

Dr. M.P. Fadden, distinguished wardens, ladies & gentlemen.

21 yrs. ago, I was honoured ~~with~~ by the Gairdner Foundation with the Award of Merit.

- 6 years to last case
- 3 years since WHA

If anyone had suggested then that I would be speaking here today on the subject of ~~smallpox~~ smallpox, I would have suggested that they had taken leave of their senses.

Smallpox, ^{I thought} ~~was~~ was a closed book. We had written the last chapter. It is important, however, that once again we revisit smallpox — not to do so, as we ^{have} realized, could eventuate in a fatal error.

Most important lesson —

This afternoon —

- like to remind you briefly what clinical smallpox was — ^{any one} ~~see a case~~
- To describe the primary elements of the eradication effort
- To describe why now we are again concerned about this disease and what is being done about it

It is especially appropriate to be ~~at~~ speaking on this subject ^{at this institution} ~~in Canada~~. Canada played an important role in the effort. Drs. Bobo Wilson and Paul Fenje of Connaught Laboratories, then part of the U. of T., directed one of the two principal ^{smallpox} vaccine reference labs. and were vaccine producers for the Americas. Canadian CIDA donated millions of doses of vaccine and Canadian staff filled important posts.

The Death and Resurrection of a Virus

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Gairdner Foundation
Toronto, Canada

21 October 2004



Ali Maalin - 26 October 1977



Ramses V



Sitala Mata



Sapona

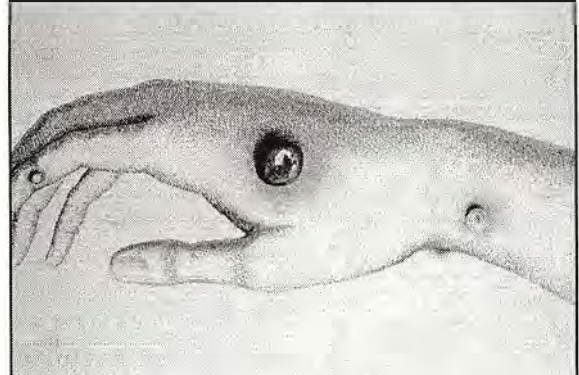
"That disease was the most terrible of all the ministers of death. The horror of the Plague...visited our shores only once or twice within living memory but the smallpox was always present, filling the churchyards with corpses...and making the eyes and cheeks of the betrothed maiden objects of horror to the lover."

Macauley

*only disease for
which folks have
known to be cured
in many cultures*



Edward Jenner



Cowpox on the hand of Sarah Nelmes



Deaths in the 20th Century

Due directly or indirectly to armed conflict:

100,000,000

Due to smallpox

300,000,000+



Smallpox -- characteristics

- Incubation period is 10-12 days
- Severe flu-like symptoms then rash
- Case fatality rate --30 %
- No therapy available

Day 2

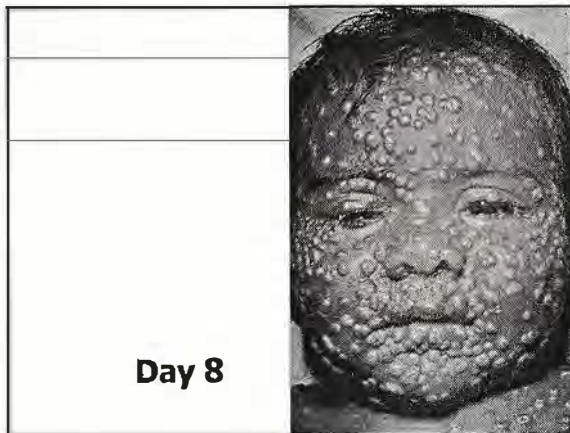


Day 5



skin yms

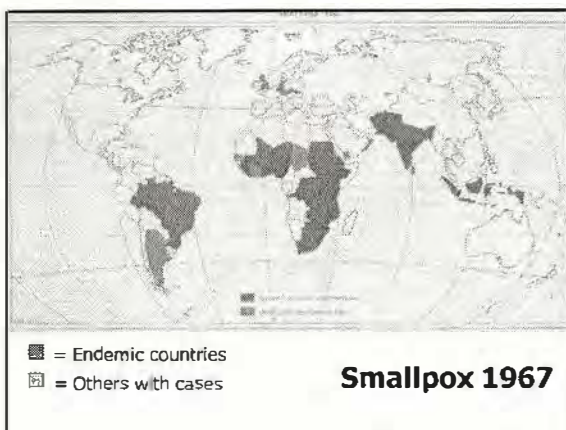
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Characteristics of Smallpox Favoring Eradication

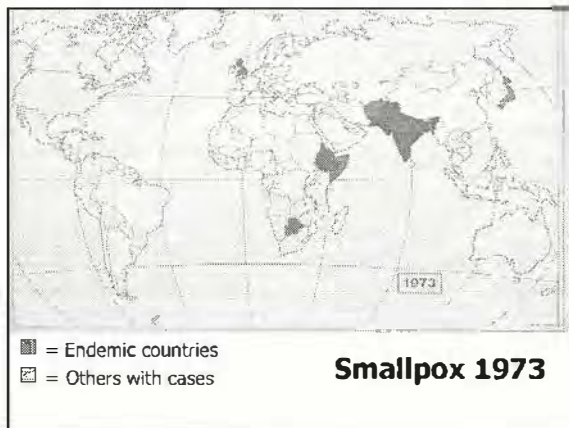
- Man -- the only host
- Virus spread -- only during rash; face-to-face contact
- Permanent immunity after recovery
- Transmission stops spontaneously in remote areas
- Vaccine is heat-stable and easy to administer
One dose provides long lasting protection

unique with 100% mortality

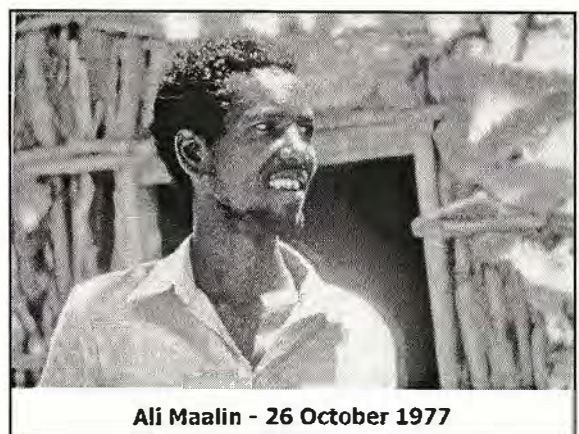
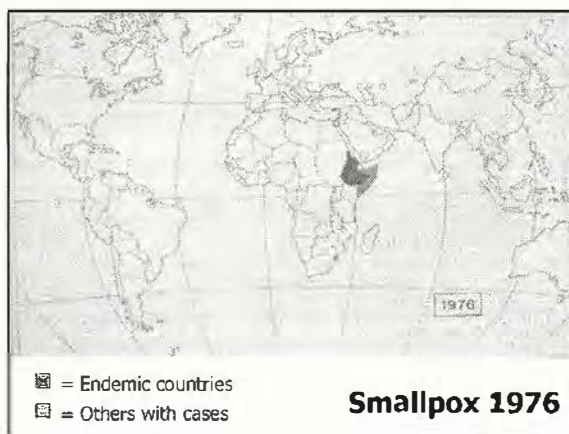


Shubby





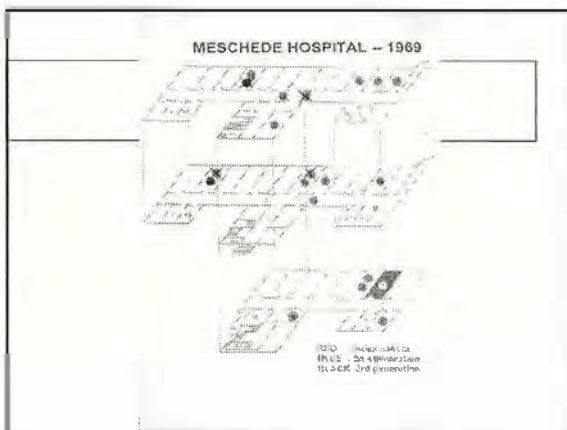
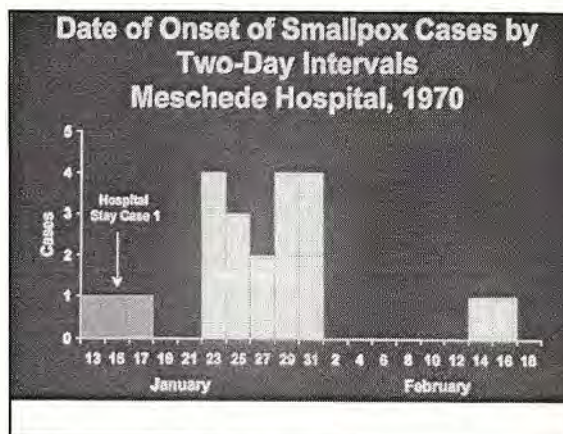
Smallpox 1973



Smallpox



Meschede, Germany - January 1970



"On May 8, 1980, WHO announced that smallpox had been eradicated from the planet... Soon after the WHO announcement, smallpox was included in a list of viral and bacterial weapons targeted for improvement in the 1981-85 Five-Year Plan...the Soviet military command issued an order to maintain an annual stockpile of 20 tons."

Alibek, 1998

Factory - where was smallpox

Susceptibility of the population to Smallpox -- 2004

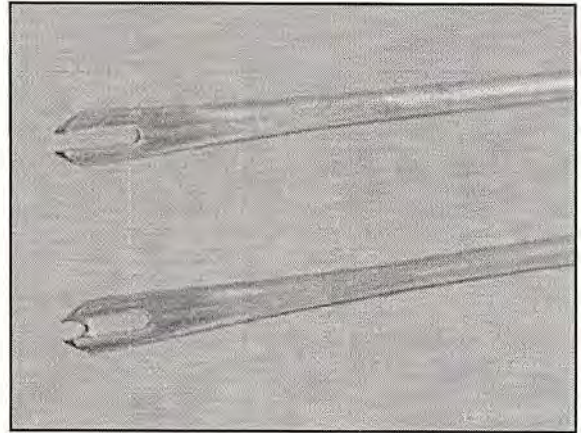
- Vaccination stopped in 1980
- Persons under 23 years have not been vaccinated
- Persons vaccinated only once pre-1980 have little or no immunity
- Population-- >75% are fully susceptible

Epidemic Response Capability September 18, 2001

- Vaccine manufacturers -- none
- Vaccine in storage
 - U.S. 15 million doses
 - 90,000 doses actually available
 - World ? 80 million doses

Response capability -- 2004

- Perhaps 10-15 countries with sufficient vaccine for their own emergency needs
- Global supply – about 400 million doses
- Trained and vaccinated teams prepared to move rapidly
- Diagnostic laboratories now expanding
- A WHO Global smallpox stockpile now in planning stage



Should vaccination be restarted?

- Probability that smallpox will be used as a weapon
 - Frequency of adverse reactions
 - Likely effectiveness of outbreak control
- Handwritten note: how bad just 0*

Smallpox Vaccine Expected Adverse Events

- Life-threatening complications (per million)
 - Post-vaccinal encephalitis (3)
 - Progressive vaccinia (1)
 - Eczema vaccinatum (12)
- Less serious
 - Generalized vaccinia
 - Accidental inoculation
 - Rash and fever
- If 100 million vaccinated, 100+ deaths might occur (1960's data)

Smallpox vaccine

a newly reported cardiac complication

- Myopericarditis 1:8,000
 - Almost all primary vaccinees
 - Onset 7 to 20 days
 - Fever, chest pain, EKG changes, enzymes increased
 - Recovery

Effectiveness of outbreak control

- Smallpox doesn't spread readily
- Patient transmits only after symptoms
- Vaccine protects even when given 3-4 days after infection



Epidemiology of Smallpox

Transmission Patterns in Europe: 1958-1973

- Outbreaks: 34
- Cases: 573
 - Transmission in hospital: 277 (48%)
 - Transmission in home: 143 (25%)
- Hemorrhagic cases – a threat to hospitals
 - Bradford, UK (1961) 10 cases
 - Germany (1970) 16 cases
 - Yugoslavia (1972) 38 cases



Outbreak Control

- Isolate patient
- Vaccinate contacts since patient's fever began and household contacts
- Daily temperatures for contacts
- Make vaccine available on request in area but no compulsory vaccination
- No quarantine of city or groups; no airport closure



The future

- How long must we sustain our efforts ?

END

I'm afraid in definitely. But bear in mind that the threat of smallpox is not a threat
~~Need to be aware~~
to Canada or to the U.S. ^{outbreak} Smallpox anywhere is a threat to global security and this inevitably
means the ^{need for} active participation ^{in deliberate response} of all countries within the context of the WHO. There
are some who today would discourage ^{participation in} international organizations protesting that they are
cumbersome and bureaucratic (national governments are not, of course). ~~But bear~~
To be borne in mind is that ~~the~~ what most considered to be an impossible task -
the eradication of ~~smallpox~~ ^{smallpox} ~~is~~ ^{humanity's} greatest scourge - was accomplished within the
bureaucratic framework of an international organization. The success is attributable
not to the efforts of one or a few but literally 1000s who worked selflessly and tirelessly;
not to one nationality - 69 different ones were on our staff at one time or another; not
to one primary donor - the largest contributed only 12%.

opportunities and
In this increasingly interconnected modern world, there are more challenges
transnational collaboration is critical. The future
~~is before us~~ before us than ever before. ~~They~~ must not be ~~lost~~ ^{compromised} by the
intransigence of one or a few major players.