


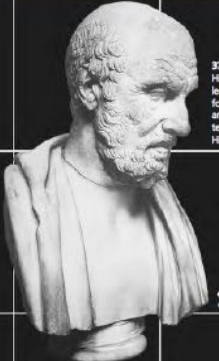


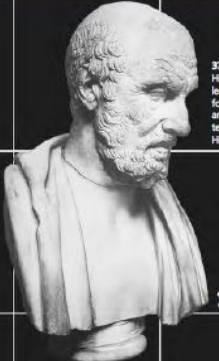
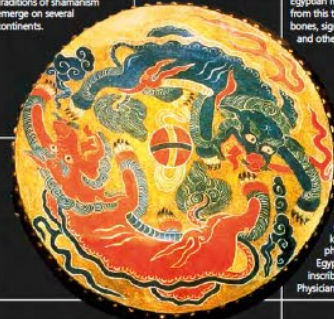


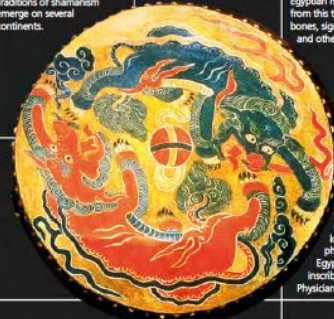

역사속에서 감염병 이야기 알아보기

2019년 8월
경북대학교병원
감염내과
김신우

내용

- 시대에 따른 질병과 의학의 발전 (감염병 중심)
 - 고대-700년까지
 - 700-1800년
 - 1800-1900년
 - 1900-1960년
 - 1960년-현재
- 현재의 새로운 감염병과 다제내성균 문제
- 결어

고대인의 의학에 대한 생각과 지혜, 고대-700년까지

| PREHISTORY | | 3000 BCE | 1500 BCE | | 450 BCE | 50 CE | 400 CE |
|--|---|--|--|--|---|---|--|
| 40,000 YEARS AGO Neanderthals possibly use medicinal herbs, as evidenced by fossilized Neanderthal teeth. | 7,000 YEARS AGO A man undergoes a deliberate and successful arm amputation at what is now Buttrich-Boulencourt, France. |  | 1500 BCE The first reference to diabetes appears in an Egyptian papyrus. | 500 BCE The concept of the four humors, central to many medical systems for the next two millennia, begins to take shape in ancient Greece. |  | 600 CE In ancient Rome, Pedanius Dioscorides produces <i>De Materia Medica</i> (On Medical Matters), a treatment compendium. Innumerable subsequent versions become known as <i>Materia Medica</i> . German version of <i>De Materia Medica</i> | 400 Translation of <i>ayurvedic</i> works into Chinese begins. |
| 20,000 YEARS AGO Holes are drilled into skulls—a procedure called trepanning—to treat medical conditions. | 5,300 YEARS AGO In the European Alps, Ötzi the Iceman suffers gut parasites, and painful bone and joint conditions. | | 1400 BCE The Mesopotamian <i>Gula Hymn</i> includes: "I am a physician, I can heal; I carry around all healing herbs, I drive away diseases, I give cures to mankind." |  | 370 BCE Hippocrates dies, leaving many followers to expand and update his teachings as the Hippocratic Corpus. |  | 530 Sergius of Reshaina translates around 30 works of Galen into Syriac; they will go on to be further translated into Arabic from the 8th century. |
| 10,000 YEARS AGO Traditions of shamanism emerge on several continents. | 3000 BCE Egyptian mummies surviving from this time show broken bones, signs of tuberculosis, and other health problems. | A Stele of Hammurabi | 1050 BCE The landmark Mesopotamian <i>Sakikku</i> diagnostic handbook is completed by physician Esagil-kin-Apli of Borsippa. | 500 BCE Early versions of <i>Sushruta Samhita</i> , an <i>Ayurvedic</i> compilation, appear in India. |  | 130 CE Soranus of Ephesus writes <i>Gynaecology</i> , one of the first thorough texts focusing on medicine for women. | 500 In Central America, Mayan medical <i>ah'men</i> use hallucinogenic plant extracts to divine disease causes and treatments. |
|  | 2200 BCE <i>Ren-Ankh</i> , or Houses of Life, are built in ancient Egypt as places for creation and preservation of knowledge. | 2700 BCE The tomb of one of the earliest known female physicians, ancient Egypt's Merit-Ptah, is inscribed "Chief Physician." | 1755 BCE The Code of Hammurabi, ruler of Babylon, includes several pronouncements on medical care, such as physicians are responsible for the success and failure of their actions. | 500 BCE Lord Shiva, God of <i>Ayurveda</i> | 440 BCE Hippocrates undergoes training at the local <i>asklepeion</i> (healing temple). | 200 Zhang Zhongjing practices in Changsha. | 651 The Hôtel Dieu Hospital is founded in Paris, France; it is Europe's, possibly the world's, oldest hospital still active on its original site. |
| 7,000 YEARS AGO Teeth of live patients are drilled, perhaps for abscess pain relief, in Mehrgarh, Pakistan. | 2650-2600 BCE In ancient Egypt, <i>imhotep</i> becomes the leading priest-physician and is soon elevated to godly status. |  | 1550 BCE The Ebers papyrus mentions medical use of willow bark, from which aspirin is derived. | 400 BCE Huangdi Neijing (Yellow Emperor's Classic of Internal Medicine), an early classic text, establishes the framework for traditional Chinese medicine. | 260 BCE In Alexandria, Herophilus and Erasistratus establish anatomy and physiology, partly by the practice of <i>androtomy</i> (dissecting live and dead human beings). | 165 CE The Antonine Plague (possibly smallpox) devastates populations in Europe, West Asia, and North Africa. | 680 Paul of Aegina produces the huge <i>Medical Compendium in Seven Books</i> summarizing Western medical knowledge; it remains a classic for a millennium. |
|  |  | | |  | 400 BCE Huangdi Neijing (Yellow Emperor's Classic of Internal Medicine), an early classic text, establishes the framework for traditional Chinese medicine. | 169 CE Claudius Galen returns to Rome and begins his prolific writing phase; his works will dominate European medicine for 1,500 years. | 700 Chinese scholars come to Nalanda, India, to study <i>Ayurveda</i> and other traditional medicine. |

의학은 사람의 삶의 시작부터 공존, 초기에는 샤머니즘 (Shamanism)



Medicine, The Definitive Illustrated History,
Parker, DK Publishing, 2016



기원전 3,500년 한 여성의
천두술(trephination) 한 두개골, 환자는
수술 후 매끈한 골단면을 볼 때 얼마
동안은 생존하였음 (Natural History
Museum, Lausanne)

Kelly K. Early Civilizations: Prehistoric
Times to 500 C.E: 2009

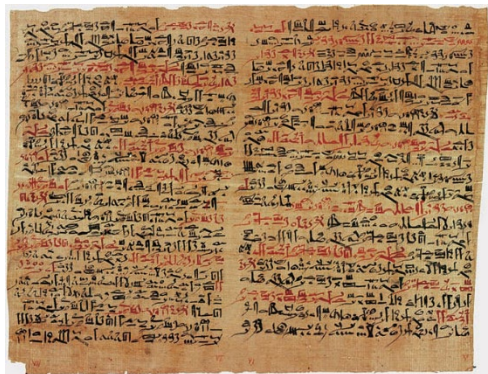
세크메트 (Sekhmet, "powerful one")은 이집트의 의 학과 치유의 여신



임호텝 (Imhotep), 기원전 2,650-2600 및 이집트 의학 파피루스 기록



- 이름의 뜻: '평화롭게 걷는 사람'
- 이집트 의사 (역사 전체 최초의 의사로 여겨짐)
- 이집트의 대신
- 피라미드를 만듦
- 신전수면요법
- 죽은 후 의학의 신 프타(Ptah)의 아들로 추앙됨 (기원전 6세기)



Edwin Smith Papyrus: 외상 수술에 대한 조언이 적힌 부분

Kelly K. Early Civilizations: Prehistoric Times to 500 C.E: 2009.

이집트의 수술 도구 그림

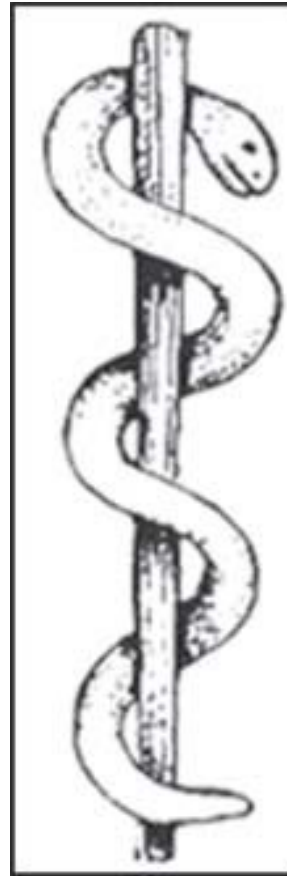


Ancient surgical instruments

Dating back to c.100 bce, this relief from a temple in Kom Ombo, Egypt, shows a range of medical and surgical instruments including forceps, scalpels, and saws.

The temple was used as a sanitorium in ancient times.

아스클레오피우스 (Asclepius) 아폴로의 아들 (전문적 '의'신)



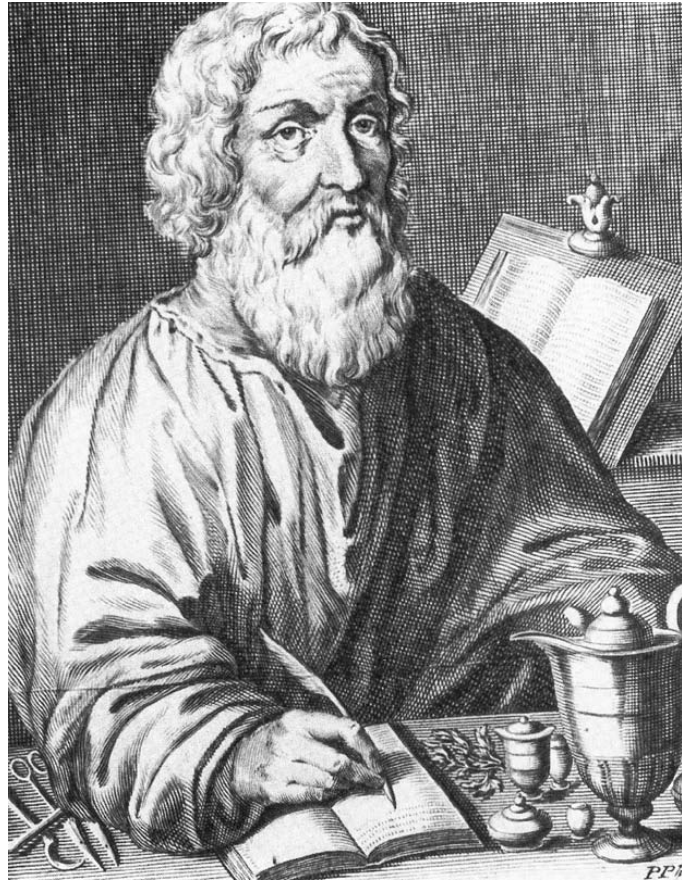
Ascleopius: 실존
의사 이름으로
나오기도 함



아스클레피오스 신전의 야외극장

아스클레오피우스 막대기 (Staff of
Asclepius): 현대 의학의 심벌로 사용됨

히포크라테스 (Hippocrates) 기원전 460-370



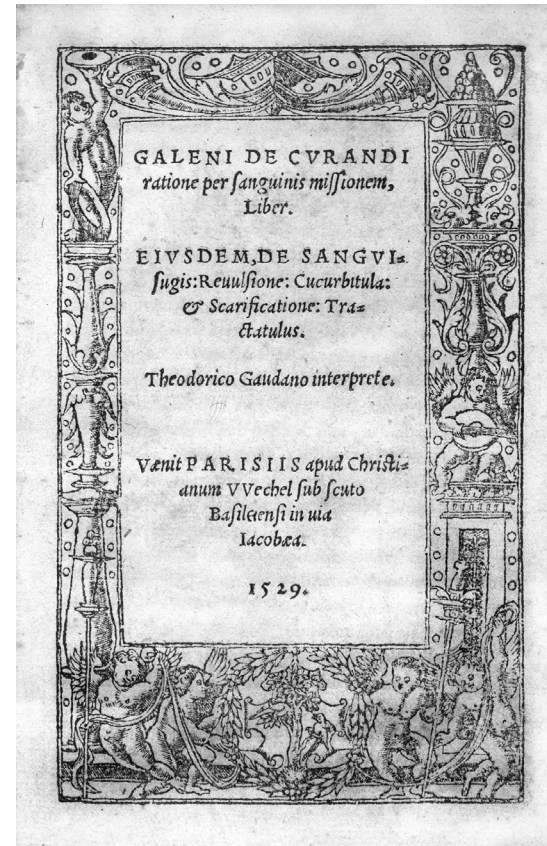
코스, 크니도스, 시칠리아에서 '의사 집단' 출현

- 초자연적 힘에서 벗어난 사고
- 음식과 약을 통한 치료
- 플라톤 기록에 히포크라테스 등장
- 전문 직업인으로서의 의사 등장
- 윤리성 강조
- 환자의 중요성

갈렌 (Aelius Galenus), 129-216



갈렌의 사상은 중세 전기간에까지 영향을 미침
(National Library of Medicine)



갈렌은 방대한 의학서적을 저술

중의학: 주술을 멈추고 한의학으로, 황제내경



황제내경: 기원전 2600년 무렵에 활동
했던 황제의 가르침을 대략 기원전
200년 무렵에 다양한 작가들에 의해
집대성된 고대 문헌

우리나라 고대 의학

- 신석기 시대 골침
(부산 낙민동 패총):
종기를 **배농** 시키는 침



골침(부산 낙민동패총 출토)

편두와 두개골 변형기술

중국 역사서 『삼국지』에는 진한인(辰韓人)은 아이가 태어나면 머리 한쪽을 돌로 눌러 찌그러뜨려 편두(偏頭)를 만드는 풍습이 있었다고 기록되어 있다. 실제 편두를 행한 인골이 김해시 예안리고분에서 발견되어 변한 지역이었던 가야에도 같은 풍습이 있었음을 알 수 있다.

편두는 고대 인도·시베리아·중남미 등지에서 유행했던 풍습이다. 특히 고대 마야인은 귀족만 편두를 했는데, 이마 안에 인간의 영혼을 볼 수 있는 제3의 눈을 만들어 미래를 예지하는 심령적 능력을 높이기 위한 것이었다고 한다.

893년 최치원(崔致遠)이 쓴 지증대사비(智證大師碑)에서 법흥왕(法興王)이 편두를 했다

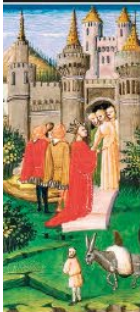


고 전하고 있어, 신라에서도 왕에게 편두를

하는 풍습이 있었음을 짐작할 수 있다. 편두를 하면 얼굴 중 입 부분이 돌출되는데, 신라의 시조 박혁거세(朴赫居世)의 부인 알영(閼英)의 입이 닭부리와 같았다는 묘사는 바로 편두를 한 모습을 말하는 것으로 보인다. 고분에서 발견된 편두는 모두 여성의 인골로서 무덤과 같이 신을 모시는 특수한 직임을 맡았던 자로 추정되기도 한다. 실제 두개골이 파열된 갓난아기의 인골도 발견되었다. 이처럼 편두는 위험하지만 특수 신분임을 나타내기에는 더없이 좋은 장치였기에 장기간 이루어졌던 것이다.



두개골(김해 예안리유적 출토) 위부터 정상인의 두개골, 천두술을 받은 것으로 예상되는 구멍 있는 두개골, 편두를 한 두개골이다.

부흥과 르네상스 700-1800

| 700 | | 1100 | | 1400 | | 1600 | | 1700 | |
|---|---|---|--|--|--|--|--|---|--|
| <p>750 Madhav Acharya compiles the 79-chapter <i>Raj Vaidya</i>, also known as <i>Madhav Nidana</i>.</p> <p>800 Varied works of Galen are translated into Arabic.</p> | <p>1000 Al-Zahrawi produces the immense surgical and medical classic <i>Kitab al-Tasrif (The Method of Medicine)</i>.</p> | <p>1123 St. Bartholomew's becomes Britain's first truly medical hospital.</p> <p>1144 Robert of Chios writes <i>De Compositione Alchimiae (The Book of the Composition of Alchemy)</i> is one of Europe's first alchemical treatises.</p> | <p>1242 Ibn al-Nafis describes the pulmonary circulation from the heart's right side through the lungs to the left side.</p> <p>1247 Song Ci produces <i>Xiyuanlu</i>, a collected record of medical jurisprudence, an early classic of forensic medicine.</p> | <p>1494-95 First reports of syphilis appear in Europe. The disease probably having been brought from the Americas.</p> | <p>1537 During the Siege of Turin, Ambroise Paré tries an old recipe for a wound-healing balm, and begins a new era in battlefield medicine.</p> | <p>1628 William Harvey publishes <i>De Motu Cordis (On the Motion of the Heart and Blood)</i>—a short report but monumentally significant due to its description of how the circulatory system works.</p> <p>✎ Harvey carrying out a postmortem</p> | <p>1665 Robert Hooke publishes <i>Micrographia</i>, a pioneering work in microscopy and one of the first science bestsellers.</p> | <p>1676 Thomas Sydenham publishes <i>Observationes Medicae (Observations of Medicine)</i>, an extremely influential text in Europe for the next two centuries.</p> | <p>1701 In Europe Giacomo Pylarini describes and practices variolation, a form of smallpox vaccination carried out in Asia.</p> <p>1790 Samuel Hahnemann begins to develop therapies based on "like cures like," which becomes known as homeopathy.</p> <p>✎ Homeopathic medicine chest</p> |
|  | <p>1025 Ibn Sina (Avicenna) completes <i>Al-Qanun fi al-Tibb (The Canon of Medicine)</i>.</p> <p>1077 Constantine the African teaches at Salerno medical school, the first such teaching institution in Europe.</p> | <p>1150s Hildegard of Bingen produces <i>Liber Simplicis Medicae (Book of Simple Medicine)</i>, later called <i>Physica</i>.</p> <p>✎ Illustration depicting arrival of Hildegard at the Benedictine Abbey</p> | <p>1316 Mondino de Luzzi writes <i>Anathomia Corporis Humani (Anatomy of the Human Body)</i>.</p> <p>1520s Smallpox, brought from Europe, begins to take a toll on people in the Americas.</p> | <p>1518 In Britain, the College of Physicians receives its royal charter.</p> <p>1520s Smallpox, brought from Europe, begins to take a toll on people in the Americas.</p> | <p>1543 Andreas Vesalius revolutionizes anatomy with <i>De Humani Corporis Fabrica (On the Fabric of the Human Body)</i>.</p> <p>1546 Girolamo Fracastoro suggests that epidemic diseases, such as rabies, spread due to some kind of communicable "spores."</p> |  | | <p>1723 Pierre Fauchard establishes modern dental practices with <i>Le Chirurgien Dentiste (The Surgeon Dentist)</i>.</p> <p>1747 James Lind discovers how to prevent scurvy by carrying out one of the first organized clinical trials.</p> <p>1768 Jacques Daviel pioneers a new technique to remove cataracts, greatly advancing their treatment.</p> <p>1774 Prussian blue is one of the first stains (dyes) to color microscopic samples, advancing the area of histology.</p> <p>1793 Jean-Baptiste Pussin and his wife Marguerite, along with Philippe Rivet, begin improvements in the care and treatment of the mentally ill.</p> |  |
| <p>620 A Benedictine hospital is established in Salerno; the medical school will develop from it.</p> <p>✎ Illustration from the 13th-century <i>Treatise on the Eye</i></p> | <p>1200s Treatments for eye conditions, such as bruising and infections, are regularly used.</p> | <p>1347 The Black Death reaches Europe, in one of the greatest of all pandemics.</p> <p>1363 Guy de Chauliac completes <i>Chirurgie Magna (Great Surgery)</i>, which will be a standard anatomical, medical, and surgical work in Europe for three centuries.</p> | <p>1520s Smallpox, brought from Europe, begins to take a toll on people in the Americas.</p> <p>1543 Andreas Vesalius revolutionizes anatomy with <i>De Humani Corporis Fabrica (On the Fabric of the Human Body)</i>.</p> <p>1546 Girolamo Fracastoro suggests that epidemic diseases, such as rabies, spread due to some kind of communicable "spores."</p> | <p>1518 In Britain, the College of Physicians receives its royal charter.</p> <p>1520s Smallpox, brought from Europe, begins to take a toll on people in the Americas.</p> | <p>1543 Andreas Vesalius revolutionizes anatomy with <i>De Humani Corporis Fabrica (On the Fabric of the Human Body)</i>.</p> <p>1546 Girolamo Fracastoro suggests that epidemic diseases, such as rabies, spread due to some kind of communicable "spores."</p> | <p>1630s Cinchona bark (the source of quinine) is brought from the New World to Europe to treat and prevent malaria.</p> <p>1673 The Royal Society of Britain begins its publication of reports by innovative microscopist Antoni van Leeuwenhoek.</p> <p>✎ Antoni van Leeuwenhoek</p> | <p>1694 Zhang Lu's <i>Zhangshi's Yitong (Chang's General Medicine)</i>, a vast medical collection, describes inoculation against smallpox.</p> <p>1694 Marcello Malpighi, founder of microanatomy, observes capillaries—the "missing link" between arteries and veins.</p> | <p>1775 Percival Potts describes how scrofula cancer is much more common in chimney sweeps—one of the first accounts implicating a carcinogen, and a landmark for occupational medicine.</p> <p>1785 William Withering reports on his investigations into digitalis, the active substance in foxgloves used to treat dropsy.</p> | <p>1796 Edward Jenner inoculates an 8-year-old boy against smallpox using cowpox material, establishing the principle of vaccination.</p> <p>1796 Franz Joseph Gall writes his first main text on phrenology. It will flourish for a few decades, then disappear.</p> <p>✎ Collection of model heads to explain principles of phrenology</p> |
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로마의 수로, 위생에 중요



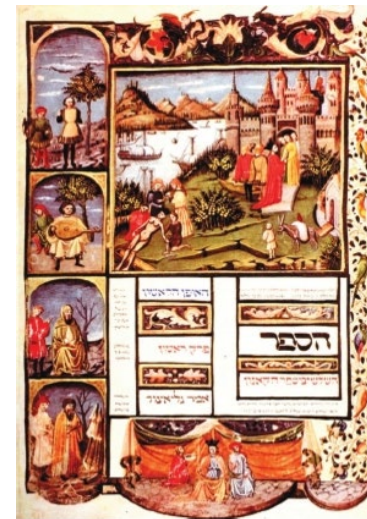
Pont du Gard, famous Roman aqueduct in France

아비시나 (Avicenna, Ibn Sina), 980-1037



The statue of Avicenna in United Nations Office in Vienna as a part of the "Persian Scholars Pavilion"

- 중세 최대 의학자 중 한 사람이다. 그리스와 아라비아의 철학과 의학을 집대성하였으며, 후대의 학자들에게 매우 큰 영향을 끼쳤다
- "의학정전"



이븐시나의 명저 『의학정전(al-Qanun fi al-Tibb)』
(1025년 완간)

Ibn Sina의 천연두 치료



TREATING SMALLPOX

A miniature from a Turkish edition of *Ibn Sina's Al-Qanun* shows a remedy being prepared for a *smallpox* victim

고대 피부병 (문둥병, 한센병)의 차별



Leper with bell

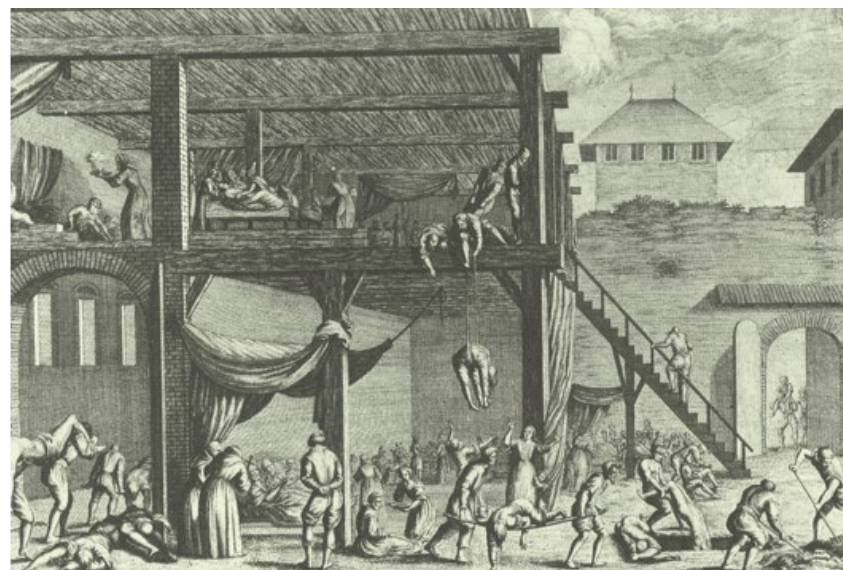
Early medieval physicians diagnosed leprosy as an **excess of "black bile,"** and prescribed **regular blood-letting** as well as a drink containing gold, which was thought to be purifying.

They wrongly believed that leprosy was easily spread, and forced lepers to ring a bell as a warning not to approach.

흑사병 (Black death), 1346-1353 페스트와 중세의 몰락 (3천만 사망/1억)

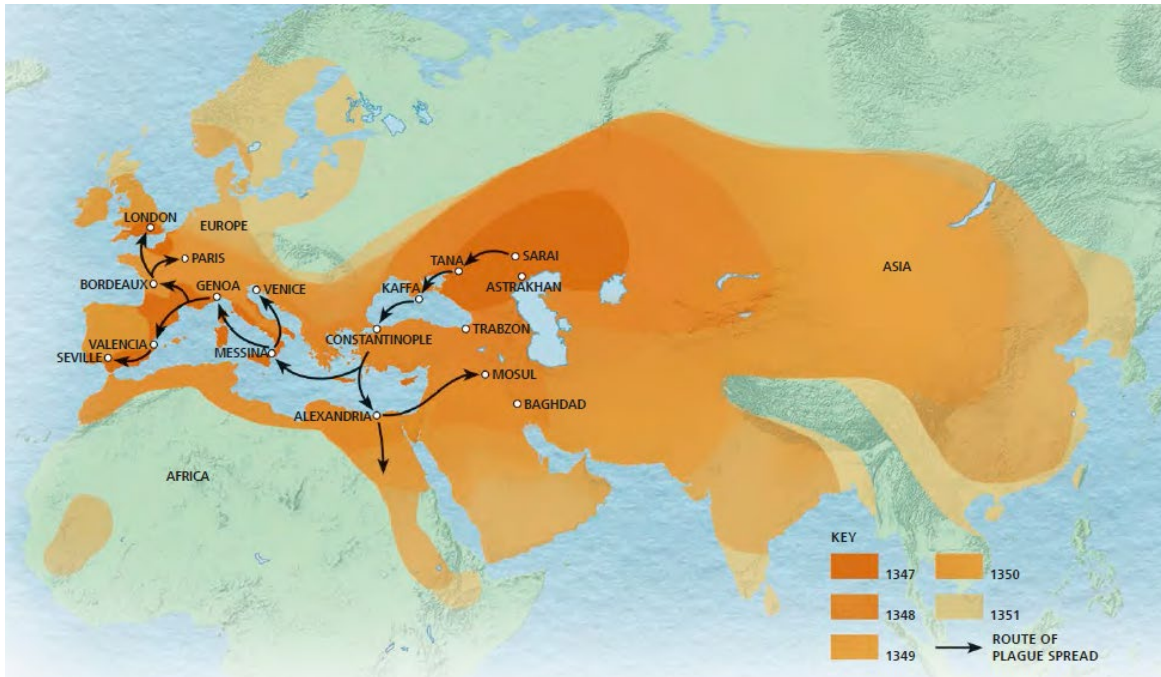


페스트 유행 시기 의사의 복장



14C 페스트 유행 시기 Vienna의 병원
(Pesthospital in Vienna)

흑사병의 파급



The spread of the plague

The Black Death is believed to have reached Europe in 1347 through the port of Kaffa (today Feodosiya) in the Crimea, from where it spread throughout the Mediterranean on ships.

By 1351 it had reached northern Scandinavia and Russia.

Only a few regions, such as Poland, escaped.

매독의 유행 (15세기 말부터)과 치료



수은 치료

외과 vs. 내과

- 외과는 왜 외과라 하나?
- 과거 외과는 겉의 종기를 해결해 주던 직업: 이발사가 하기 좋은 일
- 낮은 신분 지위였다, 교육기관도 다름, 외과의는 대학 교육하지 않음
- Surgery: 손으로 하는 일
- 이발사 의사 (Barber-Surgeon)



이발사 의사 (Barber-Surgeon)



Medicine, The Definitive Illustrated History, Parker, DK Publishing, 2016 p76-77

파레 (Ambroise Paré), 1510-1590



- 프랑스의 **외과의사**
- 이발소의 견습공, **오텔 듀 (Hotel Dieu) 병원 외과**를 수업
- 열유소작법 중지: 계란의 노른자위·장미유·테레빈유를 혼합한 것을 상처에 바르고 **붕대로 압박**
- **혈관결찰법을 발명**, 이로써 4지절단술이 용이하게 됨
- "나는 상처 난 데를 잘 감아줄 뿐, 신이 고쳐준다"

근대 외과학의 아버지로 일컬어진다

베살리우스 (Andreas Vesalius), 1514-1564



해부학의 아버지

이탈리아 파도바(Padova)에서
처형된 범죄자의 시체를 해부
해부학 책 발간 (1543년)



De Fabrica Humani Corporis

허준, 1539-1615

- 동의보감 저술
- 한국 한의학 발전의 지대한 공헌자
- 당시 한의학과 민간요법을 모아 정리



허준 (한국 문화정보원 표준영정)



동의보감의 신형장부도

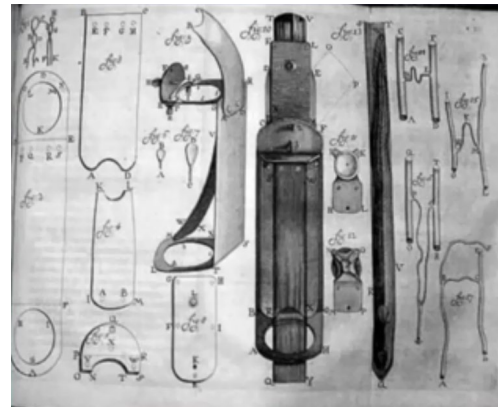
렌즈에서 현미경의 개발

- 안경 (13세기 - 14세기)
- 망원경 나옴: 렌즈 대안렌즈 및 대물렌즈를 이용, 각광, 천문학의 큰 도구
- 현미경 나옴: 처음에는 별 관심이 아니었음, 의학 생물학에는 큰 역할

레벤후크 (Antonie van Leeuwenhoek), 1632-1723

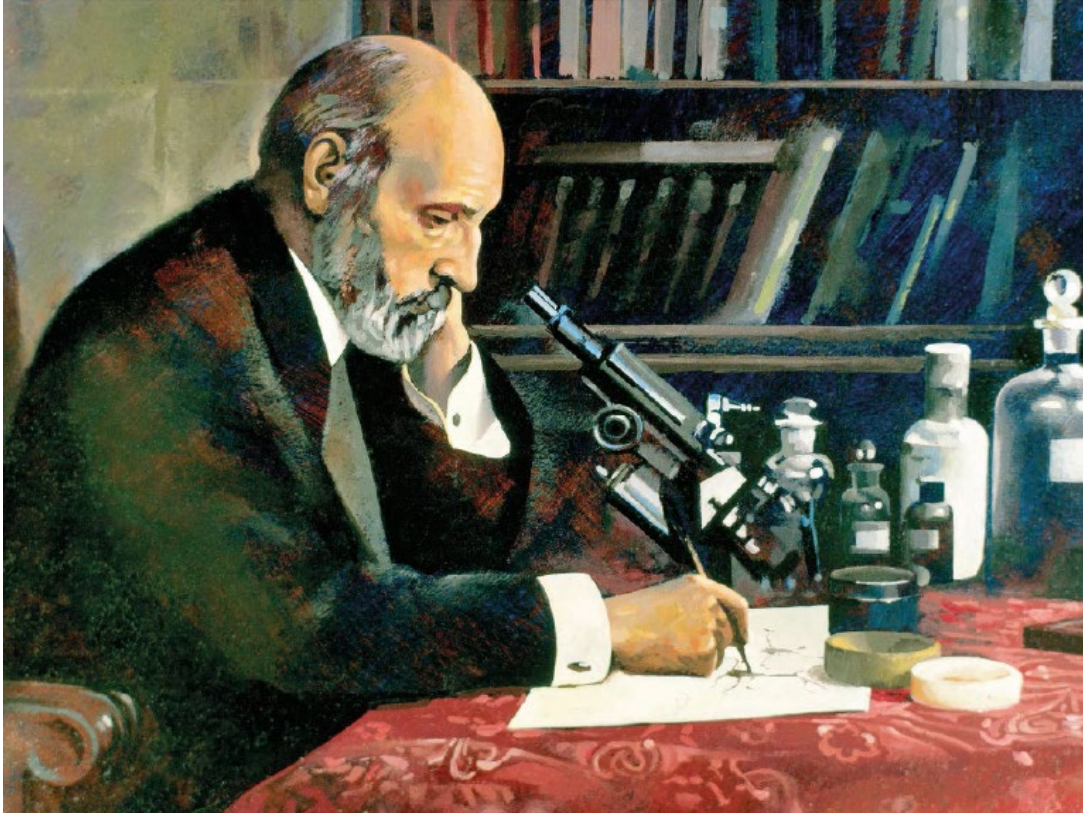


- 현미경 및 스케치, 식물업 종사자
- 네델란드인
- 400개 이상의 현미경을 만듦
- 미생물, 세포의 존재를 밝힘 (그러나 그 의미는 모름)



레벤후크의 현미경 설계도

현미경, 의학을 바꾸다



Artist at work

In addition to being a **histologist**, **Cajal** was also a talented artist. He produced hundreds of illustrations mapping the nervous system, which are still used as teaching aids today.

천연두 아즈텍 문명을 무너뜨리다



Decimated empire

This illustration from the *Florentine Codex* shows Aztecs dying of **smallpox**, which was allegedly introduced by one African slave in the Spanish army.

Almost half of the Aztec population succumbed to the disease, including their **ruler Cuitláhuac**

산토리오 (Santorio Santorio), 1561-1636

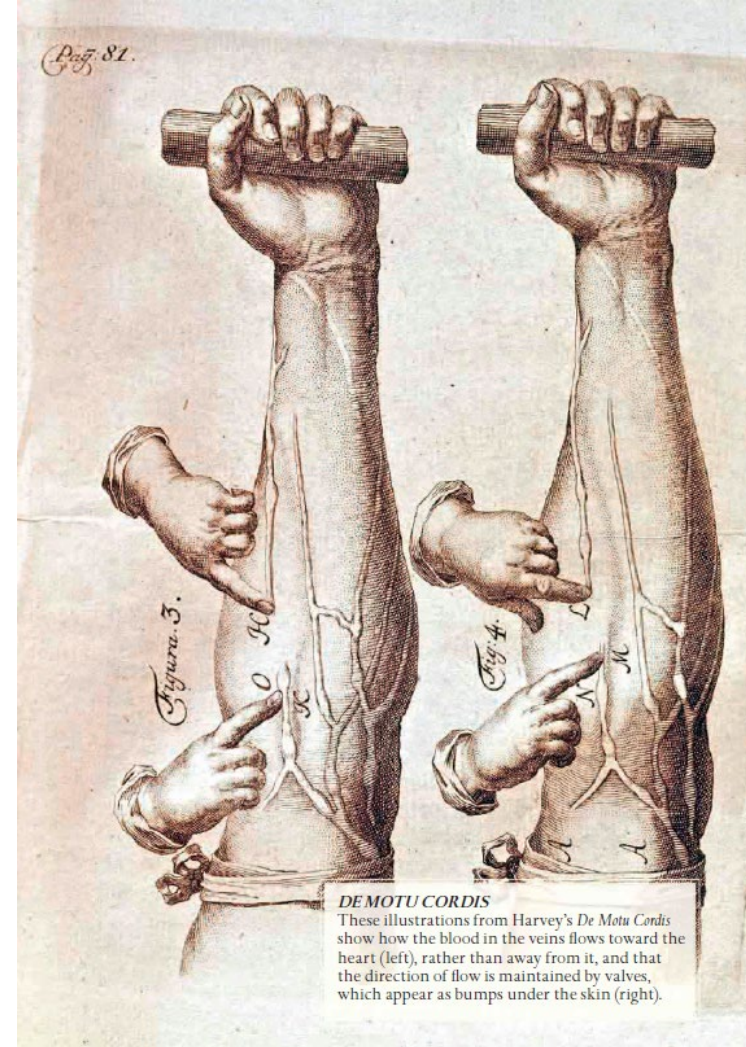
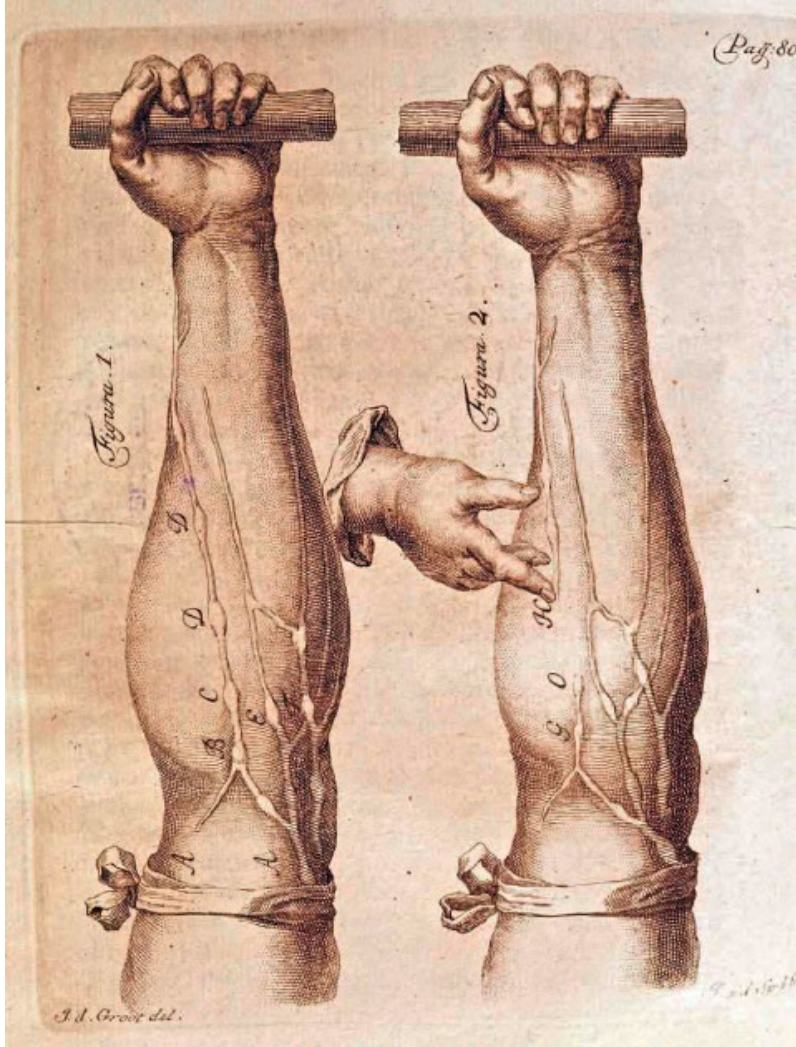


Santorio in his weighing chair

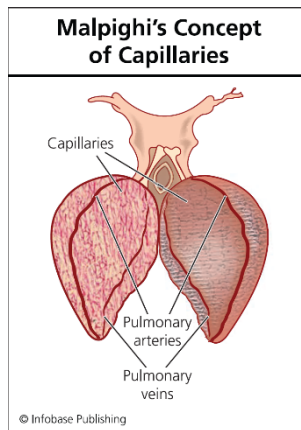


- 정량실험과 올바른 계측의 중요성
- 신체의 변화를 측정 (의학의 척도 발간), 체온계, 맥박계, 습도계
- 의물리학파의 대표
- 인체 대사에 관심 (동화작용, 이화작용 입증)

하비 (Harvey)의 정맥의 흐르는 방향과 venous valve의 역할 도해



말피기 (Marcello Malpighi), 1628-1694



말피기가 사용했던 현미경

현미경으로
개구리
허파에서
모세혈관
발견

하비의
혈액순환론
을 완성



“과학으로서의 의학”

- 다른 과학적 사실을 받아들일 수 있는 상태가 됨
- 다른 과학적 진보에 힘입어 발전
- 기존 전통적 질병관적 사고 (히포크라테스 및 갈렌)에서는 불가능한 것이 가능하게 됨

제너 (Edward Jenner), 1749-1823



Jenner's Case 17 in 1796 involved vaccinating eight-year-old James Phipps with cowpox, which caused slight symptoms. Six weeks later, Jenner deliberately infected him with smallpox and recorded: "No disease followed."

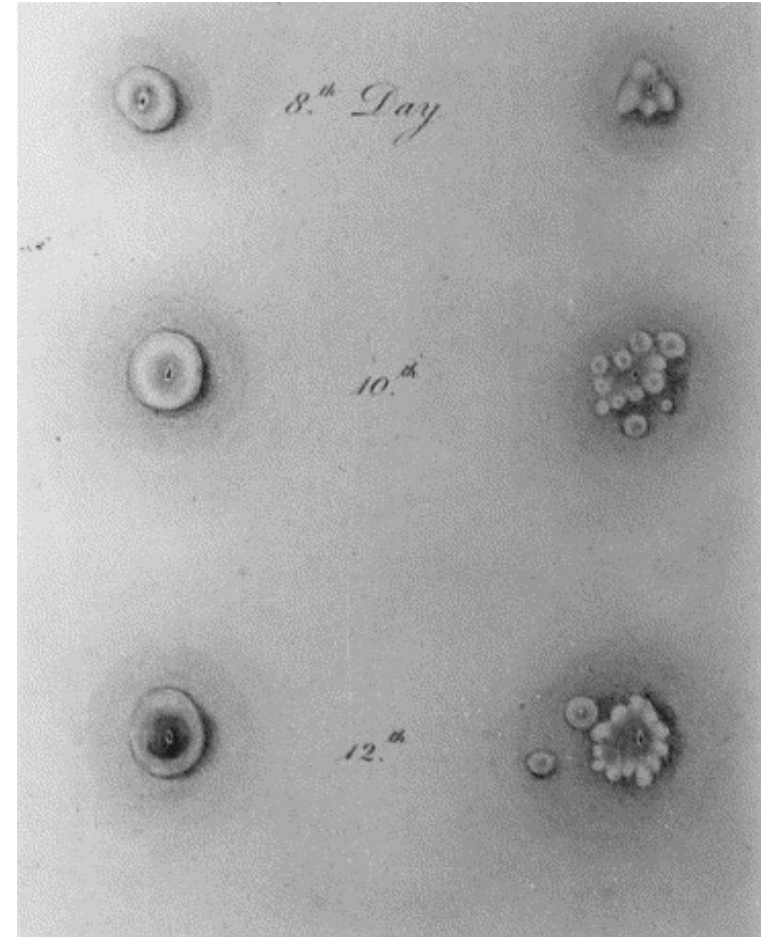
천연두에 대한 우두 접종법을 개발
가장 많은 인류의 목숨을 구한 사람 중
하나

1798년 제너 '천연두 백신의 원인과 결과 에 대한 연구' 발표: 23명에 실험




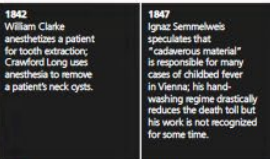
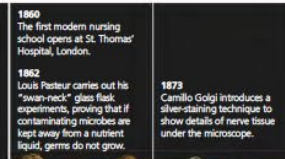



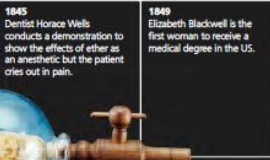


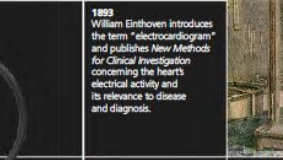

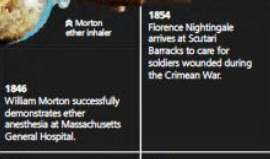
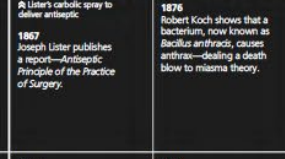
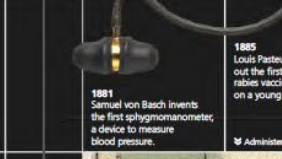
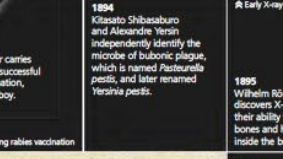


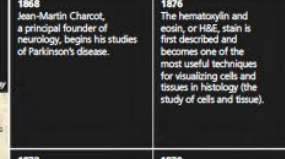


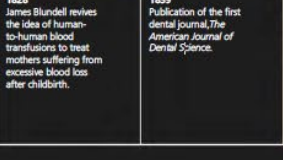

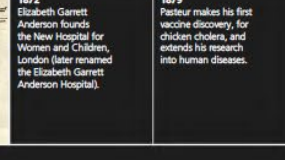
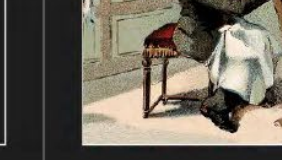

The hand of Sarah Nelmes
from Jenner's **Inquiry**

History of Vaccine Development, Plotkin, Springer
New York, 2011 p15



Edward Jenner's Inquiry; a bicentenary analysis,
Baxby, Vaccine 17,301-307, 1999

의학의 큰 일들 1800-1900

| 1800 | 1840 | 1860 | 1880 | 1895 |
|--|---|--|---|---|
| <p>1802 Europe's first pediatric hospital, Hôpital des Enfants Malades, opens in Paris.</p> <p>1808 Johann Christian Reil introduces the term psychiatry, proposing it should become a recognized medical specialty.</p> <p>1816 René Laennec invents a simple but hugely significant diagnostic instrument—the stethoscope.</p> <p>1828 James Blundell revives the idea of human-to-human blood transfusions to treat mothers suffering from excessive blood loss after childbirth.</p> | <p>1842 William Clarke anesthetizes a patient for tooth extraction; Crawford Long uses anesthesia to remove a patient's neck cysts.</p> <p>1847 Ignaz Semmelweis speculates that "cadaverous material" is responsible for many cases of childbed fever. In Vienna, his hand-washing regime drastically reduces the death toll but his work is not recognized for some time.</p> <p>1845 Dentist Horace Wells conducts a demonstration to show the effects of ether as an anesthetic but the patient cries out in pain.</p> <p>1849 Elizabeth Blackwell is the first woman to receive a medical degree in the US.</p> <p>1854 Florence Nightingale arrives at Scutari Barracks to care for soldiers wounded during the Crimean War.</p> <p>1858 James Simpson begins the use of chloroform for pain relief during childbirth.</p> <p>1859 Publication of the first dental journal, <i>The American Journal of Dental Science</i>.</p> | <p>1860 The first modern nursing school opens at St. Thomas' Hospital, London.</p> <p>1862 Louis Pasteur carries out his "swan-neck" glass flask experiments, proving that if contaminating microbes are kept away from a nutrient liquid, germs do not grow.</p> <p>1873 Camillo Golgi introduces a silver-staining technique to show details of nerve tissue under the microscope.</p> <p>1876 Robert Koch shows that a bacterium, now known as <i>Bacillus anthracis</i>, causes anthrax—dealing a death blow to miasma theory.</p> <p>1876 The hematoxylin and eosin, or H&E, stain is first described and becomes one of the most useful techniques for visualizing cells and tissues in histology (the study of cells and tissue).</p> <p>1879 Pasteur makes his first vaccine discovery, for chicken cholera, and extends his research into human diseases.</p> | <p>1881 The first professional midwives organization, Matrons' Aid Society, is founded in Britain, and soon changes its name to the Midwives Institute.</p> <p>1882 Robert Koch identifies the cause of tuberculosis: <i>Mycobacterium tuberculosis</i>.</p> <p>1884 Robert Koch isolates the causative germ for cholera and describes how it is spread, and prevention and control measures.</p> <p>1883 William Einthoven introduces the term "electrocardiogram" and publishes <i>New Methods for Clinical Investigation</i> concerning the heart's electrical activity and its relevance to disease and diagnosis.</p> <p>1884 Kiyasato Shibasaburo and Alexandre Yersin independently identify the microbe of bubonic plague, which is named <i>Pasteurella pestis</i>, and later renamed <i>Yersinia pestis</i>.</p> <p>1885 Louis Pasteur carries out the first successful rabies vaccination, on a young boy.</p> <p>1881 Samuel von Basch invents the first sphygmomanometer, a device to measure blood pressure.</p> <p>1895 Sigmund Freud publishes <i>The Interpretation of Dreams</i> setting out various psychological theories, including a model of mental structure based on the unconscious, preconscious, and conscious.</p> <p>1899 Santiago Ramón y Cajal publishes <i>Comparative Study of the Sensory Areas of the Human Cortex</i>, greatly advancing the neurosciences.</p> | <p>1897 Chemists at Bayer in Germany, including Felix Hoffman and Heinrich Dreser, produce a synthetically modified version of salicylic acid that is better tolerated by the body; it is named Aspirin.</p> <p>1899 Aspirin goes on sale worldwide and becomes one of the most successful and adaptable medical drugs of all time.</p> <p>1896 John Hall-Edwards uses X-ray imaging for the first time during a surgical operation. The same year the first reports of harm caused by X-rays, including hair loss, blisters, burns, and swelling, appear.</p> <p>1895 Wilhelm Röntgen discovers X-rays and their ability to "see" bones and hard tissues inside the body.</p> <p>1895 In Vienna, Karl Landsteiner begins his studies of immunity, antibodies, and blood, especially how and why it clots.</p> <p>1895 Sigmund Freud and Josef Breuer coauthor <i>Studies on Hysteria</i>, the first main work in psychoanalysis.</p> <p>1896 Almroth Edward Wright develops and introduces the first effective typhoid vaccine.</p> <p>1897 A vaccine for plague is developed, but limited effectiveness and the infection's complex nature mean it does not become widely used.</p> |
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콜레라: 죽음의 역병



Cholera defeats the Turkish Army

The triumphant grim reaper, Death, is shown on the cover of this Paris newspaper in 1912.

The Turkish army is defeated not by the enemy, but by cholera.

The disease swept through the camps, **killing 100 men a day during the First Balkan War (1912–13).**

나쁜 공기 (Miasma) 이론



CHOLERA TRAMPLES THE VICTOR & THE VANQUISHED BOTH.

Miasma Theory

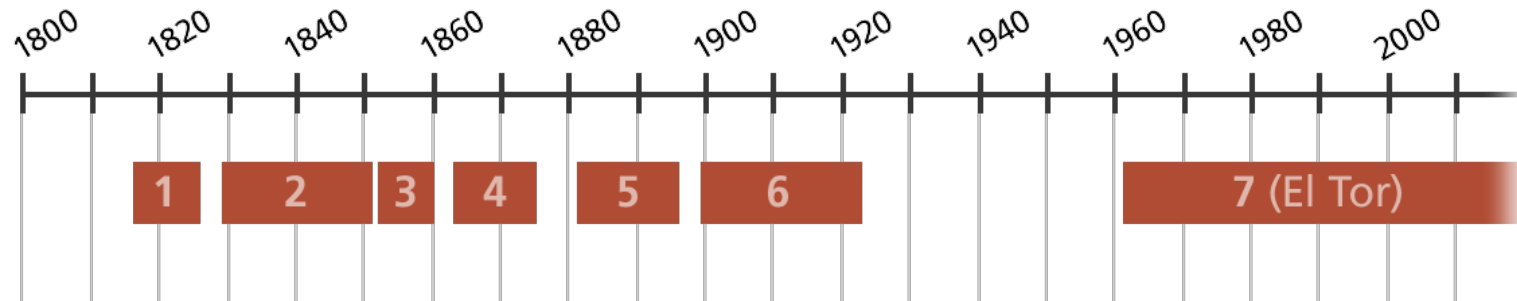
Bad smells, which are associated with rot and decay, have long been linked with illness.

The miasma theory, believed since ancient times, held that diseases were caused and spread by a mix of foul-smelling vapors, gases, and possibly tiny particles present within them.

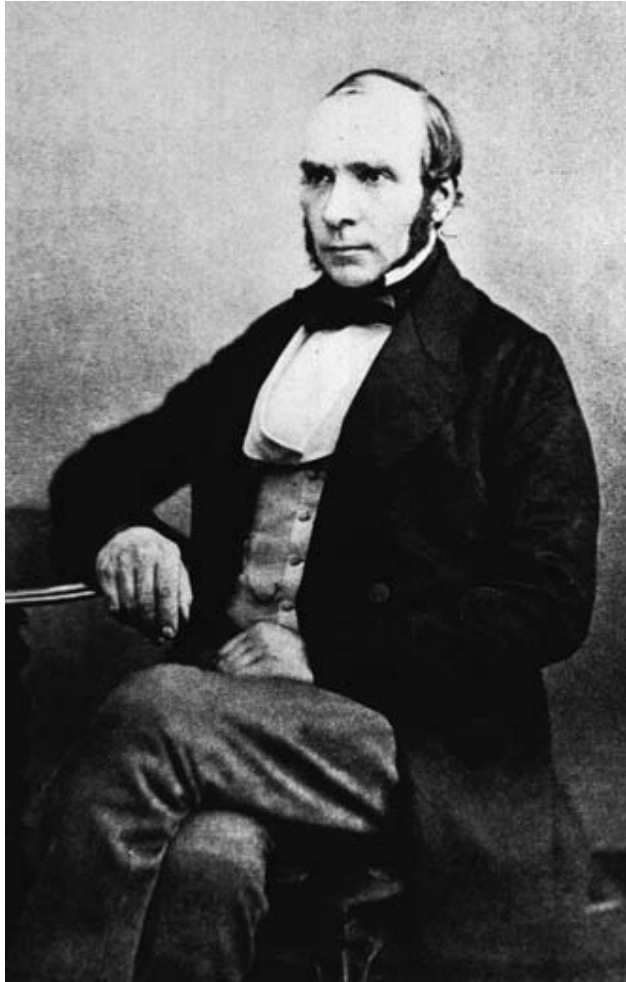
콜레라의 전세계적 유행

- 19세기 가장 두려워한 질환 (결핵보다)
- 갑작스러운 유행: 공포
- 빠르게는 하루 안에 사망도 하게함
- 코흐에 의해 원인 발견

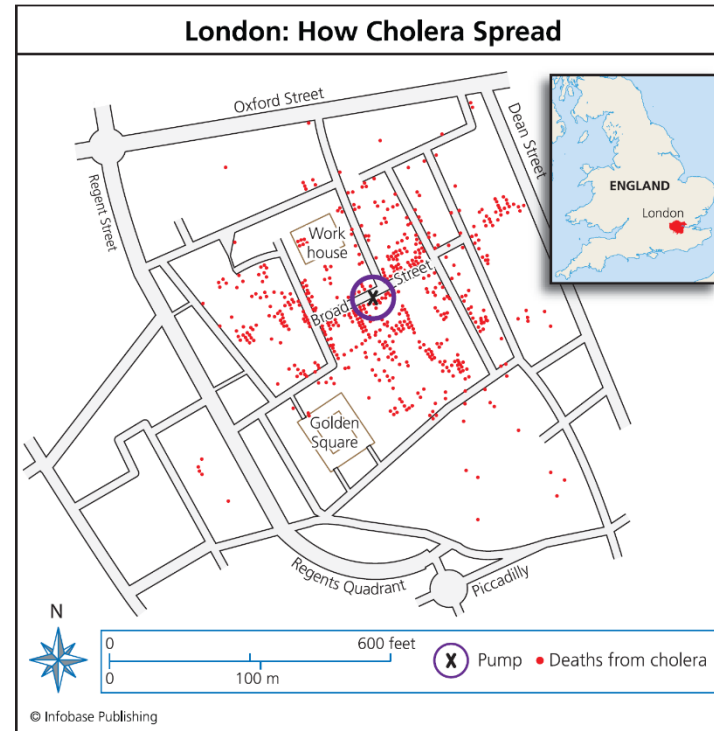
Cholera pandemics



스노우 (John Snow), 1813-1858



그가 1854년 런던에 창궐한 콜레라가
오염된 물을 통해서 퍼졌다는 것을 연구를
통해 밝혀 내어 수많은 목숨을 구함



John Snow (National Library of Medicine)

스노우의 가설이 받아들여지다



Death's dispensary

A cartoon from 1866 shows how Snow's deductions about the spread of cholera by water were accepted a decade later

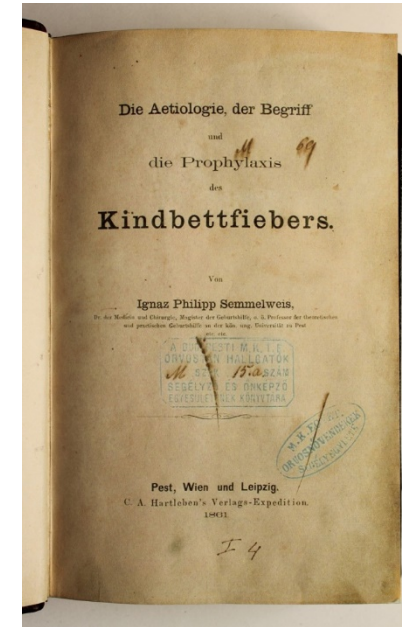
제멜바이스 (Ignaz Semmelweis), 1818-1865



1861년 그는 『산욕열의 원인,
이해, 예방』을 출간하면서
산욕열에 대해 상세하게 분석하고,
통계학적 수치를 제시하며 설명함



손씻기의 중요성



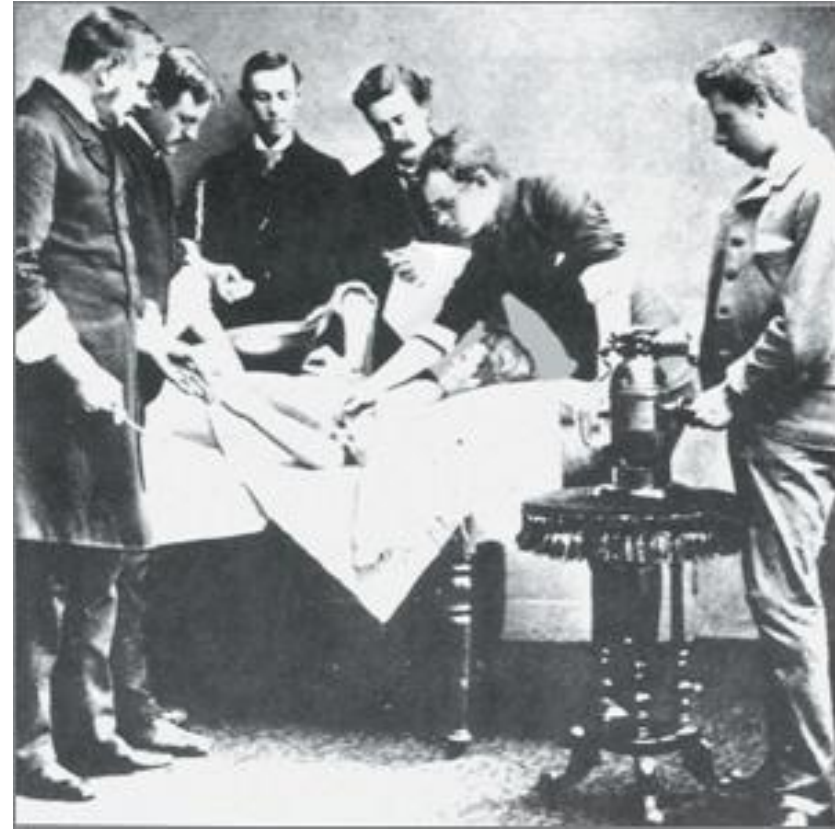
산욕열: 손씻기로 감소를 증명



Handwashing in maternity wards

In 1847 Ignaz Semmelweis noted that after he advocated regular handwashing, death rates at the First Clinic in the Vienna General Hospital fell from 12–13 percent to 1–2 percent.

리스터 (Joseph Lister), 1827-1912

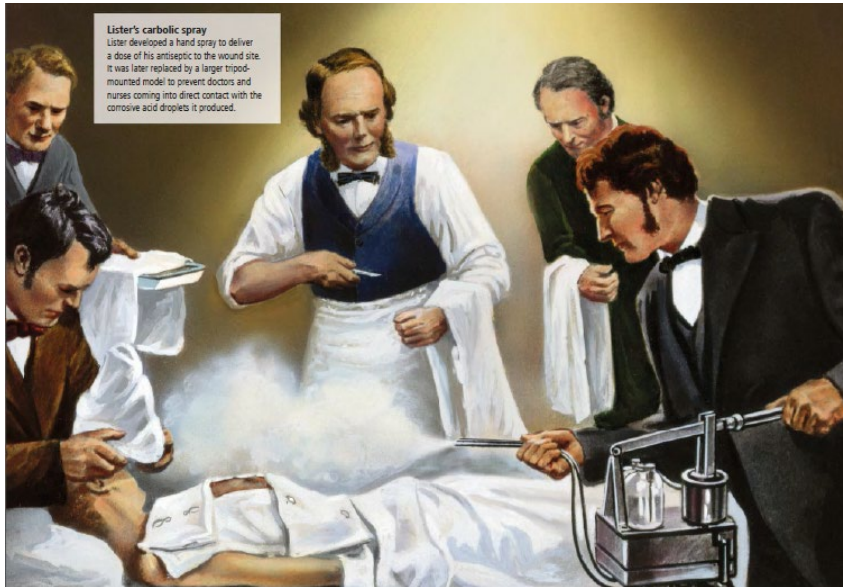


리스터 석탄산 분무로 상처 감염 예방에 성공

Lister's carbolic spray

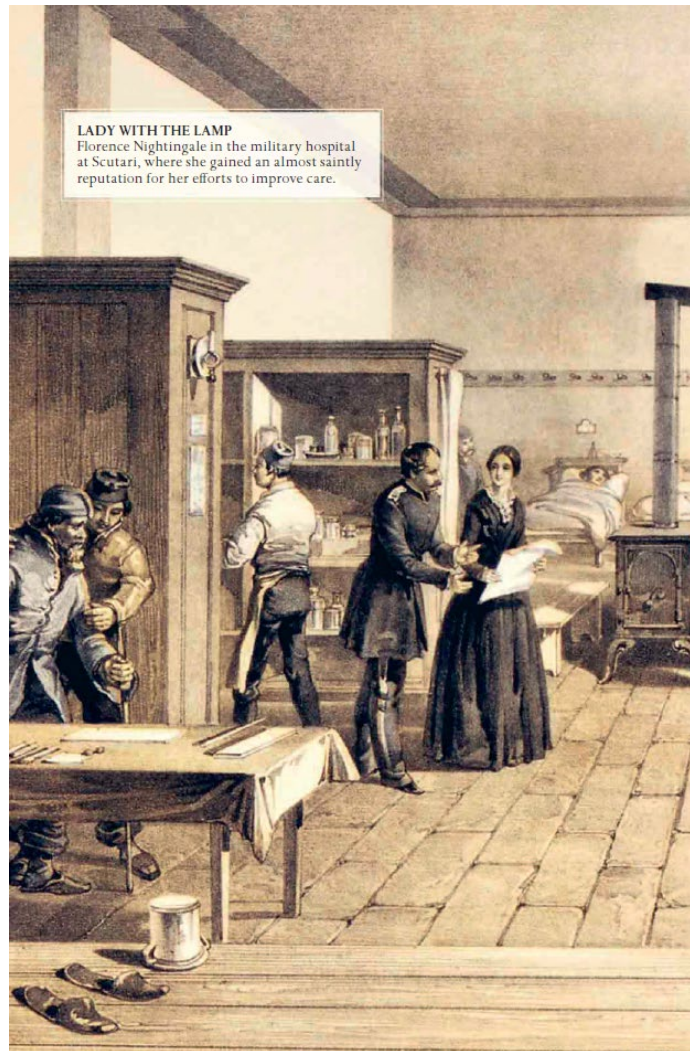
Lister developed a hand spray to deliver a dose of his **antiseptic** to the wound site.

It was later replaced by a larger tripod mounted model to prevent doctors and nurses coming into direct contact with the corrosive acid droplets it produced.



antiseptic surgery

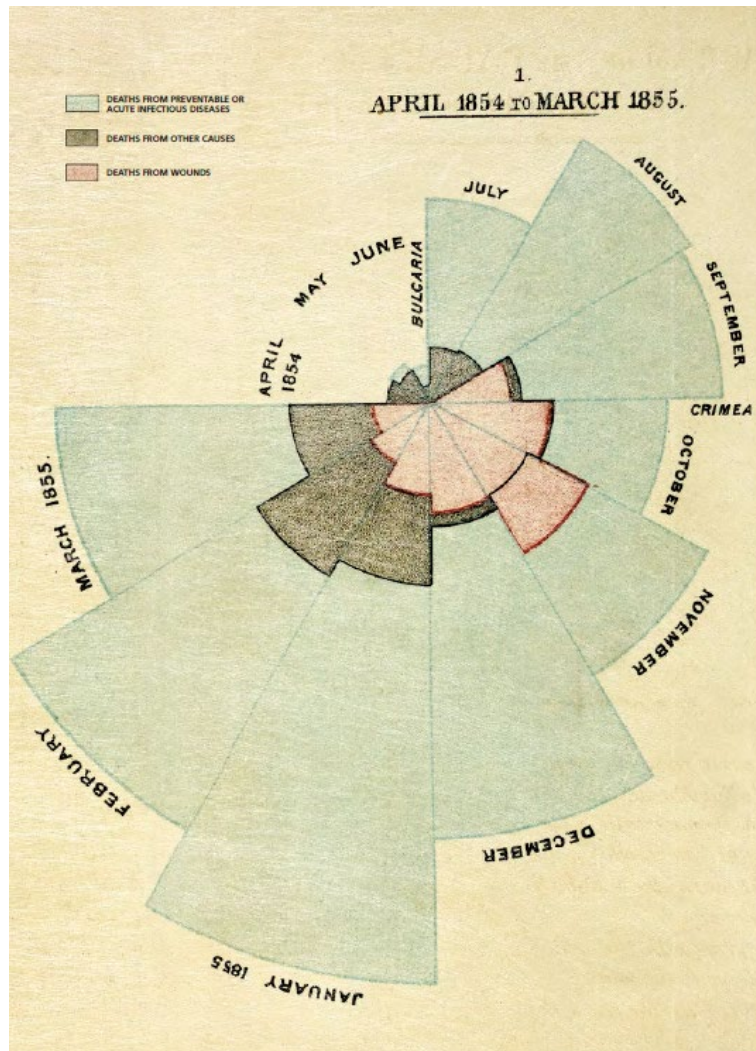
나이팅게일 (Florence Nightingale), 1820-1910



- “등불을 든 여인”
- 크림 전쟁 당시 30여명의 간호사를 데리고 이스탄불에서 활동한 것
- 현대 간호학의 기틀을 잡고 발전시켰기에 "간호학의 어머니"로 불린다
- 위생, 환기를 중요시



나이팅게일: 크림 전쟁에서의 병원에서 병사의 죽음의 이유 분석

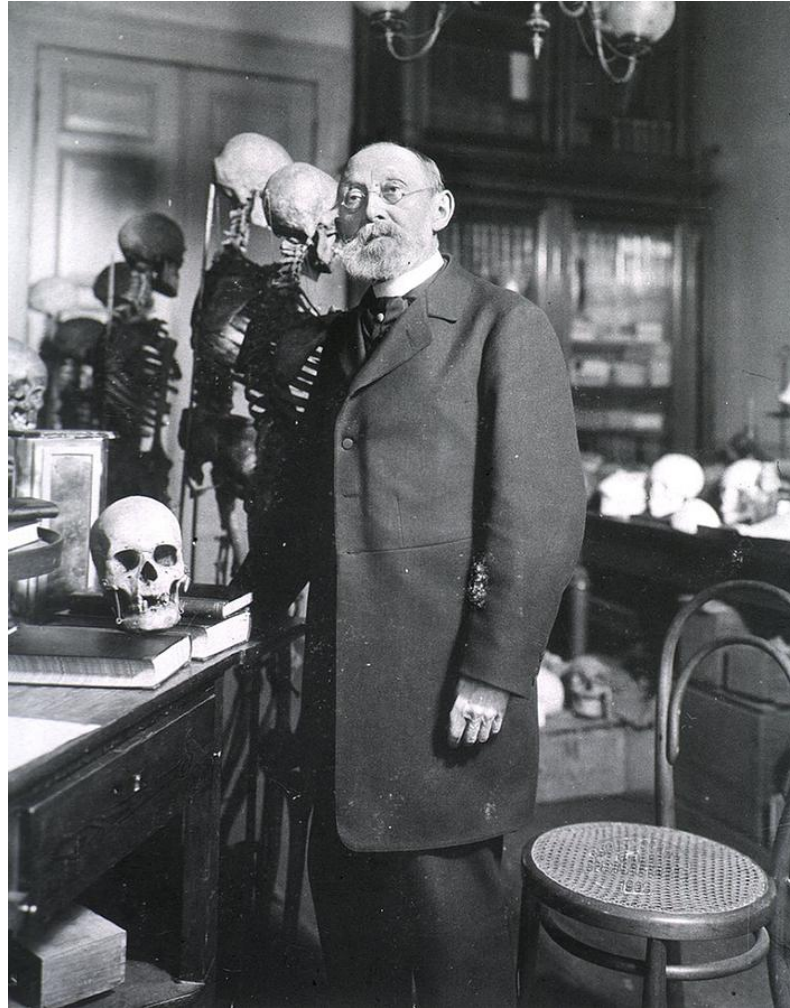


Crimean War deaths

Produced by Florence Nightingale during the Crimean War, this chart illustrates that more soldiers died as a direct result of infectious diseases than battlefield wounds.

Nightingale used it in her hard-fought campaign to improve the standards of hygiene in field hospitals.

피르호 (Rudolf Ludwig Carl Virchow), 1821-1902



세포병리학의 아버지
"모든 병원체는 세포에
의해서 이루어진다"는
주장으로 병의 원인이
세포의 기능적이고
형태적인 변화에 있다고
하였다

파스퇴르 (Louis Pasteur), 1822-1895



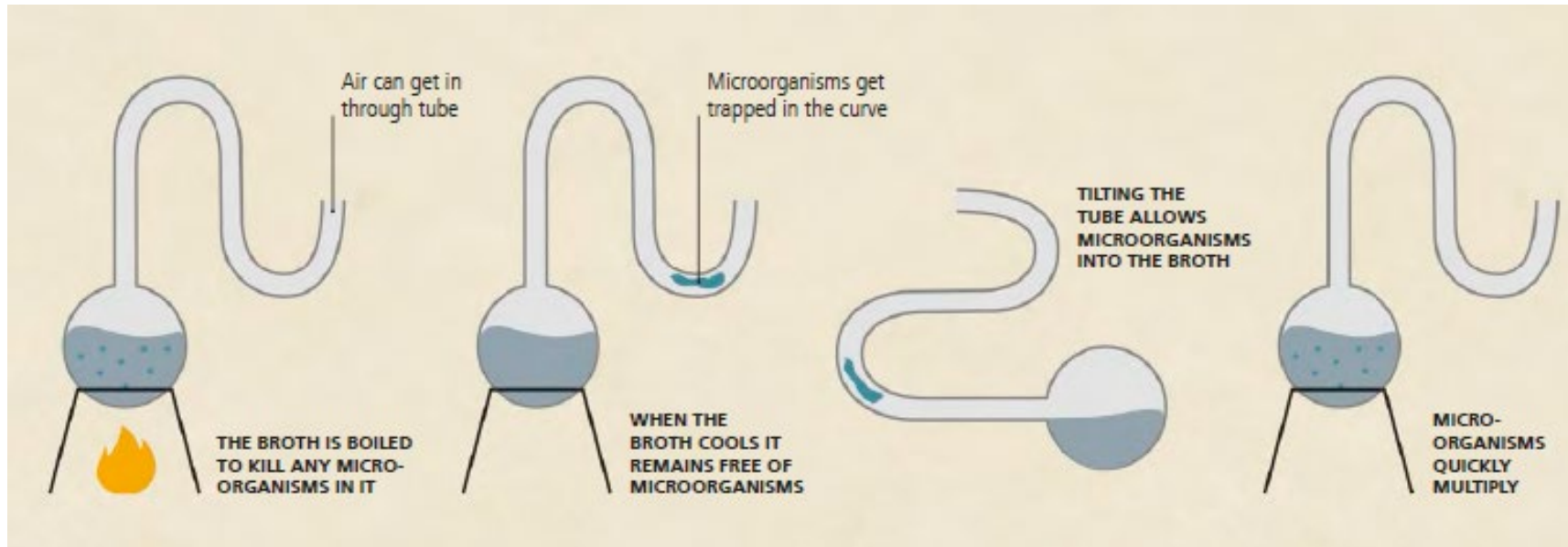
병균이론 (Germ theory)

발효, 부패가 같은 기전

자연발생설의 부정,
부분가열멸균법

닭 콜레라 백신
탄저병 백신
광견병 백신

생명은 생명에서만 발생: 파스퇴르, 자연발생설 부정



파스퇴르의 탄저 예방백신 실험



Animal immunization against **anthrax**: a popular representation of the Pouilly-le-Fort experiment, celebrating the hundredth anniversary of the birth of Pasteur. Drawing of Damblans (Le Pelerin, n° 2333 of 5 November 1922)

파스퇴르의 공수병 백신 연구, 실험

836

HARPER'S WEEKLY.

VOLUME XXIX., NO. 1512.

PASTEUR'S LATEST DISCOVERY.

Five years ago the great French chemist Louis Pasteur determined to find a remedy for hydrophobia. His discovery of a method of inoculation by which cattle and sheep were enabled to defy anthrax, or spleen fever, had led him to believe that the virus of rabies could be used in a similar way for the protection of human beings. In June, 1884, he had solved the problem so far as the inoculation of dogs was concerned, but not until October last was he able to announce that by inoculation men could be protected. That announcement was made at a meeting of the French Academy of Sciences. M. PASTEUR then had two patients under treatment. He now has more than seventy. His process is described as follows: A rabbit is inoculated with a fragment of spinal marrow taken from a rabid dog. In fifteen days the rabbit becomes mad and dies. A second rabbit is inoculated with a bit of spinal marrow taken from the first, and the inoculation is repeated until sixty rabbits have been used. With each successive inoculation the virus becomes stronger, and the period of incubation is shortened, until, in the case of the sixtieth rabbit, it is only seven days. The chemist discovered some years ago, while experimenting with the virus of fowl cholera, that it could be weakened or attenuated only by exposure to dried air. Bits of marrow from the inoculated rabbits, graded with reference to the strength of the virus and the date of extraction, are exposed to dried air in bottles. In this way M. PASTEUR procures a supply of virus graded from a specimen that is so attenuated as to be almost powerless up to a specimen that is fresh and that will cause hydrophobia in an animal in seven days. The person who has been bitten is inoculated under the skin by means of a Pravaz syringe containing sterilized liquid in which a small piece of marrow has been dissolved.



M. PASTEUR.
AN INOCULATION FOR HYDROPHOBIA.—FROM "ILLUSTRATION."

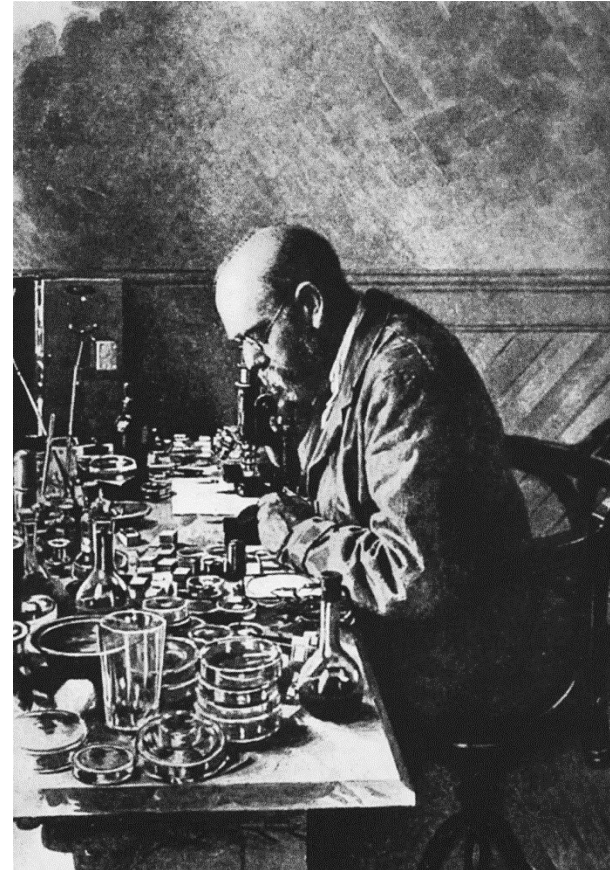
solved. Spinal marrow containing virus of the greatest attenuation is first used. Virus of greater power is used in successive inoculations, until at last the most powerful is introduced. By degrees the system becomes accustomed to it, and M. PASTEUR holds that after safely undergoing the last inoculation of the series the patient is proof against hydrophobia.

The first of the chemist's patients was Joseph MEUSTRE, an Alsatian. He was bitten in July last. Eminent physicians of Paris were of the opinion that he could not escape a terrible death unless he should be saved by this process. In ten days he was inoculated thirteen times, and the virus used in the thirteenth operation was of the greatest strength. It caused the death of a rabbit in seven days, but had no effect upon MEUSTRE. When the discovery was made known to the Academy of Sciences the inoculation scar was one hundred days old, but MEUSTRE was in perfect health.

The length of the period of incubation in cases of hydrophobia varies greatly, ranging from twenty-five or thirty days to one year, and cases are reported in which the disease did not appear for two or three years. In a great majority of cases, however, rabies is developed within six months. M. PASTEUR is confident that his treatment will be effective if it shall be applied at any time before actual hydrophobia appears. Four children living in Algiers were bitten on August 30. That the dog was mad is proved by the fact that one of them died in October of acute hydrophobia. The three who survived reached Paris on October 25, and were inoculated. They have returned to Algiers, and are said to be in good health. Owing to the varying length of the period of incubation, cautious physicians are not ready to admit as proven that the assumed value of inoculation has been proved. They prefer to wait until time and numerous cases

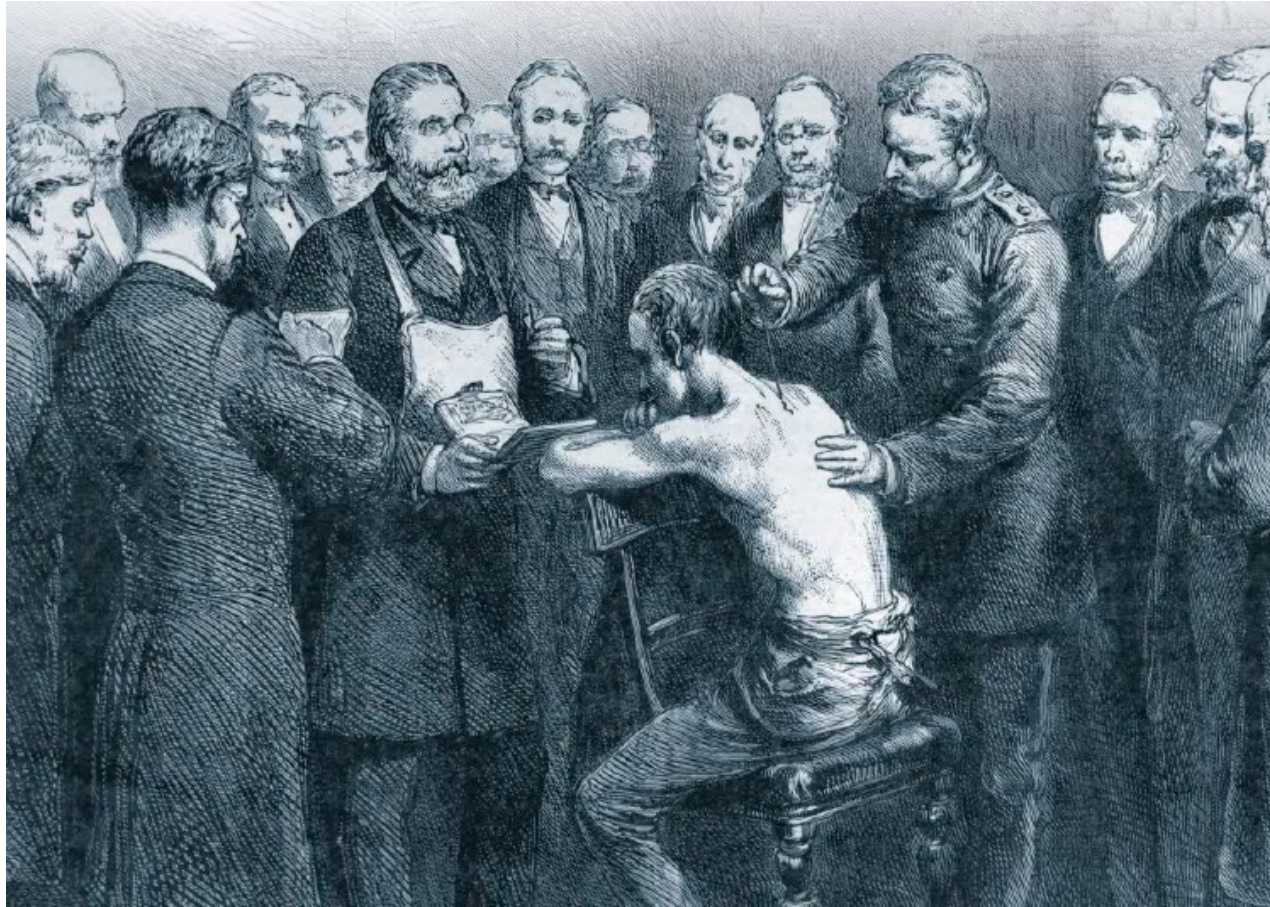


코흐 (Robert Koch), 1843-1910



코흐의 가설: 세균학의 아버지
탄저균(1877년), 결핵균(1882년), 콜레라균(1885년) 등을 발견, 1905년 노벨상

코흐 tuberculin으로 결핵 치료를 시도하다



논란 후 실패,
나중에
진단시약으로
사용

예술 및 문학 작품에서 미화된 결핵에 의한 죽음

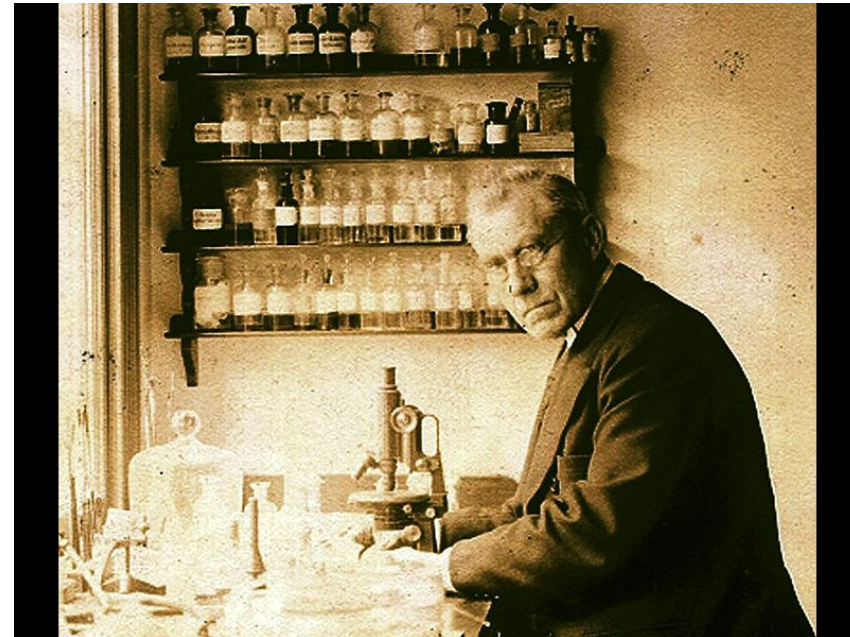


During the 18th to early 20th centuries, tuberculosis was "romanticized" by writers, poets, playwrights, and artists as a disease of the able, intelligent, and creative. This serene scene is part of a five-image montage of a young, dying woman that was composed by English photographer Henry Peach Robinson.

바이러스를 발견하다: Dmitri Ivanovsky

Introduction

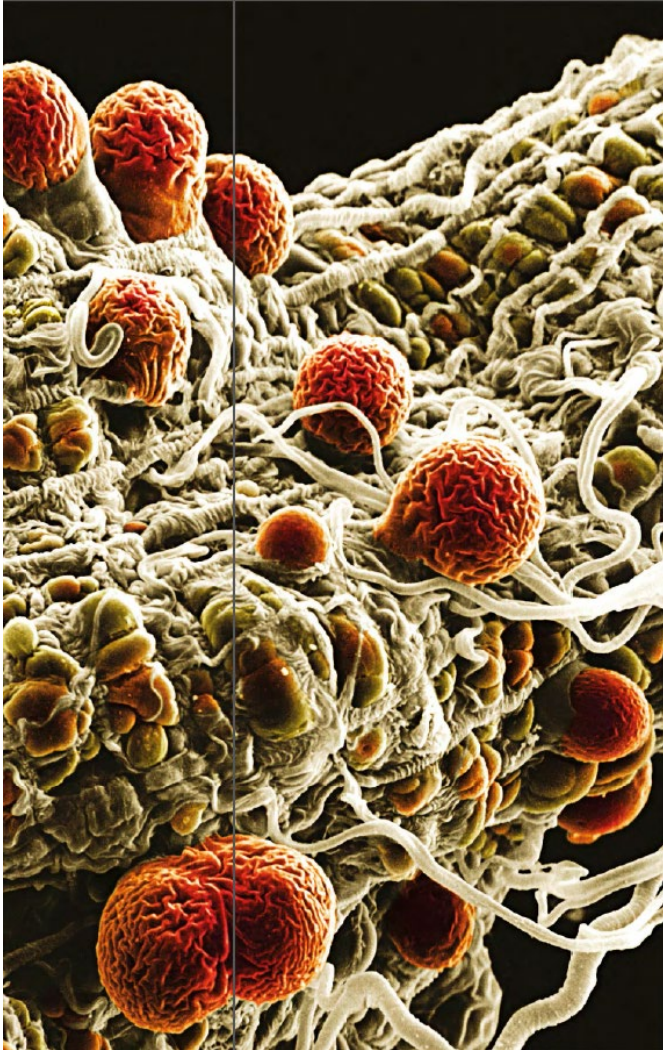
Dmitri Ivanovsky (1892)



발전의 시대 1900-1960

| 1900 | | 1910 | | 1920 | | 1930 | | 1940 | | 1950 | | | | | | | |
|---|---|---|--|---|--|--|---|--|---|---|---|--|--|---|---|--|---|
| <p>1901 Alois Alzheimer writes the first account of a form of dementia that will come to be known as Alzheimer's disease.</p> | <p>1905 Fritz Schaudinn and Erich Hoffmann identify the causative bacterium of syphilis, <i>Treponema pallidum</i>.</p> | <p>1910 Hans Christian Jacobaeus carries out early laparoscopic (minimally invasive or "keyhole") surgery on a human patient.</p> | <p>1916 Progress in ant clotting and storing blood allows front-line transfusions for soldiers in World War I.</p> | <p>1921 Bacillus Calmette-Guérin (BCG) vaccine, developed over many years by Albert Calmette and Camille Guérin, comes into use against tuberculosis.</p> | <p>1924 Hans Berger records the first human electroencephalogram, EEG, showing the electrical activity of the brain.</p> | <p>1935 Two early polio vaccines are trialed in the US but fail terribly causing illness, paralysis, and even death.</p> | <p>1940 The first artificial hip is implanted; the design and materials will be much improved in the 1950s.</p> | <p>1955 George Mason invents the pressurized metered-dose "aerosol" inhaler (to deliver the same measured amount each time); it is suitable for conditions such as asthma.</p> | <p>1901 Karl Landsteiner announces that blood exists in different forms, or groups, initially termed A, B, and C.</p> | <p>1905 Eduard Zimm carries out the first successful cornea transplant.</p> | <p>1910 Paul Ehrlich discovers the first effective treatment for syphilis, Salvarsan.</p> | <p>1918 The influenza (Spanish flu) pandemic spreads. One of the deadliest disease outbreaks in history. It kills around 100 million people.</p> | <p>1921-22 Frederick Banting and Charles Best use pancreas extracts (containing insulin) to treat diabetes in dogs; the method is then applied successfully to treat humans.</p> | <p>1927 Karl Landsteiner and Philip Levine identify the M, N, and P blood groups.</p> | <p>1937 Max Theiler and Hugh Smith produce "17D," the first effective vaccine against yellow fever.</p> | <p>1942 The first antihistamine drugs are developed.</p> | <p>1957 "Wonder drug" thalidomide is marketed for numerous conditions. But soon its use by women during early pregnancy is linked to babies being born with malformations and disabilities.</p> |
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말라리아와 전쟁



Malaria parasite

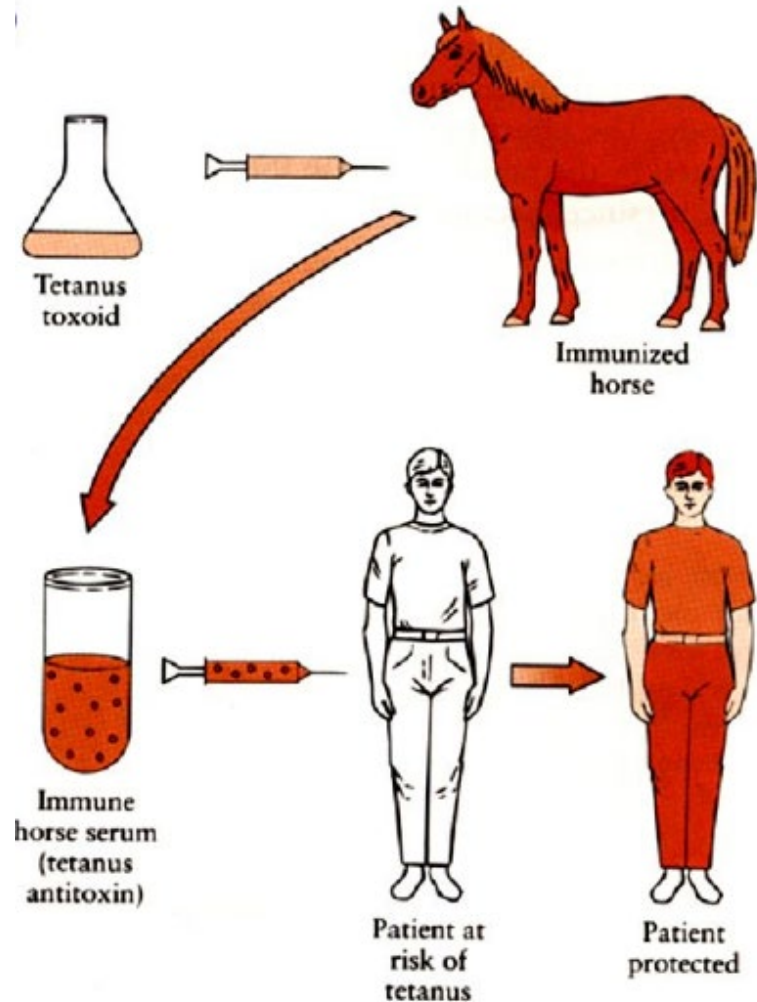
The red blobs seen here are egg clusters of the malaria parasite in the [mosquito gut](#).

Each cluster produces thousands of infectious, actively moving parasites, which travel to the mosquito's salivary glands and are injected into people when it bites.



혈청요법: 에밀 아돌프 폰 베링

- Emil von **Behring**
- 1901 노벨 생리의학상

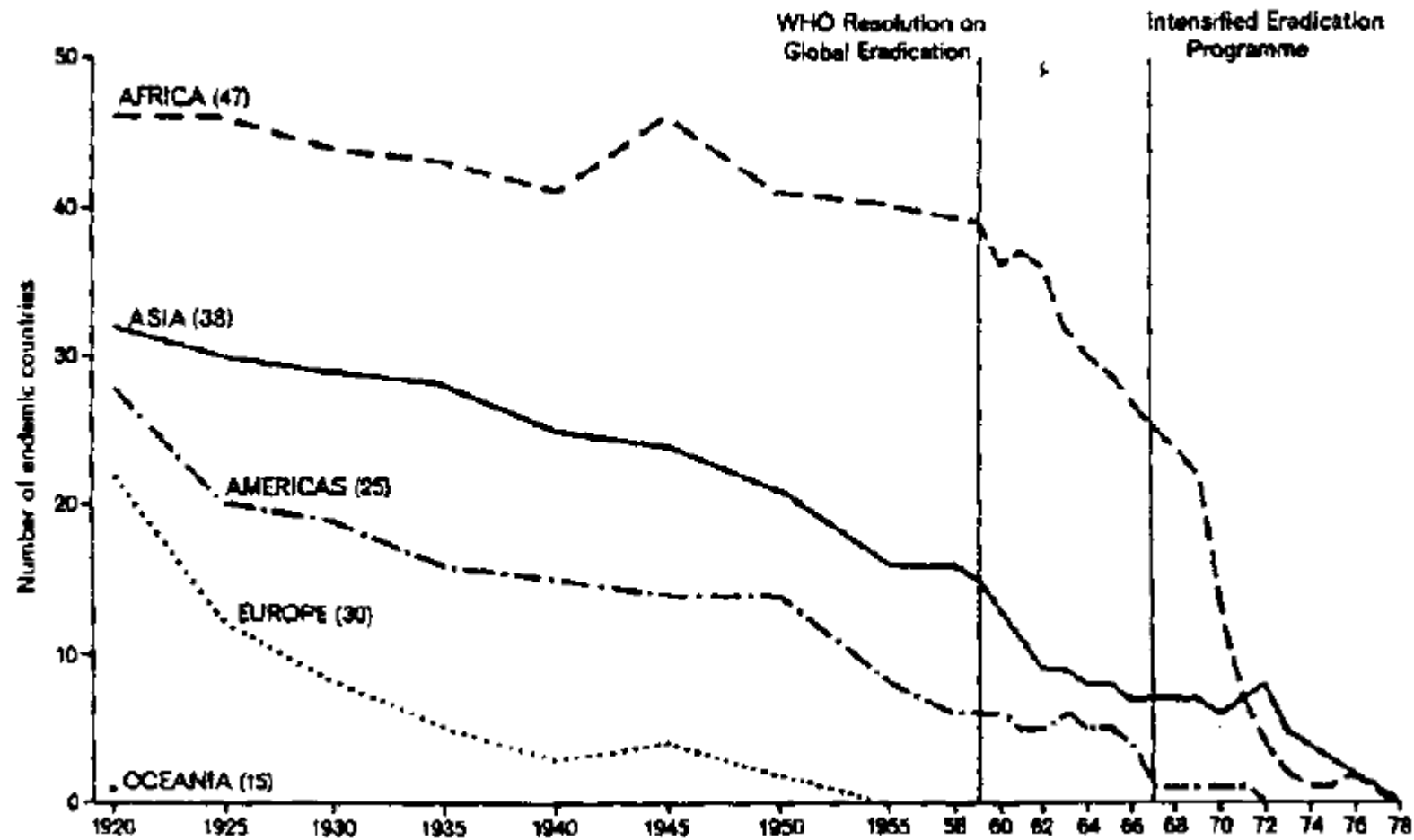


두창 (마마, *small pox*)의 멸절, 1980년 5월: 유 일한 사건



New York State Department of Health Photograph

천연두의 감소 및 멸절

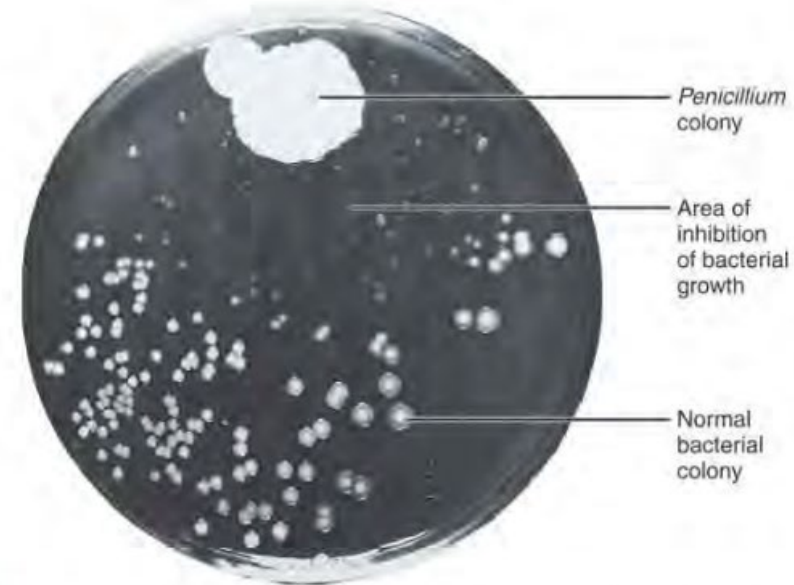


천연두와 지식영

- 고종(高宗) 16년(1879)과 17년에 종두법을 위시해서 일인(日人) 군의로부터 서양의학의 지도를 받아 조선인에게 보급 시도
- 일본으로부터 종두술을 들여왔다고 하여 친일파로 몰려 체포, 전라도로 유배
- 고종 19년(1882) 전라도 어사(御使), 박영효(朴泳孝)의 청으로 전주 성내에 우리나라 처음으로 **우두국(牛痘局)**을 신설, 공식으로 종두를 실시하고 종두법을 가르쳤으며, 고종 22년(1885) 우리나라 사람의 손으로 쓴 최초의 종두서(種痘書) 『우두신설(牛痘新說)』을 저술

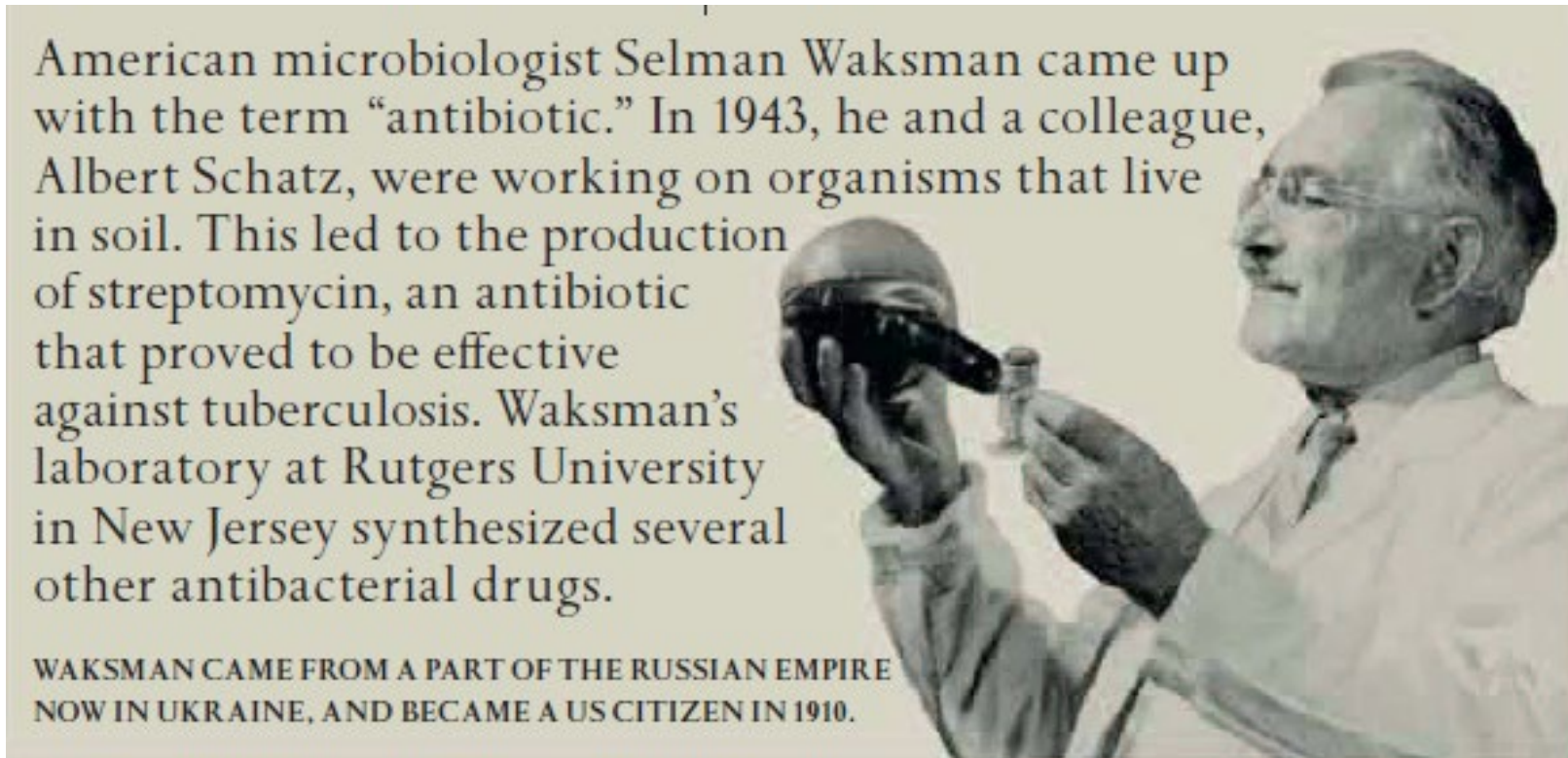
최초의 전염병연관 국가 기관 설립, 우두법이 서양의학의 정착에 큰 역할

플레밍 (Alexander Fleming), 1881-1955

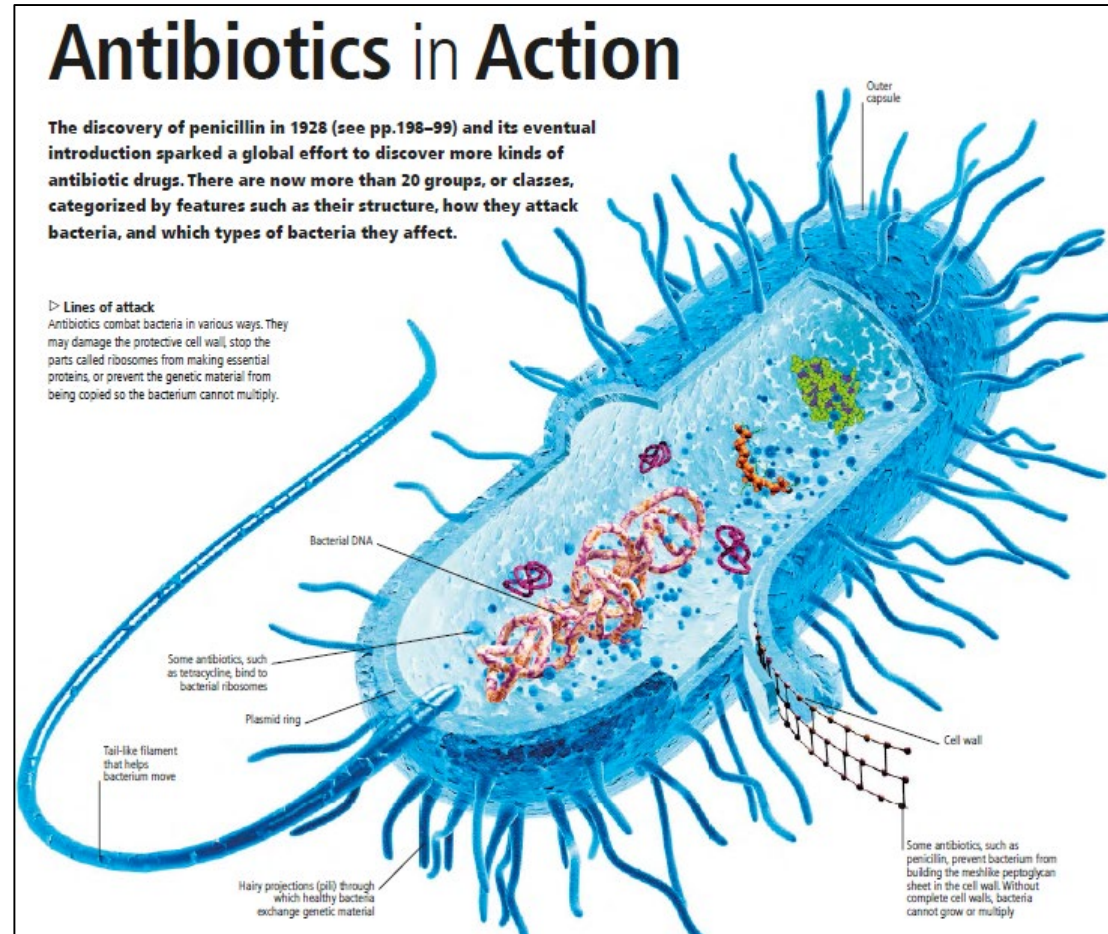
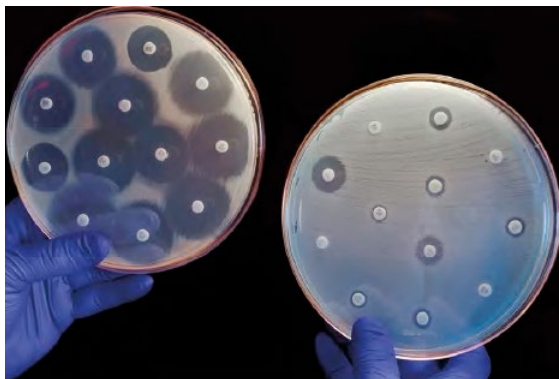


- 페니실린 발견
- 1941년 페니실린 대량생산 시작

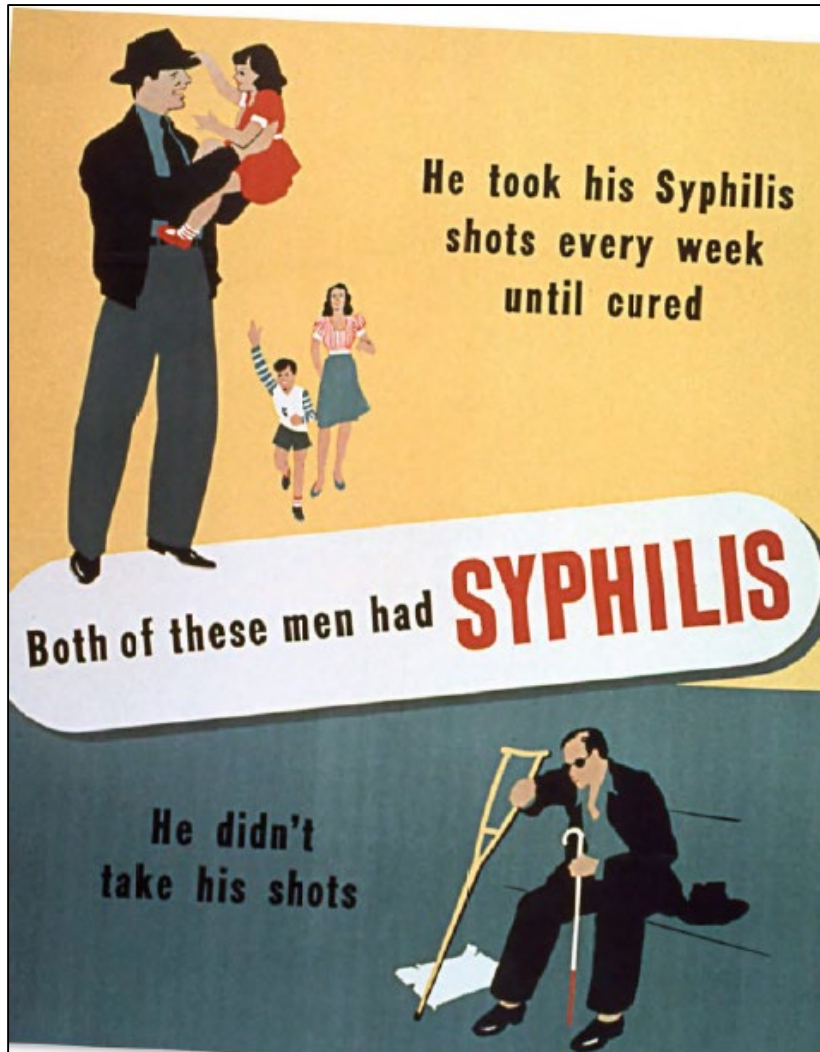
Selman Waksman: 항생제란 말 사용



페니실린 후 항생제의 개발: 병에 제대로 된 무기를 가지게 된 시대



살발산 (Salvarsan): 매독 완치제



스페인 인플루엔자, 1918-19



1918년 세계적 독감으로 인해 1차대전 때 죽은 사람보다 더 많은 사람을 희생되었다.

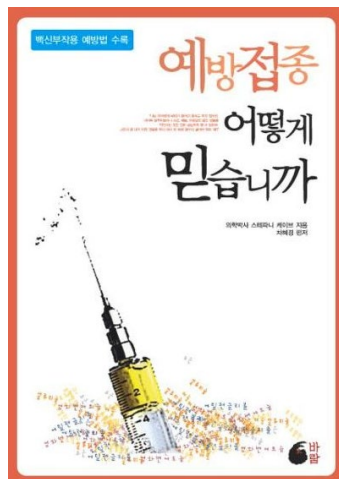
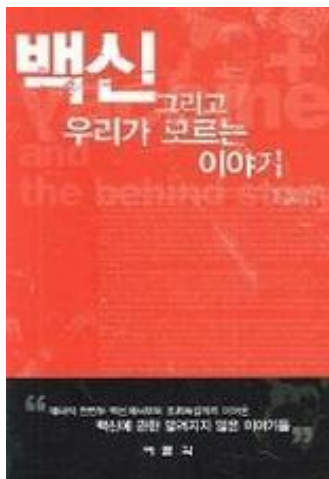


20세기 가장 위대한 의학적 성과

| 성과 | 득표율(%) | 순위 |
|------------------------|--------|----|
| 깨끗한 물과 하수도(개인위생) | 15.8 | 1 |
| 항생제 | 12.5 | 2 |
| 마취 | 13.9 | 3 |
| 백신 | 11.8 | 4 |
| DNA 구조 발견 | 8.8 | 5 |
| 세균 이론 | 7.4 | 6 |
| 먹는 피임약 | | |
| 근거중심의학 | 5.6 | 8 |
| 화상진료(X-ray, CT, MRI 등) | 4.2 | 9 |
| 컴퓨터 | 3.6 | 10 |
| 간이 탈수 치료 | 2.7 | 11 |
| 면역학 | 1.6 | 12 |
| 흡연위험 경고 | | |
| 클로르프로마진 | 0.6 | 14 |
| 조직배양 | 0.4 | 15 |

예방접종 거부주의 (vaccine denialism)

- 외국에서 문제가 되는 사례들이 있음
- 국내에서도 예방접종력을 확인하는 것이 필요



Andrew Wakefield



백신 거부주의자의 생각

- 예방접종보다 아이의 자연치유력과 면역력을 강화시켜주는 것이 중요하다고 생각
- 검증되지 않은 유해물질을 아이 몸속에 주입하는 것은 어리석은 행동으로 생각
- 예방접종은 삶의 자연스러움을 역행하는 행위
- 예방접종 스케줄에 있는 감염병은 현대의학으로 치료가 가능하므로 예방접종이 불필요하다

흔한 감염질환에 대한 백신의 효과

| | Disease | Maximum number of cases (year) | Number of cases in 2004 | Percent change |
|-------|--|--------------------------------|-------------------------|----------------|
| 디프테리아 | Diphtheria | 206,939 (1921) | 0 | -99.99 |
| 홍역 | Measles | 894,134 (1941) | 37 | -99.99 |
| 볼거리 | Mumps | 152,209 (1968) | 236 | -99.90 |
| 백일해 | Pertussis | 265,269 (1934) | 18,957 | -96.84 |
| 소아마비 | Polio (paralytic) | 21,269 (1952) | 0 | -100.0 |
| 풍진 | Rubella | 57,686 (1969) | 12 | -99.98 |
| 파상풍 | Tetanus | 1,560 (1923) | 26 | -98.33 |
| 헤모필루스 | <i>Haemophilus influenzae</i> type b infection | ~20,000 (1984) | 16 | -99.92 |
| B형 간염 | Hepatitis B | 26,611 (1985) | 6,632 | -75.08 |

Abbas & Lichtman: Basic Immunology, 3rd Edition. Copyright © 2008 by Saunders, an imprint of Elsevier, Inc. All rights reserved.

Abbas, Basic Immunology 3rd Edition

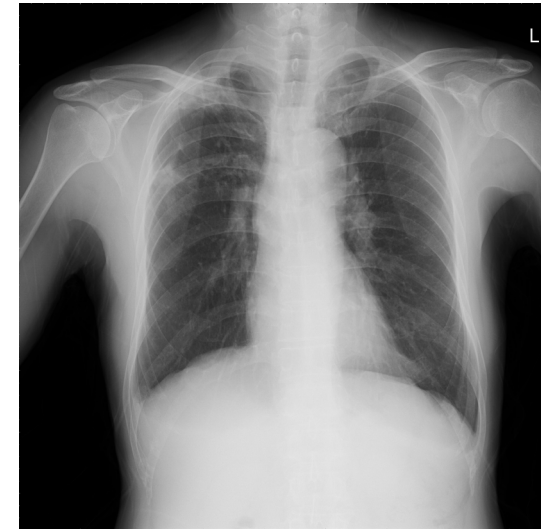
백신: 전염병을 예방하는데 가장 효과적이고 비용-편익적인 수단

백신거부주의에 대한 의견

- 백신거부주의:
 - 의료정보의 홍수 속에서 일반인의 길 잃은 모습의 한 전형적 모양
 - “헛똑똑이”의 사고방식의 대표적 형태
- 잘못된 의료 정보에 대해서는 객관적 사실에 대한 선제적, 적극적 교육이 필요
- 그러나 교육의 한계가 있는 분야, 믿음의 문제
- 의료정보의 대중에 알리는 것은 객관성이 중요함
- 전문가의 균형잡힌 정보전달의 중요성이 큼을 알게 함

19세기 결핵의 확산, 20세기 결핵과의 싸움

- 19C 산업화, 도시화로 확산 (세계인구의 1/3 추정)
- 1946년 이전 예방 및 치료법은 별 도움이 안되었음
- 1946년 Streptomycin, PAS, Isoniazid 발견
- 1950년 Rifampin



폐결핵 흉부 단순 X선
사진 (우상부 폐에 병변)

La Miseria by Cristóbal Rojas (1886) 우리나라 최초발행 크리스마스실(1932)

BCG를 만든 Calmette와 Guerin



- Calmette is seated, Guerin standing. November 1932
- 방광암 치료의 일부로 사용되기도 함

BCG 효과: 다양한 보고, 20년 효과(?), 중증 질환의 감소는 있는 듯

Prospective BCG human trials

| Trials | TB deaths/ | | No | | No non- | | Protection (%) |
|-----------------------|------------|----------|------------|-----|------------|----|----------------|
| | 100,000 | BCG (mg) | vaccinated | TB | vaccinated | TB | |
| Aronson 1946–49 US | 200 | 0.1 | 123 | 4 | 139 | 11 | 80 |
| UK BMC 1950–72 | 35 | 0.1 | 20,500 | 18 | 19,600 | 97 | 78 |
| US Comstock Palmer | 30 | 0.2 | 16,200 | 26 | 17,854 | 32 | 14 |
| India 1968–70 | 200 | 0.1 | 88,200 | 162 | 44,135 | 44 | 0 |

경구 소아마비 예방백신의 개발, late 1954

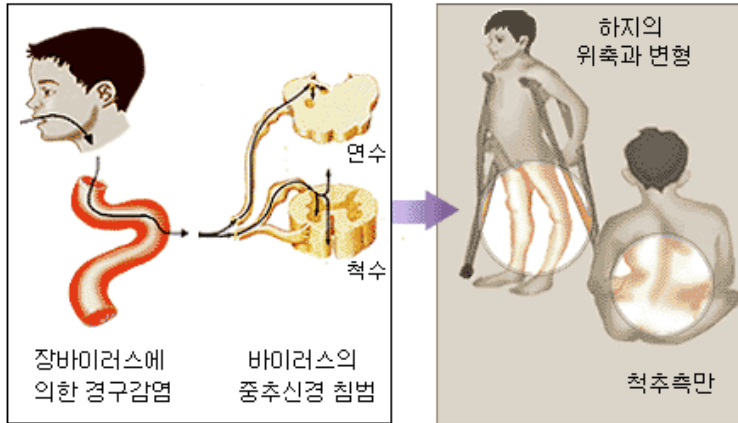


ALBERT SABIN, M.D.



소아마비 (폴리오)의 감소

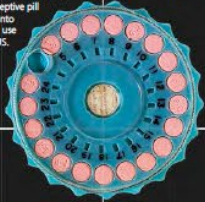
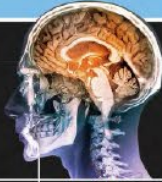

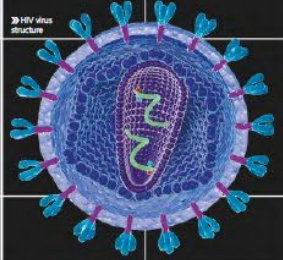



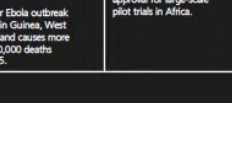
장바이러스감염에 의한 소아마비



루즈벨트 대통령

우리나라: 백신 사업 후 1984년 이후에는
현재까지 한 명의 환자도 발생하지 않고
있음

현재의 의학, 1960-현재

| 1960 | 1970 | 1980 | 1990 | 2000 | 2010 |
|---|--|---|--|---|--|
| <p>1960 The first combined oral contraceptive pill comes into general use in the US.</p>  <p>1961 First accounts are published concerning antibiotic resistance in the "superbug" MRSA, methicillin-resistant <i>Staphylococcus aureus</i>.</p> <p>1962 John Charnley pioneers a much improved artificial hip joint that becomes the standard implant.</p> <p>1963 A team led by Thomas Starzl performs the first human liver transplant.</p> <p>1967 In Cape Town, South Africa, Christian Barnard and his team perform the first human-to-human heart transplant.</p> <p>1969 The Britain Report by the UK government warns against the overuse of antibiotics in the agriculture sector.</p> <p>1970 Pioneering surgeons, including Dr. Christian Barnard (left)</p> | <p>1970 Godfrey Hounsfield's invention of the computerized tomography (CT) scanner is first used in medicine to visualize a patient's brain.</p>  <p>1971 Maurice Hilleman and coworkers develop the MMR vaccine for measles, mumps, and rubella (German measles).</p> <p>1972 Stanley Cohen and Herbert Boyer invent recombinant DNA (rDNA), beginning the era of "genetic engineering."</p> <p>1977 Raymond Damadian, Larry Minkoff, and colleagues carry out the first magnetic resonance imaging (MRI) body scan.</p>  <p>1978 Techniques developed by Patrick Steptoe and Robert Edwards lead to the first IVF "test tube" baby Louise Brown, being born in Oldham, North England.</p> <p>1979 Michael Bishop and Harold Varmus discover the first oncogene (cancer-linked gene), c-Src.</p> <p>1977 Experts agree that the term "Alzheimer's disease" can be used for presenile and senile dementias; the condition is no longer seen as being linked to age.</p> | <p>1980 The World Health Organization (WHO) "declares solemnly that the world and its peoples have won freedom from smallpox."</p> <p>1981 Acquired immunodeficiency syndrome (AIDS) is first diagnosed, and is named the next year.</p> <p>1983 Is an unexpected discovery, Barry Marshall and Robin Warren identify <i>Helicobacter pylori</i> in gastric ulcers and gastritis.</p> <p>1983 Two independent teams led by Robert Gallo and Luc Montagnier discover the virus causing AIDS. It is officially named human immunodeficiency virus (HIV) in 1986.</p>  <p>1983 Harald zur Hausen and coworkers identify human papillomaviruses (HPVs) in cervical cancer.</p> <p>1989 The first telemedicine system for remote diagnosis and treatment is launched, specializing in cardiac defibrillation.</p> | <p>1984 The US Government begins to plan the Human Genome Project to identify all 3.2 billion base pair "code letters" in the full sequence of human DNA; other nations agree to become involved.</p> <p>1985 Alec Jeffreys introduces the first techniques for DNA fingerprinting, or DNA profiling, which identifies DNA elements unique to an individual.</p> <p>1986 A large multicenter trial supports streptokinase as an effective thrombolytic or "clot-buster" therapy for myocardial infarction (also known as a heart attack).</p> <p>1990 The Human Genome Project gets under way, under the auspices of the US Department of Energy and the National Institutes of Health. Expected end date is 2005.</p> <p>1992 The first vaccine is developed for hepatitis A.</p> <p>1996 One of the first monoclonal antibody treatments, trastuzumab, is used against breast cancer.</p> <p>1999 The first off first trial of gene therapy (nuclear gene transfer) is carried out, with mixed results.</p> <p>1999 Gene therapy comes of age with the treatment of a 4-year-old girl for a rare enzyme disorder known as adenosine deaminase (ADA) deficiency.</p> <p>1999 The first gene therapy trial begins for Parkinson's disease.</p> <p>2000 The US authorities approve the surgeon-assisting robotic da Vinci Surgical System for use in certain procedures.</p> <p>2000 The first gene therapy trial begins for Parkinson's disease.</p> <p>2001 The Lindbergh operation shows telesurgery is possible across the Atlantic as a surgeon in New York controls a robot that operates on a patient in Strasbourg, France.</p> <p>2003 The follow-up to the Human Genome Project, ENCODE (ENCyclopedia Of DNA Elements), begins. This project aims to identify all functional elements of the human genome sequence.</p> <p>2003 Dolly the sheep is the first mammal cloned from an adult body cell, by the team led by Ian Wilmut.</p> <p>2007 The HMMB Hand is the first commercially available bionic hand, invented by David Gow and coworkers.</p> | <p>2000 A remote-controlled robotic surgery</p> <p>2000 The US authorities approve the surgeon-assisting robotic da Vinci Surgical System for use in certain procedures.</p> <p>2000 The first gene therapy trial begins for Parkinson's disease.</p> <p>2001 The Lindbergh operation shows telesurgery is possible across the Atlantic as a surgeon in New York controls a robot that operates on a patient in Strasbourg, France.</p> <p>2003 The follow-up to the Human Genome Project, ENCODE (ENCyclopedia Of DNA Elements), begins. 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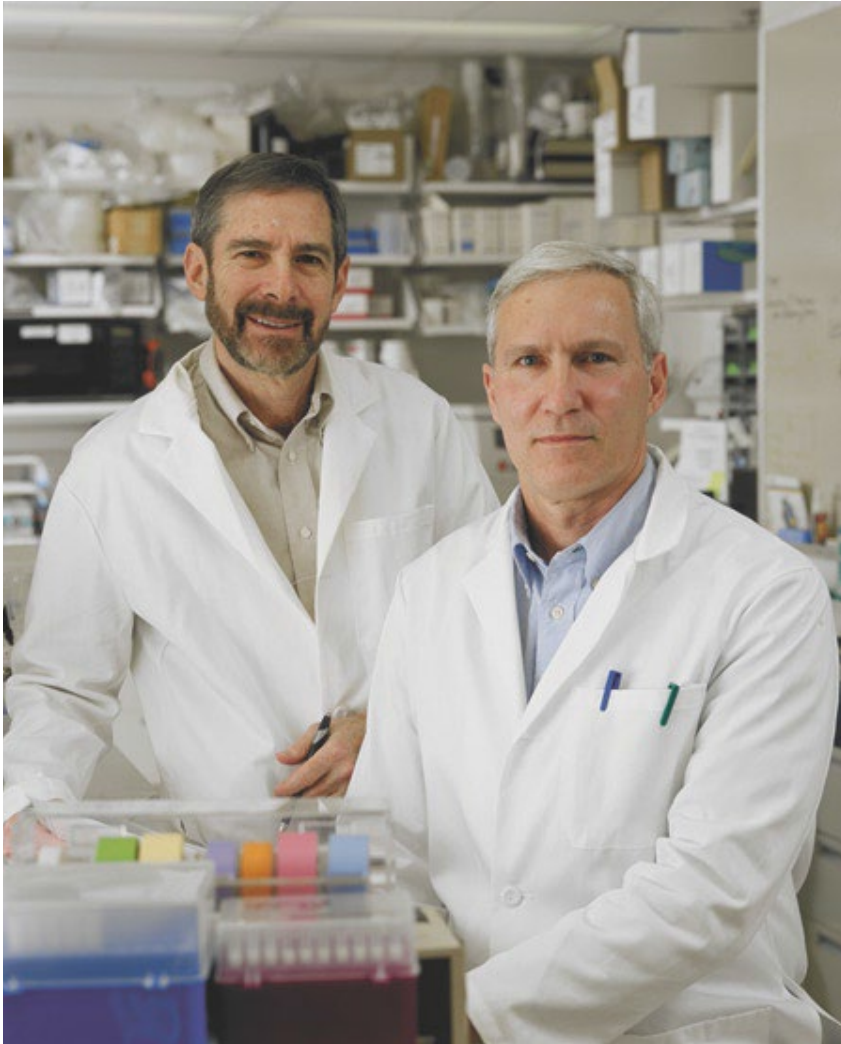
제약산업의 발전



PHARMACEUTICAL PRODUCTION LINE

Workers package drugs at a pharmaceutical production line in China—the third-largest prescription drugs market in the world.

자궁경부암을 예방하는 백신: HPV vaccine



- Douglas Lowy and John Schiller



HIV, 에이즈: 1981년 알려지기 시작

HIV and AIDS

In 1982 doctors in the US recognized a new illness, AIDS, which operated by suppressing the patient's immune system, rendering it susceptible to other, opportunistic infections. More than 40 million people worldwide have died of AIDS-related illnesses. A cure, or even a vaccine, remains elusive.

In the late 1970s physicians in California noted an increasing occurrence of Kaposi's sarcoma, a rare type of cancer, and of *Pneumocystis carinii*, a form of pneumonia previously seen only in patients whose immune system had been compromised (for example by chemotherapy). By 1981 the US Centers for Disease Control and Prevention (CDC) diagnosed these patients with a new disease, which came to be called Acquired Immune Deficiency Syndrome, or AIDS.

Pattern of transmission
Initially, clusters of victims were identified among the male homosexual community, intravenous drug users, and users of blood products such as hemophiliacs or patients undergoing transfusions. This seemed to indicate a cause associated with the transfer of blood or other human body fluids.

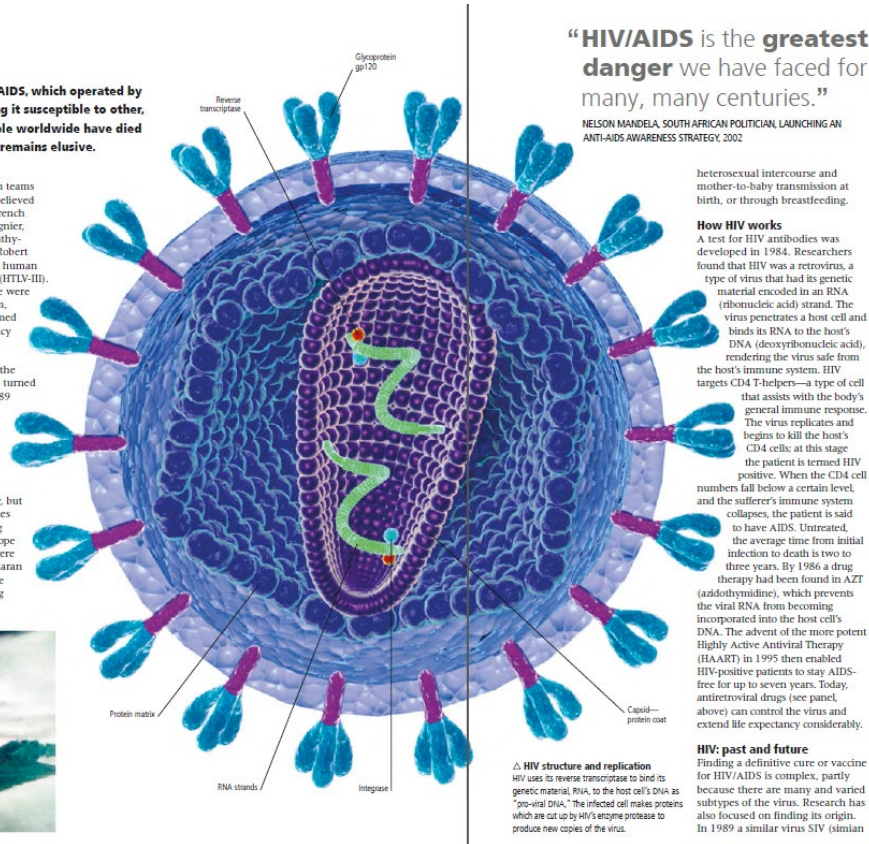
Tip of the iceberg

Public health campaigns used television advertisements such as this one from 1987 to emphasize the severity of AIDS, which had claimed many lives and would continue to do so if ignored.



In 1983-84 two research teams identified a viral agent believed to be responsible. The French team, led by Luc Montagnier, named it lymphadenopathy-associated virus (LAV); Robert Gallo's US team called it human T-lymphotropic virus III (HTLV-III). It was realized that these were the same microorganism, which, in 1986, was named human immunodeficiency virus (HIV).

The search for a cure became urgent as, from the first isolated cases, AIDS turned into an epidemic. By 1989 there were 100,000 AIDS cases in the US and a further 142,000 worldwide, rising to 30 million by 1993. The early cases were predominantly in the homosexual community, but the balance tipped as rates among intravenous drug users in the US and Europe rose. Millions of cases were also reported in sub-Saharan Africa, where the disease appeared to be spreading primarily as a result of



△ HIV structure and replication
HIV uses its reverse transcriptase to bind its genetic material, RNA, to the host cell's DNA as "pro-viral DNA." The infected cell makes proteins which are cut up by HIV's enzyme protease to produce new copies of the virus.

heterosexual intercourse and mother-to-baby transmission at birth, or through breastfeeding.

How HIV works

A test for HIV antibodies was developed in 1984. Researchers found that HIV was a retrovirus, a type of virus that had its genetic material encoded in an RNA (ribonucleic acid) strand. The virus penetrates a host cell and binds its RNA to the host's DNA (deoxyribonucleic acid), rendering the virus safe from the host's immune system. HIV targets CD4 T-helpers—a type of cell that assists with the body's general immune response. The virus replicates and begins to kill the host's CD4 cells; at this stage the patient is termed HIV positive. When the CD4 cell numbers fall below a certain level, and the sufferer's immune system collapses, the patient is said to have AIDS. Untreated, the average time from initial infection to death is two to three years. By 1986 a drug therapy had been found in AZT (azidothymidine), which prevents the viral RNA from becoming incorporated into the host cell's DNA. The advent of the more potent Highly Active Antiviral Therapy (HAART) in 1995 then enabled HIV-positive patients to stay AIDS-free for up to seven years. Today, antiretroviral drugs (see panel, above) can control the virus and extend life expectancy considerably.

HIV: past and future

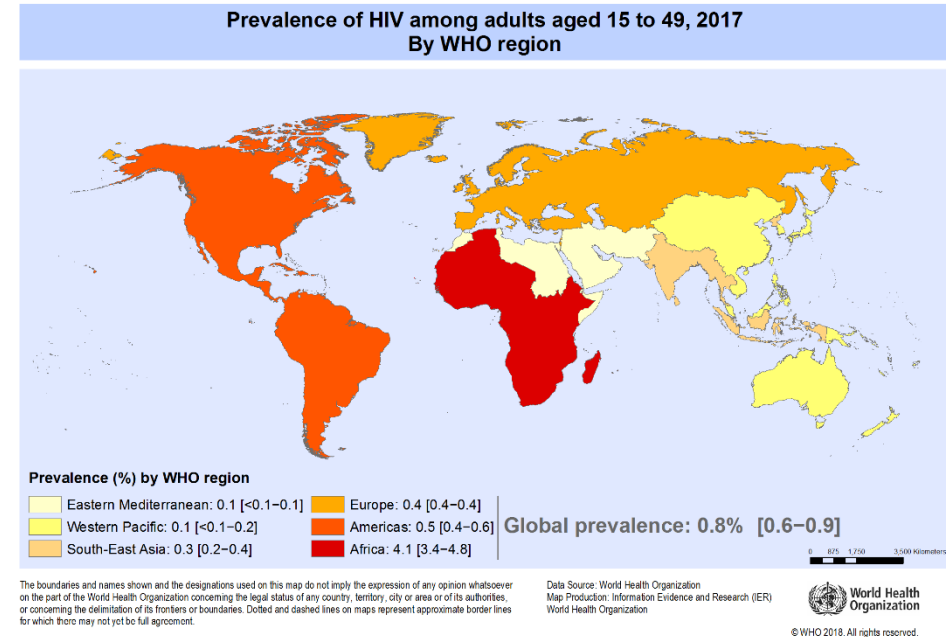
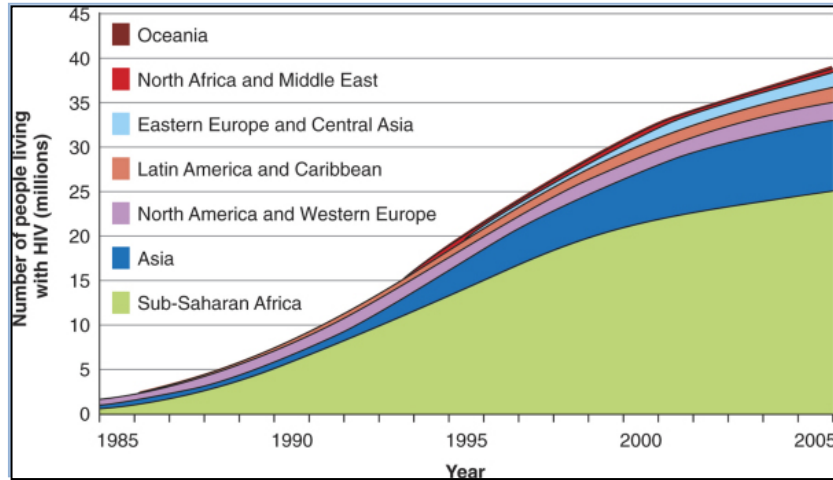
Finding a definitive cure or vaccine for HIV/AIDS is complex, partly because there are many and varied subtypes of the virus. Research has also focused on finding its origin. In 1989 a similar virus SIV (simian

바이러스 발견:
1983-84

1986, was named
human
immunodeficiency
virus (HIV).

세계 지역별 HIV 감염의 변화

1986-2005, 전세계 유병율, 2017년



WHO의 HIV 치료 전략: "fast track"

(Bigger Goal for Viral Suppression)

| TARGETS | |
|--|--|
| By 2020 | By 2030 |
| 90-90-90 HIV treatment | 95-95-95 HIV treatment |
| 500 000 New adult HIV infections | 200 000 New adult HIV infections |
| ZERO Discrimination | ZERO Discrimination |

에이즈 종식을 위한

2020년 목표

진단 90%

치료 90%

바이러스억제 90%

2030년 목표

진단 95%

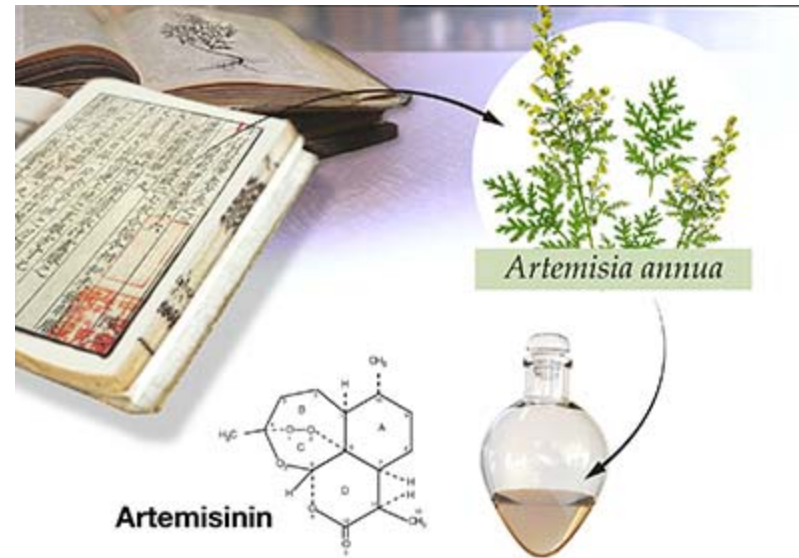
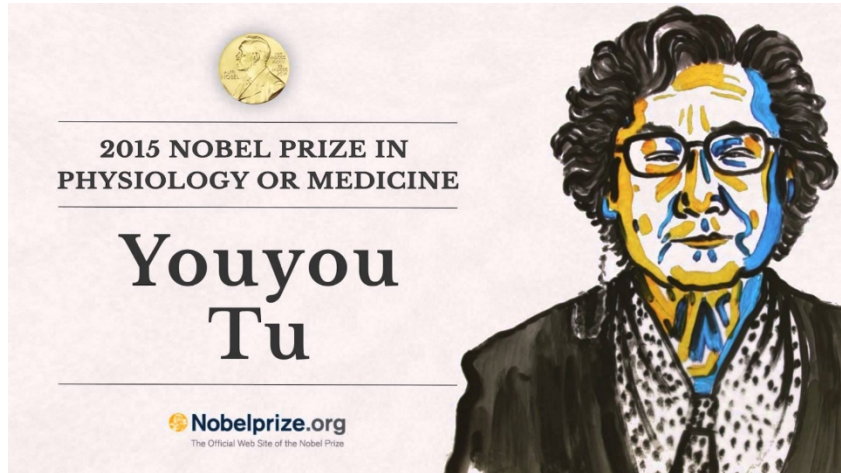
치료 95%

바이러스억제 95%

헬리코박터: 궤양을 만드는 세균

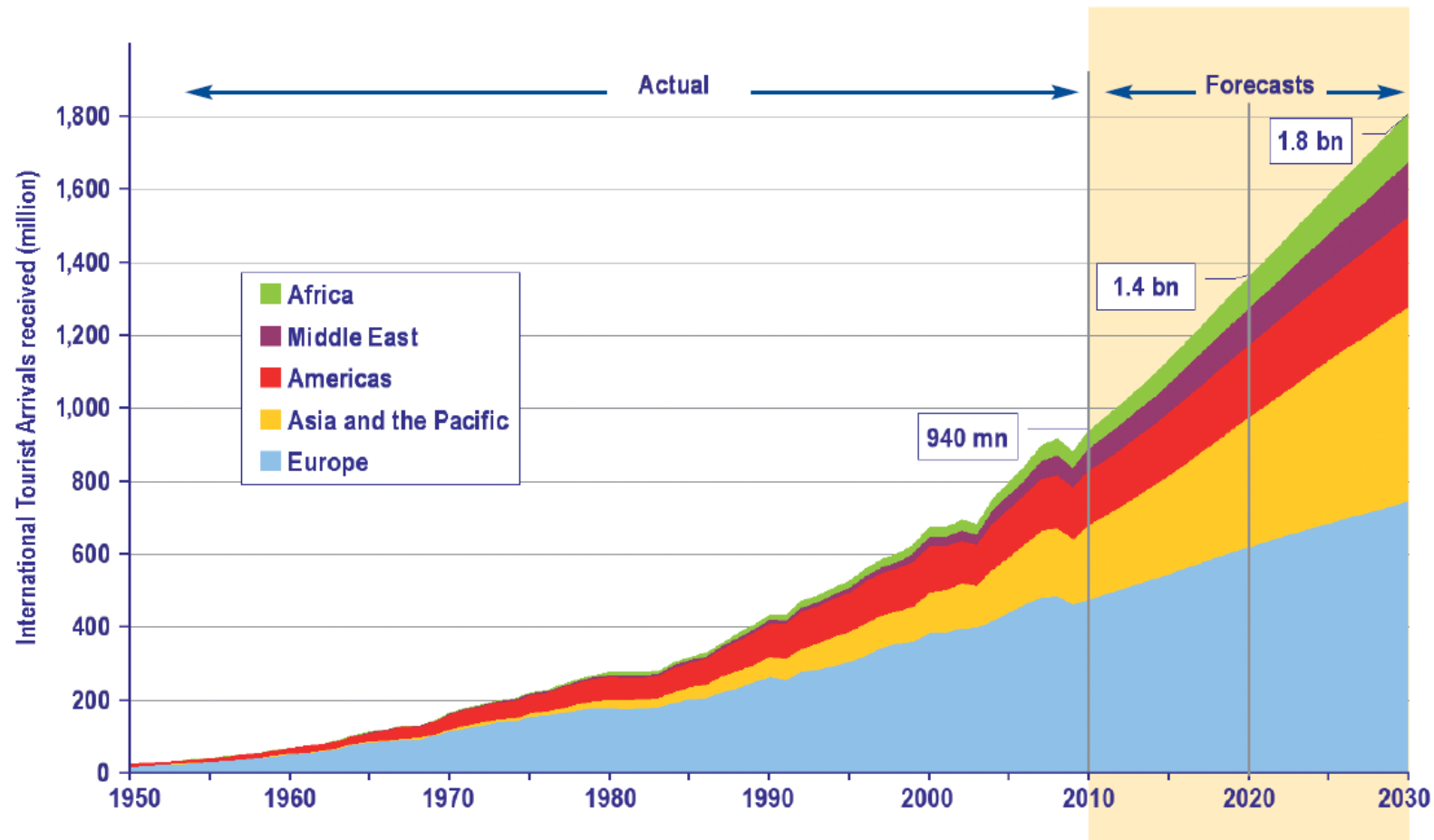


Artemisinin으로 노벨상 받은 중국 약학자



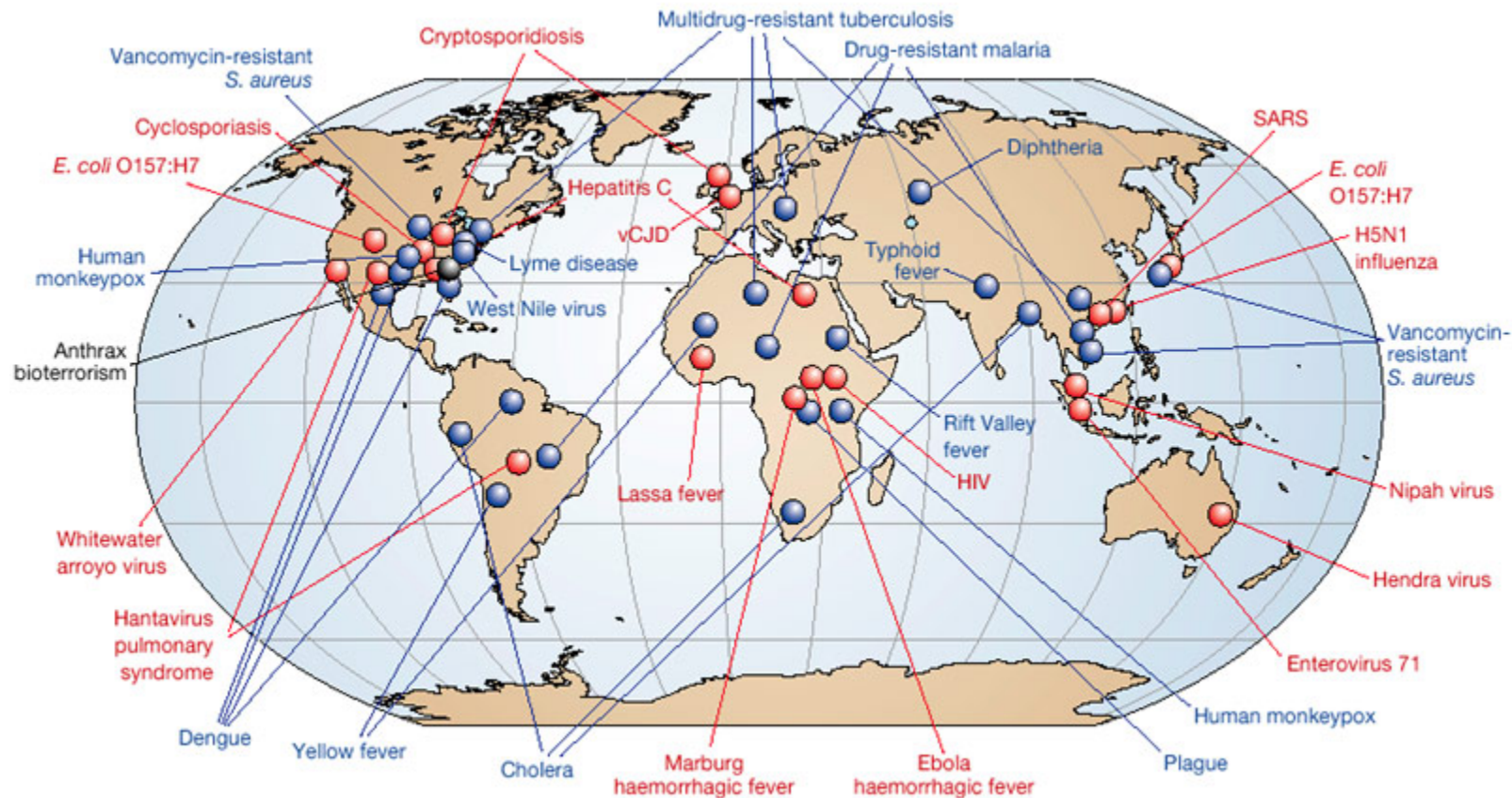
Artemisinin: 현재 열대열
말라리아 등에 최고의 약효

해외여행의 증가



새로운 감염병 및 재출현 감염병

(Emerging and re-emerging infectious diseases)



The challenge of emerging and re-emerging infectious diseases. Nature 430:242-9, 2004.

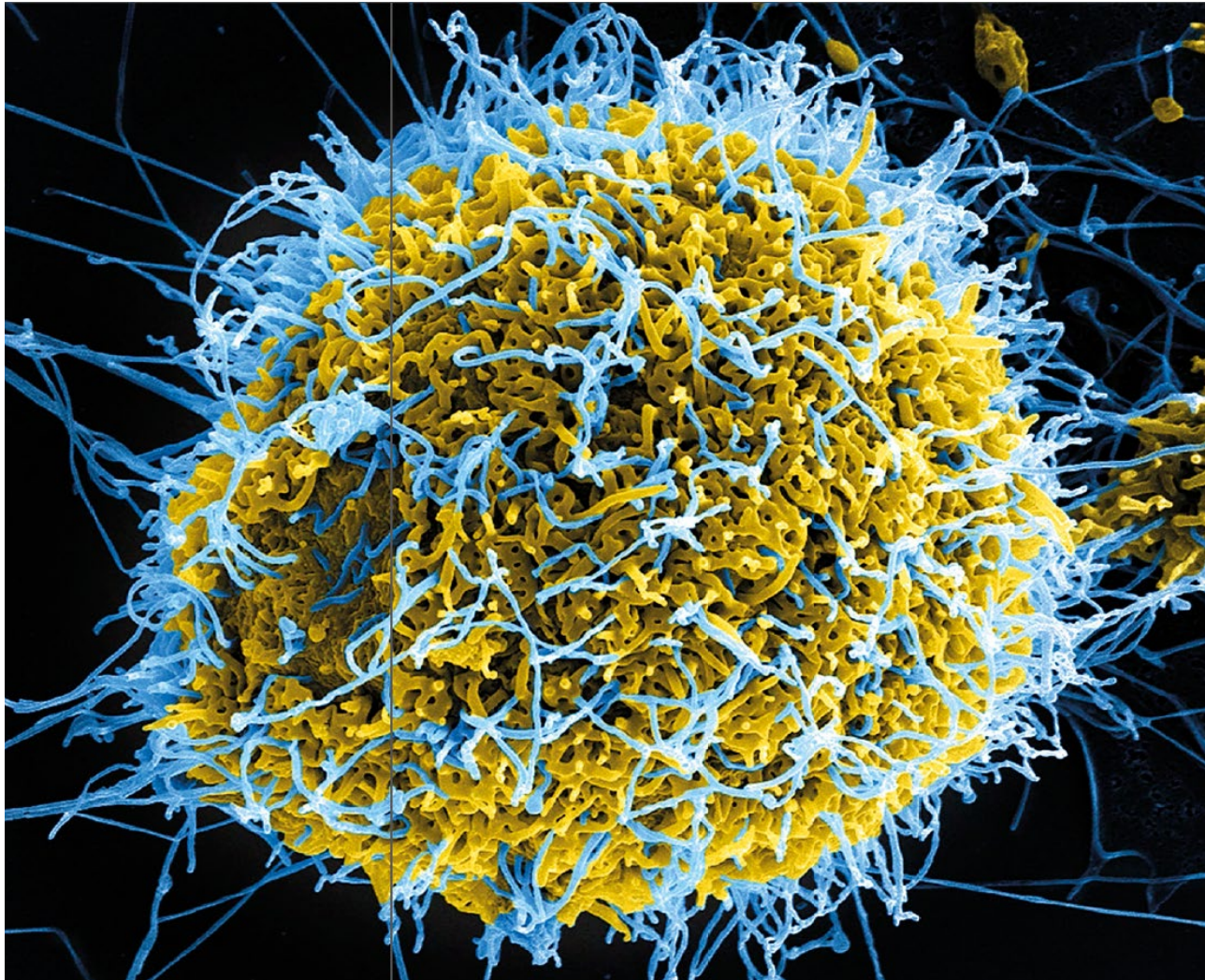
SARS



POLICE PROTECTION FROM SARS

In an effort to contain a [SARS outbreak in 2003](#), a military policeman, masked for protection, stands guard outside a 102-ward hospital in Taiwan, the first to be used solely for SARS sufferers

에볼라 바이러스에 감염된 세포

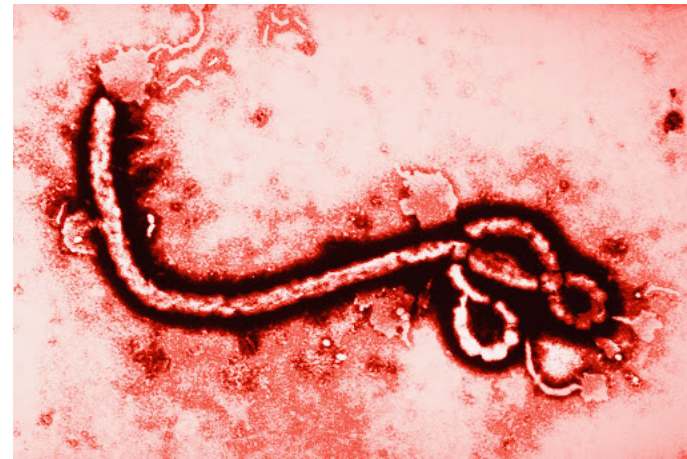


Ebola virus in an infected cell

An electron micrograph shows Ebola virus particles (in blue) budding from an infected cell. Once it has infiltrated the cell membrane, the virus colonizes the cell to reproduce.

에볼라 역학

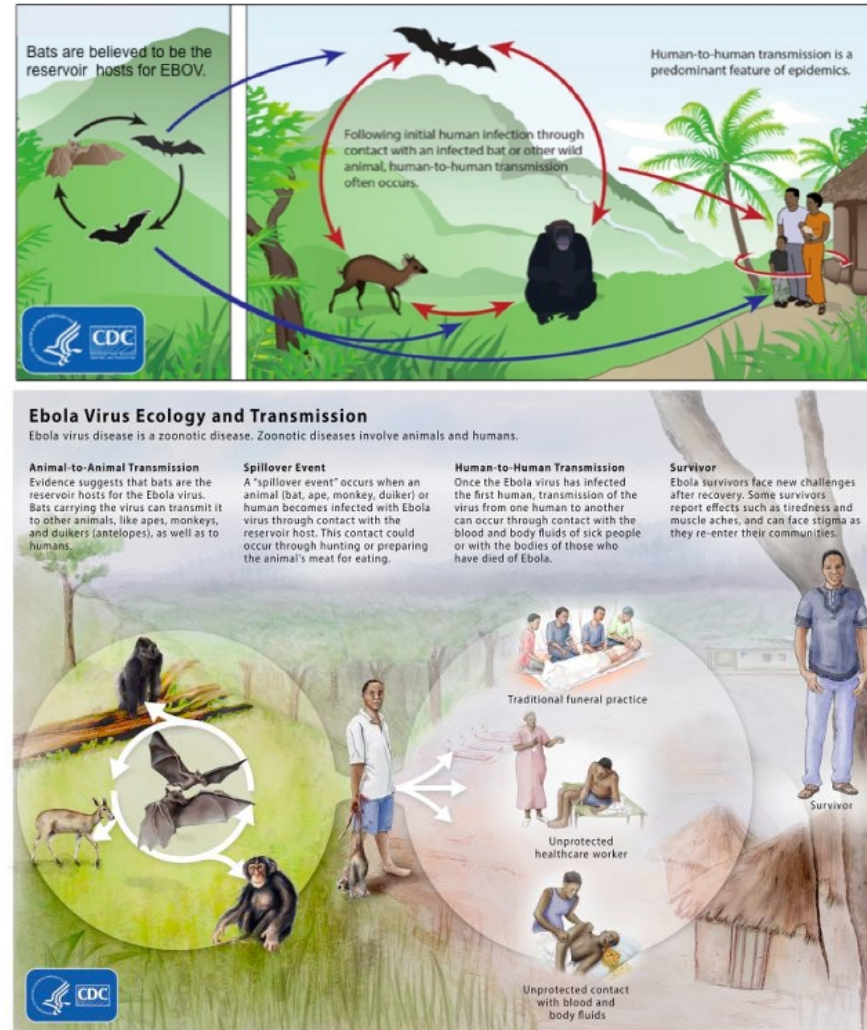
- 필로바이러스과
- 5가지 혈청형
 - Zaire(EBOV)
 - Sudan(SUDV)
 - Bundibugyo(BDBV)
 - Tai Forest(TAFV)
 - Reston(RESTV)
- 에볼라바이러스병은 1976년 콩고민주공화국에서 첫 유행



나이지리아의 Bushmeat와 과일박쥐



나이지리아의 라고스의 시장에서 한 여인이 야생동물 고기를 팔고 있다. 야생동물은 에볼라 바이러스의 숙주가 되기 쉽다. (사진=AFP)



에볼라바이러스의 진료: 접촉이 안 되므로 어려움 상당함



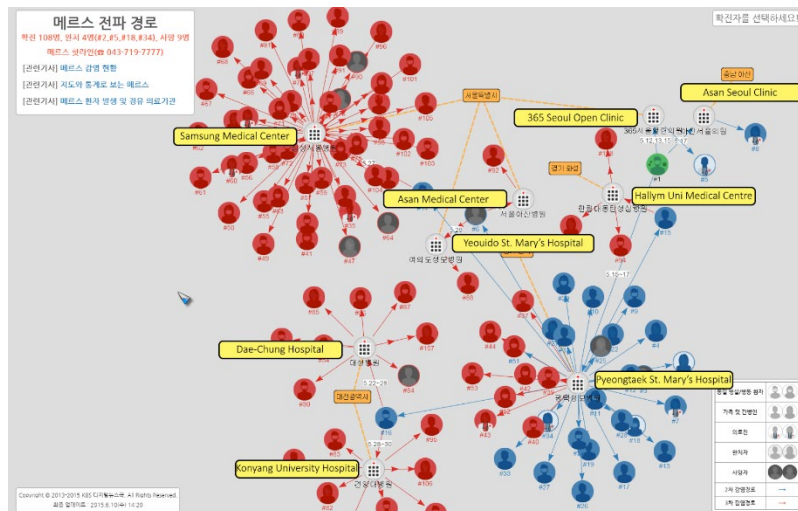
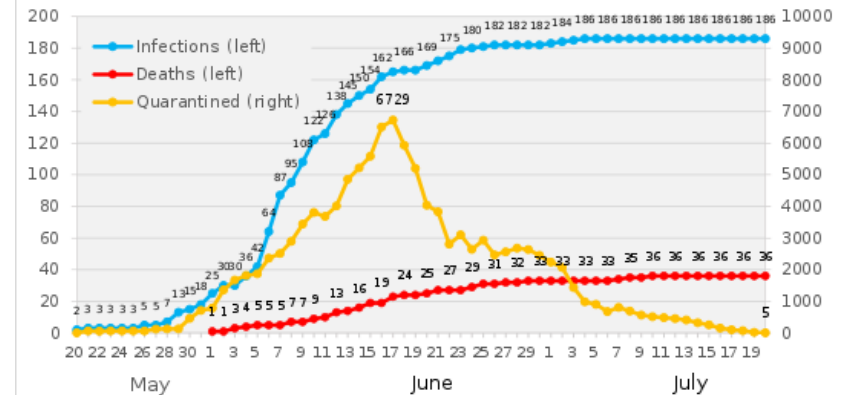
MERS와 한국에서의 유행, 2015년

HOW MERS GOT TO SOUTH KOREA

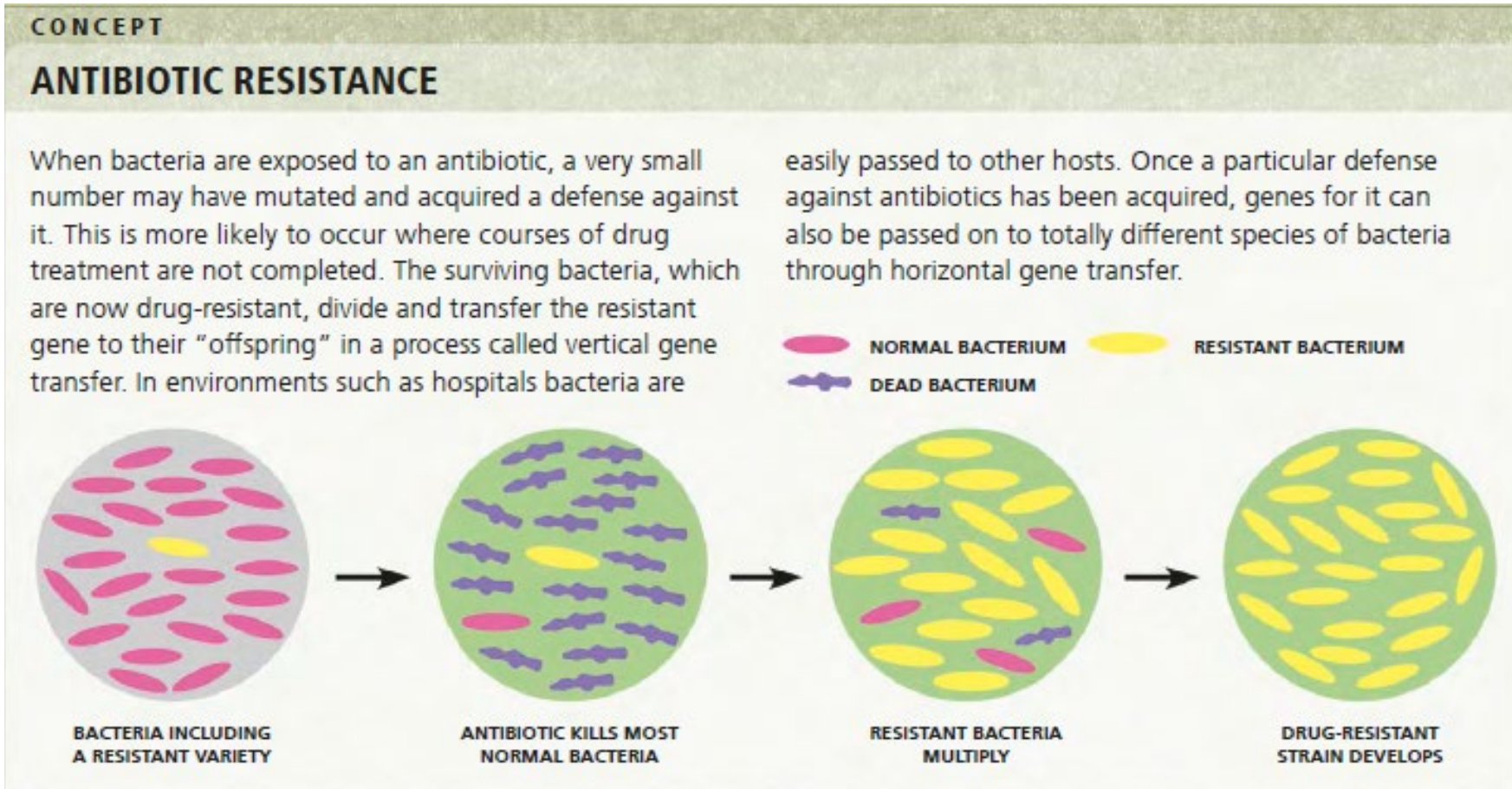


SOURCE: South Korean government, June 10, 2015

2015 MERS in South Korea



항생제 내성의 시대: Superbugs



어류 및 가축에 사용하는 항생제의 남용



Flagyl (for Giardia)



Ciprofloxacin



Doxycycline



Bactrim DS

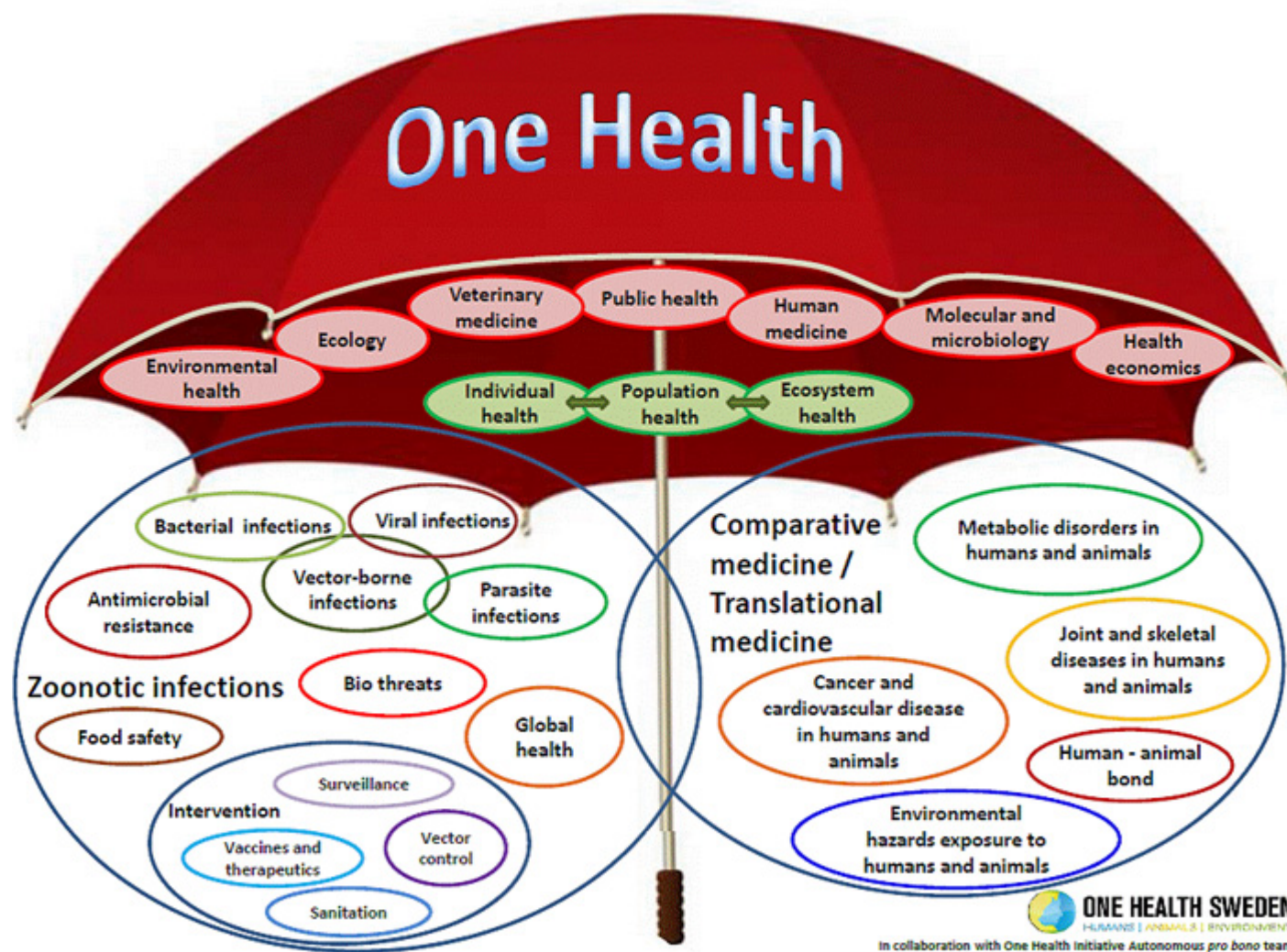


Amoxicillin

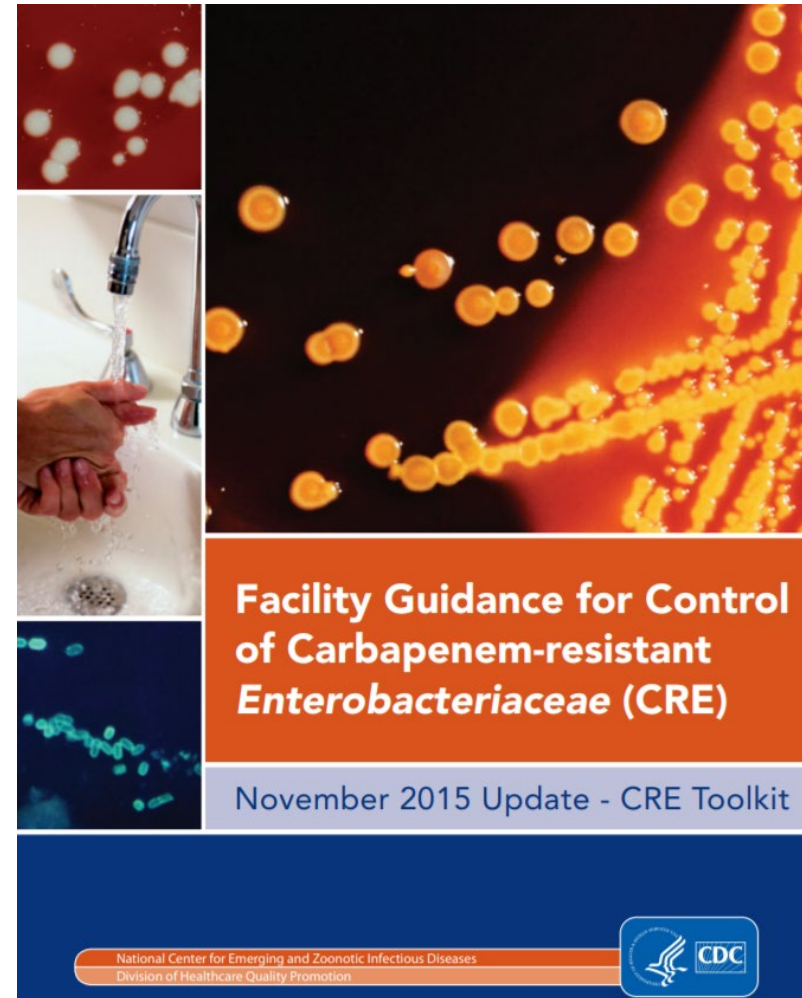
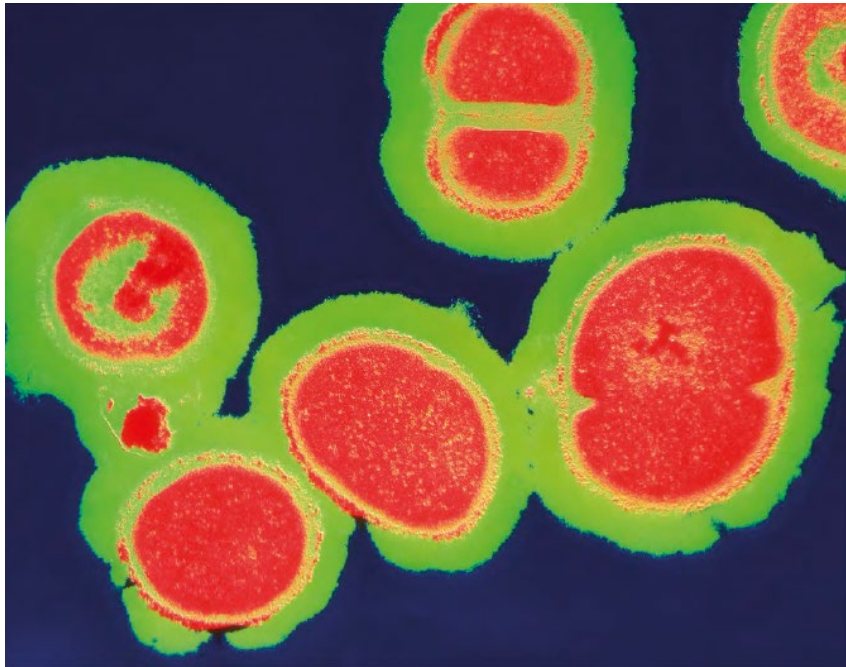
<http://thepreppepages.com/fish-antibiotics-for-preppers/>



원헬스 (one-health) 접근법

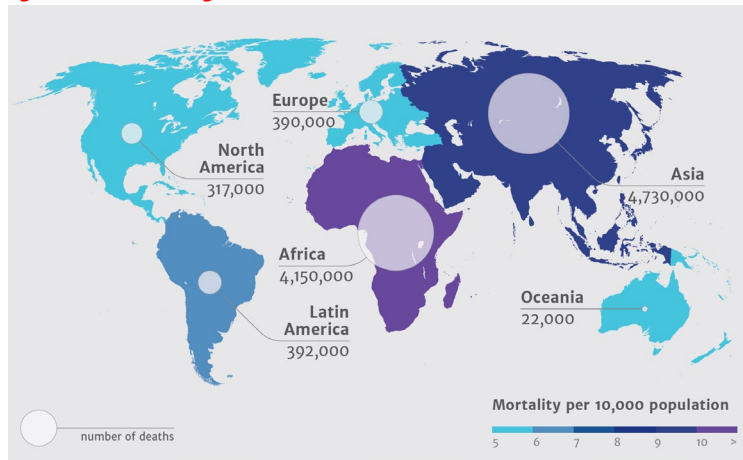


다제내성균: 항생제 후 시대를 우려

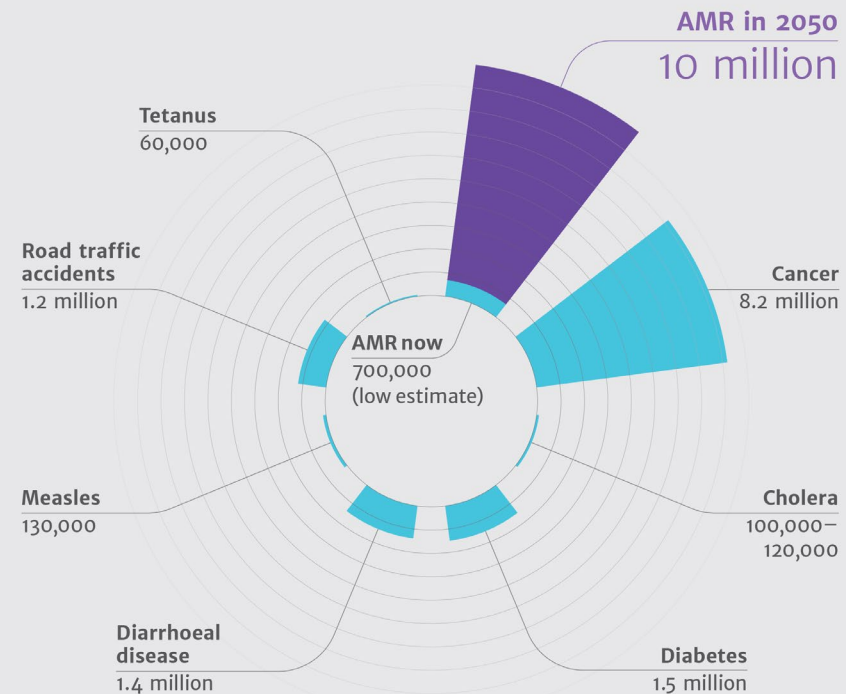


내성균의 문제, 국제적

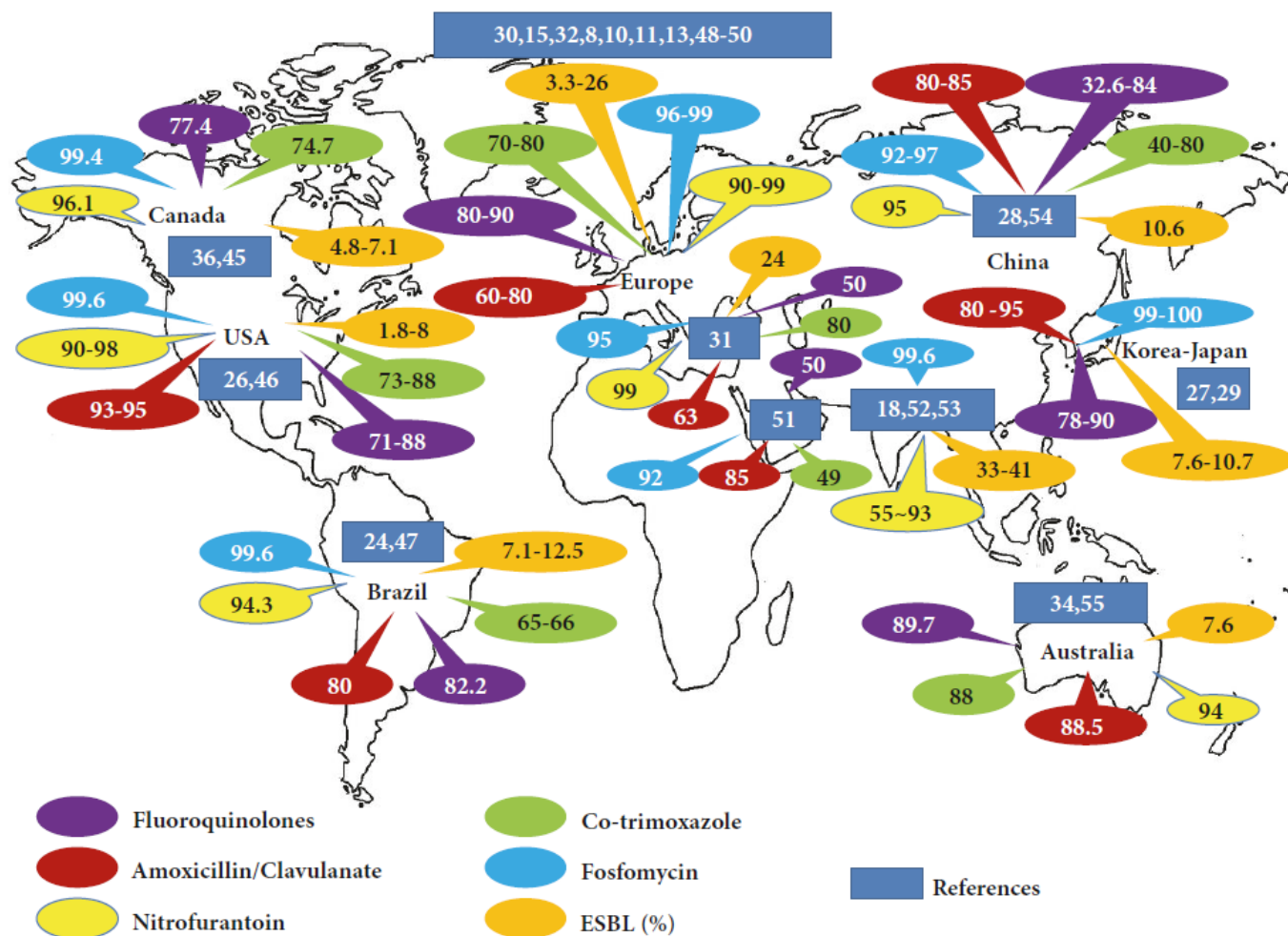
- Approximately **700,000** people die every year from antibiotic-resistant infections, and this number is projected to surpass **10 million per year by 2050**.



Deaths attributable to AMR every year compared to other major causes of death



지역사회 요로감염 대장균의 항생제 감수성



결어

- 의학은 인류의 삶과 함께 존재해 옴
- 감염은 인류의 가장 중요한 위협이었음
- 세균이론의 증명, 병원체와 감염의 병리에 대한 이해의 증가 (콜레라, 결핵 등) 등이 현재 감염 및 미생물학을 뒷받침 함
- 페니실린 후 많은 치료 약제(항생제)는 인류의 생명연장의 최대 공헌자
- 백신의 개발은 항생제와 더불어 큰 공헌
- 새로운 감염병의 출현, 다제내성균의 출현은 인류에게 다시 큰 위협으로 이에 대한 준비와 대비가 필요