A novel aspect of Sick Building Syndrome:
MYCOPLASMA PNEUMONIA IN CLINICAL VIEW OF RESISTANT RESPIRATORY DISORDER

MICROBIOLOGY

A novel aspect of chronic respiratory infection:
MYCOPLASMA MICROBIOLOGY

We would like to bring the most community acquired pneumonia: MYCOPLASMA PNEUMONIA to the attention of our patients and website visitors. For the past 8 years we have being encountered several patients female and male with odd symptoms of chest tightness, fatigue, breathing difficulty, even asthma with wheezing and shortness of breath. Dizziness and malaise, or feeling unwell for no apparent reason. Most of the routine diagnostics laboratory-work , and electrocardiogram were normal. Referral to specialist were with no significant findings. However, our further search to the cause of those mysterious symptoms revealed unusual infections related to SICK BUILDING SYNDROME associated with Mycoplasma Pneumoniae and Candida Albicans, as a common mold type. Sick building syndrome can occur at the home environment.

As of today, we know that Mycoplasma Pneumoniae (Mp) is the leading cause of community acquired pneumonia. Our clinic recently facing more and more patients with Mp and candida albicans infection with its colorful symptoms beyond the acute pneumonia.

Mycoplasma is widely distributed in the nature in animals and plants pathogens. 1898 it was found as cause of lung infection by cattle. It is manifested in human beings as cause of lung infection and non-specific infection of urogenital tract. Mycoplasma contains no cell wall and is very flexible can pass through filters with 220 nm, whereby other bacteria cannot. Mycoplasma dose not survive the dry environment. Not visible under microscopic filter. It can take the shape of a string to a ball shape. Important pathogenic mycoplasmas for human are:

Mycoplasma pneumonia Mycoplasma hominies, found in Oropharynx and genital area as a cause of rare atypical pyelonephritis and septic abortion Urolytic urea plasma: responsible for non- gonorrheal urethritis.

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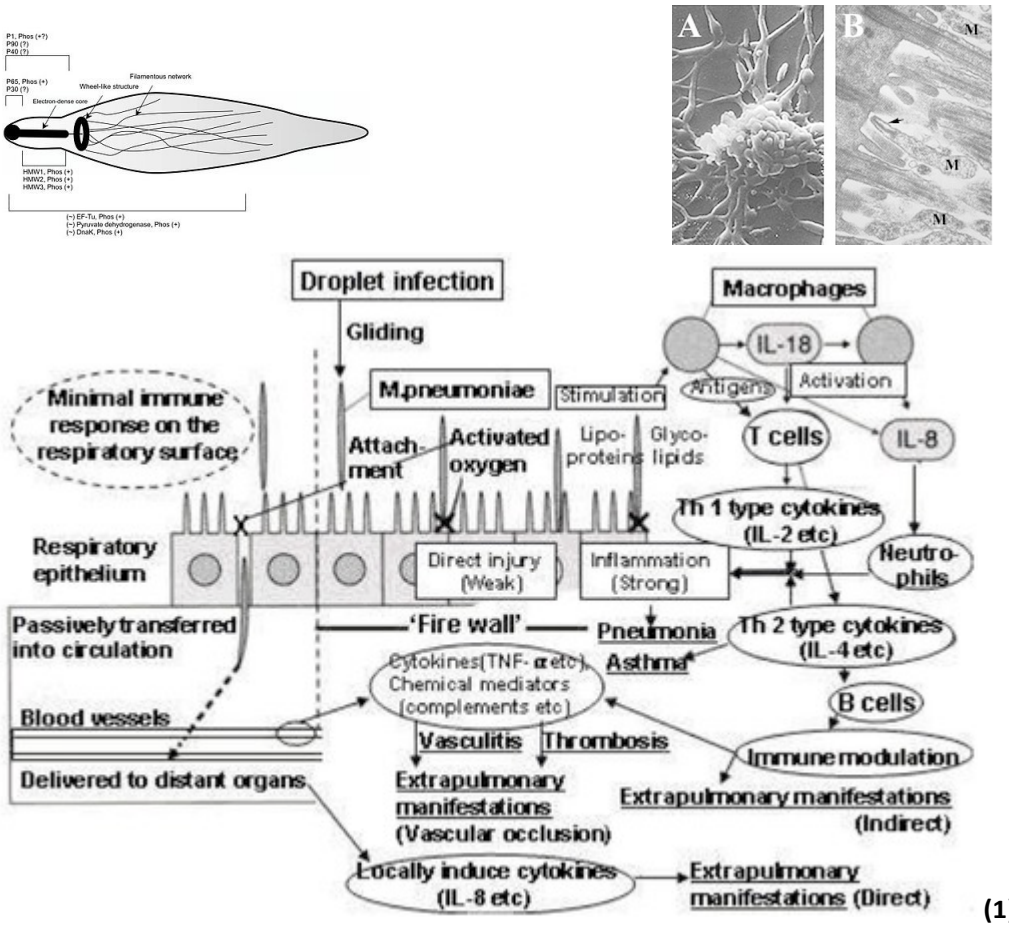

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Steps of infection, Immunologic response, Manifestation of disease

We faced in the past 6 years several symptomatic patients both gender, adult and children in riverside County, CA. Most of our questions to patient's symptoms with normal lab work results however, revealed high level of Mycoplasma pneumoniae Immunoglobulin (IgG) level in some acute cases IgM, as well as Candida Albicans IgG/IgA/IgM. We started in all of them the treatment that resolved patient's symptoms. **Important symptoms included: non cardiac chest pressure and pain, shortness of breath with and without exertion, asthma, fatigue, blurry vision, anxiety and depression**. Patients with chest pain symptoms and anxiety were often referred to Emergency Department for possible acute heart attack or seen at Cardiologist clinic undergone several special tests, all negative. Our data showed a group of patients exposed to mold at their home or work environment infested them with opportunistic **Candida Albicans** infection of pulmonary system too. In Three cases we found by Ct-Scan imaging moderate to severe peribronchial hilar lymph nodes enlargement. All three were symptomatic. A group of employee all encountered with moderate to severe cough, chest pain, fatigue, eye irritations, and abdominal symptoms. In investigation revealed there was a longstanding leak in the sealing and the air conditioner system had non appropriate maintenance for years. The work or home environment condition may be a contributing trigger to infestation of mycoplasma pneumoniae and candida Albicans infection. This may be directly related to Sick Building Syndrome.

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In human beings, the characteristic pathological features of Mp-- pneumonia have been reported as alveolar (air ways) infiltration with lymphocytes and neutrophils, as well as lymphocyte/plasma cell infiltrates in the peri--bronchio--alveolar area and ciliary structures. Mp occurs at any age, but the incidence is less common in elderly, as compared with young adults, and possibly highest among school aged children. (Foy et al, 1979). Severity of Mp pneumonia seems to depend on the host immune response to the infection through a complexity of various mechanisms, including an allergic reaction to Mp, Mp virulence, host defenses, and polarization toward Th1 or Th2 predominance in the host immune system at the given time. **MYCOPLASMA activation is involved in asthma attacks, and sudden inflammatory lung condition, hypoxia, fatigue unknown sources, retrosternal chest pressure and chest pain of non-- cardiac sources.** Autoimmune hematologic disorders can also occur following Mp infection. It is reported that patients with humoral deficiency seemed to become chronic carries of MP (Tylor--Robinson et al 1980) or to undergo repeated episodes of MP pneumonia or even severe arthritis.

Radiologic findings: Most of X--rays of chest interpreted by radiologist usually as normal findings. However, with known history of patient illness, a critical look in to the x--rays in the hand of experienced physician may convert the results to presence of an inflammatory lung condition. A CT--Scan of the chest/lungs may determine the suspicion on some inflammatory reaction around the airways in the lungs and that only with knowledge of patient's history of illness. **M. Pneumoniae or M. Fermentans attacks the bronchial lining of the bronchial tubes, causing special feature and expression of bronchial tree, which is often gives the impression of normal chest x--rays by radiologist.** A wide spectrum of findings on thin--section CT have been reported, such as ground glass opacities(GGO), consolidation, bronchial wall thickening, centrilobular nodules, interlobular septal thickening, pleural effusion, mosaic attenuation, air trapping and lymphadenopathy(Kim et al., 2000, Reitner et al., 2000, Chiu et al., 2006, Lee et al., 2006,Miyashita et al., 2009). On CT--Scan finding of Ground Glass effect and feature is one of the additional diagnostic point we have to look for. Each of those radiologic findings are non--specific, but Miashita and collogues reported that bronchial wall thickening and centri-lobular nodules on thoracic CT would be clue to diagnosis.

Serologic findings: There are many diagnostic serologic tests, although these serologic tests and their interpretations are not standardized. Serologic methods, such as complement fixation (CF), passive agglutination (PA), and detection of IgG and IgM by enzyme immunoassays (EIA) were conventionally used for diagnosis of Mp infection. However, detection of IgM and IgG per se does not determine the severity of symptoms. The high level of IgG or IgM in association with pulmonary and other symptom reveals the presence of high activity of Mp. We experienced the highest level of up to 3990 u/ml (normal: 0--99)- which was associated with acute weight loss and severe mediastinal lymphadenopathy. **Patients may admitted several times to emergency department, or cardiologist with no presumed diagnostic results. Most of the time patient diagnosed with Chronic Obstructive Pulmonary disease COPD or Asthma and left on mercy of series of Inhaler medications.** Mycoplasma pneumonia is usually self-- limited and rarely fatal. Mycoplasma may cause upper and lower respiratory infections. Clinical features of Mp infection may vary among different ages.

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- **Symptoms are associated with gradual onset of respiratory or constitutional symptoms such as dry cough, fever, headaches, malaise, and chest tightness. Dry cough, in absence of sputum usually witnessed in the early phase MP pneumonia and it may persist for a long period as typical symptom before it get worse**. **Analysis of physical examination** data revealed that more than of half of patients with Mp pneumonia had no audible crackles and were likely to have late-inspiratory crackles as compared with those infected with typical pathogens(Norisue at al 2008). Mycoplasma pneumoniae is one of the leading causes of Community Acquired Pneumonia (CAP), and it may worsen symptoms of underlying asthma.

Specific imaging findings[1] of representative pathogens for community-acquired pneumonia

Pathogens	Specific imaging appearances
Streptococcus pneumoniae	Alveolar/lobar pneumonia
Mycoplasma pneumoniae	Bronchopneumonia with wall thickening of the central bronchi
Chlamydophila pneumoniae	Infectious bronchiolitis with bronchial dilatation
Legionella pneumophila	Sharply marinated peribronchial consolidations within ground-glass opacities
varicella-zoster	Scattered nodules with a random distribution
Tubercle bacillus	Tree-in-bud appearance with finer and denser branching opacities than those of bronchopneumonia caused by common bacteria common bacteria (postprimary tuberculosis)
Cryptococcus neoformans	Multiple nodules/masses with or without cavities in the same pulmonary lobe
Pneumocystis jirovecii	Bilateral patchy ground-glass opacities with a geographic distribution

A study showed that most Mp patients, positive by PCR, had respiratory symptoms; that Mp DNA might be detected several months after acute infection; and asymptomatic carriage of Mp is uncommon even after outbreak period (Nilsson et al, 2008).M. Pneumoniae or M. Fermentans attacks the bronchial lining of the bronchial tubes. Extra pulmonary manifestation: The presence of following extra a pulmonary manifestation is itself evidence of human immune system interaction with Mp.

- **Central Nervous System: Encephalitis, aseptic meningitis, poly radicalistic, cerebellar ataxia, myelitis.**
- **Cardiovascular disease: pericarditis, endocarditis, and myocarditis.**

- **Dermatological diseases: Steven-Johnson syndrome, erythema multiform, erythema nodosum, anaphylactic purpura, and acute urticaria.**
- **Hematological diseases: Autoimmune hemolytic anemia (cold agglutinin disease), hemophagocytic syndrome, disseminated intravascular coagulation, and thrombocytopenia purpura.**
- **Inflammatory diseases: Conjunctivitis, Iritis, Uveitis, and otitis media.**
- **Opportunistic infection: Simultaneous infection seen by several symptomatic patients with Mp in our patients. We witnessed the presence of Candida Albicans in patients with history of exposure to mold at their residence or work place**.

Treatment

Treatment for Mp showed Tetracycline and Azithromycin (macrolides), Erythromycin improve symptoms of Mp. Optimal antimicrobial dosage and duration are not clearly determined; however, we recommend generally a 30 days of therapy to eradicate and suppress the mycoplasma pneumoniae activity. In case of resistance to Azithromycin (macrolides)after 30 days, a repeated dose of the same recommended. Tetracycline recommended only in oriental exposure and origin of the mycoplasma. Other opportunistic infection may be treated simultaneously or after Mp infection treatment. Recurrent Mycoplasma activity seen often, which need to be addressed as above. We recommend to address the safety of the work place or home environment to prevent recurrence of the symptoms.

If you have any of those symptoms and never relieved of your symptoms ask your primary Care Physician for a laboratory test work , Chest X-ray, and/or CT-Scan of chest.

- **Serology for Mycoplasma pneumoniae: Ig-M, Ig-G, Ig-A,**
- **Serology for Candida Albicans: Ig-M, Ig-G, Ig-E,**
- **C-X-ray and Ct-Scan of Chest,**
- **Check your workplace and home environment for water leakage, Mold growth,**
- **See around if anyone else sharing the same symptoms with you,**

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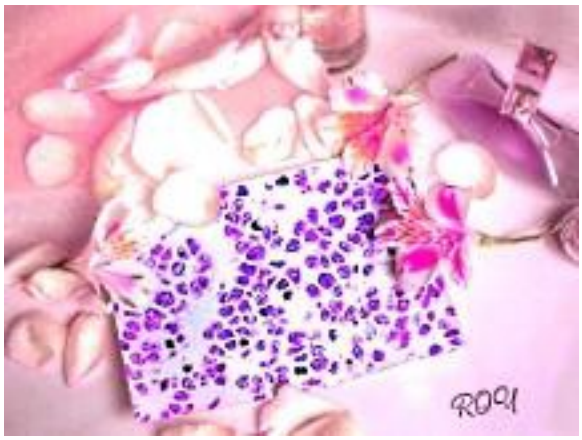
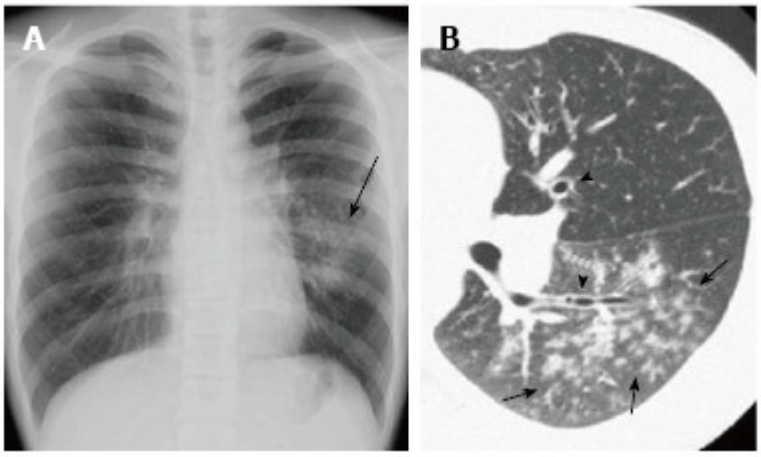
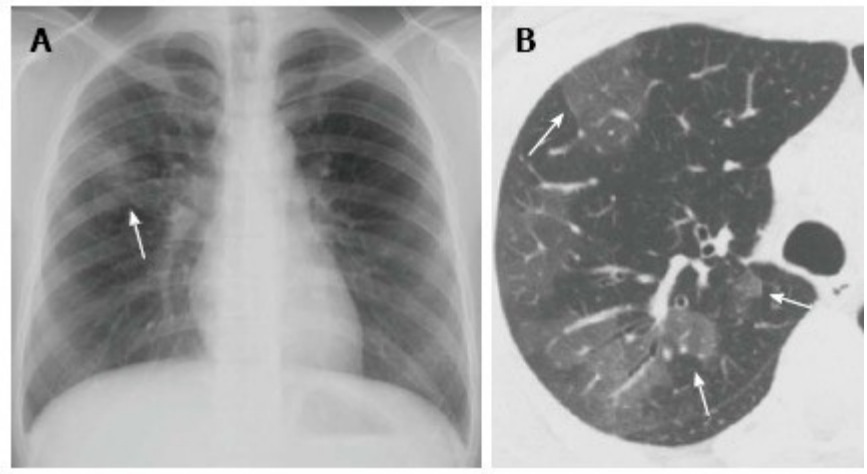


Histogram of Mycoplasma



Mycoplasma pneumoniae pneumonia showing bronchopneumonia in a man in his 10s. A: Chest radiograph shows reticulonodular opacities and focal consolidation in the left middle to lower lung field (arrow). The left pulmonary hilum appears enlarged; B: Thin-section: *Atsushi Nambu, Katsura Ozawa, Noriko Kobayashi and Masao, Taglo: Imaging of Community –acquired Pneumonia, Role of imaging examination, imaging diagnosis of specific pathogens and discrimination from noninfectious disease. World J Radiology. 2014 Oct 28; 6(10):779*



Mycoplasma pneumoniae pneumonia showing ground-glass opacity predominant pneumonia in a woman in her 30s. A: Chest radiograph shows patchy ground-glass opacity (GGO) with peribronchial nodules in the right middle lung field (arrow); B: Thin-section CT reveals a non-segmental consolidation with air bronchograms . (1)

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