

Chapter - 8.12

MYCOPLASMA

Introduction

Nocard and Roux discovered mycoplasma 100 years back. These organisms passed through bacteria stopping filter. They caused pleuropneumonia in cattle and were also called “Pleuropneumonia like organisms” (PPLO). They were also called Eton’s agents. They are pathogens of respiratory and urogenital tracts. In humans, *Mycoplasma pneumoniae* causes pneumonia. *Ureaplasma urealyticum* has been associated with non gonococcal urethritis in men. *M. hominis* caused post partum fever in women and also in uterine tube infections.

General Characteristics of Mycoplasma

The smallest size is 125 – 250nm. They are highly pleomorphic, lack rigid cell wall, bound by a triple layered unit membrane that contains sterol. They are completely resistant to penicillins because they lack cell wall. But they are inhibited by tetracycline or erythromycin. They grow in cell free media. The centre of the colony is embedded beneath the surface giving a fried egg appearance. Growth is inhibited by specific antibody. They have an affinity for mammalian cell membrane.

Morphology

Because of lack of cell wall, morphology is not specific. Growth in fluid media gives rise to many different forms like rings, bacillary and spiral bodies, filaments and granules. Growth on solid medium shows plastic protoplasmic masses of indefinite shape and are easily distorted.

Culture

Mycoplasma grows in heart infusion peptone broth with 2%

agar, pH 7.8 to which 30% human ascitic fluid or animal serum is added. Incubation at 37°C for 48 – 96 hrs reveals no turbidity in fluid but centrifuged sediments show pleomorphism in Giemsa stain.

Growth Characteristics

Extremely small in size. They grow on complex but cell free media. They pass through filters and are comparable with Chlamydiae or large viruses. Many Mycoplasmas use glucose as a source of energy and Ureaplasmas require urea [10%]. They grow on cell free media that contain lipoprotein and sterol.

Classification

They belong to the class Mollicutes (soft skin). They lack cell wall and cell wall precursors. Mollicutes are divided into 2 orders (1) Mycoplasmatales and (2) Acholeplasmatales. Mycoplasmatales are divided into two families (1) Mycoplasmataceae and (2) Spiroplasmataceae. Mycoplasmataceae has two genera (1) Mycoplasma and (2) Ureaplasma.

8.14-1 Diseases caused by Mycoplasmas

In Humans some are normal inhabitants of genitourinary tract, particularly females. In pregnant women it is associated with chorio amnionitis, post partum fever and low birth weight of infants. *U. urealyticum* requires 10% urea for growth. It causes non gonococcal urethritis and may cause male infertility. *M. pneumonia* causes pneumonia.

In Animals mycoplasma causes pleuro – pneumonia which is a contagious disease of the cattle, with occasional deaths.

Human infections

There are over 150 species in the class of cell wall free bacteria known as Mollicutes. At least 15 of these species are thought to be of human origin. In humans 4 species are of primary importance. *Mycoplasma pneumoniae* causes pneumonia and joint infections. *Mycoplasma hominis* produces post partum fever, and

uterine tube infections. *Ureaplasma urealyticum* is associated with non gonococcal urethritis, lung diseases and in premature infant of low birth weight. *Mycoplasma genitalium* is related to *M. pneumoniae*, and causes pneumonia and also urethral and other infections.

Mycoplasma pneumoniae

The morphology appears different according to methods of examination. Growth in fluid media gives rise to many different forms including rings, bacillary, spiral bodies, filaments and granules. Growth on solid media consists of plastic protoplasmic masses of indefinite shape that are easily distorted. *M. pneumoniae* causes atypical pneumonias.

Pathogenesis

From the respiratory secretions through inhalation organisms enter the respiratory tract. They attach to the receptor on the respiratory epithelial cells, multiply and cause the disease.

Clinical Findings:

Pneumonia caused by mycoplasma is generally a mild disease. It starts from asymptomatic infection to serious pneumonitis, with occasional neurologic and hematologic involvement. After the onset symptoms of fever, headache, sore throat and cough follows. The cough is non productive, later blood streaked sputum and chest pain may be seen. It may progress to very severe illness. Death is very rare but may cause cardiac failure.

Lab Diagnosis:

Sputum, blood, throat swab, inflammatory exudates and respiratory secretion are collected. Direct microscopic examination is of no use. Specimens are inoculated in media to grow the organisms. Mycoplasma grows in heart infusion peptone broth with 2% agar, pH 7.8 to which 30% human ascitic fluid or animal serum has been added. Following incubation at 37 °C for 48 to

96 hrs there may be no turbidity but Giemsa stains of the centrifuged sediment shows the characteristic pleomorphic structure and subculture on solid media yields minute colonies. The colonies are round with a granular surface and a dark centre, typically buried in the agar. They can be sub cultured by cutting a small bit of agar with the colony.

Serology

Rise in the antibody can be demonstrated by Complement Fixation Test, Immunofluorescence test, Passive Haemagglutination test, Cold agglutination test with human O RBC [Non – specific test]. A titre of 1 : 64 or more supports the diagnosis.

Treatment

Tetracycline and erythromycin are used for treatment.

Prevention & Control

Close contact with infected individuals must be avoided. No vaccine is available for clinical use.

MYCOPLASMA HOMINIS

This can be associated with a variety of diseases but demonstrated only in a few cases. It is isolated from upper urinary tract infection in about 10% of patients with pyelonephritis. It is associated with infection of uterine tubes, salpingitis. It is also isolated from women with post – abortal or post – partum fever and from joint fluids of arthritis patients.

MYCOPLASMA GENITALIUM

This organism is isolated from non gonococcal urethritis. Culture of *M. genitalium* is difficult. PCR, molecular probes and serologic tests are used for diagnosis. Data suggests that *M. genitalium* is associated with non Gonococcal acute and chronic urethritis.

UREAPLASMA UREALYTICUM

This has been associated with many diseases but it is demonstrated only in few cases. It requires 10% urea for growth. It causes non gonococcal urethritis in few men but majority of NGU is caused by *Chlamydia trachomatis* [50%]. *U. urealyticum* is common in the female genital tract. *U. urealyticum* has been associated with lung disease in premature low birth weight infants. They acquire the organism during birth. It is associated with infertility also.

Points to remember

1. Mycoplasmas are cell wall less bacteria.
2. They cause variety of infections in man, animals and plants.
3. In man it causes respiratory, and urogenital infections most commonly and other types rarely.
4. They can be cultured in artificial culture medium and sensitive to tetracycline and erythromycin.