# THE IMPORTANCE OF S.PNEUMONIAE IN THE DEVELOPMENT OF CHRONIC RESPIRATORY TRACT INFECTIONS IN ADULTS

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**Abstract.** Streptococcus pneumoniae (pneumococci) are gram-positive, alpha-hemolytic, aerobic, capsule-forming diplococci. Pneumococcal infection is a major cause of otitis media, pneumonia, sepsis, meningitis, and death. Diagnosis is by Gram-stained smears and culture. Treatment depends on the resistance profile and includes any beta-lactams, macrolides, respiratory fluoroquinolones, pleuromutilin, or occasionally vancomycin.

**Keywords:** Diseases caused by pneumococci, Diagnosis, Treatment, Prevention, Basics, Additional information.

## INTRODUCTION

Pneumococci do not grow on simple nutrient media and require the addition of blood and normal animal serum to the media, which are sources of vitamins, choline, and catalase. In the laboratory, pneumococci are identified by the following features:

Gram-positive lanceolate diplococci

catalase-negative

Alpha-hemolysis on blood agar

Sensitivity to optochin

Lysis by bile salts

Pneumococci usually colonize the human respiratory tract, with a seasonal distribution - winter-spring. Spread - airborne.

True epidemics of pneumococcal infections are rare; however, some serotypes appear to be associated with outbreaks in certain populations or settings

(e.g., military personnel, crowded areas, homeless people), especially in crowded settings.

**MATERIALS AND METHODS**

Depending on the chemical structure of the capsular polysaccharide, pneumococci are divided into serological types; in addition, the chemical composition of the capsule determines the virulence and pathogenicity of the microorganism. Virulence varies within serological types due to genetic diversity. Currently, > 90 different pneumococcal serotypes have been identified based on their reaction with type-specific antiserum. The pneumococcal polysaccharide capsule is critical for avoiding phagocytosis. Serotype 3 strains, which have a denser capsule and a tendency to form more mucoid colonies than other serotypes, are the most common causes of invasive pneumococcal disease in adults. Most serious infections are caused by serotypes 3, 4, 6B, 9V, 14, 18C, 19F, and 23F, which are included in the most commonly initially administered pneumococcal conjugate vaccines, PCV15 and PCV20. These serotypes account for approximately 90% of severe infections in children and 60% in adults. The serotype composition of the agent is slowly changing, partly due to the widespread use of a polyvalent vaccine. Serotype 19A, which is highly virulent and multidrug-resistant, is associated with respiratory tract infection and invasive disease; therefore, it is now included in the 15- and 20-valent pneumococcal conjugate vaccines. Additional serotypes causing infection have been included in updated 15- and 20-valent pneumococcal conjugate vaccines [1].

**RESULTS AND DISCUSSION**

Patients most susceptible to serious and invasive pneumococcal infections include those with one or more of the following characteristics:

Chronic medical conditions (eg, chronic cardiorespiratory disease, diabetes mellitus, liver disease, alcoholism)

Immunodeficiency or immunosuppression (eg, HIV, congenital and acquired hypogammaglobulinemia [eg, due to multiple myeloma], iatrogenic)

Congenital or acquired asplenia

Sickle cell disease or other hemoglobinopathies

Long-term hospital admissions

Smokers

Aboriginal, Alaska Native, and certain other American Indian groups

Chronic renal failure or nephrotic syndrome

Cochlear implant

CSF leak

Generalized cancer

Hodgkin's disease

Leukemia

Lymphoma

Solid organ transplant

The elderly People, even those who have no other illnesses, usually have a poor prognosis for pneumococcal infections.

Chronic bronchitis, acute respiratory viral infections, especially influenza, can predispose to the development of pneumococcal infection.

The characteristic capsule can be demonstrated using the swelling test. In this assay, the application of antiserum is followed by staining with India ink, which causes the capsule to appear as a halo around the organism. After the capsule binds to the type-specific antiserum, which causes it to swell, the pneumococcal capsule becomes visible under the microscope. After the addition of methylene blue, pneumococcal cells stain dark blue and are surrounded by a well-defined halo, which represents the outer edge of the capsule [2].

Culture confirms identification. Serotyping and genotyping of isolates may be useful for epidemiological reasons (e.g., to monitor the spread of specific strains and strains resistant to antibacterial agents). Variation in virulence within a serotype can be detected using techniques such as pulsed-field gel electrophoresis and multilocus sequencing. The urine antigen test has high specificity (>90%) but low sensitivity (50–80%) and is highly dependent on concomitant bacteremia. The positive predictive value is high (>95%) (the proportion of patients with a positive

test result who actually have disease) (1). However, the negative predictive value (the proportion of patients with a negative test who actually do not have disease) is low, so a negative urine antigen test should not be used to exclude pneumococcal disease [3].

**CONCLUSION**

Streptococcus pneumoniae plays a crucial role in the development and progression of chronic respiratory tract infections in adults, posing a significant health burden worldwide. Given its ability to colonize the respiratory mucosa, evade immune responses through its polysaccharide capsule, and adapt to different host environments, pneumococci remain one of the leading causes of pneumonia, bronchitis, and other chronic respiratory conditions.

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