Human infectious diseases: new threats

The serious EHEC outbreak in Germany in 2011, the 2009 swine flu pandemic, the bird flu pandemic in 2005 and 2006 and the SARS outbreak in China in 2003, all of which have fuelled the fear of devastating epidemics for many people in Germany, have fortunately all been contained – at least up until now. However, experts warn of new dangerous pathogens that are spreading as a result of globalization and global climate warming. This is leading to new challenges, as many infectious diseases are becoming resistant to medical treatment.

It was not that long ago that the threat of infectious diseases such as smallpox, measles, tuberculosis, pest and cholera to human health was assumed to be no longer existent – at least in highly developed countries. Improved hygiene conditions, the development of vaccines and antimicrobial drugs seemed to have curtailed or even eradicated the old scourges of humanity such as smallpox. However, the world is no longer so optimistic. Well-known diseases are returning in particularly dangerous forms that are difficult to treat. Infectious diseases caused by tropical pathogens, for example, are emerging in Europe as a result of global climate warming and intercontinental air traffic.

The biggest scare comes from new infectious diseases that are caused by previously unknown pathogens and that occur in many countries around the world. The most serious example of such a disease on the global level is AIDS, which is caused by the HI virus (HIV). Since the late 1970s, HIV and AIDS (acquired immunodeficiency disease syndrome) have spread across the world and the pandemic shows no signs of abatement. The WHO predicts HIV/AIDS deaths will reach 6.5 million in 2030. Due to the fact that combination therapies have become available (which in Germany are paid for by the health insurance companies), enabling AIDS sufferers to lead nearly normal lives, people seem to be less aware of the threat and tend to forget that, despite the availability of highly effective antiviral drugs, AIDS is still a disease for which no cure exists. A matter of great concern was the emergence of Central African diseases caused by the Ebola and Marburg viruses; fortunately, only a few individuals were affected. This is in stark contrast to infectious disease epidemics like SARS and bird flu that have occurred in the last decade. In 2003, SARS spread from Hong Kong by way of air traffic to infect individuals in many countries around the world within around 36 hours and become a worldwide pandemic. The spread of SARS has been fully contained, but is not confirmed to have been eradicated. Two years after the SARS pandemic, bird flu had the world on tenterhooks; the 2009 swine flu outbreak was the most recent pandemic. Germany got off rather lightly and the fear of pandemics soon became a subject of little interest for the media, at least until May 2011 when the EHEC outbreak was given substantial coverage. In Germany, more than 4,200 people were diagnosed with EHEC within two months; 850 were admitted to hospital with haemolytic uremic syndrome (HUS); 53 died.

EHEC

EHEC bacteria of the strain O104:H4 that caused the EHEC outbreak in Germany in 2011. Scanning electron microscope image; scale: 1 µm

(enterohaemorrhagic E. coli) is a pathogenic strain of the bacterium Escherichia coli that produces cytotoxic proteins (Shiga toxins). Infection often leads to haemorrhagic diarrhoea. Approximately 20 per cent of people infected develop HUS, a disease characterized by haemolytic anaemia (i.e. anaemia caused by the destruction of red blood cells), low platelet count, acute kidney failure and blood in the urine. It is not yet confirmed whether we have managed to overcome the most serious bacterial infectious disease registered in Germany so far. The Robert Koch Institute (RKI), which called for the notification of EHEC cases back in 2001, registers between 800 and 1200 cases of EHEC in "normal" years. In contrast to the 2011 epidemic, these EHEC infections are caused by an E. coli strain that only leads to mild disease symptoms. However, in late February 2012, a six-year-old girl died from EHEC bacteria of the dangerous strain that caused the endemic of early 2011.

However, pathogens of epidemics that have never occurred in Germany are far more dangerous than EHEC. Experts predict that it is only a matter of time before such pathogens occur in Germany. Professor Dr. Emil Reising, a tropical diseases specialist, has issued warnings about the Crimean-Congo virus that has already led to deaths in Turkey. The virus has also been detected in the Antalya area, which is a popular holiday destination for Germans. So it can be assumed that the virus will at some point be introduced into Germany. Crimean-Congo haemorrhagic fever (CCHF) is transmitted by ticks and causes

internal bleeding (haemorrhage). It has a mortality rate as high as that of the dangerous Ebola virus. The West Nile virus, which can lead to fatal meningitis, has already approached German borders. It entered the Western Hemisphere in 1999, spread across the entire USA, and has since also been detected in southeast Europe and Austria. The Chikungunya virus (CHIKV) also causes haemorrhagic fever; it originates in tropical Africa and Asia, but since 2007 has been repeatedly diagnosed in northern Italy. West Nile virus and CHIKV are insect-borne viruses that are transmitted to humans by Aedes albopictus, a mosquito species that in recent years has been detected in the Upper Rhine area in southern Germany.

The RKI has included EHEC, CHIKV, West Nile and other exotic infectious pathogens in a list of pathogens that are given highest surveillance priority (Epidemiological Bulletin No. 4 of 7th November 2011). Among the top infectious diseases listed is tuberculosis, which is a common disease in Eastern Europe and Africa where it causes around 1.8 million fatalities per year. The infectious disease is caused by Mycobacterium tuberculosis, a mycobacterial strain that has become resistant to most antibiotics, and predominantly develops in individuals coinfected with HIV (ed. note: HIV infection has contributed to a significant increase in the worldwide incidence of tuberculosis). With regard to globalization and international travel, experts refer to Mycobacterium tuberculosis as a ticking time bomb. In 2010, total drug resistant tuberculosis strains (TDR-TB) strains were detected in South Africa; these spread as the HIV pandemic spreads and are posing completely new challenges.

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30-Apr-2012

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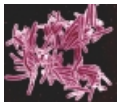

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