



Suspect Ebola patient under isolation
Photo provided by Centers for Disease Control and Prevention



Lesion of anthrax on neck
Photo provided by Centers for Disease Control and Prevention

Examples of Zoonotic Diseases

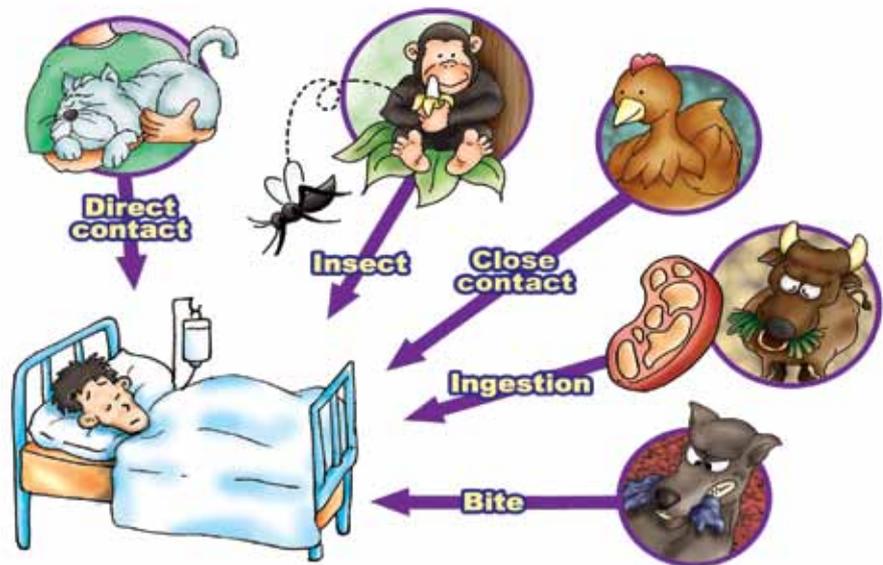
Anthrax	E. coli O157	Severe Acute Respiratory Syndrome (SARS)
Avian Influenza	Plague	Salmonellosis
BSE	Psittacosis	Tuberculosis (TB from cattle)
Ebola	Rabies	Yellow Fever

Disease moving from animal to man by many routes

Now this list is not complete by any means. There is a more comprehensive list at the end of this article. That list has at least 60 diseases. This list of zoonoses of public health concern is also an important reminder of the tremendous socio-economic and trade damage that this group of diseases can cause to many countries.

You might well ask by what route does a man get infected by a zoonosis and from which animals? The answer is by almost any route and by almost any animal. Though each disease has it's own particular favourite method.

So Yellow fever(黃熱病) can be passed on to man from monkeys by the bites of insects, usually mosquitoes. Rabies (狂犬病) is usually passed on by the bite of a dog or cat. Bovine Spongiform Encephalopathy (BSE) (牛隻腦部海綿狀病變(瘋牛病)) , E. coli O157 (大腸桿菌O157), salmonella (沙門氏菌) and anthrax (炭疽病) can be caught by eating contaminated food. Avian influenza, plague (鼠疫), psittacosis (鸚鵡熱) are passed on by close contact. Ringworm (金錢癬) can be caught from cats by



Examples of routes of zoonotic infection. Please see text for details.



Vector of Yellow Fever a Mosquito
Photo provided by James Gathany

Present list of Priorities

Major

- Avian Influenza
- Rabies
- "The New and Unexpected"

Routine

- BSE
- Tuberculosis
- E. coli O157
- Psittacosis
- Leptospirosis

direct contact.

However, just as each zoonosis has its own favourite method they nearly always have alternative ways of reaching man. So, E. coli O157 can be passed on to children in petting zoos. Avian influenza has been associated with handling contaminated poultry carcasses. Rabies can be caught by going into a bat cave: the virus drops down from the bats in the ceiling. Salmonella can be commonly caught by contact with pet terrapins (寵物龜) kept at home.

So, how is this relevant to Hong Kong? The first relevance is to realise that everywhere in the world there are zoonoses and that Hong Kong will be no exception. The aim of the vets and doctors will be to produce a proportional response to zoonoses already in Hong Kong and those which might arrive. At this point it becomes complicated. There is a list of over 60 diseases from which to choose. Why choose one disease over another?

Based on their training and years of experience the government vets and doctors have priorities they think most appropriate. They are Avian Influenza, Rabies, and the "The New and Unexpected". The last, "The New and Unexpected" is because they are aware that at any time for totally individual reasons an unexpected disease may appear. This may be because it is a new disease as in the case of Severe Acute Respiratory Syndrome (SARS) (嚴重急性呼吸系統綜合症). Also the public is traveling to far away places and trade is increasing everyday, so the risk of obtaining a zoonosis from the other side of the world is now possible.

Before we consider this list you may think: if these diseases are often serious and come from animals, why don't we get rid of all the animals in Hong Kong? The problem with that is these diseases although they come from animals don't need animals to arrive in Hong Kong. They can come in on food, on travelers and in cargo. So, the problem will not go away even if we get rid of all the animals in Hong Kong. The reasons for disease emergence are multiple, but there are two main factors - expansion of the human population and the globalization of trade.

Avian Influenza, Rabies and the “New and Unexpected”



Birds suffering from Bird Flu
Photo by AFCD

Avian Influenza

There will be more complete papers produced on the above three diseases but a summary is produced here.

Avian influenza (禽流感) is also known as bird flu. At any one time some birds will have flu but these will be in many different parts of the world. In fact ducks are thought to carry this virus and often not get sick. What is most important to know is that there are many different strains of flu. Some of these strains can infect man and be very serious. The H5N1 type if it gets into a man may kill. Luckily it finds it quite hard to get in to a person. We say that it is not very infectious to man. But as its consequences are so serious we pay it attention. The reason it is not so infectious is because the receptor proteins (蛋白質受體) on man and those proteins on the outer coat of the virus don't fit very well.

The government has launched a large programme to reduce people's exposure to bird flu. This includes discouraging feeding of birds, making sure live bird markets are hygienic, ensuring birds which are slaughtered in Hong Kong come from disease free and vaccinated flocks and checking Hong Kong's own chicken farms. Also the veterinary laboratory, public health and university laboratories constantly monitor this virus. There are also many other additional controls.

Flu viruses constantly change (reassort (基因重組)). The great worry is that a highly infectious flu virus would get the dangerous aspects of H5N1. So effort is also directed to watch these viruses week by week. The veterinary laboratory of Agriculture, Fisheries and Conservation Department (AFCD) is sampling many dead birds for just this reason. Any isolates it finds are sent to The University of Hong Kong to examine in great detail. Influenza viruses isolated from pigs at abattoirs are also checked.

Rabies

Every year rabies kills about 55,000 people mainly in Asia and Africa. But even developed countries such as the USA record occasional deaths due to it. The disease is especially nasty in that a person dying from rabies slowly goes mad or



Patient with Rabies restrained in bed
Photo provided by
Centers for Disease Control and Prevention

'rabid (瘋狂)'. The person often knows that this is happening to them. Once a person develops the nervous signs they will die. While 55,000 a year may not seem many it is reckoned to be an underestimate. What rabies also does when it appears in a territory is produce hysteria (歇斯底里) among healthy people. Mothers may refuse to send their children to school. People may insist that their neighbors put their perfectly healthy and vaccinated dogs to sleep. Authorities have to spend extra effort controlling the disease and managing the information given to the media correctly.

Only a small number of places have been free of the disease for many years. They include the UK, New Zealand, Australia, Hong Kong and Japan.

This freedom has been preserved in Hong Kong for several main reasons. 1. An effective border control. 2. Cooperation of the public with regard to vaccinating dogs. 3. An effective veterinary service. 4. Control of stray animals. 5. Observation of animals that have bitten someone. 6. Testing of suspected rabid animal. With so much rabies in Asia there is no guarantee that it will not come back.



The New and Unexpected

SARS was a new virus. However, in the list of 60 zoonoses there are diseases which if they arrived in Hong Kong would be new and a surprise. However, in this modern world they could come here. A good example is ebola (伊波拉病毒). This is usually confined to Africa and thanks to the work of the World Organisation for Animal Health (OIE) and World Health Organization (WHO) it has stayed there. The strain of ebola that has been seen in Zaire has one of the highest case fatality rates of any human pathogenic virus, roughly 90%. It can initially be mistaken for malaria, typhoid, dysentery and influenza. The main source of the infection is the meat of primates, e.g. gorillas and chimpanzees. This is called 'Bush meat' (野生動物肉). Obviously, in Hong Kong no one wants any one to bring any African bush meat here. While Africa is a long way away,

Gorilla meat can be a source of ebola
Photo by Mila Zinkova

American researchers got a shock when they found a variant of ebola in pigs in the Philippines (Reston Ebolavirus). Fortunately, this variant is not dangerous to man. They are monitoring it to make sure it does not become dangerous.

Another example is the nipah virus (立栢病毒) which was first identified in 1999. It caused an outbreak of disease on pig farms in peninsular Malaysia. The main signs in the pigs were nervous signs and pneumonia. However, over 105 human deaths resulted from those who came into contact with the pigs and over one million pigs were culled to control the disease. In addition, 11 cases including one death occurred in abattoir workers in Singapore exposed to pigs imported from the affected Malaysian farms.

Finally, one can from time to time get something which is extremely worrying. Smallpox (天花) was eradicated in the world decades ago. Yet in 2003 in America 93 people suddenly started developing classical signs of smallpox. For a moment the whole world literally held its breath. Then it was found out to be monkeypox (猴痘病), a disease which was first associated with animal illness in Zaire and West Africa during 1970 – 1971. The American's pet prairie dogs had been exposed to an African Gambian pouched rat. Fortunately, all the Americans recovered.



*Civet Cat associated with SARS virus
Photo provided by wikipedia.org*

*Tuberculosis found in cattle
Photo by AFCD*



Prioritised as Routine Surveillance

A brief word about the routine diseases. Meat inspection overseen by vets is used to control tuberculosis (TB) found in cattle. Also advice will be given to ensure beef imported is free from TB and BSE. Fortunately, this is uncommon. But one still has to maintain capability to isolate and check for these diseases in case of an outbreak.



Fruit Bat associated with Nipah Virus
Photo by Raul654

The future

In one sense the world is getting smaller. The rise of these diseases is worrying. However, there is in place a reasonable solution. Underlining any solution to these new problems is international cooperation and the quick and free exchange of ideas and information. This is now achieved in two ways. The first is the informal discussions between experts and the use of specialist web sites such as Promed (www.promed.org). These were for example useful in the SARS outbreak. The second which is of great use and still very fast is the formal use of internationally agreed institutions. This has been of great use with avian influenza. The main organization is the OIE and it is vital that all countries contribute not just for their own selfish requirements but also for the benefit and safety of mankind. This quote is relevant in this regard: *"The World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) formally recognises the responsibility of the OIE to specify standards and recommendations as the international references for animal health and zoonotic diseases."* It is safe to say that without the OIE, zoonotic diseases would be rampant throughout the world.

Conclusion

Zoonoses or zoonotic diseases are part of life anywhere in the world. While some of these diseases are thankfully not very common, many are very serious. Some of these diseases have the capability to kill many people. All zoonoses have the ability to make hundreds if not thousands of people sick. The cost of an outbreak of any zoonotic disease in terms of lives lost, illness, families damaged, and economy damaged can be significant. It is wise therefore always to keep these diseases in mind and to have controls in place for the zoonoses most relevant to a country. It is also a good idea to have plans for monitoring zoonoses which may become dangerous. The modern world with its increase in trade and travel has increased the chance of more zoonotic disease outbreaks in the future. In the 21st century, they can now appear anywhere in the world.

The Main Zoonoses of the world

- Anthrax (炭疽病)
- Avian influenza (禽流感)
- Babesiosis (巴貝蟲病)
- Barmah forest virus (巴馬森林病毒)
- Bartonellosis (貓爪熱)
- Bolivian hemorrhagic fever (波利維亞出血熱)
- Borrelia (Lyme disease and others) (伯氏疏螺旋體包括萊姆病及其他)
- Borna virus infection (玻那病毒的感染)
- Bovine spongiform encephalopathy (BSE) (牛隻腦部海綿狀病變/瘋牛症)
- Brucellosis (布氏桿菌症)
- Campylobacteriosis (空腸彎曲菌病/彎曲桿菌症)
- Chagas disease (查格斯氏病)
- Chlamydophila (Psittacosis) (鸚鵡熱)
- Cholera (霍亂)
- Cowpox (牛痘)
- Crimean-Congo hemorrhagic fever (剛果出血熱)
- Cryptosporidiosis (隱孢子蟲病)
- Eastern equine encephalitis (東方馬腦炎)
- Ebola virus hemorrhagic fever (伊波拉病毒出血熱)
- Echinococcosis (包蟲病)
- E coli O157 infection (O157型大腸桿菌感染症)
- Giardia lamblia infection (梨形鞭毛蟲病)
- Hantaviral diseases (漢他病)
- Hendra virus infection (亨德拉病毒感染症)
- Korean hemorrhagic fever (韓國出血熱)
- Kyasanur forest disease (克亞沙奴森林熱)
- Lassa fever (拉薩熱)
- Leishmaniasis (利什曼原蟲症)
- Leptospirosis (鈎端螺旋體病)
- Listeriosis (李斯特菌病)
- Lymphocytic choriomeningitis (淋巴球性脈絡叢腦炎)
- Marburg fever(馬爾堡熱)
- Mediterranean spotted fever (地中海斑點熱)
- Monkey herpes B (乙型疱疹)
- Monkeypox (猴痘病)
- Nipah virus infection (立栢病)
- Omsk hemorrhagic fever (鄂木斯克出血)
- Orf (animal disease) (接觸性水泡皮膚炎)
- Oropouche fever (奧羅普切(病毒)熱)
- Plague (鼠疫)
- Q-Fever (Q熱)
- Rabies (狂犬病)
- Rift valley fever (裂谷熱)
- Ringworm (Microsporum canis) (金錢癬)
- Salmonellosis (沙門氏菌感染症)
- Scabies (Scabies from animals) (疥癬症)
- Severe acute respiratory syndrome (SARS) (嚴重急性呼吸道症候群)
- Sodoku (Rat bite fever) (鼠咬熱)
- Streptococcus suis infection (豬鏈球菌病)
- Toxocariasis (蛔蟲症)
- Toxoplasmosis (弓型蟲感染症)
- Trichinosis (旋毛蟲病)
- Tuberculosis (TB from Cattle) (結核病)
- Tularemia (Rabbit fever) (兔熱症)
- Typhus of rickettsiae (普氏立克次體引致的斑疹傷寒)
- Venezuelan equine encephalitis (委內瑞拉馬腦炎)
- Venezuelan hemorrhagic fever (委內瑞拉出血熱)
- West Nile fever (西尼羅河熱)
- Western equine encephalitis (西方馬腦炎)
- Yellow fever (黃熱病)

Editorial Board:

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Agriculture, Fisheries and Conservation Department

Room 708, 7/F Cheung Sha Wan Government Office, 303 Cheung Sha Wan Road, Kowloon, Hong Kong

Website: www.afcd.gov.hk

Email: tsdiq@afcd.gov.hk