



SARS Laboratory Diagnosis

WHO SARS Team

17 June 2003 = day x+93

Today

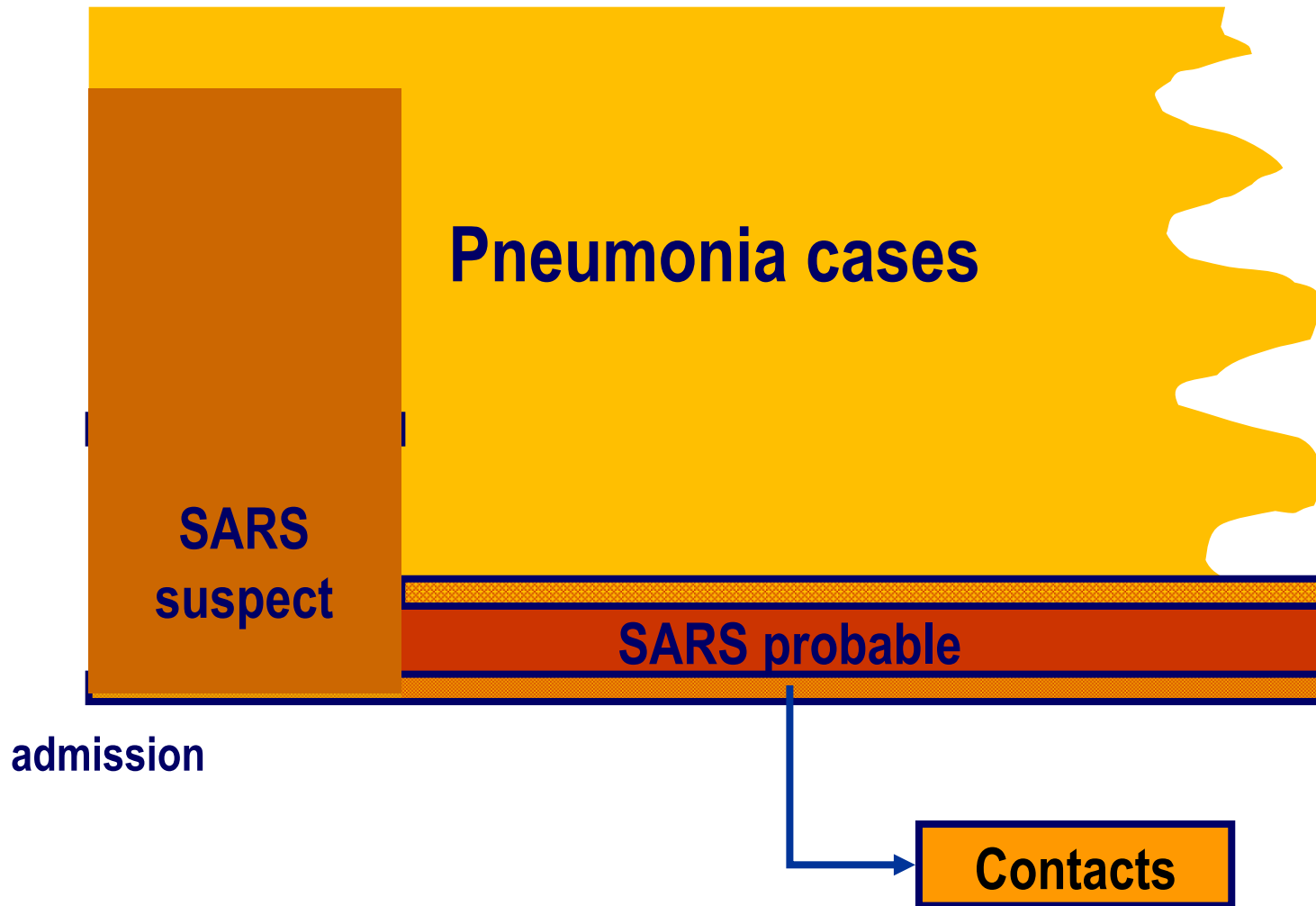
- **Contribution of laboratory diagnosis to SARS control**
- **Current stage of development of laboratory tests**
- **Obstacles and challenges**
- **Gaps and need**

SARS → use of laboratory tests

- Patient treatment/management
- Understanding of the natural history of the disease

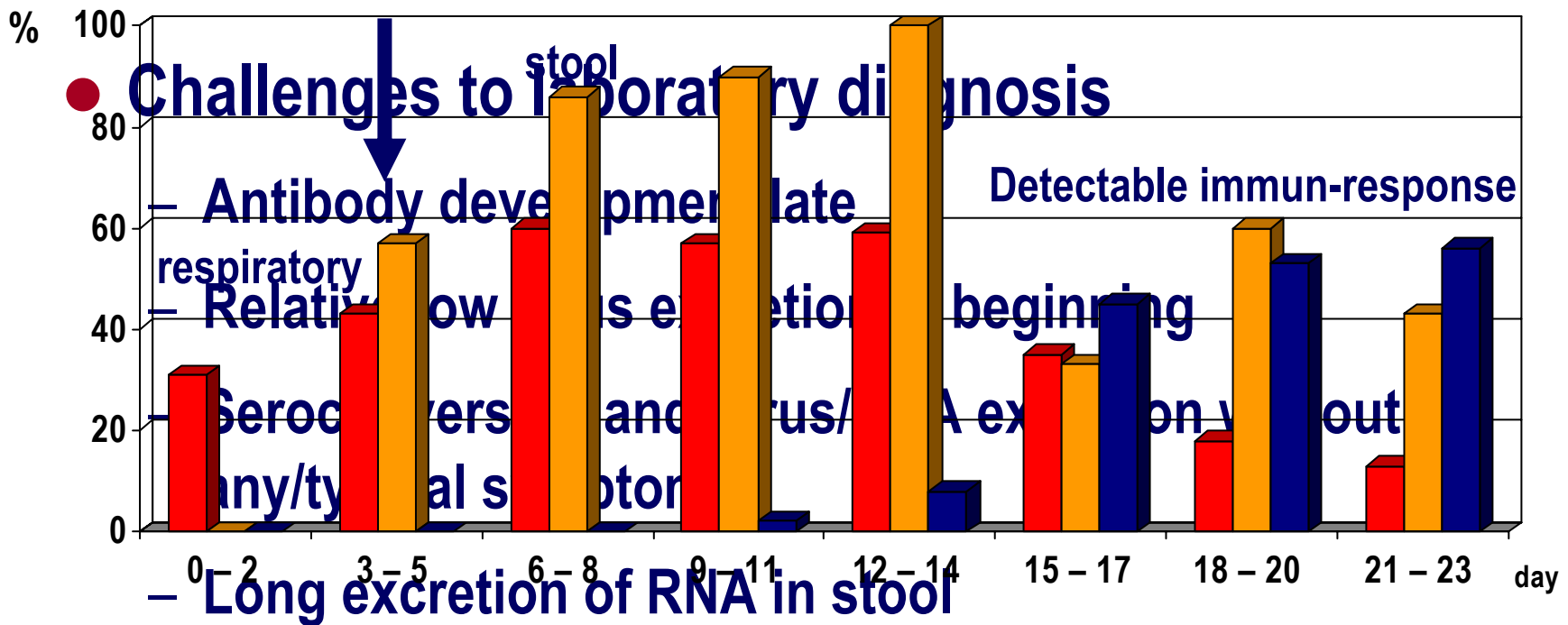


SARS Diagnosis



SARS laboratory diagnosis

- Indicators of infection
 - Presence/excretion of virus
 - Measurable immune response

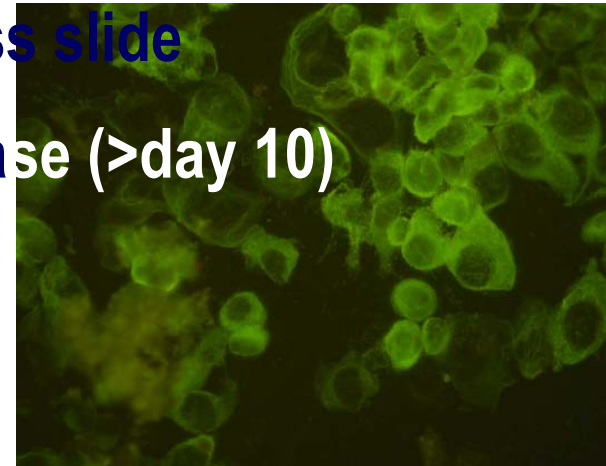


SARS laboratory tests 1

- **Immune response1: ELISA/Westernblot**
 - CDC Atlanta, CDC Beijing; HKU, Hong Kong SAR; ...
 - Detection of IgM/IgG against various virus components
 - Ag: whole virus; recombinant (various virus proteins)
 - ELISA: large scale screening
 - WB: confirmatory test; no large scale testing
- **Antibody detection reliably only late in disease**
- **No standardization yet; one ring-trial so far**

SARS laboratory tests 2

- Immune response 2: Immune-fluorescence assay
 - Reliable, robust test; cumbersome for large scale screening
 - Detection of IgM/IgG
 - Ag: whole virus fixed in cells on glass slide
 - Antibody detection only late in disease (>day 10)
 - No standardization yet



SARS laboratory tests 3

- **Presence/excretion of virus**
 - **Virus isolation in tissue culture/animal models**
 - Sophisticated lab; low sensitivity
 - **Antigen detection by serological methods**
 - currently not feasible
 - monoclonal antibodies?
 - **Detection of genetic material (NAAT)**



SARS Nucleic Acid Amplification Techniques

● PCR

- Reiterative process for amplification of viral genetic material;
 - Target: multiple regions of viral genome
- High specificity and relatively high sensitivity
- Various techniques (nested; real-time...)

→ Conditions

- Experienced laboratory staff and/or sophisticated equipment
- High laboratory quality assurance standards

→ No standardization yet; one ring trial so far



Summary: positive laboratory results

- **Important adjunct to clinical diagnosis**
 - **Virus isolation and seroconversion: definitive answer**
 - **NAAT very useful: require additional verification and quality assurance**
 - **However:**
 - Seroconversion and consistent virus/RNA excretion only late in disease
 - Epidemiological significance unclear of RNA excretion in milder/asymptomatic cases and after disease resolution



Summary: negative laboratory results

- No additional significance for case management and initiation for disease control measures
 - Virus/RNA excretion low during initial phase
 - Ab reaction detectable only during late phase
 - NAAT: sensitivity too low for exclusion of disease

SARS - Do we need diagnostic tests?

- **Yes: particularly at the tail end of the outbreak.**
 - **Quick tests**
 - SARS
 - Other respiratory diseases (Influenza)

SARS laboratory diagnosis: priorities

- Requires concerted efforts of various partners for common public health goal
 - Incentives for long-term investments necessary
 - Public health
 - Establish pedigreed panel of specimens for test validation
 - Standardizing reagents (reference virus and serum) for test performance assessment
 - Genetic diversity databank
 - Repository of reagents and isolates

If you think research is expensive - try disease. Mary Lasher 1901-1994



Provision of standardizing reagents through WHO

61 countries; 11 June 2003

