John Hunter is sometimes called the ‘Father of scientific surgery’. He studied specimens and the outcomes of real operations to try and find new and better ways of treating patients. Many of the specimens in this Museum are related to major advances in surgery, medicine and public health. Read the following examples as you explore the Museum. Which development do you think has had the most impact?
The smallpox vaccine

For hundreds of years, people feared one disease more than any other: the 'speckled monster', or smallpox.

Take a look at the samples of skin, feet and a face from smallpox sufferers in the Crystal Gallery.

What is smallpox?
Smallpox is an acute contagious disease with no effective treatment. Nearly a third of those infected die and survivors may be scarred or suffer blindness.

Estimated 300 million people were killed by the virus.

Nearly two centuries later, the World Health Organisation launched an intensive plan of smallpox vaccination and in 1979 the disease was formally certified as eradicated.

A wide range of different vaccines are used today, to prevent many other diseases which were once commonplace. You've probably been vaccinated yourself.

Jenner’s milkmaids...
In 1796, after hearing that milkmaids who had suffered from a similar, but less dangerous disease – cowpox – never contracted smallpox, English doctor Edward Jenner injected eight year old James Phipps with pus taken from someone suffering from cowpox.

Like the milkmaids, Phipps never contracted the more deadly disease. After experimenting successfully on several other children, Jenner announced his discovery, using the word ‘vaccine’ from the Latin vacca, meaning cow.

More information
www.who.int/mediacentre/factsheets/smallpox/en/
www.bt.cdc.gov/agent/smallpox/overview/disease-facts.asp
www.bbc.co.uk/history/historic_figures/jenner_edward.shtml
www.jennermuseum.com
Antiseptics

A dirty business...

If you were unfortunate enough to need an operation in the eighteenth or early nineteenth century, your surgeon probably wore a bloody apron, used dirty knives and didn’t wash his hands before he started. Even if the operation itself was successful, you had a fifty-fifty chance of dying from an infection picked up on the operating table.

Look at the display about Joseph Lister and Louis Pasteur in the Science of Surgery Gallery.

Until Louis Pasteur’s studies of fermentation and putrefaction, people thought that infection – or sepsis – was caused by exposing the moist tissues of the body to air, and the standard approach to preventing infection was simply to cover up a wound.

Combating infection

Inspired by Pasteur’s work, English surgeon Joseph Lister questioned this, proposing that infection was caused by minute organisms.

He developed a solution containing carbolic acid and used this to sterilise surgical instruments and spray into the air during operations. When he directly applied this solution to wounds in 1865, the post-operation infection rate dropped dramatically. He called it an ‘anti’-septic because it prevented the wounds from going septic.

A lasting legacy

With the adoption of antiseptics, surgery became much safer, and surgeons could attempt more complex operations. We still use antiseptic procedures today; they are especially important for combating ‘superbugs’ such as MRSA.

More information

www.discoveriesinmedicine.com/A-An/Antisepsis.html
www.sciencemuseum.org.uk/broughttolife/people/josephlister.aspx
The tubed pedicle

The tubed pedicle was a revolutionary surgical technique developed in World War I. It helped save and transform the lives of thousands of seriously injured servicemen.

Read the stories of Private George Stone and Sergeant Sidney Beldam, and look at the displays nearby in the Science of Surgery Gallery.

‘War! What is it good for?’

In 1914, the First World War brought new horrors to the world as armed forces used heavy artillery, shells and machine guns on the battlefields of Europe. Many survivors suffered horrific injuries to their faces. The worst were unrecognisable when they returned home, their faces so mutilated they were unable to eat, drink or speak.

The first plastic surgeon?

After witnessing injuries first hand at the Western Front in 1916, New Zealand surgeon Sir Harold Gillies returned to England and created a specialist facial ward in a military hospital. After being inundated with 2,000 casualties after the Battle of the Somme, he set up an entire hospital in Sidcup, Kent, which went on to treat another 5,000 soldiers.

Combating infection

Gillies attempted to reconstruct the faces of his patients with tissue taken from other parts of the body. But without antibiotics, infections often developed. Gillies realised that if the grafted skin’s original blood supply was maintained, infection was less likely. And so the tubed pedicle was born. Gillies used a flap of skin from the patient’s chest or forehead and swung it into place on the face but the flap remained attached to its original location, sewn up into a tube to prevent infection. After several weeks, the flap was cut and repairs made.

This technique revolutionised the treatment of facial injuries in the early twentieth century. Today, the development of antibiotics and new microsurgery techniques (which enable plastic surgeons to connect tiny blood vessels together) have superseded it.

More information

www.projectfacade.com
Immunosuppressive drugs

Although there are many diseases which can be effectively treated, sometimes, when an organ becomes damaged, it will ultimately stop working and need to be replaced if the patient is to survive.

Early experiments with transplant surgery were unsuccessful because the recipient’s immune system rejected the tissue from another person. What was needed was a mechanism to reduce the activity of the body’s immune system to make transplants feasible.

**Look at the transplant display in the Science of Surgery Gallery.**

**I love you brother…**

The world’s first successful major organ transplant took place in Boston in 1954, when Richard Herrick received a kidney from his identical twin, Ronald. It saved his life – though he died seven years later when his new kidney also became diseased. This transplant worked because the twins’ tissues were similar enough to prevent rejection.

Inspired by this success, scientists experimented with a wide range of different treatments to try and prevent rejection, including exposure to radiation, infusion of bone marrow cells and the use of drugs.

**From rabbits to humans**

In 1959 Schwartz and Dameshak showed that the drug mercaptopurine prevented rabbits from producing anti-bodies against human tissue. Further experiments in dogs encouraged surgeon Sir Roy Calne to use a related drug in an experimental human kidney transplant in 1961. His first two patients died after a month. The third lived a year. By 1965 80% of patients who received a kidney from a live donor survived more than a year.

Today, surgeons can successfully transplant livers, hearts, lungs, bowels, stomachs, pancreases and even hands and faces.

In 2008, the total number of organ transplants completed in the UK was just under 10,300.

**More information**

[www.archive.sciencewatch.com/interviews/sir_roy_calne.htm](http://www.archive.sciencewatch.com/interviews/sir_roy_calne.htm)

The Microscope

Ask a dozen people to draw an image of a scientist at work and half of them will probably include a microscope in their sketch. It’s such a powerful device for seeing information usually hidden from our eyes, that scientists still rely on it, four hundred years since the first device was developed.

Look at the display of early microscopes and examine the slides in the Science of Surgery Gallery.

Taking a closer look

No-one’s quite sure who built the very first microscope, but by the early 1600s scientists around the globe were using them to peer into previously hidden worlds, and a spate of discoveries ensued. In 1661, Marcello Malpighi’s microscopic observations in Bologna confirmed William Harvey’s theory of blood circulation. In 1665, Robert Hooke described the thousands of tiny boxes he saw in a slice of cork, naming them cells.

In 1687 Dutch draper and amateur scientist Antonie van Leeuwenhoek, using his own homemade microscopes, was the first person to observe protozoa and bacteria (though he called them animalcules) in pond water, rain water and human saliva.

Ever since, scientists have used microscopes to help them observe smaller and smaller things, and by the twentieth century, electron microscopes enabled scientists to view strands of DNA or look at the structure of individual atoms. Science relies on observation and a lot of observation relies on microscopes.

More information

www.discoveriesinmedicine.com/Hu-Mor/Microscope-Compound.html