

Respiratory Syncytial Virus Vaccines for the Elderly Population in Japan

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Abstract: Respiratory syncytial virus (RSV) is commonly known as a pathogen of the bronchiolitis in children, however, recently also as a pathogen of the severe virus pneumonia in adults, especially elderly persons, and vaccines for elderly persons have been developed. There are two vaccines, such as the vaccines targeted for subgroup A with the adjuvant, and that targeted for both subgroup A and B but not included the adjuvant in Japan. Both vaccines are considered effective to prevent not only the incident of RSV infection/pneumonia, but also the exacerbations of the elderly persons with underlying diseases including chronic cardiopulmonary diseases.

Keywords: Arexvy, Abrysvo, Elderly Persons, Respiratory Syncytial Virus, Viral Pneumonia, Vaccine

1. Mini Review

1.1. The significance of respiratory syncytial virus infection in elderly persons

Respiratory virus infections are among the most common diseases encountered in routine medical practice, and their prevalence has a considerable impact on society [1]. Influenza and COVID-19 are particularly well known, and respiratory syncytial virus (RSV) has also been a major problem for some time, particularly in the field of pediatrics, but its potential to cause serious lower respiratory tract infections in the elderly population has also attracted attention [2, 3].

Before the COVID-19 pandemic, RSV infection was ranked around third as a cause of influenza-like illness in elderly persons, and in the United States, RSV infection was estimated to account for a maximum of 12% of medical visits for acute respiratory infections in adults aged 50 years and older, and around 7% of all influenza-like illnesses and acute respiratory infections [2, 4]. Moreover, the seriousness of the illness caused by RSV is equal to or greater than that caused by influenza, with pneumonia occurring in 47.4% of RSV infections and 25.8% of influenza infections, and the risk is shown to increase particularly in patients with underlying diseases such as chronic obstructive pulmonary disease (COPD), heart failure, and diabetes mellitus [2, 4]. RSV was originally thought to have a longer incubation period and longer cell recovery time than influenza [1], but this tendency is more pronounced in older people with weakened immune systems and low activities of daily living scores, so it may be appropriate to view it as a viral infection associated with 'prolonged' hospitalization or ongoing poor health.

In Japan, there appeared to be an increase in hospital admissions due to worsening respiratory symptoms caused by RSV infection in elderly persons. However, with advances in genetic diagnosis of viral infections during the COVID-19 pandemic, a clearer picture of RSV infections has emerged [5]. Specifically, before the COVID-19 pandemic, it

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was thought that RSV infections increased mainly in children during the period from autumn to early winter, just before the influenza season. However, following the pandemic, it has been suggested that RSV may have shifted to becoming a 'summer infection,' and that the infection was not only prevalent among children, but also spread to their parents and grandparents with whom they lived [5]. Furthermore, these adults, the grandparent generation, mainly in their 70s and 80s, had more severe inflammation than the parent generation, mainly in their 20s to 40s, and they included a significantly higher number of patients admitted to hospital with pneumonia-like symptoms and receiving antibiotic treatment.

This is consistent with previous reports from outside Japan, and it could be said that the significance and severity of RSV infections in elderly persons within Japan are being elucidated [6].

1.2. Introduction of respiratory syncytial virus vaccines: two vaccines

Against this background, vaccines targeting the elderly population have been introduced [5]. At present, there are no antiviral drugs that have proven effective against RSV infections, and vaccines are the only means of preventing severe illness.

The following two vaccines are currently available for use in adults:

1. Product name: Arexvy (GlaxoSmithKline) [7]

Arexvy is an RSV vaccine for adults aged 60 years and over. It aims to induce a stronger immune response by combining an adjuvant with an antigen. It is a monovalent vaccine in which the antigen is the pre-fusion F protein subgroup A of RSV. This vaccine specifically targets the elderly population and may effectively extend their healthy life expectancy. In international clinical trials, it was proven effective, with an efficacy of 82.58% in preventing the initial onset of lower respiratory tract disease caused by viral infection. In adults aged 60 years and over, the efficacy by comorbidity of Arexvy in preventing the initial onset of lower respiratory tract disease caused by RSV infection during the first RSV season after vaccination was 94.61% in the group with at least one notable comorbidity (such as COPD). There have been rare reports of shock and anaphylaxis as serious adverse reactions, and the main adverse reactions (reported in 10% or more cases) are pain, headache, muscle pain, joint pain, and fatigue. It has been confirmed that this vaccine provides strong prevention against disease onset and reduces disease severity in the elderly population, and it is relatively safe to use.

2. Product name: Abrysvo (Pfizer) [8]

Abrysvo is an RSV vaccine for pregnant women between 24 (preferably 28) and 36 weeks of gestation and adults aged 60 years and over. Rather than combining an adjuvant with the antigen, it is a bivalent vaccine containing two types of antigen: the subgroup A and B subtypes of the RSV-F protein. By providing active immunity to mothers, this vaccine can safely protect mothers and newborns, and it can prevent conditions caused by RSV infection specific to children, such as bronchiolitis, exacerbation of asthma, and severe respiratory failure. Thus, it may also contribute to the prevention of RSV in the parent and grandparent generations. Of course, this vaccine is also indicated for adults aged 60 years and older, directly preventing lower respiratory tract infections such as pneumonia in elderly persons. In this way, it achieves two goals at once across a wide range of age groups. The vaccine has been confirmed as highly effective in preventing disease onset and severe illness in both mothers and children. In adults, the vaccine was deemed safe and well-tolerated in individuals aged 60 years and over based on safety evaluations in international clinical trials involving 17,215 participants who received the vaccine (including 1,159 participants enrolled from Japan).

In addition, Comparison data for both these vaccines and the mRNA-1345 vaccine (Moderna), which is available outside Japan, have also been published [9] (Figure 1). All of these vaccines are considered effective and highly safe, and they are likely to be accepted by many hospitals and patients.

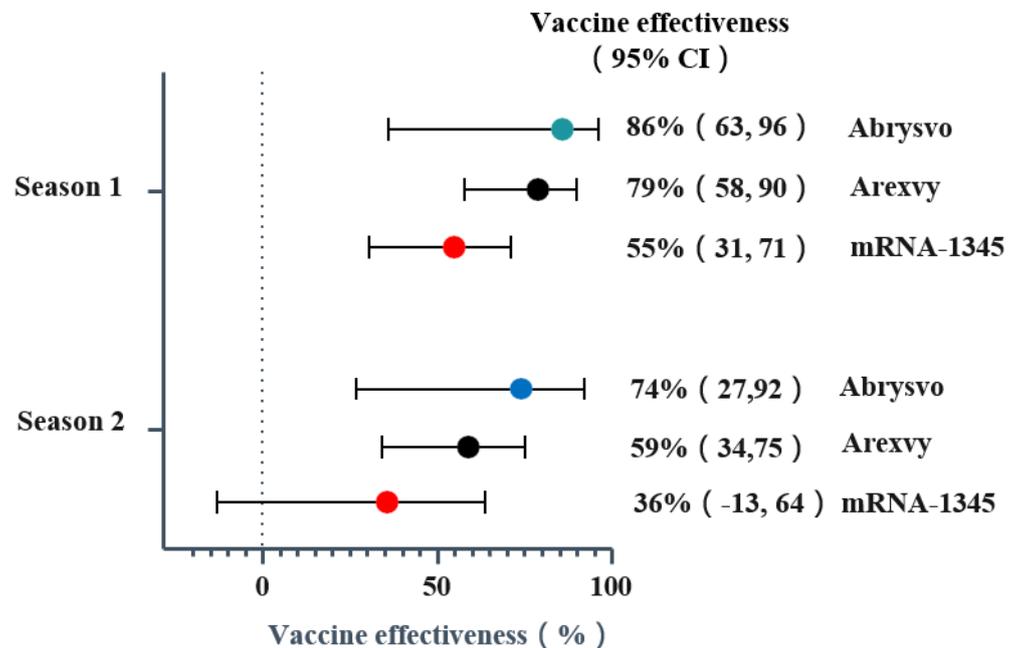


Figure 1. Comparisons of vaccine effectiveness among three vaccines of respiratory syncytial virus for adults. These data showed that vaccine effectiveness for the patients with three and more than three symptoms of lower respiratory tract illness (LRTI) in season 1 and season 2. Blue circles: Abrysvo (Pfizer), Black circles: Arexvy (GSK), Red circles: mRNA-1245 (Moderna), respectively.

2. Conclusions

2.1. The importance of promoting vaccination in the elderly population

In Japan, influenza vaccination has become well established, with an overall vaccination rate of approximately 60%, which is comparable to that of Western countries[10]. However, significant issues remain, such as the COVID-19 vaccine being administered only once a year instead of twice, and the pneumococcal vaccine for elderly persons having a coverage rate of around 10%, despite being approved for regular administration.

RSV vaccines are also attracting attention in Japan as an important vaccination for the elderly population. They are a key pillar of vaccination in elderly persons and should be actively pursued nationwide.

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