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SARS WORLDWIDE (163): ETIOLOGY  
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A ProMED-mail post

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Date: Mon 21 Jul 2003

From: ProMED-mail <[promed@promedmail.org](mailto:promed@promedmail.org)>

Source: Canadian Broadcasting Corporation, News, Mon 21 Jul 2003 [edited]  
<<http://www.cbc.ca/stories/2003/07/21/sars030721>>

Confirmation of the Identity of the SARS Agent

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An international team of scientists say they have conclusively identified the virus responsible for SARS. As suspected since the height of the outbreak, a [novel] coronavirus is responsible for the disease. "The significance of the paper [published online in the journal "The Lancet" on Tue 22 Jul 2003; see below. - Mod.CP] is confirming that this [novel] coronavirus does produce very serious disease," said Frank Plummer, Scientific Director at the National Microbiology lab in Winnipeg. The researchers [confirmed the identity of] the virus by looking at clinical and post-mortem samples from 436 SARS patients in 6 countries. They also injected the virus into 4 macaques (a species of monkey common in Southeast Asia), 3 of which went on to develop SARS-like symptoms.

"Collectively, these results of laboratory studies of SARS patients and experimental infections of macaques prove that the newly discovered SARS-associated coronavirus (SARS-CoV) is the primary causal agent of SARS," said the study's lead author, Prof. Albert Osterhaus of Erasmus University, the Netherlands, in a press release.

Plummer's team at the National Microbiology Centre was able to find SARS-CoV in only 60 percent of samples from SARS patients that they examined. He thinks there's something else going on that scientists don't yet understand. One possibility is that some people listed as probable cases actually had something else that looked like SARS. Microbiologist Dr. Donald Low of Mount Sinai Hospital in Toronto said that it is vital to have a definitive diagnosis for SARS. "That's going to help us, especially if we see clusters of cases where we were able to get a number of different samples and if they come back negative, being able to say this is not SARS." Furthermore, SARS could be a seasonal disease, poised to return later this year along with the usual cases of cold and influenza.

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[The Lancet paper can be accessed  
online: <<http://image.thelancet.com/extras/03art6318web.pdf>>

The paper is entitled "Newly discovered coronavirus as the primary cause of severe acute respiratory syndrome", authored by Thijs Kuiken, Ron A M Fouchier, Martin Schutten, Guus F Rimmelzwaan, Geert van Amerongen, Debby van Riel, Jon D Laman, Ton de Jong, Gerard van Doornum, Wilina Lim, Ai Ee Ling, Paul K S Chan, John S Tam, Maria C Zambon, Robin Gopal, Christian Drosten, Sylvie van der Werf, Nicolas Escriou, Jean-Claude Manuguerra, Klaus Stöhr, J S Malik Peiris, Albert D M E Osterhaus. The Summary of the paper reads as follows:

"The worldwide outbreak of severe acute respiratory syndrome (SARS) is associated with a newly discovered coronavirus, SARS-associated coronavirus (SARS-CoV). We carried out clinical and experimental studies to assess the role of this virus in the causation of SARS. We tested clinical and postmortem samples from 436 SARS patients in 6 countries for infection with SARS-CoV, human metapneumovirus, and other respiratory pathogens. We infected 4 cynomolgus macaques (*Macaca fascicularis*) with SARS-CoV in an attempt to replicate SARS and did necropsies on day 6 after infection. SARS-CoV infection was diagnosed in 329 (75 percent) of 436 patients fitting the case definition of SARS; human metapneumovirus was diagnosed in 41 (12 percent) of 335, and other respiratory pathogens were diagnosed only sporadically. SARS-CoV was, therefore, the most likely causal agent of SARS. The 4 SARS-CoV-infected macaques excreted SARS-CoV from nose, mouth, and pharynx from 2 days after infection. 3 of 4 macaques developed diffuse alveolar damage similar to that in SARS patients and characterised by epithelial necrosis, serosanguineous exudate, formation of hyaline membranes, type 2 pneumocyte hyperplasia, and the presence of syncytia. SARS-CoV was detected in pneumonic areas by virus isolation and RT-PCR, and was localised to alveolar epithelial cells and syncytia by immunohistochemistry and transmission electron microscopy. We conclude that replication in SARS-CoV-infected macaques of pneumonia similar to that in human beings with SARS, combined with the high prevalence of SARS-CoV infection in SARS patients, fulfill the criteria required to prove that SARS-CoV is the primary cause of SARS."

These data establish the principal role of the SARS-associated coronavirus in the causation of SARS. However, they do not exclude the participation of other co-factors or agents such as Human metapneumovirus, although the role of the latter can probably be discounted in view of its high prevalence in the respiratory tract of the general population. As Dr. Low points out, these concerns will persist until an accurate diagnostic test becomes available. - Mod.CP]

[see also:

SARS - worldwide (04): etiology [20030325.0737](#)  
SARS - worldwide (13): etiology [20030327.0758](#)  
SARS - worldwide (16): etiology [20030328.0774](#)  
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