Recent Advances in the Management of Viral Flu Infections


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ABSTRACT

Flu is an infectious respiratory disease which is caused by influenza viruses. The most common symptoms of flu are nausea, vomiting and diarrhoea. Different subtypes of influenza viruses are identified based on the combinations of these antigenic structures. Influenza viruses are negative-sense, single-strand RNA viruses that belong to the family Orthomyxoviridae. Antiviral medications are the current pharmacotherapy of flu because they are approximately 70% to 90% effective in preventing influenza. Influenza virus type A is readily prone to mutations, which can lead to minor antigenic changes (antigenic drift) or major antigenic changes (antigenic shift). These changes can result in viral strains capable of causing either an epidemic or a pandemic, because overall immunity in the population is lower. Flublok is the first trivalent influenza vaccine made using an insect virus (baculovirus) expression system and recombinant DNA technology (i.e., without the use of actual influenza virus), so there is little risk of getting the flu from the vaccine. Flublok is highly purified, has three times the amount of active ingredient in traditional influenza vaccines, and contains no preservatives, antibiotics or adjuvants. It provides protection against the latest strains of influenza by containing the corresponding hemagglutinin antigens for those strains. This review article provides brief information of influenza and its treatment by biotechnology-based vaccines introduced within the past few years.

KEYWORDS: Influenza; Hemagglutinin; Flu; Flublok; Baculovirus; Antigenic shift.

Introduction

The word influenza may have been derived from the Latin word influo, which means “to flow in,” indicating airborne transmission, or from the Italian word influence, which indicates influence of weather or an astrological influence. In addition to humans, influenza also infects a variety of animal species. Some of these influenza strains are species specific, but new strains of influenza may spread from other animal species to humans (Mohan et al., 2012).

The term avian influenza used in this context refers to zoonotic human infection with an influenza strain that primarily affects birds. Influenza is a leading cause of illness and death around the world, resulting on average in more than 200,000 hospitalizations and ranging from 3,000 to 49,000 deaths annually in the U.S. alone. More than 90% of influenza-related deaths occur in people over the age of 65, and individuals of all ages with weakened immune systems are at particularly high risk for developing complications from the illness. Influenza, also known as the flu, is a contagious respiratory disease that is caused by influenza viruses. Influenza viruses infect the respiratory tract (nose, throat, and lungs) in humans. Flu season typically peaks in January or February but can extend as late as May. The flu is different from a cold, mainly because the symptoms and complications are more severe. (Abramson et al., 2012; Thompson et al., 2003; 2004).

Biology of Influenza Virus

The structure of the influenza virus is somewhat variable, but the virion particles are usually spherical or ovoid in shape and 80 to 120 nanometers in diameter (Figure 1). Sometimes filamentous forms of the virus occur as well, and are more common among some influenza strains than others. The influenza virion is an enveloped virus that derives its lipid bilayer from the plasma membrane of a host cell. Two different varieties of glycoprotein spike are embedded in the envelope. Approximately 80 percent of the spikes are hemagglutinin, a trimeric protein that functions in the attachment of the virus to a host cell. The remaining 20 percent or so of the glycoprotein spikes consist of neuraminidase, which is thought to be predominantly involved in facilitating the release of newly produced virus particles from the host cell.

Fig. 1. Core structural features of influenza virus.