

Preventing the Spread of SARS

Overview of CDC's Laboratory Findings

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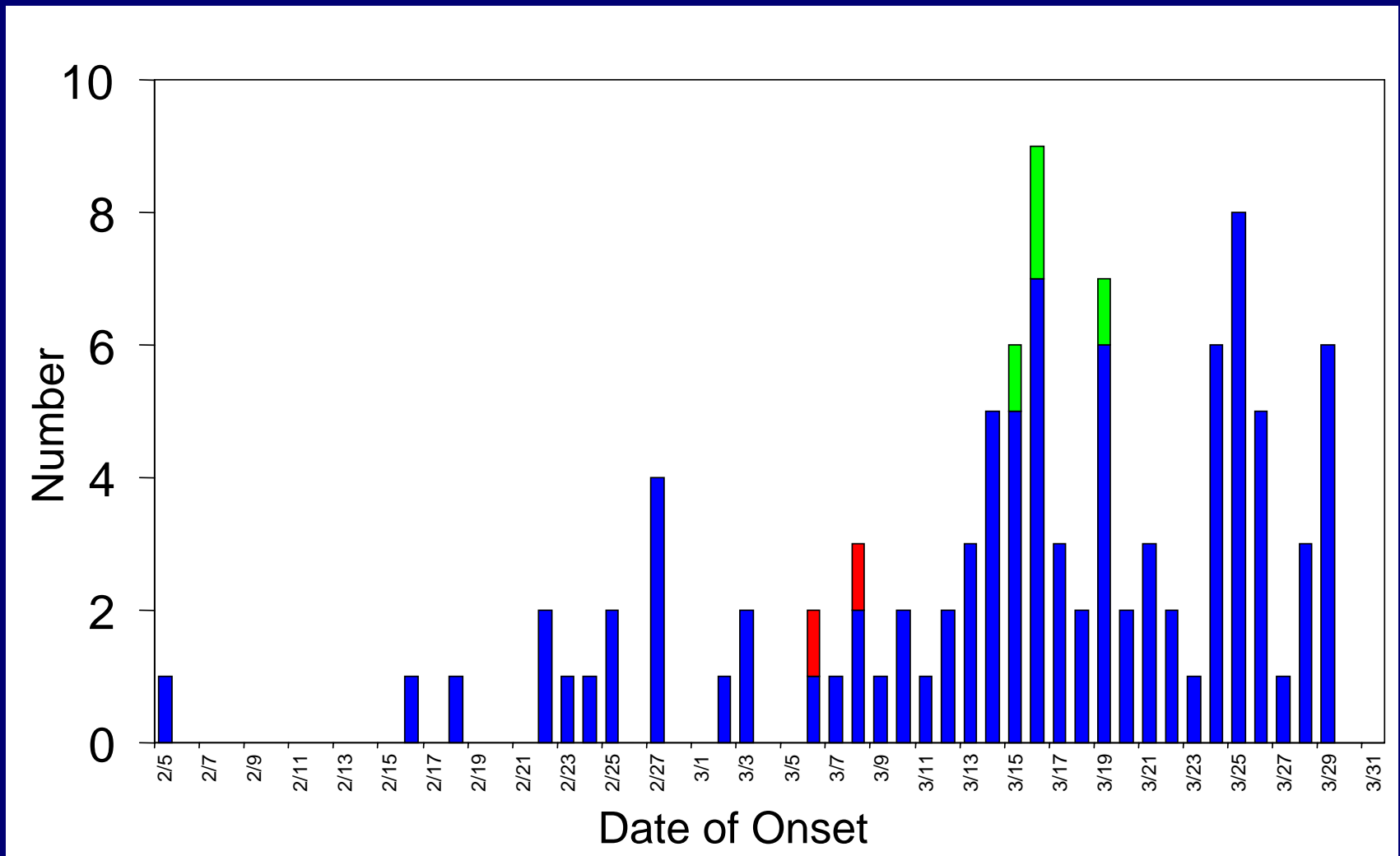


CDC SARS Investigation

- CDC Emergency Operations Center activated on March 14
- Approximately 30 scientists deployed to assist the investigations in Hong Kong, Vietnam, Taiwan, Thailand, and Canada
- Nearly 300 CDC staff working at CDC headquarters and throughout the United States



Number of Suspect SARS Cases by Exposure Category and Date of Illness Onset, United States—2003 (N=100) as of 4/03/2003



■ Travel to high risk area
 ■ Ill contact
 ■ HCW





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Press Release

For Immediate Release

March 24, 2003

Contact: CDC Media Relations

404-639-3286

CDC Lab Analysis Suggests New Coronavirus May Cause SARS

The Centers for Disease Control and Prevention (CDC) announced today that a previously unrecognized virus from the coronavirus family is the leading hypothesis for the cause of severe acute respiratory syndrome (SARS). Two coronaviruses that are known to infect humans cause one third of common colds and are also a common cause of health care-associated upper respiratory infections in premature infants.

"This is encouraging news from our laboratories at CDC," said Tommy G. Thompson, Secretary of Health and Human Services. "These and other excellent scientists all over the world have been working around the clock for days and their hard work is paying off. They continue to look at other possible causes of SARS, but this is a key finding in our efforts to identify the cause of this global outbreak."

Additional steps needed to confirm this hypothesis include further culturing of the virus from appropriate specimens, sequencing the viral genome, and examining specimens from patients at different stages of their illness.



Coronaviruses

- Single-strand RNA, nonsegmented, enveloped, ~31,000 NTs
- 2 serogroups (229E and OC43) in humans
 - ~1/3 of common colds
 - Reinfections common
- Envelope
 - S - spike protein
 - M - matrix protein
 - HE - hemagglutinin



Coronaviruses

- Survival
 - 229 E
 - 6 days in suspension
 - 3 hrs after drying on surfaces
 - OC43
 - ≤ 1 hr after drying on surfaces



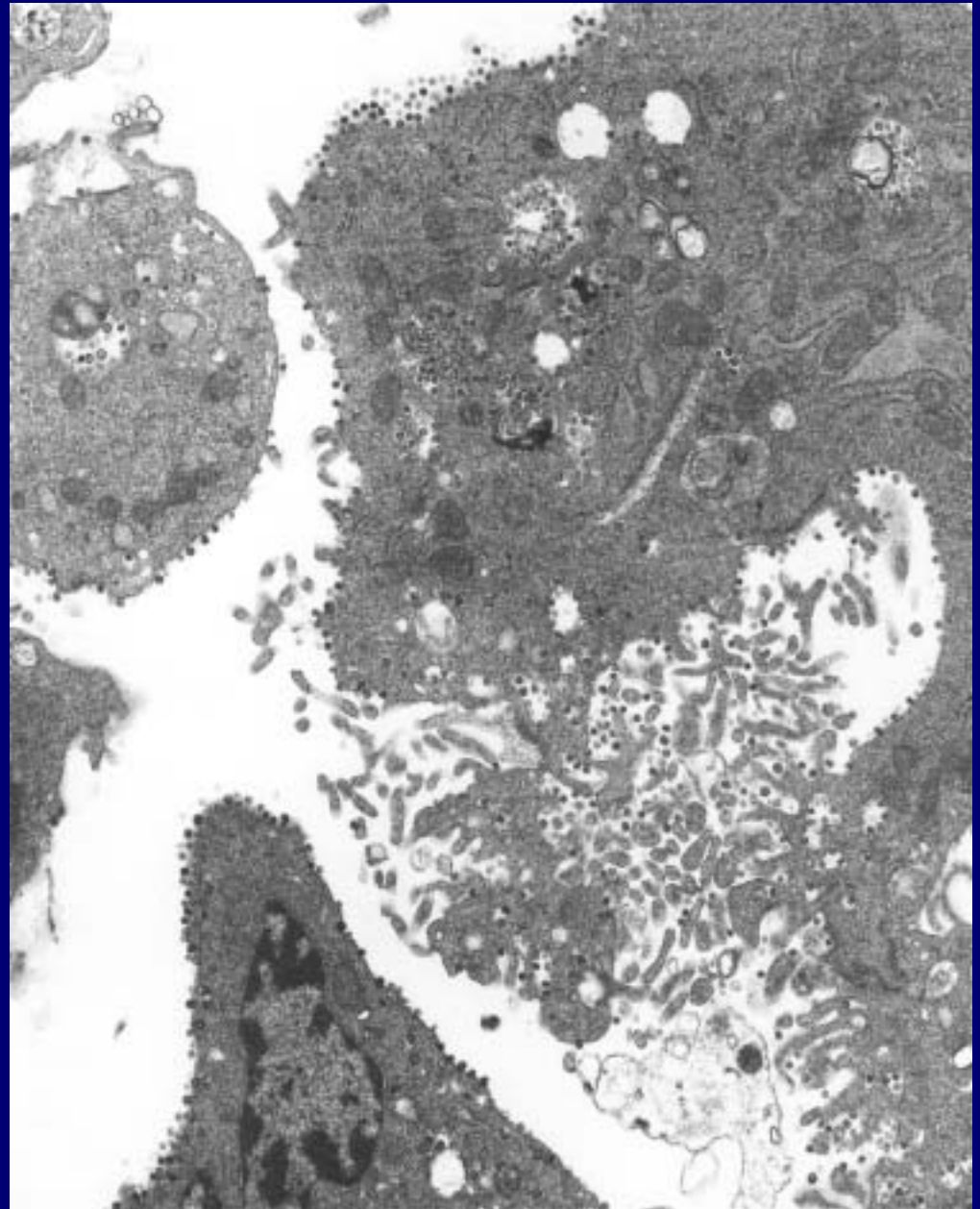
Laboratory Evidence as of 4/03/2003

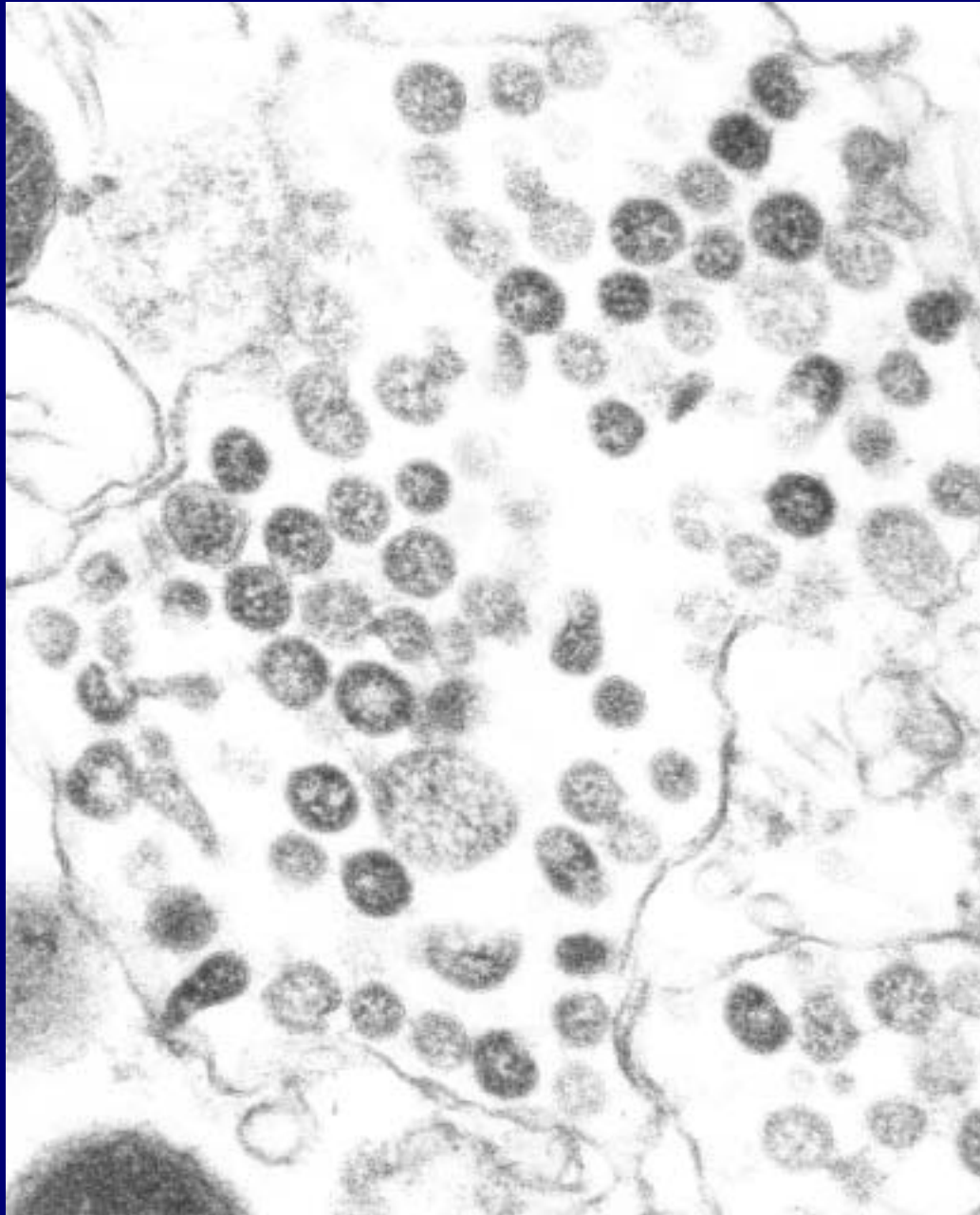
<u>Assay</u>	<u>Findings</u>	<u>No. pos. patients*</u>
Culture (Vero E6 cells)	Viral growth	4
EM (cell culture, BAL)	Virus-like particles, Coronavirus	2
PCR (tissue, swabs)	Coronaviral nucleic acid	11
Serology (IFA, EIA)	Antibody	5
Histopathology	DAD (ARDS)	4

*Results not mutually exclusive

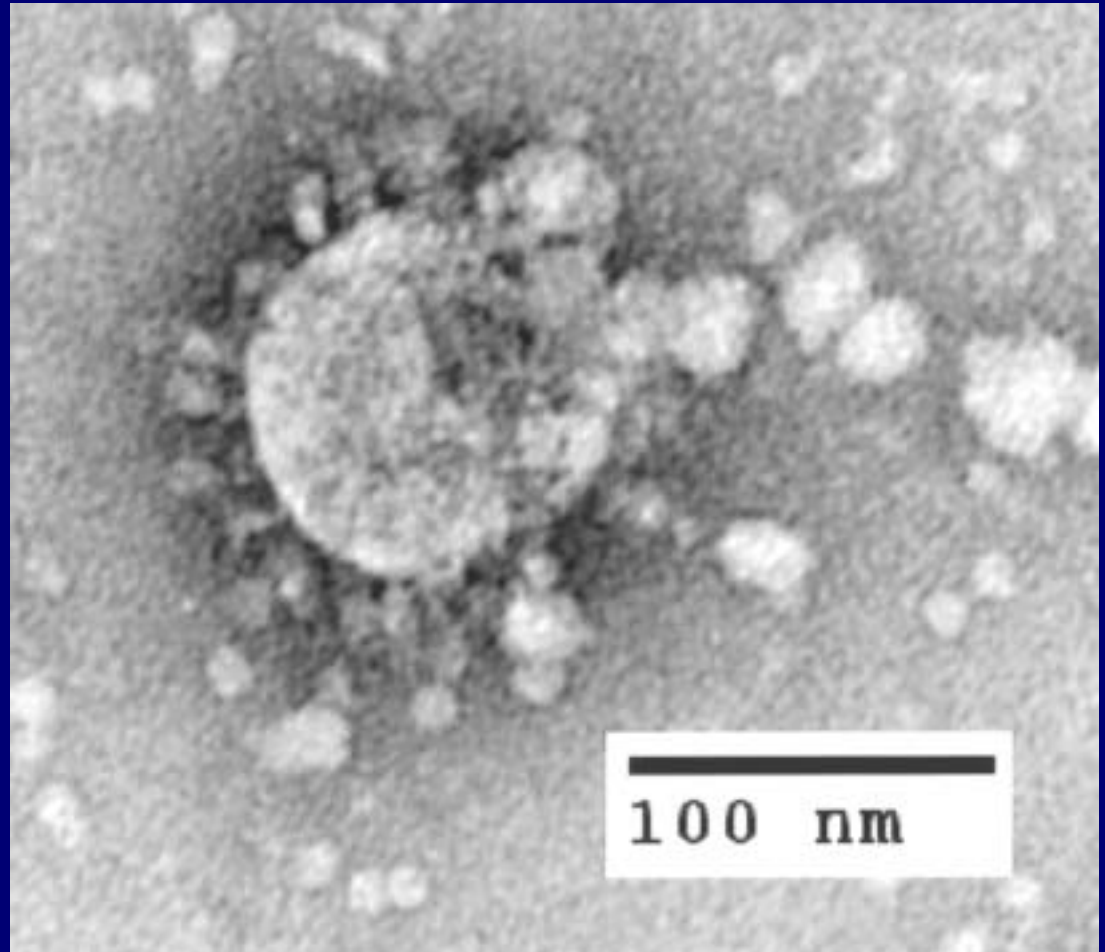


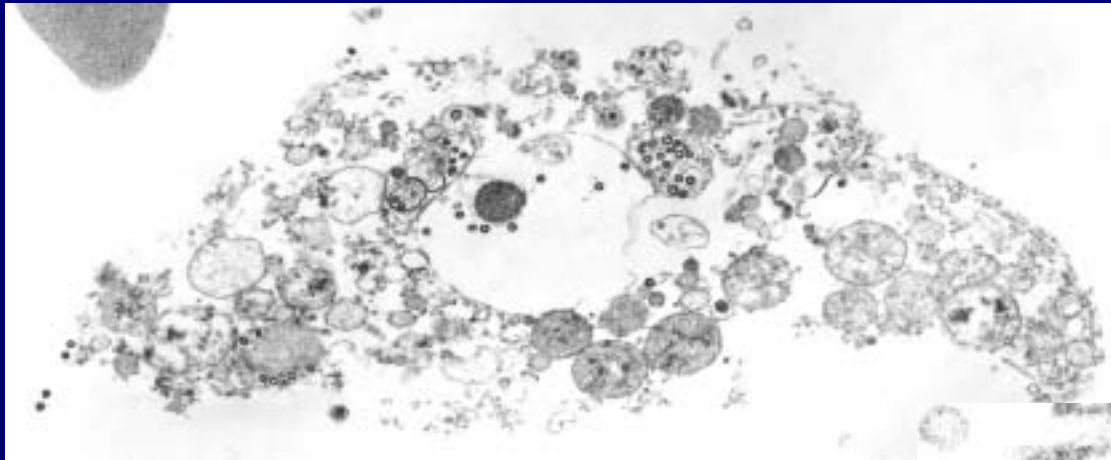
Coronavirus-infected
Vero E6 cells (isolate
from SARS patient)
by thin section EM



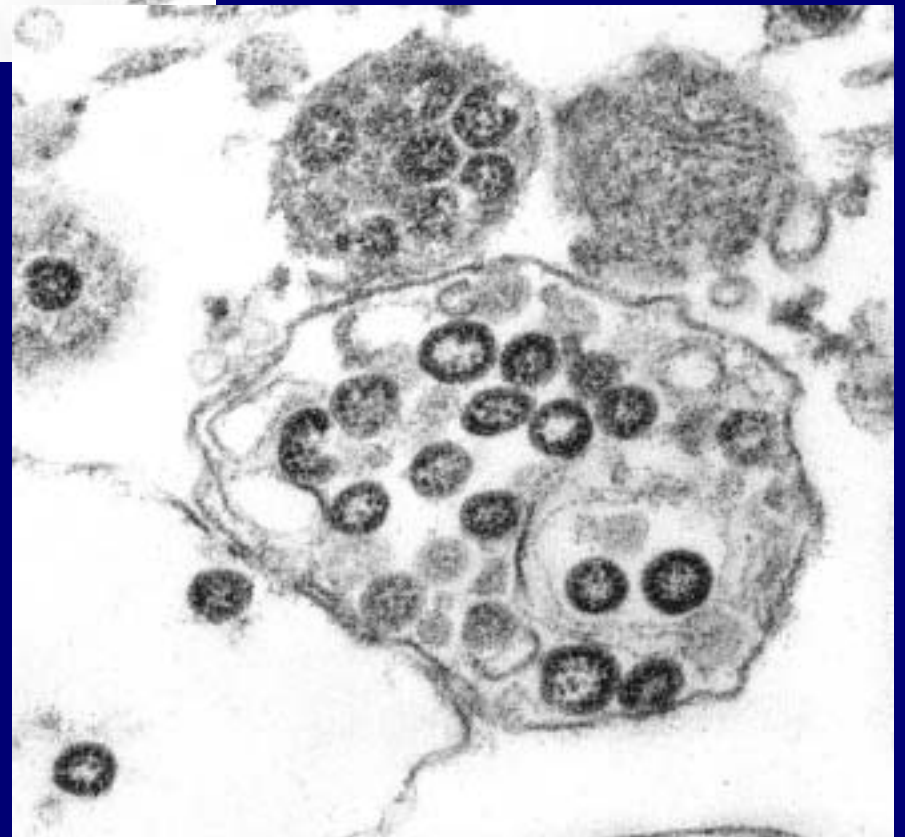


Coronavirus particle
by negative stain EM
(isolate from patient
with SARS)

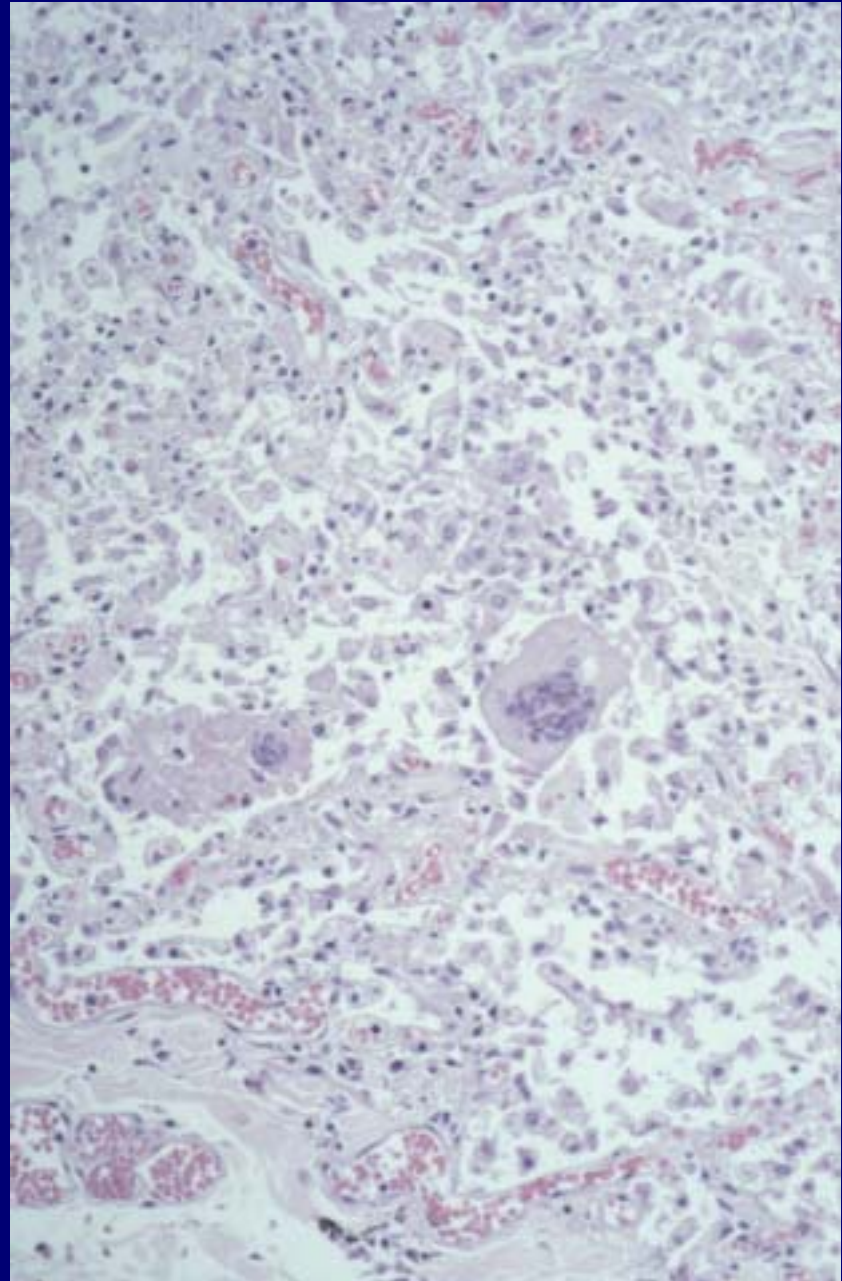


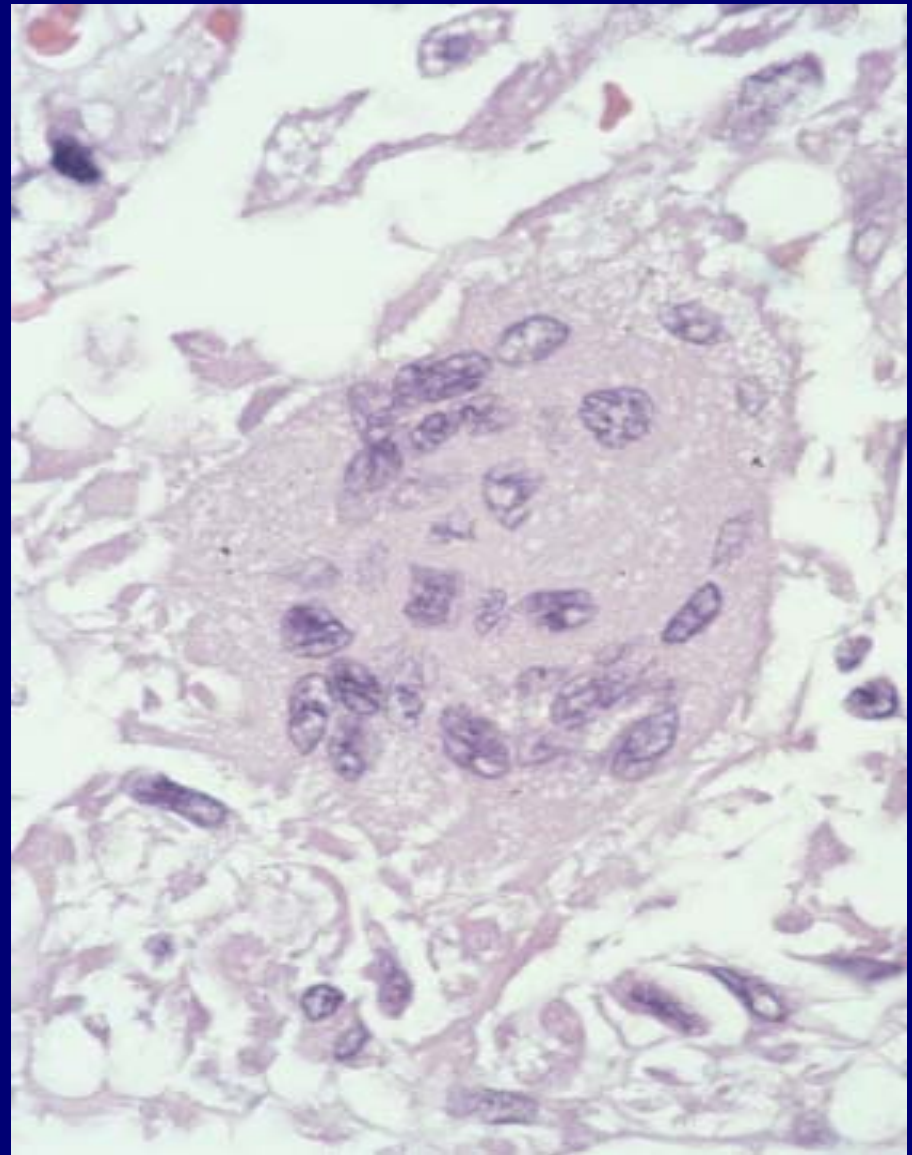
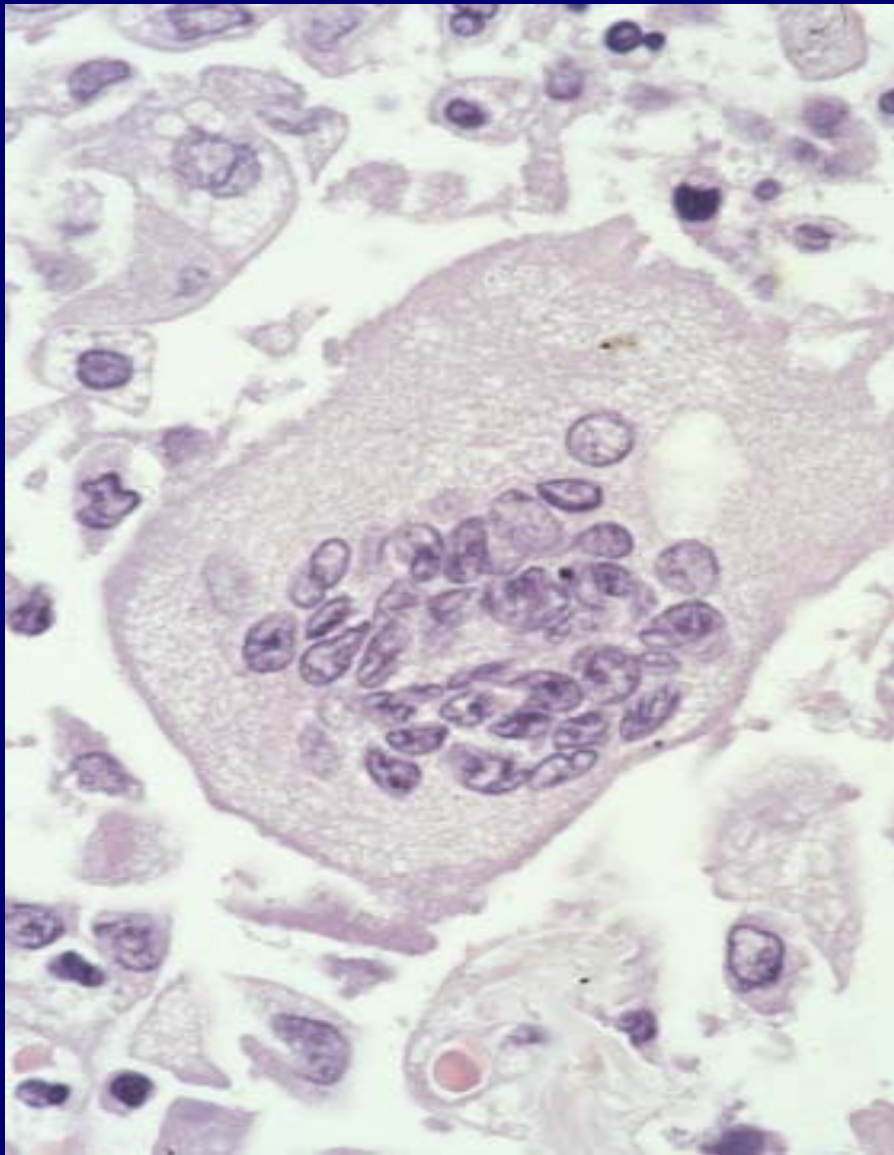


Coronavirus-infected cell
in BAL of SARS patient



Lung of patient with fatal SARS showing diffuse alveolar damage and syncytial giant cells





Multinucleated syncytial giant cells
in lung of SARS patient



Other Laboratory Work in Progress

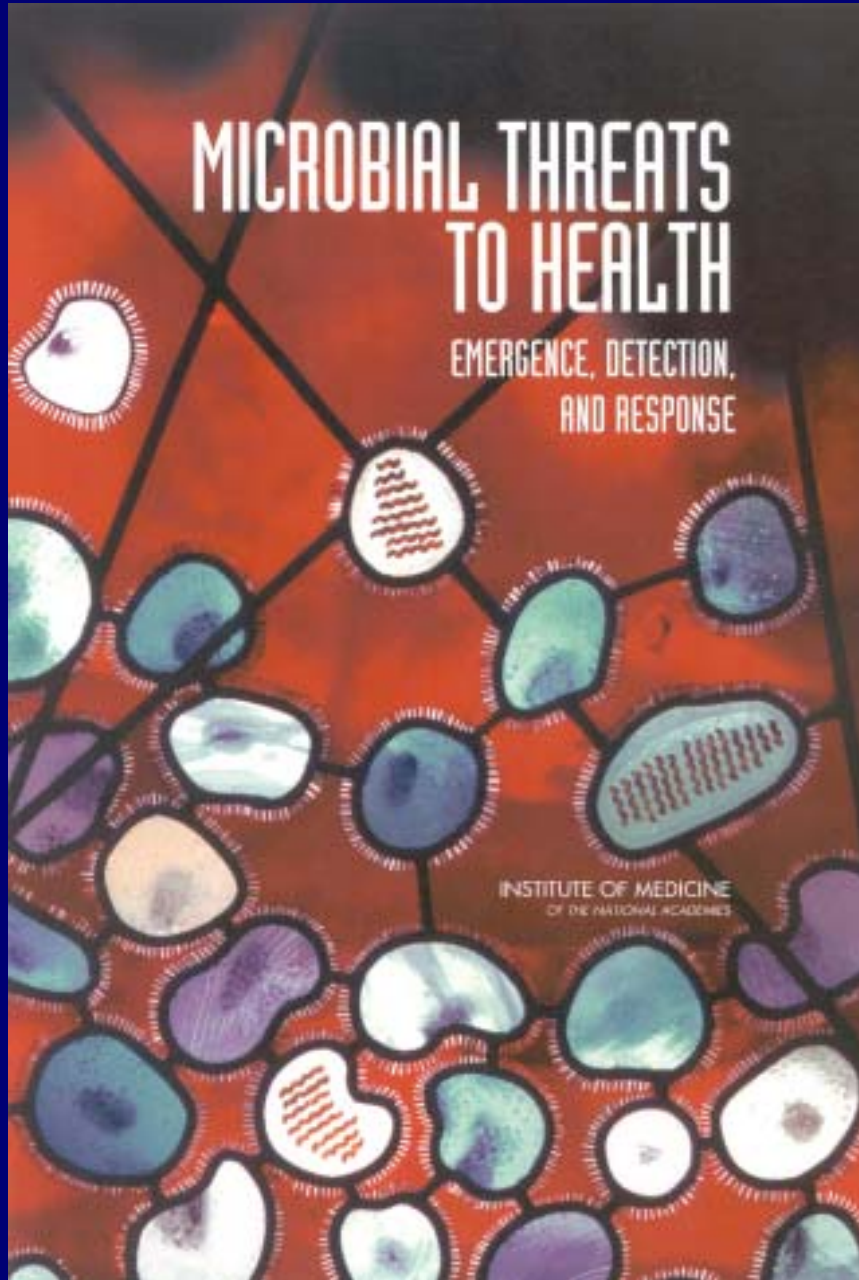
- Immunohistochemistry
- In situ hybridization
- Virus sequencing



MICROBIAL THREATS TO HEALTH

EMERGENCE, DETECTION,
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Emerging Global Microbial Threats

Case in point: SARS



Candidate Factors Affecting Emergence of SARS

- Human demographics and behavior
- Human susceptibility to infection
- Economic development and land use
- Changing ecosystems
- International travel and commerce
- Microbial adaptation and change
- Breakdown of public health measures
- To be determined . . .



Addressing the Threat of SARS

- Enhancing global response capacity
- Improving global infectious disease surveillance
- Rebuilding domestic public health capacity
- Developing diagnostics
- Educating and training multidisciplinary workforce
- Vaccine development and production
- Need for new antimicrobial drugs



SARS

What we need to know

- Future course of outbreak
- Source of virus
- Mode of transmission in community
- Risk of household transmission
- Risk of transmission on airplanes and ships
- Environmental persistence/decontamination
- Period of infectiousness




SARS

What we need to know (cont.)

- Explanation for age distribution
- Importance of “hypertransmitters”
- Role of co-infection
- Optimal diagnostic test(s)
- Effective therapy
- Vaccine approaches





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Communicable Disease Surveillance & Response (CSR)

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Severe Acute Respiratory Syndrome (SARS)


- [Update 20 - Situation in China and Hong Kong Special Administrative Region, 3 April \(Archives\)](#)
- [Cumulative Number of Reported Cases, 3 April \(Archives\)](#)
- [Affected Areas, 3 April \(Archives\)](#)

This web page has been created to provide the public and professionals information about Severe Acute Respiratory Syndrome (SARS). The site will be updated daily to ensure that the most current information is available.

SARS, an atypical pneumonia of unknown aetiology, was recognized at the end of February 2003. The World Health Organization (WHO) is co-ordinating the international investigation with the assistance of the [Global Outbreak Alert and Response Network](#) and is working closely with health authorities in the affected countries to provide epidemiological, clinical and logistical support as required.

- [WHO Guidelines/Recommendations/Descriptions](#)
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<http://www.who.int/csr/sars/en/>



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- [Health Departments](#) (Mar 18, 2003, 9:00 PM EST)
- [Patients & Their Close Contacts](#) (Mar 31, 2003, 9:00 PM EST)
- [Isolation & Infection Control](#) (Mar 30, 2003, 4:30 PM EST)
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Travel & International Resources

CDC Resources & Advisories

- [Travel Advisory](#) (Mar 28, 2003, 1:00 PM EST)
- [Notice for Travelers Arriving in U.S. From China, Vietnam, & Singapore](#) (Mar 28, 2003, 10:30 AM EST)
- [Americans Living Abroad](#) (Mar 28, 2003, 1:00 PM EST)
- [International Adoptees](#) (Mar 27, 2003, 4:00 PM EST)

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Emerging Global Microbial Threats

Lessons learned from SARS

- Importance of strong national and international collaborations and partnerships
- Need for planning and practice
- Expect the unexpected

