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Present investigations and new aliments of swine flu

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Abstract

Swine flu is a disease of the respiratory system, caused by the H1N1 virus or type A influenza virus, and has been declared as a pandemic by the World Health Organization. Initially, swine flu was reported only in pigs, but of recent, a considerable number of cases of swine flu in humans too, have been reported all over the world. The U.S. Centers for Disease Control and Prevention(CDC) recommends the use of Tamiflu (oseltamivir) or Relenza (zanamivir) for the treatment and/or prevention of infection with swine influenza viruses. Cases of swine flu are rising on a daily basis and this calls for different treatment options that are effective in relieving swine flu symptoms. It also calls for more awareness on its causes, symptoms, diagnosis, prevention, treatments and new technologies available to fight against swine flu.

Keywords: Swine, Flu, Nano Patches, Spray System

Introduction

Swine influenza (also called H1N1 flu, swine flu, hog flu, and pig flu) is an infection by any one of several types of swine influenza virus. Swine influenza virus (SIV) is any strain of the influenza family of viruses that is endemic in pigs.[1] As of 2009, the known SIV strains include influenza C and the subtypes of influenza A known as H1N1, H1N2, H3N1, H3N2, and H2N3.Electron microscope image of the reassorted H1N1 influenza virus photographed at the CDC Influenza Laboratory. The viruses are 80–120 nanometres in diameter.[2] Like people, pigs can get influenza (flu), but swine flu viruses aren't the same as human flu viruses. Swine flu doesn't often infect people, and the rare human cases that occurred in the past have mainly affected people who had direct contact with pigs. But the current "swine flu" outbreak is different. It's caused by a new swine flu virus that has changed in ways that allow it to spread from person to person and among people who haven't had any contact with pigs.To distinguish it both from flu viruses that infect mainly pigs and from the seasonal influenza A H1N1 viruses that have been in circulation for many years, the CDC calls the virus "novel influenza A (H1N1) virus" and the World Health Organization calls it "pandemic (H1N1) 2009." The CDC calls swine flu illness "H1N1 flu" and the World Health Organization calls it "pandemic influenza A (H1N1)."

In April 2009 the nation received scary news; a virus was sweeping through Mexico and South America, and had reached the Southwestern United States. That virus was Swine Flu or H1N1, an influenza virus affectionately known as the heinie virus. This is a variation of the same virus that was responsible for tens of millions of deaths in 1918, an influenza that the common flu shot will not protect against. Swine influenza virus is common throughout pig populations worldwide. Transmission of the virus from pigs to humans is not common and does not always lead to human influenza, often resulting only in the production of antibodies in the blood. If transmission does cause human influenza, it is called zoonotic swine flu. People with regular exposure to pigs are at increased risk of swine flu infection. The meat of an infected animal poses no risk of infection when properly cooked.

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History

Swine influenza was first proposed to be a disease related to human influenza during the 1918 flu pandemic, when pigs became sick at the same time as humans. [3] The first identification of an influenza virus as a cause of disease in pigs occurred about ten years later, in 1930.[4] For the following 60 years, swine influenza strains were almost exclusively H1N1. Then, between 1997 and 2002, new strains of three different subtypes and five different genotypes emerged as causes of influenza among pigs in North America. In 1997-1998, H3N2 strains emerged. These strains, which include genes derived by reassortment from human, swine and avian viruses, have become a major cause of swine influenza in North America. Reassortment between H1N1 and H3N2 produced H1N2. In 1999 in Canada, a strain of H4N6 crossed the species barrier from birds to pigs, but was contained on a single farm. The H1N1 form of swine flu is one of the descendants of the strain that caused the 1918 flu pandemic. [5-6] As well as persisting in pigs, the descendants of the 1918 virus have also circulated in humans through the 20th century, contributing to the normal seasonal epidemics of influenza.(6) However, direct transmission from pigs to humans is rare, with only 12 cases in the U.S. since 2005.[7] The H1N1 viral strain implicated in the 2009 flu pandemic among humans often is called "swine flu" because initial testing showed many of the genes in the virus were similar to influenza viruses normally occurring in North American swine.[8] But further research has shown that the outbreak is due to a new strain of H1N1 not previously reported in pigs.

In late April, Margaret Chan, the World Health Organization's director-general, declared a "public health emergency of international concern" under the rules of the WHO's new International Health Regulations when the first cases of the H1N1 virus were reported in the United States. [9-10] Following the outbreak, on May 2, 2009, it was reported in pigs at a farm in Alberta, Canada, with a link to the outbreak in Mexico. The pigs are suspected to have caught this new strain of virus from a farm worker who recently returned from Mexico, then showed symptoms of an influenza-like illness.[11] These are probable cases, pending confirmation by laboratory testing.

The new strain was initially described as an apparent reassortment of at least four strains of influenza A virus subtype H1N1, including one strain endemic in humans, one endemic in birds, and two endemic in swine. Subsequent analysis suggested it was a reassortment of just two strains, both found in swine.[12] Although initial reports identified the new strain as swine influenza (i.e., a zoonosis originating in swine), its origin is unknown. Several countries took precautionary measures to reduce the chances for a global pandemic of the disease[13]. The Swine flu has been compared to other similar types of influenza virus in terms of mortality: "in the US it appears that for every 1000 people who get infected, about 40 people need admission to hospital and about one person dies".[14] There are fears that swine flu will become a major global pandemic in the winter months, with many countries planning major vaccination campaigns. [15]

Signs and symptoms

In swine

In pigs influenza infection produces fever, lethargy, sneezing, coughing, difficulty breathing and decreased appetite. In some cases the infection can cause abortion. Although mortality is usually low (around 1-4percent;) (1)the virus can produce weight loss and poor growth, causing economic loss to farmers. Infected pigs can lose up to 12 pounds of body weight over a 3 to 4 week period.[16]

In humans

Main symptoms of swine flu in humans[17]

Direct transmission of a swine flu virus from pigs to humans is occasionally possible (called zoonotic swine flu). In all, 50 cases are known to have occurred since the first report in medical literature in 1958, which have resulted in a total of six deaths. Of these six people, one was pregnant, one had leukemia, one had Hodgkin disease and two were known to be previously healthy. Despite these apparently low numbers of infections, the true rate of infection may be higher, since most cases only cause a very mild disease, and will probably never be reported or diagnosed. [18] (18) According to the Centers for Disease Control and Prevention (CDC), in humans the symptoms of the 2009 "swine flu" H1N1 virus are similar to those of influenza and of influenza-like illness in general.

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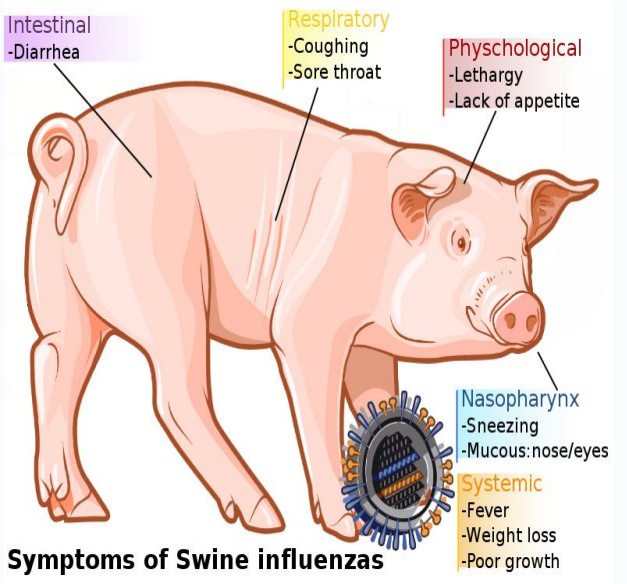
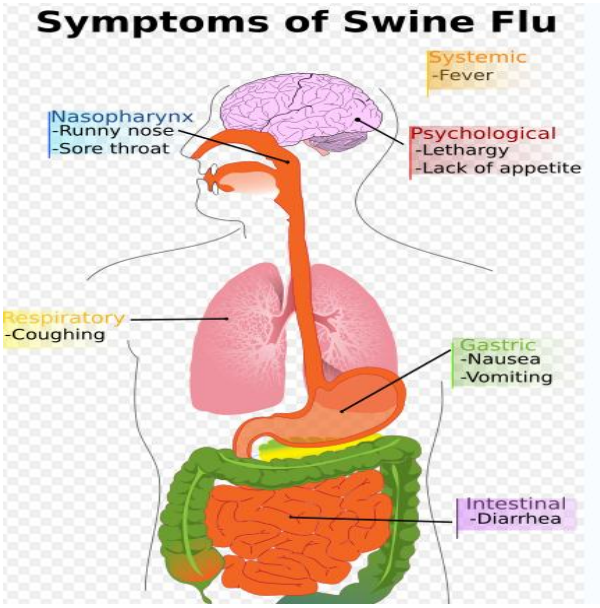
Symptoms include fever, cough, sore throat, body aches, headache, chills and fatigue. The 2009 outbreak has shown an increased percentage of patients reporting diarrhea and vomiting. The 2009 H1N1 virus is not zoonotic swine flu, as it is not transmitted from pigs to humans, but from person to person.[19]

Because these symptoms are not specific to swine flu, a differential diagnosis of probable swine flu requires not only symptoms but also a high likelihood of swine flu due to the person's recent history. For example, during the 2009 swine flu outbreak in the United States, CDC advised physicians to "consider swine influenza infection in the differential diagnosis of patients with acute febrile respiratory illness who have either been in contact with persons with confirmed swine flu, or who were in one of the five U.S. states that have reported swine flu cases or in Mexico during the 7 days preceding their illness onset."A diagnosis of confirmed swine flu requires laboratory testing of a respiratory sample (a simple nose and throat swab). [21] The most common cause of death is respiratory failure, other causes of death are pneumonia (leading to sepsis), high fever (leading to neurological problems), dehydration (from excessive vomiting and diarrhea) and electrolyte imbalance. Fatalities are more likely in young children and the elderly.



Symptoms of Swine influenzas



Diagnosis

Swine flu is diagnosed by following five steps: [22-23]

Step1: The first symptoms of swine flu include coughing, lack of appetite and lethargy. Fever over 100 degrees Fahrenheit is typical.

Step2: Watch for the advanced signs of Swine Flu. As the infection advances, some people will experience sore throat, body aches, runny nose, vomiting, nausea and diarrhea.

Apart from the above symptoms caution should be taken in children showing the following symptoms

- Flu symptoms appear to get better but then return with worse cough and fever
- Bluish color of the skin
- Troubled, Fast Breathing
- Does not want to drink fluids
- Fever and a rash
- Refusing to be held because of irritability
- Difficulty waking up or little interaction

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Urgent medical attention is required for adults who show signs of Symptoms listed in Steps 1, 2 and any of the following:
(a)Sudden confusion or dizziness
(b)Shortness of breath or difficult breathing
(c)Persistent, severe vomiting
(d)Pressure or pain the abdomen or chest
Step3: Call your Doctor. If you are experiencing many of the symptoms listed in Steps 1 and 2, contact your doctor to discuss if influenza treatment or testing is recommended.
Step4: Final Diagnosis by a Doctor. Only a Doctor can diagnose swine flu by running tests. There are two tests that are conducted to aid in the confirmation of a diagnosis. Both tests require a sample of secretions from the nose and mouth (known as a nose and throat swab) and must be tested in the first 24-72 hours after the first symptoms appear.

Prevention

Prevention of transmission from pig to human

Swine can be infected by both avian and human influenza strains of influenza, and therefore are hosts where the antigenic shifts can occur that create new influenza strains.The transmission from swine to human is believed to occur mainly in swine farms where farmers are in close contact with live pigs. Although strains of swine influenza are usually not able to infect humans this may occasionally happen, so farmers and veterinarians are encouraged to use a face mask when dealing with infected animals. The use of vaccines on swine to prevent their infection is a major method of limiting swine to human transmission. Risk factors that may contribute to swine-to-human transmission include smoking and not wearing gloves when working with sick animals[23].

Prevention of transmission form human to human

Swine flu cannot be spread by pork products, since the virus is not transmitted through food[24].The swine flu in humans is most contagious during the first five days of the illness although some people, most commonly children, can remain contagious for up to ten days. Diagnosis can be made by sending a specimen, collected during the first five days for analysis[25].Recommendations to prevent spread of the virus among humans include using standard infection control against influenza. This includes frequent washing of hands with soap and water or with alcohol-based hand sanitizers, especially after being out in public[26]. Chance of transmission is also reduced by disinfecting household surfaces, which can be done effectively with a diluted chlorine bleach solution[27].Experts agree that hand-washing can help prevent viral infections, including ordinary influenza and the swine flu virus. Also avoiding touching eyes, nose and mouth with hands prevents flu. Influenza can spread in coughs or sneezes, but an increasing body of evidence shows small droplets containing the virus can linger on tabletops, telephones and other surfaces and be transferred via the fingers to the mouth, nose or eyes. Alcohol-based gel or foam hand sanitizers work well to destroy viruses and bacteria. Anyone with flu-like symptoms such as a sudden fever, cough or muscle aches should stay away from work or public transportation and should contact a doctor for advice.

Vaccination

Vaccines are available for different kinds of Swine Flu. Avoid close contact -- that is, being within 6 feet -- with people who have flu-like symptoms. Minimize touching your mouth, nose, or eyes. Since this is not easy, keep those hands clean. If you have flu-like symptoms -- fever plus at least cough or sore throat or other flu symptoms -- stay home for seven days after symptoms begin or until you've been symptom-free for 24 hours -- whichever is longer. Wear an N95 respirator if helping a sick person with a nebulizer, inhaler, or other respiratory treatment. Since there is no definitive proof that a face mask prevents flu transmission, do not rely solely on a face mask to prevent infection. People who have or are suspected of having swine flu should wear a face mask, if available and tolerable, when sharing common spaces with other household members, when outside the home, or when near children or infants. Breastfeeding mothers with swine flu symptoms should express their breast milk, and the child should be fed by someone else[28-30].

Treatment

If a person becomes sick with swine flu, antiviral drugs can make the illness milder and make the patient feel better faster. They may also prevent serious flu complications. For treatment, antiviral drugs work best if started soon after getting sick (within 2 days of symptoms).

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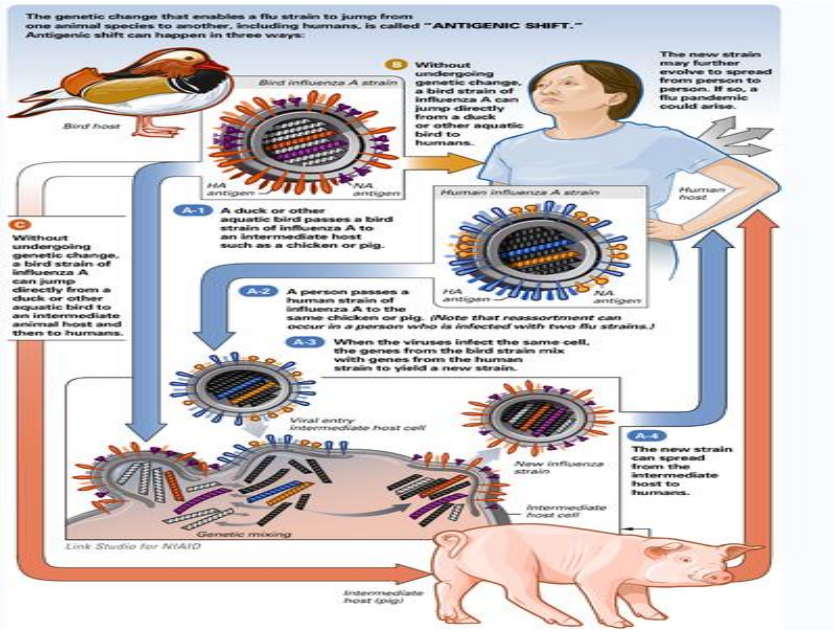
Beside antivirals, supportive care at home or in hospital, focuses on controlling fevers, relieving pain and maintaining fluid balance, as well as identifying and treating any secondary infections or other medical problems. The U.S. Centers for Disease Control and Prevention recommends the use of Tamiflu (oseltamivir) or Relenza (zanamivir) for the treatment and/or prevention of infection with swine influenza viruses; however, the majority of people infected with the virus make a full recovery without requiring medical attention or antiviral drugs. The virus isolates in the 2009 outbreak have been found resistant to amantadine and rimantadine. Tamiflu and Relenza are both medicines of the same type but Relenza comes as an inhaler (rather than a pill) and is recommended for use in pregnancy. In the U.S., on April 27, 2009, the Food and Drug Administration (FDA) issued Emergency Use Authorizations(EUAs) to make available Relenza and Tamiflu antiviral drugs to treat the swine influenza virus in cases for which they are currently unapproved. The agency issued these EUAs to allow treatment of patients younger than the current approval allows and to allow the widespread distribution of the drugs, including by non-licensed volunteers.[31-33]



Antibiotics

Antibiotics are used to treat swine flu patients who develop complications. They help combat bacterial infections such as pneumonia. In hospitals, antibiotics will be used to treat the sickest patients and may reduce the length of hospitalisation. Though the most popular treatment adopted by those suffering from swine flu is allopathic medication, there are many traditional medicines that are used for the treatment of swine flu. Many of the past records say that swine flu was successfully treated by homeopathic medication, in the swine flu epidemic of 1918. Homeopathic medicines that have been effective for the treatment of swine flu are: gelsemium, bryonia, oscillococcinum and eupatorium. Ayurvedic medicines used as a remedy to relieve swine flu symptoms contain herbs like neem (Indian lilac), elderberry, ginger, Immunomodulators and pepper extracts. Once the symptoms have reduced, herbs such as triphala, echinacea, etc. can be taken to eliminate all the symptoms completely. Since the role of these medicines is not yet proved for their role in viral chemotherapy there is an every need for a scientific study on these medications.

New technology responds in fight against swine flu[34-38]

a) Bioflu natural defence against swine flu

The first line of defence against infection and illness. The stronger the immune system, the better the odds of not being infected in the first place and the quicker the body will recover from infection and illness.

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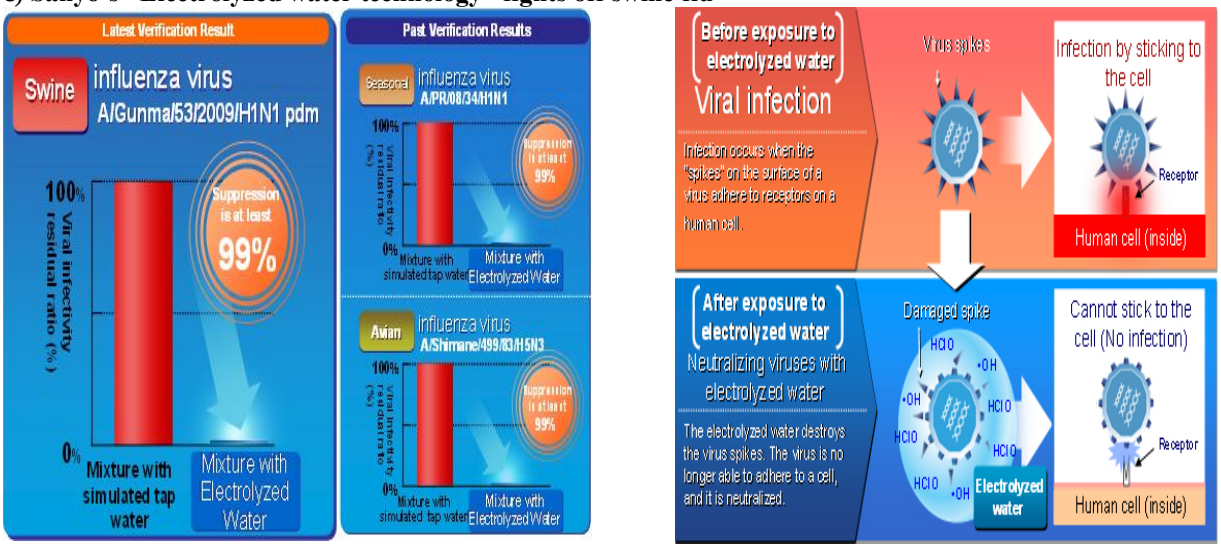
We believe that the public are looking for less harsh, more natural ways of defending their bodies against viral infections and boosting their immune system.At a time when everyone was trying to protect themselves against the frightening spread of viral infections and the spectre of a Swine Flu pandemic, a supplement which has become hugely popular in the US is about to hit the UK market. BioFlu, which combines western science with Chinese traditional medicine, could prove to be as big a hit in other countries as it has been in the US. BioFlu gives a powerful boost to the immune system. Since it was introduced in 2005, BioFlu Immune Supportcombines a selection of four of the most powerful, natural antioxidants – Black Elderberry, shown in human trials to reduce the severity of flu symptoms by 50%, Siberian Ginseng, and Star Anise and Shikimic Acid, the plant from which the leading anti-viral drug Tamiflu is made. Biotivia, the company making and distributing BioFlu Immune Support, believe that this product is a safe and natural aid in strengthening the body's immune system against the onslaught of viral infections.[34]

b) Electrostatic Spraying Technology

ESS technology was developed at the University of Georgia to change the agricultural industry. Electrostatic spraying technology provides a superior tool in the fight against Swine Flu. "It is how you spray a disinfectant that matters most," says Bruce Whiting of Electrostatic Spraying Systems, Inc. (ESS). The ESS nozzle sprays a fine mist of electrically charged liquid droplets. Air pressure carries the tiny negatively charged droplets toward the target. The electrostatic charge causes the droplets to wrap around the object with an attraction 75 times greater than that of gravity. Droplets will even reverse direction and move upward against gravity to coat hidden surfaces. In order to effectively spray the new "green" chemicals used in fighting viruses and bacteria, the superior coverage afforded by the ESS spray nozzle is essential. Many surfaces require the lighter, more evenly distributed coating provided by an electrostatic sprayer, rather than the heavy soaking experienced with a traditional pump sprayer. Disinfecting areas such as waiting rooms, buses, or other public buildings which get constant usage is challenging. The advantages of an electrostatic sprayer are that it coats thoroughly and dries quickly, allowing the room or vehicle to be put back into uses almost immediately.[35]

c) **Sanyo's "Electrolyzed water technology" fights off swine flu**



Today Sanyo of all companies claiming their "electrolyzed water technology" has proven to be actually effective in fighting the nasty virus. Sanyo claims that their new technology, jointly developed with the Gunma Prefectural Institute of Public Health and Environmental Sciences in central Japan, is at least 99% effective in suppressing infectivity for H1N1 (the virus was exposed to electrolyzed water for ten minutes after which this viral infectivity reduction effect was observed). A mixture with tap water served as an example for a viral infectivity residual ratio of 100%.

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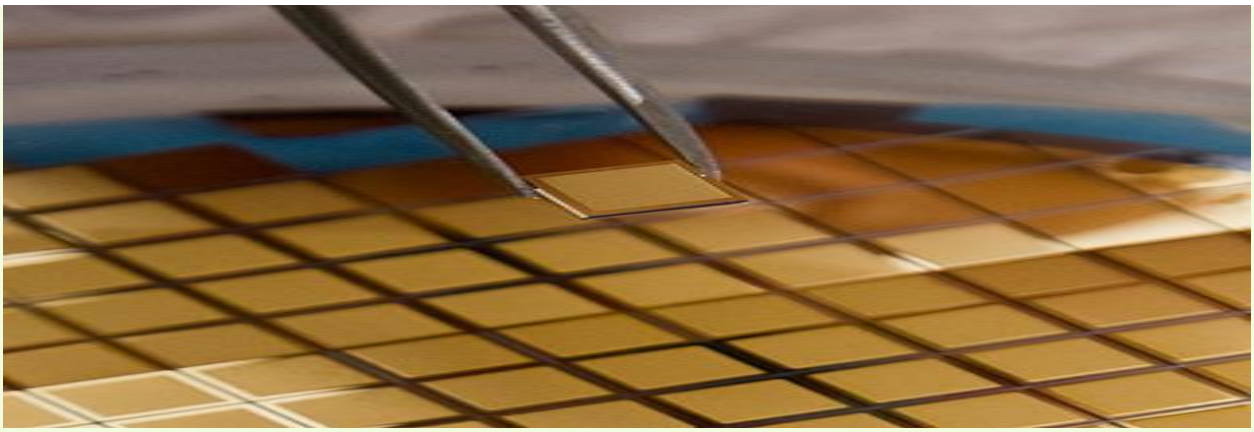
d) Nanopatches to join the fight against swine flu

In response to the growing threat of swine flu, a UQ team is applying nanopatch technology to potentially solve the problems associated with vaccinating millions of Australians. Australian Institute for Bioengineering and Nanotechnology (AIBN) researcher Professor Mark Kendall heads a team testing the potency of mass vaccinations using only a fraction of the standard dose. These nanopatches to protect against challenge from the swine A H1N1 influenza virus. Professor Kendall said this research used new nanopatch technology which does away with the needle and syringe and stimulated a potent immune response with a reduced dose. By accurately and reliably delivering the vaccine to the abundant immune cells, which are located just under of the surface of the skin, we are able to initiate a rapid and powerful immune response from the body, while using considerably less vaccine. The beauty of the nanopatch lies in the large-scale rapid vaccinations in a cost effective manner that is currently not available with the needle and syringe. The nanopatch could also potentially eliminate needle phobia. The risk of needle sticks injuries while being easy and cost-effective to administer.



e) Fast-tracked swine flu vaccine under fire

Flu vaccines are traditionally produced from non-virulent (attenuated or weakened) influenza viruses. To be effective, the genes of the non- virulent virus used must match those of the viral strain spreading in the population. Activation of the immune system by exposure to the non pathogenic form of the circulating pathogenic strain leads to the production of antibodies that will confer protection against the pathogenic strain. Producing the non-virulent virus involves first identifying and then recreating the subtypes of two of the virus's surface proteins, haemagglutinin (H) and neuraminidase (N), which determine the strain's virulence and ability to spread, and are also the target proteins for vaccine production.

f) Lanxess disinfectant effective against swine flu viral strain

02 Jul 2009 - A recent study carried out on behalf of LANXESS has demonstrated the effectiveness of the disinfectant Preventol CD 601 against the swine flu viral strain. "The test results from Giessen University show that Preventol CD 601 can also play a major role in the fight against swine flu, which has now been classed as a pandemic. Our unique combination of three active ingredients has already proven extremely effective against other enveloped viruses such as the H5N1 bird flu virus," says Dietmar Schlegel, market segment manager for Disinfection in LANXESS's Material Protection Products (MPP) business unit. The viral strain responsible for swine flu is an A viral strain (H1N1) from the Orthomyxoviridae family, which also includes bird flu.

g) L.E.A.P.S (Ligand epitope antigen presentation system) technology

One of the most promising and exciting developments in the battle against swine flu is Cel-Sci's (AMEX: CVM) L.E.A.P.S. (Ligand Epitope Antigen Presentation System) technology. The goal of this new method is to not only immunize against the current strain of H1N1, but to also keep a patient immune to any future mutations of that strain.

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This could be a major breakthrough in combating such a virulent illness like H1N1, which has a high potential for mutation. The vaccine will accomplish this seemingly remarkable feat by working against parts of the virus that if mutated would kill it. Cel-1000, the product of L.E.A.P.S. can be used on by itself or in conjunction with other vaccines, boosting their effectiveness and ability to resist mutated forms of the strain.

h) Drug firms gear up for swine flu

Novartis began injecting its swine flu in people in its first human tests in early August. This vaccine will be tested on 6,000 people in Germany, Britain and the U.S. Sanofi-Pasteur, which makes about 40 percent of the world's flu vaccine, expects to start testing its swine flu vaccine shortly in the U.S. and Europe. CSL became the first vaccine maker to start testing its vaccine in humans. Those efforts got under way in July. Meanwhile, GlaxoSmithKline, which has orders for 291 million doses of vaccine, has not yet started testing its vaccine in humans.WHO recommends vaccines be beefed up with adjuvants--ingredients used to boost the body's immune response--as a way to stretch the supply of swine flu vaccine.

i) Vaccine Technology

A US company that was awarded a 35-million-dollar contract to develop an influenza vaccine using insect cell technology has produced a first batch against (A)H1N1 flu. The insect cell technology has advanced in recent years to a point that we believe it could help meet a surge in demand for US-based vaccine for seasonal and pandemic flu. A(H1N1), or swine flu, which emerged in Mexico in April, has been declared a pandemic by the World Health Organization, killing 231 people worldwide and infecting more than 52,000 people in 100 countries. Protein Sciences makes flu vaccine by infecting caterpillar cells with a baculovirus carrying the gene for hemagluttinin, a molecule that sticks out of the surface of the influenza virus. Protein Sciences' technology is also safer "because these caterpillars don't have any association with man or other animals, so there's no chance for their cells to learn how to propagate human viruses," Adams told .Under the terms of the grant made to Protein Sciences, if the company's new insect-cell technology proves to be safe and effective, the pharmaceutical minnow, which has just 50 employees, must boost its US manufacturing capability to provide a finished vaccine within 12 weeks of pandemic onset. It would also have to produce at least 50 million doses of flu vaccine "within six months of pandemic onset.

Conclusions

Swine flu may become life threatening disease if not managed properly. In this aspect personnel care is much more important. Since there is an every chance of spread of disease in a bigger scale, researchers should make their efforts for a deepening the knowledge and thereby work for the prevention and treatment of the disease. Simultaneously awareness should be brought among each and every corner of the world since a very famous saying goes like this “prevention is better than cure”.

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