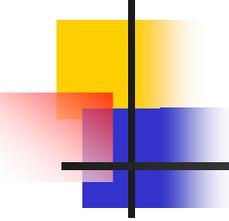


# Biosecurity and Biosafety Practices: we must improve our performance and set standards

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Tony Della-Porta  
Biosecurity and Biocontainment  
International Consultants,  
Australia

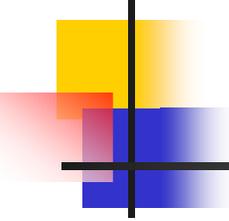


# Australia views on BWC

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- Need to strengthen international co-operation against biological weapons
- Strongly committed to objectives of BWC
- Principles enshrined in the Convention as imperative today as when BWC came into force in 1975

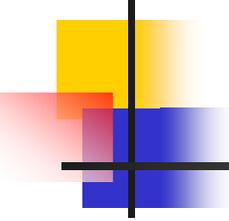




# Increased threat of use of biological agents

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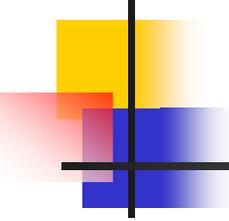
- Access to agents
- New technologies
  - Biotechnology
  - Dispersal
  - Manufacture
- Need for increased vigilance by Countries – threat of bioterrorism



# Australia's definition of biosecurity

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- The prevention of the deliberate misuse of biological pathogens and toxins
  - Biosafety is not the same as biosecurity
  - However, accidents can lead to serious biosecurity problems

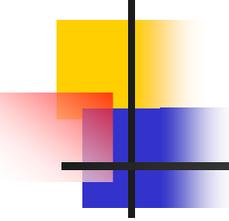


# Biosecurity measures

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- A list of select agents
- Facility registration and control
- A federal database of registered facilities including agents & toxins
- Mandatory Security requirements
- Mandatory background checks
- A national oversight body
- Risk assessment
- Security plan and access control
- Independent investigation process

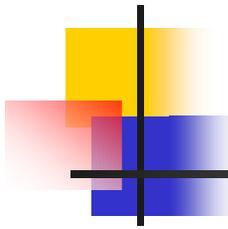




# Risks from accidental release of agents

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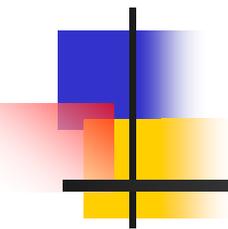
- Singapore SARS-Coronavirus laboratory infection (PhD student)
- Taiwan SARS-Coronavirus laboratory infection (Principle investigator)
- Most countries face similar risks of accidents



# Some examples of biosafety / biosecurity issues

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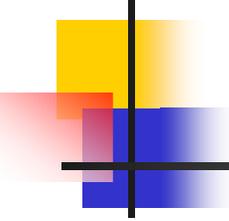
- *Sverdlovsk: March 1979 – anthrax*
- **Singapore: August-September 2003 – SARS**
- **Taiwan: December 2003-January 2004 - SARS**



# Singapore SARS-Coronavirus Incident

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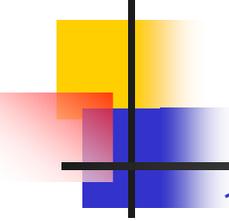
August-September 2003



# Epidemiology

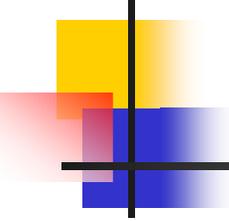
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- 27-year-old doctoral student
  - Worked in lab on West Nile virus
  - Same laboratory worked on SARS
- Fever onset August 26
  - Clinical picture consistent with SARS
  - Specimens positive for SARS
- Source of infection?



# Transmission Hypotheses

- 1) Patient acquired infection a while ago and carried it latently
  - Evidence against:
    - Patient has recent documentation of seroconversion that coincides with clinical infection
    - Patient denies contact with any known SARS case or travel to previously SARS affected areas
- 2) Patient recently acquired infection from someone
  - Evidence against:
    - One contact had recent illness, but no fever; seronegative 27 days after illness onset
    - Patient denies contact with any other ill person



# Transmission Hypotheses

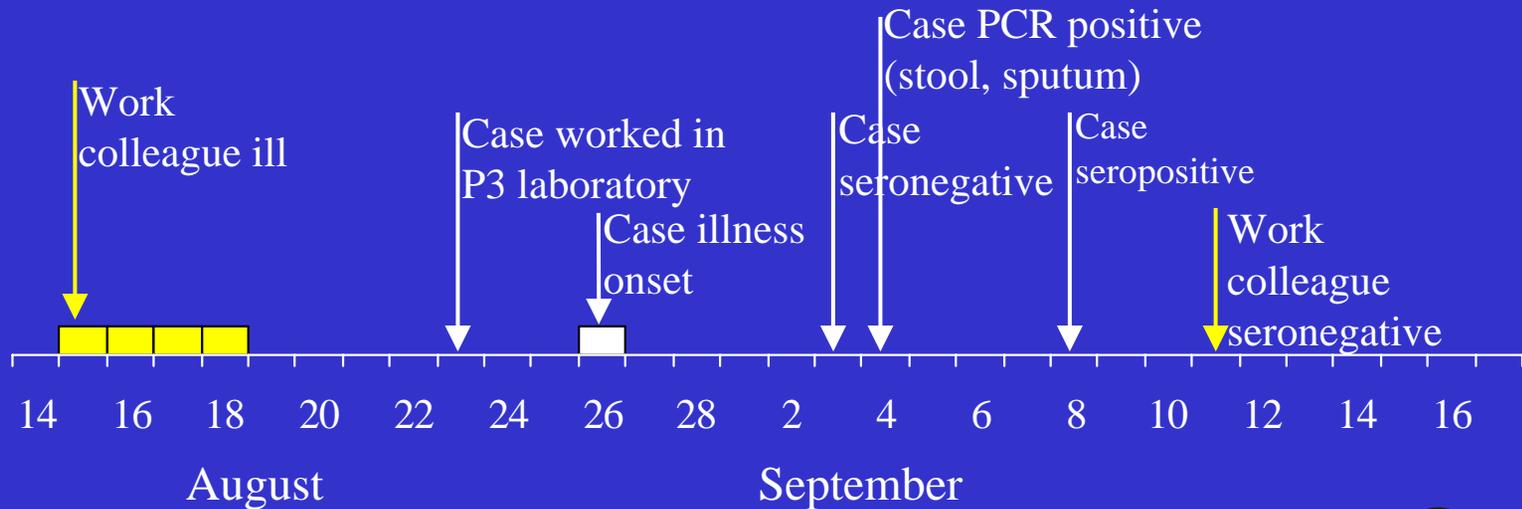
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## 3) Patient acquired infection through laboratory contamination

- Evidence for:
  - Patient worked on West Nile virus in BSL-3 laboratory 3.5 days before his illness onset
  - Lab worked on SARS virus; last known work on live virus within 2 days
  - Procedures for laboratory safety not optimal
  - Testing of the frozen specimen that Case A worked with was positive by RT-PCR for the SARS coronavirus and West Nile virus
  - Sequence of lab and patient strain very similar



# Timeline of Events

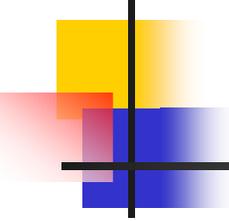


# Environmental Health Institute Assessment

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- Overall: Poor laboratory safety and absence of records
- Problems identified
  - Structural problems with BSL3 laboratory
  - Poor training of personnel
  - Poor record keeping
  - No security; open access to everything





# Environmental Health Institute Recommendations

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- Suspend work until further notice
- Fix structural problems
- Destroy specimens in freezer
  - All West Nile specimens
  - SARS virus stocks
- Develop appropriate training standards that are competency based
- Computerize inventory records



# Biological Standards

## Recommendations for Singapore

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- Need for a National Legislative basis for Standards in Biosafety Laboratories for Singapore.
- Creation of a structure for laboratory certification covering both structure integrity and operating procedures. These certifications should be renewed on an annual basis.

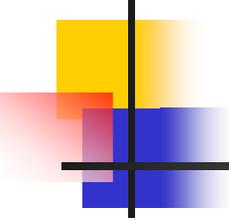


# Transport of Specimens

## Recommendations

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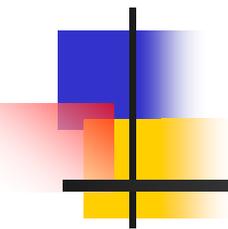
- Creation of the tracking system for importation, exportation to and from Singapore, transfer of infectious agent among laboratories in Singapore.



# Report of investigation team

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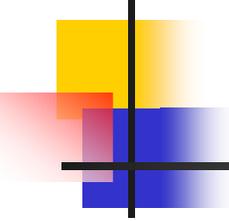
- On the Singapore Ministry of Health web site
- [http://www.moh.gov.sg/sars/pdf/Report\\_SARS\\_Biosafety.pdf](http://www.moh.gov.sg/sars/pdf/Report_SARS_Biosafety.pdf)
- Joint CDC/WHO investigation for Singapore Ministry of Health



# Taiwan SARS-Coronavirus Incident

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December-January 2004  
(WHO Investigation)



# Description of incident

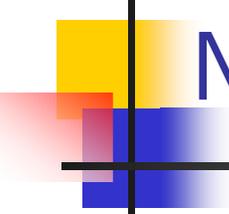
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- Principle investigator decontaminated transport isolator (BSCIII) with 70% ethanol for 10 min
- Then opened and cleaned spill exposing himself
- Then travelled to Singapore
- On return developed fever and respiratory problems (thought it was influenza)
- Hospitalised with SARS

# Implications for biosafety

- Biosafety standards should discourage continued, prolonged, worked hours in the laboratory
- The standards should ensure that access to P3 and P4 laboratories is properly documented and monitored.
- A procedure for timely reporting and follow-up of all unusual laboratory incidents should be developed.
- The occupational health component of incident reporting should be clearly defined for all laboratories working with infectious agents.





# Institute of Preventative Medicine, National Defense University

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- Overall Assessment
  - Staff and procedures not reviewed and incorrect operating procedures
- Problems identified
  - Need to retrain staff
  - Working alone and long hours
  - Lack of understanding of disinfection



# Transfer cabinet



# Peroxide decontamination generator and wall power points

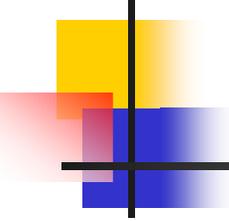


# Staff with gowns not coats (best practice)



# UV pass boxes – not suitable for taking samples out

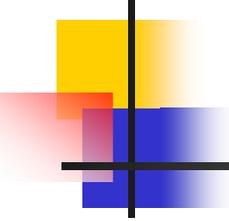




# Biological Standards

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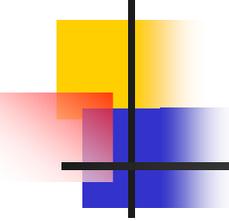
- There is a need for a legislative basis for Standards in Biosafety for Laboratories in Taiwan.
- A structure should be created for laboratory certification covering both structure integrity and operating procedures. These certifications should be renewed on an annual basis.



# Biological Standards

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- A tracking system for importation, and exportation of infectious agents to and from Taiwan should be implemented.
- An inventory of all laboratories should be urgently performed to identify those holding samples containing viable SARS-CoV, including cultured virus or clinical specimens potentially containing viable virus.



# Conclusions

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- Obvious that there are problems with training of staff working in BSL-3 and BSL-4 Labs
- Accidents can occur and present a significant community risk
- Independent certification of labs required
- Control of organisms needs – for high risk organisms not all lower risk organisms – needs to be sensible
- Control on access to BSL-3 and BSL-4 labs needs to be improved
- Needs to be much better understanding of disinfection and decontamination practices