



MEDICINE GRAND ROUNDS

Tuesday, October 20, 2009

12:00 pm – 1:00 pm

Uris Auditorium

D.A. Henderson, M.D., M.P.H.

The B.H. Kean Lecture in Global Health

Distinguished Scholar, Center for Biosecurity

Professor of Medicine and Public Health

University of Pittsburgh

Johns Hopkins University Distinguished Service Professor

Baltimore, Maryland

Smallpox: The Death of a Disease

- Target Audience:** Weill-Cornell physicians in this specialty, other interested physicians and health care providers, and students.
- Statement of Need:** WHO's global eradication of smallpox has been hailed as one of the greatest achievements of the past century. How was it achieved offer important lessons relevant to the undertaking of other international disease control program.
- Course Objectives:** Weill Cornell Medical College CME Activities are intended to lead to improved patient care. By the conclusion of this series, physicians should have a better understanding of recent developments in this field which in turn should lead to improvements in clinical practice.
- CME Accreditation:** Weill Cornell Medical College is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. Weill Cornell Medical College designates this educational activity for a maximum of 1 AMA PRA Category 1 Credit(s)™. Physicians should only claim credit commensurate with the extent of their participation in the activity.
- Faculty Disclosure:** It is the policy of Weill Cornell Medical College to adhere to ACCME Essential Areas, Policies, and Standards for Commercial Support and content validation in order to ensure fair balance, independence, objectivity, and scientific rigor in all its sponsored programs. All faculty participating in sponsored programs are expected to disclose to the audience any potential, apparent, or real conflict of interest related to their contribution to the activity, and any discussions of off-label or investigational uses of any commercial products or devices not yet approved in the United States. WCMC CME activities are intended to be evidence-based and free of commercial bias. *If you feel this is not the case, please call the Office of Continuing Medical Education at 212-746-2631 to anonymously express any concerns.*

Dr. Henderson has nothing to disclose. Dr. Henderson does not have a financial interest in any commercial products or service presented in his lecture and does not intend to discuss the off-label or investigational use of products or services.

Course Director/Planning Committee [Andrew I. Schafer, M.D.]: has nothing to disclose.

Independent Clinical Reviewer: not applicable

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Evaluations for Regularly Scheduled Conferences (RSCs) are conducted periodically throughout the year. If you have questions or concerns regarding the content or presentation of this session (including any apparent conflict of interest, please contact the Chairman's Office, Department of Medicine at 212 746 4720.

B. H. KEAN - BOYER FAMILY
FOUNDATION LECTURE
CORNELL KEAN ROUNDS

It is a pleasure for me, and an honor, to participate in paying tribute to the creative and inspiring personage of Dr. Ben Kean. I knew him by reputation (and by his book)— a benevolent pied piper attracting young professionals into a challenging world of strange illnesses and puzzling tropical infections. His book is riveting as he recounts the unusual events in which he took dramatic roles. He attributes his adventures and creative insights to having a willingness to learn and an open mind able to accommodate a variety of options. I appreciate, in particular, his delight in besting stuffy bureaucracies. He would have been a great colleague in the smallpox adventure! But, I know that a number of kindred souls, some inspired by him, were what made smallpox eradication a success.

I know that most of you have never seen a case of smallpox and don't expect to see one. I hope you don't— our last cases in the U.S. occurred in 1949. I suspect that many could recall little of the disease other than that it was an exanthematous tropical disease that disappeared some years back. Forgotten by many is that, throughout history, smallpox has been the most severe of all the pestilential diseases, annually causing millions of deaths and altering the course of history again and again. And then suddenly it was gone—in little more than 10 years. Success was the product of an incredible effort by a surprisingly small international cadre of health staff. Most were under the age of 40. Many, like Ben Kean looked beyond the conventional, in entertaining new ideas, in working with people in diverse circumstances, and adroitly side-stepping a smothering bureaucracy. The book, *Death of a Disease* is their remarkable story and mine. I wish I could say that the last chapter has been written – but I can't.

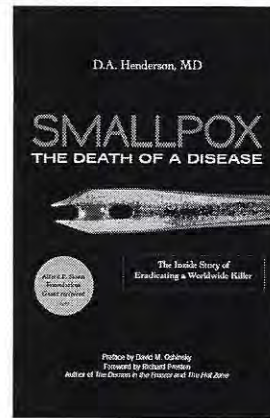
Smallpox

Once, the greatest killer – still a threat

D.A. Henderson, MD, MPH

Professor of Medicine and Public Health
University of Pittsburgh
Johns Hopkins University Distinguished Service Professor

B.H. Kean-Boxer Family Foundation Lecture
20 October 2009



"There has been no greater medical – or humanitarian – miracle in modern times than the eradication of smallpox... (This achievement) offers a winning blue print for the great medical challenges to come."

David Oshinsky – Winner of the 2006 Pulitzer Prize in History

Smallpox, the disease

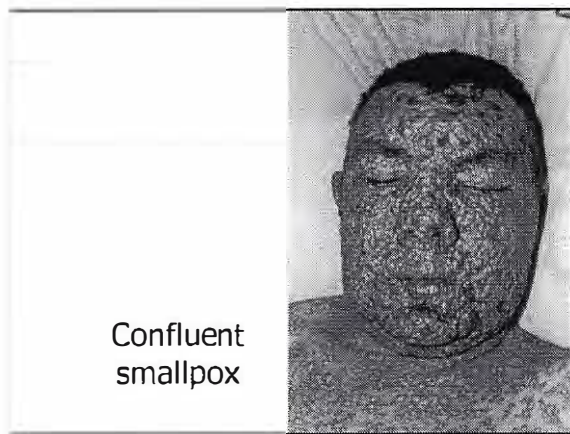
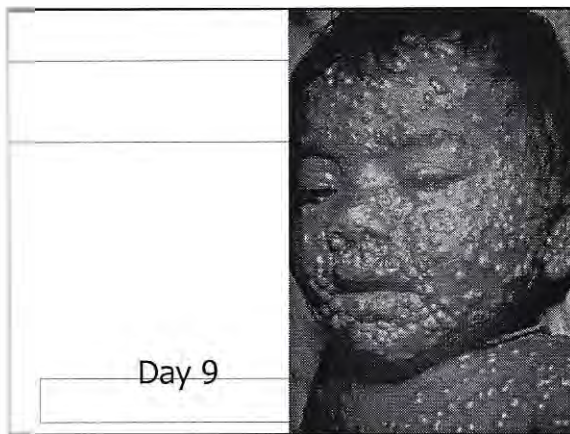
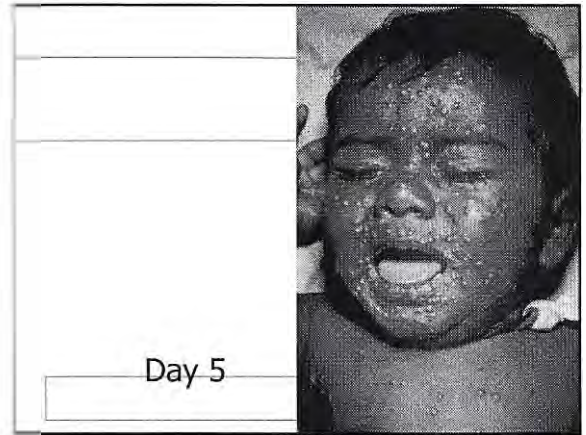
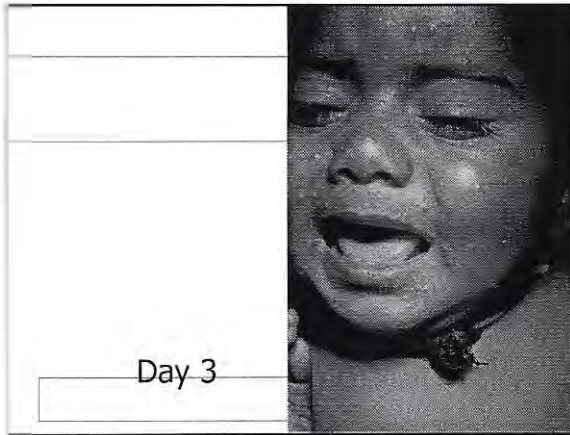
- Caused by a virus
 - Spread is by face-to-face contact during the time of rash
- Only humans can be infected
 - A chain of infection going back to the Pharaohs 3500+ years
- Death rate is 30%
 - There is no treatment

Sitala Mata



Smallpox in the 20th Century

- Deaths – 300,000,000 before 1978
 - NYTimes: 120,000,000 died either directly or indirectly as a result of armed conflict
- Compulsory vaccination in the U.S. until 1972
 - Last U.S. case was 1949
- International travelers carried a "yellow booklet" documenting vaccination in past 3 years



Global efforts to eradicate a disease

- Hookworm 1909-23 14 years
 - Treatment, sanitation
- Yellow fever 1915-32 17 years
 - Stop *aegypti* mosquito breeding
- Yaws – 1948-66 18 years
 - Penicillin treatment of patients
- Malaria – 1955-73 18 years
 - DDT insecticide

Smallpox as a target

1953 – Director General proposes

"...a practical world program, of importance and value to every country...demonstrating the importance of WHO to every Member State"

Rejected by Assembly as uneconomical and unfeasible

1959 World Health Assembly adopts USSR proposal for a global program but little progress is made

The birth of the WHO global program

- Director General submits a plan to World Health Assembly-- May 1966
 - 10 year program – WHO budget of \$ 2.4 million/year
- Objections by delegates
 - Not feasible
 - Demand for no further increases in WHO budget
- 58 votes needed to pass; 60 voted in favor

A Director is selected

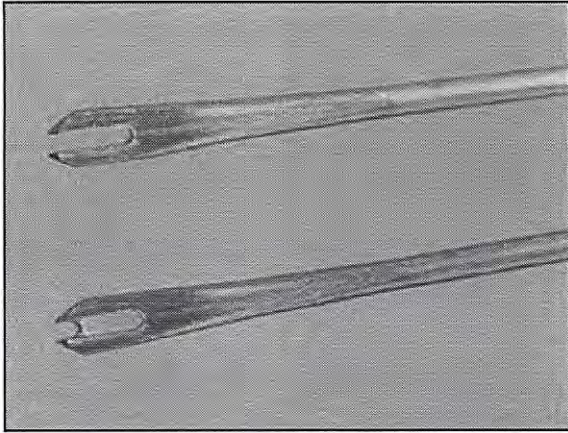
- Director General believed program would fail
 - Malaria eradication program was collapsing
 - WHO and public health credibility was threatened
- He demanded that an American serve as Director
 - The candidate declined:
 - Responsibilities for new CDC African program
 - Limited resources
 - Not enough even to buy the vaccine required
 - A career option

The Challenge

- Status of smallpox – 1967
 - >10,000,000 cases
 - 2,000,000 deaths
 - 43 countries reported cases
- Program staff
 - Headquarters – 6 professional staff; 3 secretaries
 - Regions – one each in 4 WHO Regions
 - International staff – never more than 150

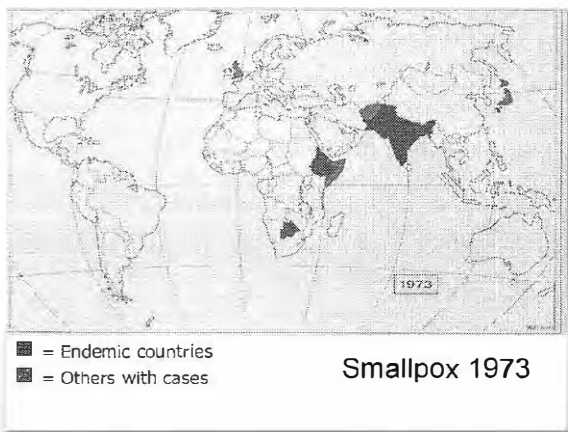
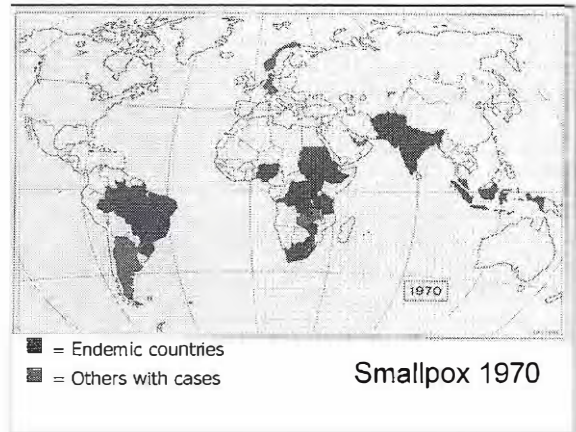
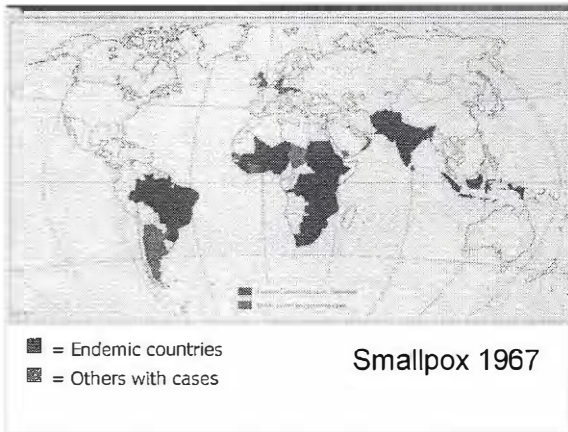
A new technique for vaccination

- Need for a more rapid, effective method
 - Traditional
 - scratch through a drop
 - Bifurcated needle—multiple puncture method
 - One-fourth as much vaccine required
 - Training time – 15 minutes
 - Easily sterilized and reused
 - Cost -- \$5 per thousand



The strategy

- * Vaccination of 80% of population
- * Surveillance
 - To obtain a weekly report from every health center and hospital
- * Containment
 - "Fire-fighting teams"
 - Investigate every case
 - Contain outbreaks with ring-vaccination





India – the pivotal challenge

1973-75

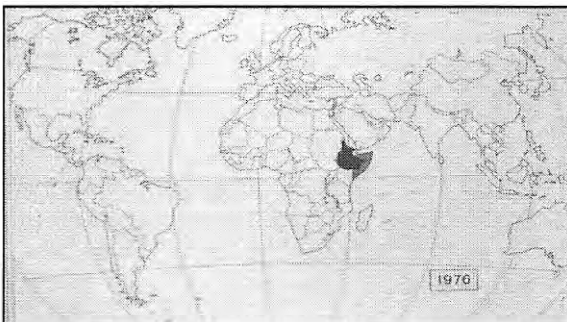
- India – 55 million and “the home of smallpox”
- A new strategy
 - Search every village in 10 days; 120,000 staff
 - Containment teams for every outbreak
 - By the third round, every house was being visited
- Catastrophic problems Jan to May 1974
 - Gasoline crisis
 - Railroads, airlines, finally health workers on strike
 - Worst floods in three decades
 - India detonates an atomic weapon—May 1974



Indian Independence Day August 15, 1975

Prime Minister Indira Gandhi

- Salutes India on its 28th Anniversary
- Announces India's freedom from smallpox for the first time in written history



■ = Endemic countries
■ = Others with cases

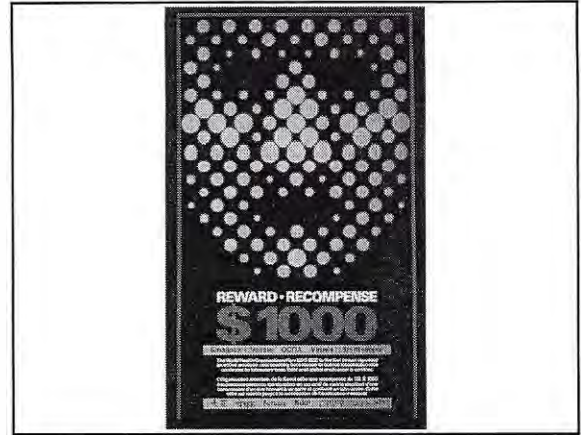
Smallpox 1976

The Final Chapter

- Ethiopia -- 25 million people
 - Size of France and Germany combined
 - Few roads – travel on foot and with donkeys
 - Marxist revolution and continuing civil wars
 - Teams kidnapped on nine different occasions
 - Program helicopter captured and held for ransom
 - Smallpox staff -- only foreigners allowed out of Addis
- Somalia
 - Nationwide epidemic – government suppressed reports
 - A race to finish before the Hajj migration



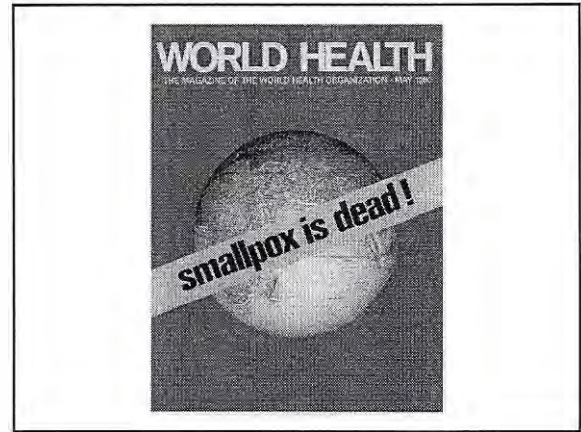
Ali Maalin - 26 October 1977



World Health Assembly --1980

- Declares solemnly that the world and all its peoples have won freedom from smallpox
- Smallpox vaccination should be discontinued in every country

» *Thirtythird World Health Assembly, 8 May 1980*



Meanwhile, horizons were expanded

- 1974--Expanded Program on Immunization
A global program to vaccinate all children with smallpox, measles, polio, DTP vaccines
Target: 1990 – 80% coverage: achieved
- 1996 –Measles eradication in the Americas
Target: 2002 – achieved

The Threat of Biological Weapons

- Biological Weapons Convention—1972
 - Cessation of research on offensive weapons
 - Destruction of existing stocks
- Attitude until late 1990s
 - Bioweapons are morally repugnant
Academic world—deliberate refusal to have anything to do with them
 - Only possible sources are sophisticated laboratories
 - A moral barrier against their use
Besides: "If used by someone, we would nuke them" R.Nixon

Clouds on the Horizon

- 1992 USSR Bioweaponer Alibek defects
 - USSR program 50 laboratories; 60,000 staff
 - Preferred agents: smallpox, anthrax, plague
 - Smallpox production capacity – 20+ tons per year
 - Laboratory research staff disperse – late 1990s
- 1995 Other centers with capability and intent
 - Aum Shinrikyo – anthrax, sarin gas
 - Iraq's 1980s program becomes known
 - Anthrax – drones, shells

A new reality– September 11, 2001

- September 16 meeting with Secretary
 - A possible second attack --smallpox or anthrax
 - Status of country
 - None <30 years of age have ever been vaccinated
 - Waning immunity
 - 75% of population susceptible
 - Vaccine availability
 - 15 million doses in storage
 - No vaccine manufacturer in the world
 - Earliest date for producing a new vaccine –5+ years

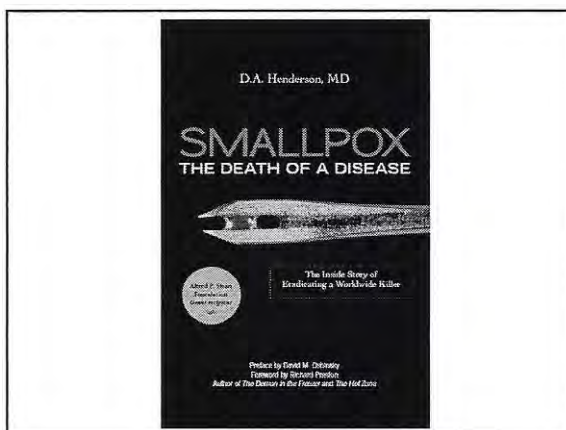
Post 9/11

- Vaccine – 200 million doses ready in 18 months
- Vaccine to be used only in emergency
 - Balance of risk of reactions and ability to respond
- Diagnostic labs increased from 2 to >100
- Reporting strengthened
- Increase rapid response capability

Coda

- From the book's introduction:

"We are only beginning to realize the potential of public health...It is a field begging for fresh, resourceful ideas and a new generation of professionals who are not constrained by 'knowing' what can't be done. So it was with so many who contributed so much to making smallpox eradication a possibility. Their stories, as well as mine, constitute the heart of the book."





Department of Medicine

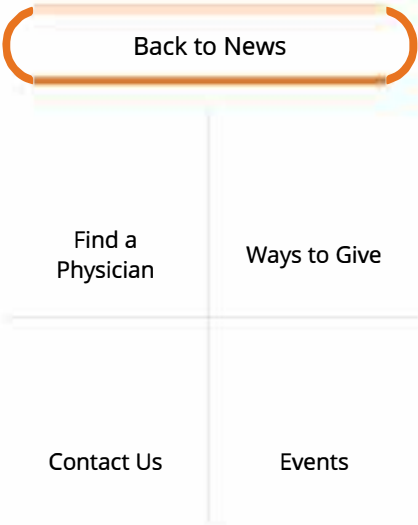
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B.H. Kean-Boxer Family Foundation Lecture in Global Health



L to R (front row): Dr. D.A. Henderson (this year's speaker), Collette Kean, Steven Boxer (son of the original donor to the Lecture, Leonard Boxer) and Dr. Andrew I. Schafer, Chairman of the Department of Medicine. L to R (back row): Dr. Christopher Barley (Leonard Boxer was his patient) and Dr. Henry Murray, who organizes this annual Lecture.

The annual B.H. Kean-Boxer Family Foundation Lecture in Global Health took place at Medical Grand Rounds on October 20th in Uris Auditorium. The speaker was Dr. D.A. Henderson from John Hopkins University. The topic of this year's lecture was "Smallpox: Death of a Disease". Dr. Henderson led the global smallpox eradication campaign, which ended successfully in 1980 when the World Health Organization declared the world smallpox-free. His presentation explored the long and successful history of smallpox eradication worldwide.



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