

Incidence of Penicillin-Resistant *Streptococcus pneumoniae*

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ABSTRACT Sensitivity to penicillin G of 190 *Streptococcus pneumoniae* strains detected by sputum culture from January 2006 to December 2011 was investigated using old criteria (PSSP: 0.06 μ g/ml or less, PISP: 0.12~1 μ g/ml, PRSP: 2 μ g/ml or greater) and new criteria (without meningitis) (PSSP: 2 μ g/ml or less, PISP: 4 μ g/ml, PRSP: 8 μ g/ml or greater). The results by the old criteria were PSSP: 43.2%, PISP: 44.7%, and PRSP: 12.1%, whereas the results by the new criteria were PSSP: 97.4%, PISP: 2.1 %, and PRSP: 0.5%. Based on the above, it was concluded that the majority of *S. pneumoniae* from sputum were penicillin-sensitive strains.

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Key words : **Penicillin-Sensitive *Streptococcus pneumoniae*,**
Penicillin-Intermediate *Streptococcus pneumoniae*,
Penicillin-Resistant *Streptococcus pneumoniae*

INTRODUCTION

With regard to *Streptococcus pneumoniae*, the National Committee for Clinical Laboratory Standards (NCCLS)¹⁾ in the USA has, until recently, defined Penicillin-Sensitive *S. pneumoniae* (PSSP) as a penicillin G (PCG) minimum inhibitory concentration (MIC) of 0.06 μ g/ml or less, Penicillin-Intermediate *S. pneumoniae* (PISP) as 0.12~1 μ g/ml, and Penicillin-Resistant *S. pneumoniae* (PRSP) as 2 μ g/ml or greater. However, new NCCLS criteria²⁾ (without meningitis) define PSSP as 2 μ g/ml or less, PISP as 4 μ g/ml and PRSP as 8 μ g/ml or greater. To evaluate whether a change in frequency of PRSP

obtained from the sputum would occur as a result of this criteria change, we investigated the difference in incidence of PRSP by both the old criteria and the new criteria.

MATERIALS AND METHODS

Materials

The materials were 190 *S. pneumoniae* strains detected by sputum culture at Kawasaki Hospital, Kawasaki Medical School from January 2006 to December 2011.

S. pneumoniae strains were obtained from 190 patients (118 males and 72 females aged 27 to 91 years, 187 outpatients and 3 inpatients).

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Methods

We measured MIC of PCG for these strains and compared their sensitivities using the old and new criteria.

The MIC was measured by microbroth dilution method.

RESULT (Fig.1)

According to the old criteria, of the 190 strains, 82 strains (43.2%) were PSSP, 85 strains (44.7%) were PISP, and 3 strains (12.1%) were PRSP. On the other hand, according to the new criteria, of the 190 strains, 185 strains (97.4%) were PSSP, 4 strains (2.1%) were PISP, and 1 strain (0.5%) was PRSP.

DISCUSSION

The world's first PRSP was reported in 1965³⁾. The first case in Japan was reported⁴⁾ in 1977. Thereafter, PRSP have spread. A nationwide surveillance in 2008⁵⁾ revealed that 52.6% were PSSP, 35.5% were PISP, and 11.8% were PRSP, showing that nearly half of *S. pneumoniae* are penicillin-resistant. This rapid increase has become

a major concern.

However, in the clinical setting, the strategy of treating even pneumonia caused by PRSP was recommended penicillin, because pneumonia caused by PRSP has been cured when a sufficient amount of penicillin is administered. The new criteria (without meningitis) stipulate PSSP as $2 \mu\text{g/ml}$ or less, thus many strains which had been conventionally judged to be PRSP are now judged to be PSSP. The present study showed that results of PSSP: 43.2%, PISP: 44.7%, and PRSP: 12.1% by the old criteria changed to PSSP: 97.44%, PISP: 2.1 %, and PRSP 0.5% by the new criteria, showing that the majority of strains are penicillin-sensitive strains. Another Japanese study on 211 stains performed in 2008⁵⁾ showed that results of PSSP: 52.6%, PISP: 35.5%, and PRSP: 9.9% by the old criteria changed to PSSP: 99.5%, PISP: 0.5%, and PRSP: 0% by the new criteria, showing that nearly all the strains were penicillin-sensitive. A study performed⁶⁾ in the USA in 2006 on 2897 strains revealed PSSP: 93.0%, PISP 6.3%, and PRSP 0.7% by the new criteria, showing that nearly all the strains were penicillin-sensitive.

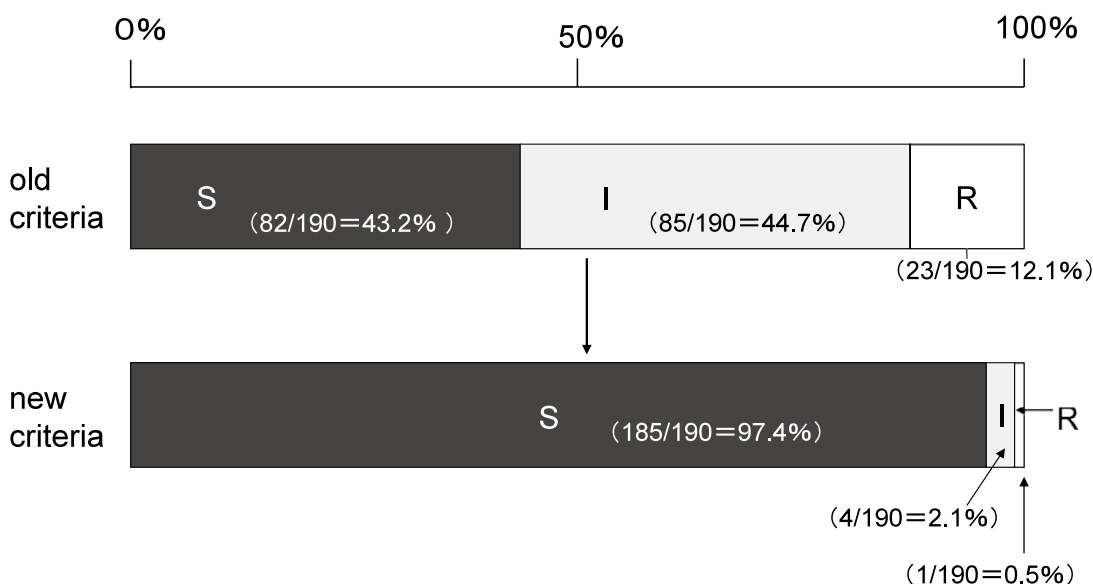


Fig. 1. Incidence of Penicillin-Resistant *Streptococcus pneumoniae* (190 strains by sputum culture, 2006~2011)

These results clarified the reason that administration of penicillin cured even pneumonia caused by *S. pneumoniae* which have been conventionally judged to be penicillin-resistant.

Based on the above, it was concluded that the majority of *S. pneumoniae* detected from sputum is penicillin-sensitive and the drug of first choice for *S. pneumoniae* pneumonia should be penicillin.

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