SMALLPOX

PRESENTED BY: JESSICA THOMAS & AERIAL RICE
ANCIENT HISTORY

- Most likely began as a virus in animals located somewhere in Africa.
- The disease spread to India and China due to trading between different countries.
- Estimated to first infect humans around 10,000 years ago.
- Evidence of smallpox was first found in ancient Egypt in 1898, when an archaeologist discovered the mummified body of Pharaoh Rameses the 5th, who died around 1157 B.C. and is believed to have died from smallpox based on the rash found on his body.
- Smallpox was spread throughout most of Europe during the 16th century along with America and eventually began to spread across Australia in 1789, where they experienced a couple different outbreaks over the years.

- First successful smallpox vaccine was invented by Edward Jenner in 1798.
CONTEMPORARY HISTORY

- Last case in United States was in 1949
- Last case of small pox worldwide was reported in 1977
- The virus is still stored away in small amounts located in two research labs.
- Smallpox vaccinations were discontinued in 1972, but is still given to high risk groups such as the military.
- Smallpox was confirmed eradicated in 1980, which lead the World Health Organization to launch a global immunization campaign.
- There is some fear that the stored away virus could be used as bioterrorism.
INTERESTING FACTS

- ALSO CALLED VARIOLA WHICH IN LATIN MEANS “SPOTTED” OR “PIMPLE”.
- LACK OF KNOWLEDGE CAUSED MANY PEOPLE WHO WERE INFECTED TO DIE BECAUSE THE DOCTORS DIDN’T KNOW HOW TO PROPERLY TREAT THE DISEASE.
- DOCTORS WOULD TRY TO “CURE” PATIENTS BY DRESSING THEM IN RED AND HAVING THEM STAY IN A ROOM NEXT TO A FIRE TO OVERHEAT THE BODY TO KILL THE VIRUS.
- IT IS ESTIMATED THAT EVERY 7TH CHILD BORN WOULD DIE FROM SMALLPOX DURING THE WORLDWIDE SPREAD.
- SOME HISTORIC PEOPLE WHO WERE INFECTED WITH SMALLPOX AND SURVIVED INCLUDE: MOZART, BEETHOVEN, GEORGE WASHINGTON, AND ABRAHAM LINCOLN.
- IN THE 1950’S, APPROXIMATELY 50 MILLION CASES OF SMALLPOX OCCURRED WORLDWIDE EACH YEAR.
- 300-500 DEATHS OCCURRED DURING THE 20TH CENTURY DUE TO SMALLPOX.
“THE LAST SMALLPOX PATIENT ON EARTH”

• Ali Malayali from Somalia came into close contact with the smallpox virus in 1977, when he was guiding a vehicle with two kids who were infected with smallpox. 10 days later he became very sick and developed a fever. A few days after that, he started to get a rash on his skin which the doctors misdiagnosed as chickenpox.

• As his symptoms progressed, it was clear that he was misdiagnosed and in fact had smallpox. He and 91 other people who he had contact with during his time of being exposed and infected with the virus had to be isolated to stop further spread of smallpox. None of these people ever caught the virus. From this point on, the World Health Organization (WHO) monitored any further spreading of the disease and declared smallpox to be eradicated in 1980. Ali Malayali survived the disease and is known as “The Last Smallpox Patient on Earth”.

A PERSON IS INFECTED WITH SMALLPOX…

- HOW DID THE PATIENT BECOME EXPOSED TO THE VIRUS?

THE SMALLPOX VIRUS CAN ONLY BE TRANSMITTED BETWEEN HUMANS ONCE SOMEONE HAS BEEN EXPOSED TO THE VIRUS IN WAYS SUCH AS:

- BREATHING IN THE VIRUS FROM A COUGH, SNEEZE, OR SALIVA FROM SOMEONE WITH SMALLPOX
- TOUCHING SKIN THAT HAS SMALLPOX BLISTERS
- TOUCHING CONTAMINATED BODY FLUIDS OR OBJECTS
- BEING IN CONTACT WITH ANYTHING THAT HAS BEEN EXPOSED TO THE VIRUS.
A PERSON IS INFECTED WITH SMALLPOX…

WHAT ARE THE SYMPTOMS OF SMALLPOX?

AFTER SOMEONE HAS BEEN EXPOSURE TO THE VIRUS, IT CAN TAKE ANYWHERE FROM 7-17 DAYS UNTIL THE PERSON GETS SICK. SMALLPOX TYPICALLY STARTS WITH FLU LIKE SYMPTOMS SUCH AS FEVER, HEADACHES, BODY ACHES, AND WEAKNESS.

- **DAY 2-3:** SMALL, ROUND POX (BLISTERS) APPEAR AND SPREAD ON THE FACE, ARMS, LEGS, AND INSIDE THE MOUTH
- **DAY 7:** THE POX ENLARGE AND FILL WITH PUS
- **DAY 12:** THE BLISTERS CRUST OVER; STOMACH PAIN AND CONFUSION CAN ALSO OCCUR
- **WEEK 3-4:** THE BLISTERS TURN INTO SCABS AND FALL OFF, LEAVING PITTED SCARS ON THE SKIN.

LONG-TERM EFFECTS OF SMALLPOX INCLUDE SCARS, BLINDNESS, AND DEFORMED HANDS AND FEET. (COMMUNICABLE DISEASE CONTROL AND PREVENTION).
A PERSON IS INFECTED WITH SMALLPOX...

- **HOW IS SMALLPOX DIAGNOSED?**
  There are special tests that can be done in a laboratory that can be used to identify the smallpox virus such as a Dic Panel, platelet count, or white blood cell count.

- **HOW TO TREAT SMALLPOX...**
  After a person is already experiencing symptoms of smallpox, the treatment become much more limited. There aren’t any special drugs used to treat smallpox, but some antibiotics may be given to help with some of the infections that arise from having the virus such as eye infections and skin infections. The best way to treat the disease is to prevent it by vaccinations. If a person is exposed to the virus but is not already vaccinated, they might still have a fighting chance if they are given the vaccine within 1-4 days after being exposed to the virus. This may help prevent the disease or lessen the severity of it.
THE VARIOLA VIRUS

A LARGE, BRICK-SHAPED, DOUBLE-STRANDED DNA VIRUS THAT SEROLOGICALLY CROSS-REACTS WITH OTHER MEMBERS OF THE POXVIRUS FAMILY. THIS IS INCLUDING: COWPOX AND CAMELPOX.

Different Forms:

**Variola major**
- Lethal strain
- Most common strain
- More severe symptoms
  - Fatality Rate 20%-40%
on the 7th day of the infection

**Variola minor**
- Mild strain
- Fatality rate of less than 1%
VIRUS CHARACTERISTICS

- BELONGS TO GENUS ORTHOPOXVIRUS, IN THE POXVIRIDAE FAMILY.
- DIAMETER IS APPROX. 200NM
- THE FAMILY IS A LINEAR, DOUBLE-STRANDARD DNA THAT MULTIPLIES IN THE CYTOPLASM
- NON-MOTILE AND NO STAINING CHARACTERISTICS
- SURVIVAL RATE IS BEST AT LOW TEMPERATURES AND HUMIDITY, BUT FOR SHORT PERIODS OF TIME
- TWO ENVELOPES: OUTER-CORE WITH LIPIDS/PROTEINS AND HAS A COMPLEX SYMMETRY.
VIRULENCE FACTORS...HOW ARE THEY STAYING ALIVE IN THE HOST?

- MULTIPLE FACTORS
- FUSION PROTEINS
  - VIRUS BEING ABLE TO FUSE OUT FROM THE HOST CELL
  - KEEPS THEM FROM BEING EXPOSED TO THE EXTRACELLULAR MATERIAL, AND DEGRADATION OF THE CELL.
- ENZYMES
  - CRP, CO FACTOR FOR SERINE PROTEASE FACTOR 1
THEY ARE ENTERING....

1. ENTERING THROUGH THE RESPIRATORY TRACT
   - ATTACHING TO: MOUTH, TRACHEA OR LUNG MUCOSA

2. CELLS NOT TIGHTLY PACKED MAKING IT EASY TO PENETRATE AND MOVE INTO SALIVA.

3. CELL MEMBRANE

4. BROUGHT IN THROUGH ENDOCYTOTESIS

5. ENTER THE HOST CELL AND CORE PROTEIN RELEASED
INCUBATION TIME

- THERE IS A PERIOD OF TIME BETWEEN 12 TO 14 DAYS ON AVERAGE OR SOMETIMES 7 TO 17 DAYS WHERE PEOPLE HAVE THE VIRUS AND HAVE NO SYMPTOMS. DURING THIS TIME THEY ARE NOT CONTAGIOUS.
INITIAL SYMPTOMS (PRODROME STAGE) 
DURATION 2–4 DAYS

• FIRST SYMPTOMS:
• FEVER IS VERY HIGH AT THIS STAGE; RANGING BETWEEN 101 TO 104 DEGREES FAHRENHEIT
• MALAISE
• HEAD AND BODY ACHES
• SOMETIMES VOMITING

NOTE: THIS IS THE POINT IN TIME WHERE PEOPLE INFECTED ARE NOT ABLE TO GO ABOUT THEIR NORMAL ACTIVITIES. THEY ARE TOO SICK TO GO OUT AND DO ANYTHING.

*SOMETIMES CONTAGIOUS
EARLY RASH
DURATION ABOUT 4 DAYS

• FIRST SIGHT: SMALL RED SPOTS ON THE TONGUE AND IN THE MOUTH
  – THEY DEVELOP INTO SORES THAT BREAK OPEN AND SPREAD THE VIRUS INTO THE MOUTH AND THROAT MAKING THE HOST VERY CONTAGIOUS.

• BREAKING DOWN OF THE SORES: WITHIN 24 HOURS A RASH SPREADS TO THE ENTIRE BODY. THE FEVER WILL START TO GO DOWN ONCE THE RASH APPEARS AND THE HOST STARTS TO FEEL BETTER.

• THIRD DAY: RASH BECOMES RAISED BUMPS

• FOURTH DAY: BUMPS FILL WITH A LIQUID, OPAQUE FLUID AND A DEPRESSION IN THE MIDDLE (BELLY BUTTON)

FEVER INCREASES UNTIL BUMPS ARE COVERED BY SCABS
RASH SPREADING THROUGHOUT BODY

[Image of a diagram showing the spread of rash in Smallpox and Chickenpox]
PUSTULAR RASH AND SCABS
DURATION ABOUT 5 DAYS

1. BUMPS ARE SHARPLY RAISED, ROUND AND FIRM.
2. BEGIN TO FORM A CRUST AND THEN SCAB
3. 2ND WEEK MOST OF THE SORES ARE SCABBED OVER
RESOLVING SCABS
DURATION ABOUT 6 DAYS

• MOST SCABS ARE FALLING OFF 3 WEEKS AFTER THE RASH APPEARS AND WILL LEAVE MARKS THAT WILL TURN INTO PITT ED SCARS.

* THE INFECTED PERSON IS CONTAGIOUS TO OTHERS UNTIL ALL SCABS HAVE FALLEN OFF.
VACCINATION

- SINCE THE LAST KNOWN CASE OF SMALL POX WAS IN 1977 VACCINES WERE THEN STOPPED.
- ACCORDING TO THE COMMUNICABLE DISEASE CONTROL AND PREVENTION, TODAY, SMALLPOX VIRUS IS KEPT IN TWO APPROVED LABORATORIES IN THE USA AND RUSSIA.

- BUT IF THE VACCINE WAS NEEDED THIS IS HOW IT WOULD GO......
VACCINATE

- EDWARD JENNER CAME UP WITH THE COWPOX VACCINE
- MADE FROM A LIVE VIRUS, SIMILAR TO THE SMALL POX VIRUS.
- HIGH LEVEL IMMUNITY FOR 3 TO 5 YEARS AND DECREASES AFTER THAT
- NOT A NORMAL VACCINE:
  1. ADMINISTRATED IN THE UPPER ARM
  2. BIFURCATED NEEDLE DIPPED INTO THE VACCINE SOLUTION
  3. NEEDLE HAS A DROPLET OF SOLUTION
  4. PRICK SKIN MANY TIMES IN A FEW SECONDS CAUSING A SORE SPOT
SIDE EFFECTS

NORMAL
- SORE ARM
- FEVER
- BODY ACHES
- DECREASED ABILITY TO EXERCISE
- DIFFICULTY HAVING A BOWEL MOVEMENT (STOOL)
- DIFFICULTY WITH MOVING
- FLUSHING OR REDNESS OF THE SKIN
- GENERAL FEELING OF DISCOMFORT OR ILLNESS
- ITCHING, PAIN, REDNESS, OR SWELLING AT THE VACCINE SITE

SEE DOCTOR
- FEELING UNUSUALLY COLD
- SHIVERING
- SWOLLEN, PAINFUL, OR TENDER LYMPH GLANDS IN THE NECK, ARMPIT, OR GROIN
- BLISTERING, PEELING, OR LOOSENING OF SKIN
- BLUE OR PALE SKIN
- BLURRED VISION
- CHANGES IN VISION
- CHEST DISCOMFORT
- CHEST PAIN, POSSIBLY MOVING TO THE LEFT ARM, NECK, OR SHOULDER
- CONFUSION
- CONVULSIONS (SEIZURES)
SMALLPOX VACCINES WERE EQUALLY DEADLY
ERADICATION OF SMALLPOX
REFERENCES


HISTORY OF SMALLPOX, CAUSES AND SYMPTOMS.


THE STORY OF THE LAST MAN WHO WAS INFECTED WITH SMALLPOX.


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