonies will grow in a fried-egg-shaped ⁶

M. pneumoniae need vital nutrients to survive. Amino acids, cholesterol, precursors to nucleic acid synthesis, and fatty acids are all nutrients that *M. pneumoniae* are required to survive ³. The host will furnish all of these nutrients to the cell. They also have an incredibly small genome (0. 58 to 2. 20 Mb) ⁷. A genome is a full set of chromosomes that will inherit traits from the organism ⁷. It also includes detailed genes and DNA sequences. *M. pneumoniae* is extremely small and in unable to synthesize its own purines ⁷. Adenine and Guanine are the two nucleotides that come from the DNA and the RNA. Without these two purines the bacteria is unable to encode for a cell wall and is the reason they require a human host.

People that are at risk of *M. pneumoniae* are children younger than five years of age and older than two years of age that have a weakened immune system. Adults who are older than the age of 65 years of age or who also have a weakened immune system. Others who are at risk are people who have Choronis Obstructive pulmonary disease (COPD), Human Immunodeficiency Virus (HIV), Acquired Immunodeficiency Syndrome (AIDS), Heart disease, Emphysema, Diabetes, have had an organ transplant, or people who are receiving chemotherapy ^{8, 9, 10}.

Others who are at risk are construction or agriculture workers, smokers, people who abuse alcohol, if you are hospitalized/ ICU, have had major surgery or serious injury ^{8, 9, 10}. Other risk factors include asthma, lung disease, cirrhosis, kidney failure, damaged spleen, have had your spleen removed, Sickle Cell Disease, or have had cochlear implants ^{8, 9, 10}.

There are many signs and symptoms of *M. pneumoniae.* Some of the first signs that you will feel are chest pains, difficulty breathing, cough that is dry and has not blood in it, excessive sweating, and chills ^{8, 9, 10}. Some of these symptoms may become worse after having a cold or the flu. The next set of symptoms you may encounter are a high fever, headache, feeling very tired, sore throat, and you might start coughing up mucus with a yellow or green color ^{8, 9, 10}. Some of the less common symptoms patience acquire are ear pain, eye pain or soreness of the eyes, muscle aches, joint stiffness, neck lump, rapid breathing, or even a skin rash accompanied by lesions ^{8, 9, 10}.

What you can expect when going to the door to find out if you have M. *pneumoniae*, is a few tests along with a chest x-ray. The first thing a doctor will do is give you a complete medical and physical exam. This will include taking your blood pressure, listening to your lungs with a stethoscope, feeling your neck to see if your lymph nodes are inflamed, and looking in your ears and mouth ^{8, 9, 10}. Because *M. pneumoniae* is difficult to diagnose with just a physical exam the doctor will order a chest x-ray and blood work. The chest x-ray will allow the doctor to see if it is in face *M. pneumoniae* that you have or just another respiratory infection. If *M. pneumoniae* is present then the lower part of the lungs will look cloudy due to the fluid buildup. On the blood work, the doctor will order CBC (complete blood count) and signs of *M. pneumoniae* in the blood $^{8, 9, 10}$. If either of these tests do not show *M.* pneumoniae and the doctor still thinks you have the disease, he may order a CT scan of the chest and possible a bronchoscopy ^{8, 9, 10}. In the event of an extreme cases the doctor can preform a lung biopsy when no the other sources do not yield a diagnosis ^{8, 9, 10}.

When it comes to treatment of *M. pneumoniae* there is not one specify way a doctor will go. There is no vaccine for *M. pneumoniae* but there are 2 vaccine that might help. One vaccine is only available for children younger than five years of age. Pneumococcal Conjugate Vaccine (PCV) would be given to help lessen the chance of the child getting *M. pneumoniae*. Some of the side effects to this vaccine are redness and tenderness where the shot is given, slight fever, loss of appetite or irritability ^{8, 9,} 10. The second vaccine that is given to children who are older than two years of age and have a

compromised immune system, Pneumococcal Polysaccharide Vaccine (PPSV). Some of the side effects of this vaccine are redness and tenderness at the injection site, muscle soreness and a slight fever ^{8, 9, 10}. This vaccine is also given to older adults that also have a weakened immune system. The doctor may start you on a round of antibiotics. They may include Macrolides, Fluroquinolones, or Tetracyclines. Some doctors will have you do deep breathing exercises to help loosen up the mucus at the bottom of the lungs.

There are some at home treatments you can do for yourself. You are going to want to control your fever with aspirin or Ibuprofen. Do not take any cough medications that have a decongestion agent without talking to your doctor. If you do take a cough medication, it makes coughing up the extra sputum difficult. You want to drink plenty of fluids so that it helps loosen up the secretions and the phlegm is able to come up. The most important thing you can do for yourself is to get plenty of rest. Your body is going to need extra energy to fight off *M. pneumoniae*.

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