SARS: The First Pandemic of the 21st Century

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Abstract

Severe acute respiratory syndrome, (SARS) first appeared nearly 18 years ago. It is different from past viruses due to it its new ability to travel airborne in planes, that past viruses could not. SARS is thought to have originated from the reservoirs in an unknown wild animal, although scientists are unsure which animal exactly. There is no known cure or therapeutic treatment currently available. Those who catch the virus should expect fever, chills, in some cases low blood oxygen levels which can cause patients to be put on ventilators, and in some cases death whether from the virus or complications from it. SARS is no longer circulating, here has not been a confirmed case since the end of the 2003 outbreak. This poster will explain the background, history, how it spread, the chemical components, health effects, and any important statistics.

Background & History

Figure 1 [10]

During the duration of the outbreak headlines continued to appear showing how bleak the epidemic could end. Figure(1). [10]

- Originated in China in early 2003 [13]
- High mortality rate [3]
- Collaboration for its identification was created [16]
- News of a potential epidemic of an abnormal pneumonia spreading caused a global alert [3]
- Epidemic ended late 2003 early 2004 [13]


Figure 2 [10]

Wearing a masks as a form of protection became the new normal for both the young and old. [10]

Figure 3 [10]

After the World Health Organization declared that the SARS outbreak had been contained many people as the one shown above went to celebrate. [10]


Figure 4 [10]

Above is the Metropole hotel in Hong Kong where 16 guests were infected and then spread the virus globally. [10]

Source/ How it Spreads


Figure 5 [10]

Above is an example of how the virus could have spread from wild animals to humans. As there are wild animals being sold next to dishes in this wet market. [10]

- ability to spread on a global scale [8]
- ability to spread the disease along airplane routes. [8]
- similar characteristics to the common cold and influenza [13]
- spreads through the transfer of saliva droplets from one person to another [16]
- Originated from the reservoirs of animals [4]
- Well suited for human [4]
- Different SARS virus can infect different animals [4]

Chemical Components

- RNA is single stranded [12]
- Backbone of one the four bases--adenine (A), uracil (U), cytosine (C), or guanine (G). [12]
- mRNA is messenger RNA [12]
- mRNA gets wrapped by the virus [12]
- SARS virus is a protein [12]
- Protein is made up of amino acids. [12]
- chemically made up of carbon, hydrogen, oxygen, and nitrogen [12]
- mRNA is a messenger RNA that gets enveloped by the virus. [18]
- Antibodies after the virus [3]
  - little traces of the virus left behind that your body remembers [3]

How SARS Works'

- Enters endosomal pathway [19]
- S protein binds to the cellular receptor [19]
- S protein is cleaved by the endosomal acid to activate its fusion activity [19]
- Viral genome is released and translated into polyproteins [19]
- Then cleaved into small products by viral proteinases [19]
- templates are synthesized [19]
- transcription on the plus-strand genome and serve as templates for mRNA synthesis [19]
- The full-length negative-strand template is made as a template for genomic RNA [19]
- Viral nucleocapsids are assembled from genomic RNA and N protein in the cytoplasm [19]
- budding into the lumen of the ERGIC [19]
- It is then released from the cell through exocytosis [19]

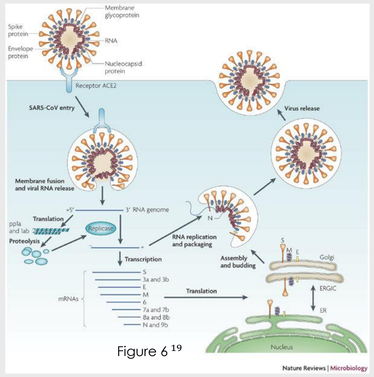

Figure 6 [19]

The life cycle of SARS is pictured above. [19]

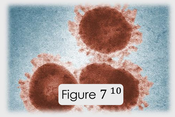
Figure 7 [10]

A close-up look at SARS. [10]

Short-term Health Effects


Figure 8 [3]

A woman from the 2003 SARS outbreak had to be put onto a ventilator. [3]

Symptoms

- Fever [14]
- Chills/ Rigors [14]
- Headache [14]
- Malaise [14]
- Muscle pain [14]
- Mild Respiratory Symptoms [14]
- Diarrhea (in some cases) [14]
- Shortness of breath [14]


Figure 9 [10]

A woman lying in a bed at a hospital in Guangzhou, China April 17, 2003. [10]

- The incubation period averages around six and a half days [11]
- hospitalization ranged anywhere from three to five days. [11]
- Most patients diagnosed in the age range of 25 to 70. [13]
- Since 2004 there has not been a known case [13]
- extreme cases often require intubation and mechanical ventilation [13]

Long-Term Health Effects

- increase in respiratory issues in the future as an impairment [9]

The number and percentage of SARS survivors (*n* = 55) who had returned to work within 24 months

	3 months	6 months	12 months	18 months	24 months
Full-time work (*n* = 41)	23 (56.1%)	30 (73.1%)	33 (80.4%)	33 (80.4%)	32 (78.0%)
Health-care workers (*n* = 27)	10 (37.0%)	18 (66.7%)	21 (77.8%)	21 (77.8%)	19 (70.4%)
Non-health-care workers (*n* = 14)	13 (92.9%)	12 (85.7%)	12 (85.7%)	12 (85.7%)	13 (92.9%)

Figure 10 [9]

The graph demonstrates that three quarters of SARS survivors were able to go back to work two years after first contracting the virus. The highlighted area shows the time frame and occupation in which what percentage went back to work and when. From the two-year study it is apparent that the impairment from surviving this virus is severe and long lasting. It is shown through exercise capacity and the participates health status from a study of SARS patients at the Prince of Wales Hospital, Hong Kong. [9]

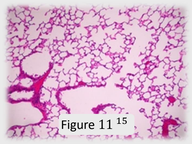
Figure 11 [15]

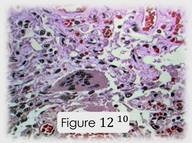
Figure 12 [10]

Figure 11 is normal lung tissue, figure 12is SARS lung tissue shown from April 1, 2003. The figure 12 shows an image of some of the long-term impairment caused by SARS such as damaged lung tissue. When compared to the image to the other image. [9]

Preventative Actions

Figure 13 [10]

Prevention at an airport as they tried to screen for fevers as people passed. [10]

- Wearing a mask [14]
- Washing hands [14]
- Sanitizing high touch surfaces [14]
- Avoid close contact [14]
- Avoid touching with unclean hands [14]


Figure 14 [10]

Nurses in an airport screening for potential cases to help stop this deadly virus. [10]


Figure 15 [10]

Preventative actions being put in place like schools going remote to help stop the spread of the virus. [10]

Important Statistics

- Since 2004 there has not been any confirmed cases of SARS anywhere in the world. [14]
- Death rate of around 9% [14]

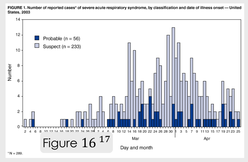

Figure 16 [17]

Depicted the suspected cases in light blue from the 2003 outbreak and the probable in dark blue. Figure (16) [17]

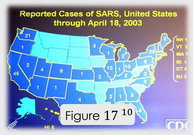

Figure 17 [10]

How many cases were state side on April 18th, 2003. Graph (17) [10]

Total Number of Cases From 2003 Outbreak

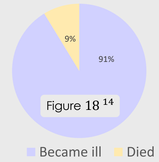

Figure 18 [14]

Shown above is the death rate of the virus, with 774 died and 7324 surviving [14]

Conclusion

SARS was the first virus of the current century, and it was also the first of its kind in the way it could travel. Unlike past epidemics when international travel was not so readily available, SARS had the ability to be able to travel easily due to its airborne nature. The virus is thought to have come from wild animals and made the jump to humans, which it was well suited for and even thrived. Although there is no known cure for SARS, there are possible treatment options currently being pursued that would numb receptors in RNA that the virus increases sensitivity to. The virus attaches itself to the RNA which blocks the receivers so the DNA cannot read it correctly causing the person to get sick. Until medical professionals figure out how to stop this virus, it will remain only controlled by preventative actions, which stop the original SARS out break in the early 2000s.

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