**SARS: The First Pandemic of the 21st Century**
Sarah Ensmlinger
Faculty Mentor: Dr. Cubon, Department of Chemistry, Kent State University Trumbull Campus, Warren, OH

**Abstract**
Severe acute respiratory syndrome (SARS) first appeared nearly 18 years ago. It is different from past viruses due to its new ability to travel airborne in planes, that past viruses could not. SARS is thought to have originated in the reservoir 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, however there has been a confirmed case since the end of the 2003 outbreak. This paper will explain the background, history, how it spread, the chemical components, health effects, and any important statistics.

**Background & History**

- High mortality rate.
- Collaboration for its identification was created.
- News of a potential epidemic of an abnormal pneumonia spreading caused a global alert.

**How SARS Works’**
- Enters endosomal pathway.
- 5 protein binds to the cellular receptor.
- 5 protein is cleaved by the endosomal acid to activate its fusion activity.
- Viral genome is released and translated into polyproteins.
- 5 protein is cleaved into small products by viral proteases.
- Templates are synthesised.
- Transcription on the plus-strand genome and serve as templates for mRNA synthesis.
- The full-length negative-strand template is made as a template for genomic RNA.
- Viral nucleocapsid is assembled from genomic RNA and Hi protein in the cytoplasm.
- Budding into the lumen of the ER/GIC.
- It is then released from the cell through exocytosis.

**Preventative Actions**
- Wearing a mask.
- Washing hands.
- Sanitizing high touch surfaces.
- Avoid close contact.
- Avoid touching with unclean hands.

**Important Statistics**

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

**Long-Term Health Effects**

- Increase in respiratory issues as an impairment.
- Symptoms after 3 months: 77 people, 75%.
- Symptoms after 6 months: 73 people, 74%.
- Symptoms after 12 months: 68 people, 72%.
- Symptoms after 18 months: 61 people, 69%.
- Symptoms after 24 months: 52 people, 65%.

**Chemical Components**

- RNA is single stranded.
- Backbone of one of the four bases—adenine (A), thymine (T), guanine (G), cytosine (C), and uracil (U).
- miRNA is a messenger RNA.
- miRNA gets wrapped by the virus.
- SARS virus is a protein.
- Protein is made up of amino acids.
- Chemically made up of carbon, hydrogen, oxygen, and nitrogen.
- miRNA is a messenger RNA that gets enveloped by the virus.
- Antibodies after the virus.
- Little traces of the virus left behind that your body remembers.

**Short-term Health Effects**

- A woman in a bed at a hospital in Guangzhou, China April 17, 2003.

**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 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. 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 outbreak in the early 2000s.