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Original Research

A history of Guy's, King's and St. Thomas' hospitals from 1649 to 2009: 360 Years of innovation in science and surgery

Riaz Agha [a,c,*], Maliha Agha [b,c]

[a] Department of Surgery, Ashford and St. Peter's Hospital NHS Foundation Trust, Surrey, UK
[b] Department of Public Health Sciences, School of Medicine, King's College London, London SE1 3QD, UK
[c] National Institute of Health and Clinical Excellence, UK

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Sir Samuel Wilks
John Hilton
Robert Bentley Todd
Sir William Bowman
Sister Mary Jones
Florence Nightingale's
Linda Richards
Joseph Lister
David Ferrier
Sir Charles Scott-Sherrington
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ABSTRACT

Much has been achieved in the scientific and surgical fields over the last 360 years. Some institutions have contributed disproportionately to these advances. The medical schools and hospitals of Guy's (est. 1721), King's (est. 1840) and St. Thomas' (est. 1173) seem to provide a focus and a catalyst for much innovation and creativity dating back to 1608. This review sets to provide an overview of the major contributors to surgical advances at these institutions over the last 360 years and what factors affected unique to these institutions contributed to the climate of discovery. It is based on a lecture given to the Osler Club of London (est. 1928) at the Royal College of Physicians in London on 4 November 2010. It is the author's premise that the people and the discoveries they made within these institutions within three square miles of London changed the practice and understanding of science and healthcare as we know it today.

* Corresponding author. Department of Surgery, Ashford and St. Peter's Hospital NHS Foundation Trust, Surrey, UK.
E-mail address: mail@riazagha.com (R. Agha).

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1. The origins of the hospitals

They are amongst the oldest hospitals in the world, having endured the Black Death, the plague, the War of the Roses, the Great Fire of London, the Blitz and over 60 years of NHS reforms. The maps below illustrate just how close in proximity these hospitals are as follows (Fig. 1).

1.1. St. Thomas hospital

Established in 1173, it was named after St. Thomas Becket, Archbishop of Canterbury from 1162 until his murder in 1170 (he was slaughtered by the King's knights in his own cathedral after a fall out with Henry II). The hospital was run by a mixed order of Augustinian monks and nuns. It provided shelter and treatment for the poor, sick and homeless free of charge. Today St. Thomas' Hospital is part of Guy's and St. Thomas' NHS Foundation Trust, with 900,000 patient contacts and 11,000 staff, it is one of the largest Foundation trusts in the UK (Fig. 2).

1.2. Guy's hospital

Established in 1721 by Thomas Guy, a Governor and benefactor of St. Thomas' Hospital. He was a publisher of unlicensed Bibles and made a fortune in the South Sea Bubble. After receiving his fellow Governors support he leased the southside of St. Thomas' Street for a peppercorn for 999 years (Fig. 3).

1.3. King's college hospital

Established in 1840 in Portugal Street close to Lincoln's Inn Fields, King's served as the training facility for medical students of King's

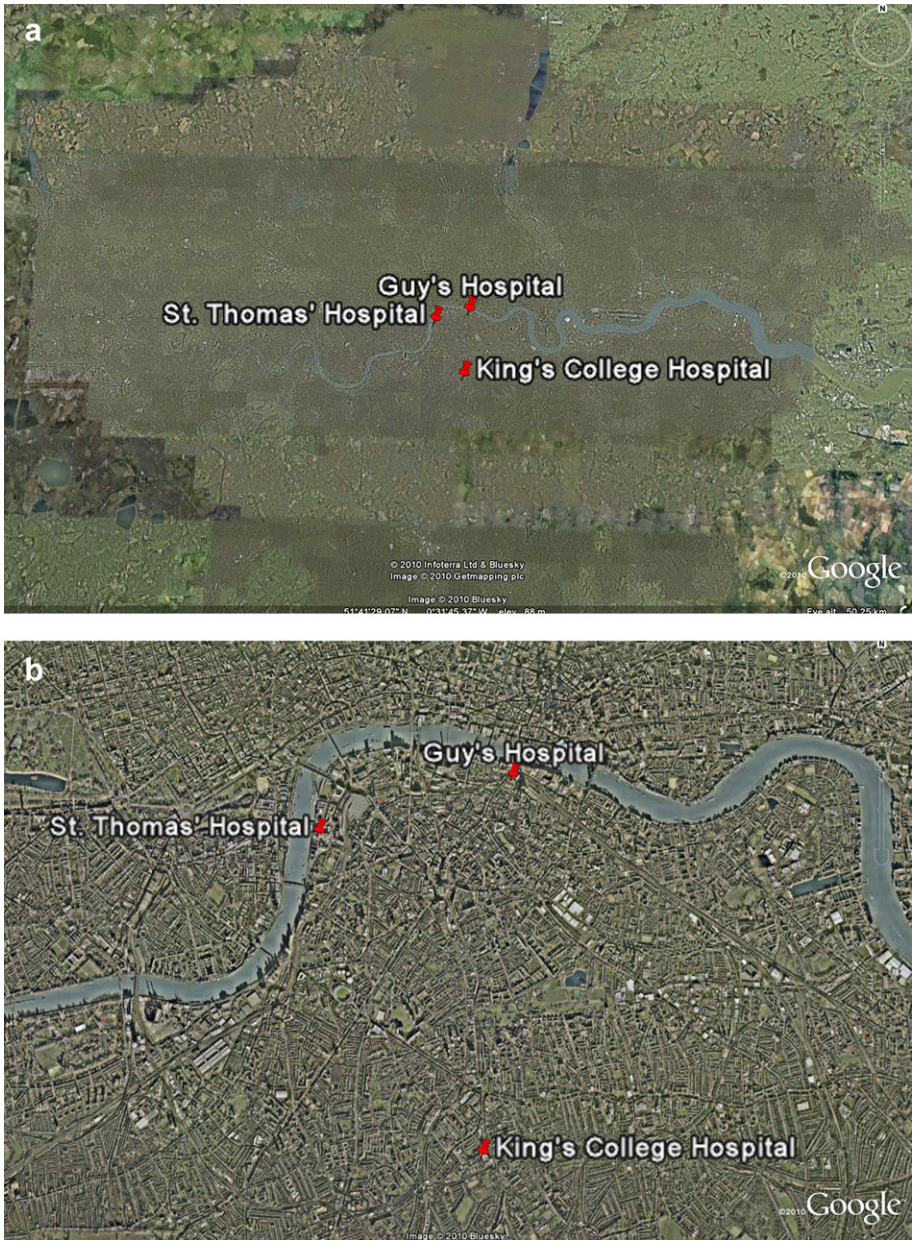

Fig. 1. Google Earth images illustrating the relationships of the three hospital sites to each other and the River Thames in London.

Fig. 2. St. Thomas' Hospital.

College London. The Surrounding area was composed of overcrowded slums characterised by poverty and disease. Within two years of opening, the hospital 1290 inpatients in 120 beds! In 1913 the hospital moved south of the Thames to Denmark Hill. HM The Queen opened the newest wing of the hospital in 2003. Today the hospital and its 7000 staff serve a community of 700,000 in the surrounding area (Fig. 4).

Fig. 3. Guy's Hospital.

2. The anatomical era

In 1649 **Thomas Wharton** (1614–1673) was appointed an anatomist at St Thomas' Hospital. He worked with John French, Oliver Cromwell's physician and was elected a fellow of the Royal College of Physicians in 1650. Wharton served as one of its censors six times between 1658 and 1673 and gave the Goulstonian lectures in 1652 or 1653.[1] In 1656 he published, at his own expense, his Latin treatise Adenographia,[2] "a description of the glands of the entire body," which he dedicated to the College of Physicians. His work gave the first thorough account of the glands of the human body, which Wharton classified as excretory, reductive, and nutrient. He differentiated the viscera from the glands and explained their relationship, describing the anatomy of the spleen and pancreas in great detail. Wharton discovered the duct of the submandibular salivary gland and the jelly of the umbilical cord, both of which are named after him. He provided the first adequate account of the thyroid and gave it that name. In addition, he explained the role of saliva in mastication and digestion. In 1657, Wharton was appointed physician to St Thomas's Hospital, London, a post he held for the rest of his life. Wharton was one of the very few physicians who remained at his post in London during the whole of the outbreak of the plague of 1665.

3. The rise of surgery

William Cheselden (1688–1752) studied anatomy in London under William Cowper and began lecturing in 1710. In 1713 he published *Anatomy of the Human Body* which became very popular and went through 13 editions. In 1718 he was appointed as an Assistant Surgeon at St. Thomas' Hospital becoming a full surgeon the following year. He was elected a fellow of the Royal Society in 1712. In 1733 he published Osteographia or the Anatomy of Bones, the first full and accurate description of the anatomy of the human

Fig. 4. King's College Hospital.

skeletal system. Cheselden retired from St Thomas' in 1738 and moved to the Chelsea Hospital. In 1744, he was elected to the position of Warden of the Company of Barber-Surgeons, and had a role in the separation of the surgeons from the barbers. In 1745, the independent Company of Surgeons was founded and would lead to the current Royal College of Surgeons of England.

Cheselden is credited with performing the first removal of congenital cataracts in 1728 in a 13-year old boy.[3,4] He is famous for the invention of the lateral lithotomy approach to removing bladder stones, first performed in 1727. In 1723 he developed the suprapubic approach, which he published in A Treatise on the High Operation for the Stone. He advanced the field of ophthalmic surgery through his operation, iridectomy, described in 1728, to treat certain forms of blindness by producing an artificial pupil. Other achievements include describing the role of saliva in digestion. He attended Sir Isaac Newton in his last illness and was an intimate friend of Alexander Pope and of Sir Hans Sloane. He is often referred to as the "father of modern surgery" having established its place as a scientific discipline (Fig. 5).

The focus on anatomy continued when in 1789, **Astley Cooper** (1768–1841) was appointed as assistant to Henry Cline, whom he succeeded as lecturer in anatomy and surgery at St. Thomas' hospital. He was appointed as a surgeon to Guy's Hospital in 1800, but carried on lecturing at St. Thomas's until 1825. The son of clergyman, his paternal grandfather and uncle were prominent surgeons. William Cooper – his uncle – was on the staff at Guy's already, and Astley studied medicine under his tutelage. He won the Copley Medal in 1800. His greatest contribution was in the field of vascular surgery, particularly the cerebral circulation. He was the first to experimentally demonstrate the effects of bilateral ligation of the carotid arteries in dogs and to propose treatment of aneurysms by ligation of the vessel. In 1805 he published in the first volume of Medico-Chirurgical Transactions, his attempt to tie the common carotid artery for treating an aneurysm in a patient – it failed. In 1808 he tried successfully to ligate the external iliac artery for a femoral aneurysm and in 1817 he ligated the aorta for an iliac aneurysm, although the patient died the next day.

When he retired, he became embroiled in a dispute over his succession that led him to lobby for the creation of a rival anatomy school at Guy's – this became known as the 'great dispute', and soured relations between the two hospitals (Fig. 6).[5]

Cooper was indefatigable and innovative anatomist[6] and described several new anatomical structures and diseases[7–12] which likewise became eponymous.

3.1. New structures

- Cooper's fascia – over the spermatic cord
- Cooper's pubic ligament – the superior pubic ligament
- Cooper's stripes – a fibrous structure in the ulnar ligaments
- Cooper's ligaments – the suspensory ligaments of the breasts.

Fig. 5. William Cheselden.

Fig. 6. Sir Astley Cooper.

3.2. New diseases

- Cooper's testis (neuralgia of the testicles)
- Cooper's disease (benign cysts of the breast)
- Cooper's hernia (retroperitoneal hernia)
- Cooper's neuralgia (neuralgia of the breast)

In 1820 he removed an infected sebaceous cyst from the head of King George IV. He was subsequently appointed sergeant surgeon to King George IV, King William IV and Queen Victoria. He served as President of the Royal College of Surgeons in 1827 and again in 1836, and he was elected a Vice-President of the Royal Society in 1830. In 1821, he was elected a foreign member of the Royal Swedish Academy of Sciences. He died on 12 February 1841 in London, and was interred, by his own desire, beneath the chapel of Guy's Hospital. A statue by Edward Hodges Baily was erected in St Paul's Cathedral.

Thomas Wakley (1795–1862) was born in Devon in 1795 to a prosperous farmer and his wife. In his early teens he was apprenticed to a Taunton apothecary. Young Wakley was a sportsman, and a boxer fighting bare-fisted in public houses. He went to London, where he attended anatomy classes at St Thomas' Hospital, eventually enrolling in medical school at Guy's and St. Thomas'. The dominant personality of the day at these two hospitals was Sir Astley Cooper who taught Wakley and left a lasting impression. Wakley qualified as a Member of the Royal College of Surgeons in 1817 aged 22. The following year he co-founded the Lancet which was extremely successful; by 1830 it had a circulation of circa 4000 (Fig. 7).

At first the editor of the Lancet remained anonymous and rumours began to circulate. After the journal began printing the content of Sir Astley Cooper's lectures, the great man paid a surprise visit to his former pupil to discover Wakley correcting the proofs of the next issue. Wakley's discomfort at his lost anonymity so pleased Cooper that they were able to have a friendly discussion and reach a mutual agreement.[13]

The Lancet then was a campaigning journal, and began a series of attacks on the medical practitioners of the day. In opposition to the hospital surgeons and physicians Wakley published reports of their lectures and exposed their malpractices. He had to fight

Fig. 7. Thomas Wakley.

a number of lawsuits, which only increased his influence. He attacked the whole constitution of the Royal College of Surgeons, and obtained so much support from among the general body of the profession, now roused to a sense of the abuses he exposed, that in 1827 a petition to Parliament resulted in a return being ordered of the public money granted to it.[14]

Wakley's campaigning was rough and outspoken:

> *[We deplore the] "state of society which allows various sets of mercenary, goose-brained monopolists and charlatans to usurp the highest privileges…. This is the canker-worm which eats into the heart of the medical body."*[15]
>
> *"The Council of the College of Surgeons remains an irresponsible, unreformed monstrosity in the midst of English institutions – an antediluvian relic of all… that is most despotic and revolting, iniquitous and insulting, on the face of the Earth."*[16]

He was especially severe on whomever he regarded as quacks. The English Homeopathic Association was "*an audacious set of quacks*" and its supporters "*noodles and knaves, the noodles forming the majority, and the knaves using them as tools*".[17]

Subsequent legislation and reforms in governing charters were for many years influenced by his campaign.[18] Wakley also became a member of parliament and his social policies were way ahead of their time – arguing against flogging and for the need of shops to be open on Sundays.

4. An obstetrician gives birth to the blood transfusion

In the 19th Century, **James Blundell** (1791–1878) studied medicine at Guy's Hospital under his uncle John Haighton. Like his

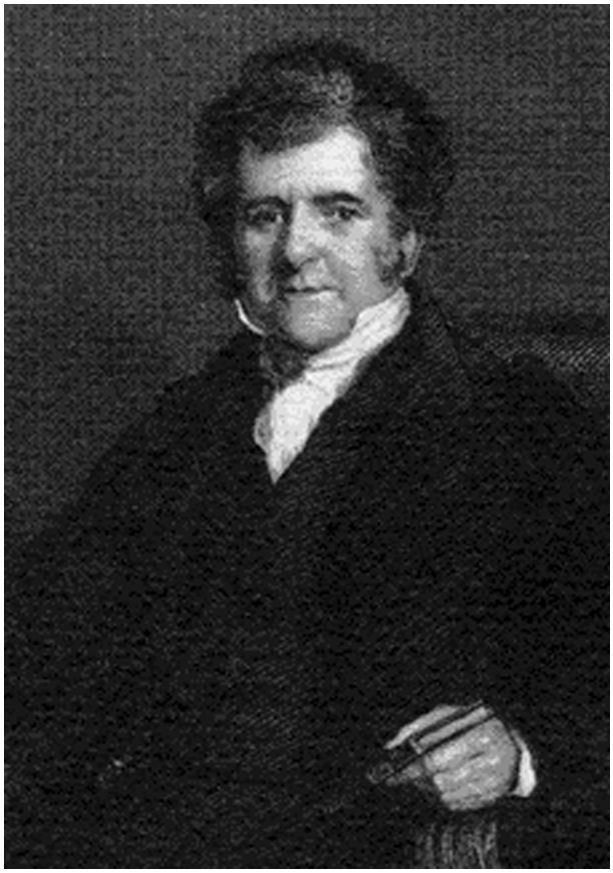

Fig. 8. Richard Bright.

uncle, who had developed several instruments still used today during delivery, James specialised in the field of obstetrics. He began his career in 1814 in London by lecturing on midwifery and physiology and became a lecturer in both at Guy's Hospital in 1818. His classes on obstetrics and gynaecology were reputed to be the largest in London.

Blundell had seen many of his patients dying in childbirth from post-partum haemorrhage. In 1818, he determined that a blood transfusion would be an appropriate solution and conducted a series of experiments using animals. He observed that as long as the blood was transfused rapidly, it would be successful with a syringe even after it had been collected in a container – Blundell invented the syringe. In 1829 he performed the first successful human to human transfusion, extracting four ounces of blood from the arm of the patient's husband using a syringe, and successfully transfused it into the patient. Over the next five years, he conducted ten documented blood transfusions, five of which were beneficial to the patients and published these results.[19] During his life he also devised many instruments for the transfusion of blood, many of which are still in use today. He became the author of Researches Physiological and Pathological in 1824 and wrote two papers on abdominal surgery and blood transfusion. Later publications include Principles and Practice of Obstetrics in 1834 and Observations on some of the More Important Diseases of Women in 1837. In using the uterine sound for diagnostic purposes, he was considered more advanced than other obstetricians of the day.

5. The three greats

In the first half of the 19th Century, Richard Bright, Thomas Addison and Thomas Hodgkin were all practicing physicians at Guy's Hospital, eventually to become known as the "three greats". They are known not just for their eponymous diseases but also for applying the scientific method to the study of illness by coupling together the study of living patients and post-mortem findings – following on from the work of John Hunter and his nephew Matthew Baillie. All three made substantial contributions to the burgeoning field of pathology.

Fig. 9. Thomas Addison.

During the 1820s and 1830s, **Richard Bright** (1789–1858) worked at Guy's Hospital; teaching, practising and researching medicine. Bright published a two-volume "Reports of Medical Cases (1827–1831)"; he also contributed to the differentiation of renal from cardiac oedema. His research into the causes and symptoms of kidney disease led to his identifying what became known as Bright's disease or nephritis.[20] For this, he is considered the "father of nephrology". His seminal papers on renal disease were published in the first volume of Guy's Hospital Reports of 1836 (Fig. 8).

In 1835 **Thomas Addison** (1793–1860) was joint lecturer with Richard Bright on practical medicine, and in 1837 became a full physician at Guy's Hospital. When Bright retired from the lectureship in 1840 Addison became sole lecturer. He held this position until about 1854–55. At that time, when medical students paid fees for separate courses of lectures, they searched throughout the city for the most attractive teachers. Addison was a brilliant lecturer and attracted huge audiences of medical students to his lectures, despite being famously nervous about public speaking (Fig. 9).

Addison gave one of the first adequate accounts of appendicitis and wrote a valuable study on the actions of poisons. He is known for describing or making seminal contributions[21] to a remarkably wide range of diseases including:

- Addison's disease
- Addisonian crisis
- Addisonism
- Addison-Biermer disease (now pernicious anaemia)
- Addison-Schilder syndrome
- Alibert's disease (false keloid) and morphea (true keloid)
- Allgrove's syndrome
- Rayer's disease

Fig. 10. Thomas Hodgkin.

Thomas Addison was a superb diagnostician and one of the most respected physicians at Guy's Hospital where he exerted a great deal of influence but devoted himself almost wholly to his students and patients.

Thomas Hodgkin (1798–1866) was considered one of the most prominent pathologists of his time and a pioneer in preventive medicine. He first described abnormalities in the lymph system in 1832. His account of Hodgkins lymphoma and subsequent work marked the beginning of times when a pathologist was actively involved in the clinical process (Fig. 10).

His greatest contribution to the teaching of pathology was made in 1836 and 1840, with his two-volume work entitled The Morbid Anatomy of Serous and Mucous Membranes, which became a classic in modern pathology. Hodgkin was one of the earliest defenders of preventive medicine, having published his book on the Means of Promoting and Preserving Health in 1841. Among other early observations were the first description of acute appendicitis, the biconcave shape of red blood cells and the striation of muscle fibres.

6. Introducing conservative surgery

Sir William Fergusson (1808–1877) was a Scottish Surgeon originally educated at the University of Edinburgh and trained at the Edinburgh Royal Infirmary. He was appointed in 1840 as Professor of Surgery at King's College Hospital at the age of 32. Shortly afterwards he was appointed surgeon to Queen Victoria. He rapidly rose to become the most famous surgeon of his day. He revived the operation for cleft palate and diseases of the jaw and invented many surgical instruments (including the vaginal speculum). He is best known for introducing the concept of conservative surgery, by which he meant excision of a joint rather than the amputation of a limb. In 1866 he was made a baronet.

He drew crowds to King's to see him operate. In the pre-anaesthetic period, speed was vital. It was said that if you blinked during one of his lithotomies, you missed it entirely. He was known for making his diagnosis with almost intuitive certainty. As an operator he was characterised by self-assurance in the most critical of

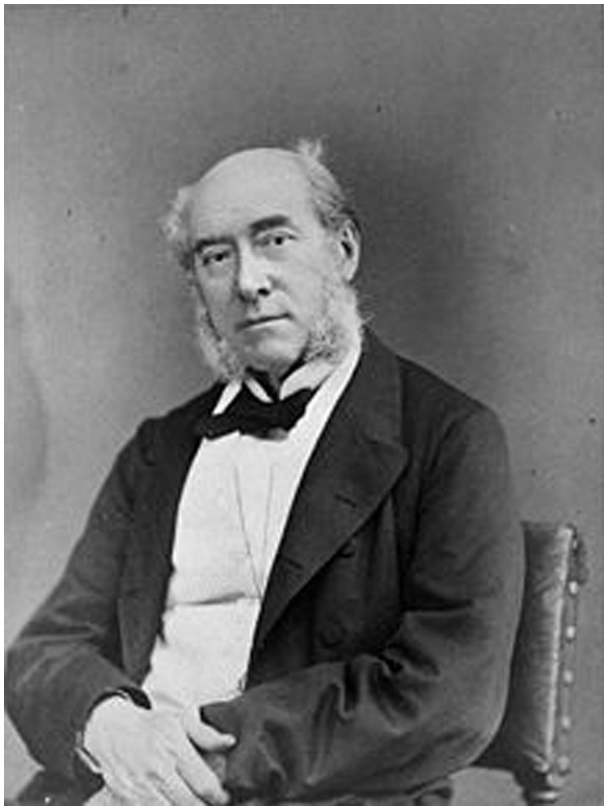

Fig. 11. Sir William Fergusson.

circumstances, by minute attention to details and by great refinement of touch. He relied more on his manual dexterity than on complicated instruments. He was the author of The Progress of Anatomy and Surgery in the Nineteenth Century (1867), and of a System of Practical Surgery (1842), which went through several editions. He died in London on February 10, 1877, of Bright's disease (Fig. 11).

7. The birthplace of modern epidemiology

Richard Bright's brother-in-law was **Benjamin Guy Babington** (1794–1866), who studied medicine at Guy's and Cambridge. In 1850 he founded the London Epidemiological Society and was its President until 1864.[22] In 1986 Geoffrey Rose wrote[23] 'If the origin of epidemiology as a branch of medical science were to be given a date it would be 1850'. Babington delivered his inaugural address to the Epidemiological Society on 2 December 1850 in the presence of about 100 members and visitors. His address was masterful, 'The object of this Society I take to be to endeavour, by the light of modern science, to review all those causes which result in the manifestation and spread of epidemic diseases – to discover causes at present unknown, and investigate those which are ill understood – to collect together facts, on which scientific researches may be securely based – to remove errors which impede their progress – and thus, so far as we are able, having made ourselves thoroughly acquainted with the strongholds of our enemies, and their modes of attack, to suggest those means by which their invasion may either be prevented, or if, in spite of our existence, they may have broken in upon us, to seek how they may be most effectually combated and expelled'.

The Epidemiological Society was organized into a number of Committees, including Smallpox and Vaccination, Cholera, Epizootic, Hospital and Continued Fever.[24] The Society's Reports 'On the State of Smallpox and Compulsory Vaccination' during the 1850s

Fig. 12. Sir Samuel Wilks.

Fig. 13. John Hilton.

were highly influential with the Government. In the first instance the Committee had elicited the views of 2000 Medical men in the United Kingdom and the British Empire. The Compulsory Vaccination Act of 1853 was, in large part, based upon the Society's advice.[25]

Babington was also a great clinician and was the first to describe hereditary telangiectasia in 1865,[26] and was the inventor of the indirect laryngoscope in 1829.[27,28] In 1907 the Epidemiological Society joined with others to form the Royal Society of Medicine (RSM).[29]

8. Queen Victoria's extraordinary physician and surgeon

Sir Samuel Wilks (1824–1911) was a collaborator and biographer of the "Three Great" contemporary physicians at Guy's. He studied medicine at Guy's Hospital from 1842 to 1846 and then became a physician and lecturer in Medicine at Guy's. From 1866 to 1870 he was Examiner in the Practice of Medicine at the University of London and from 1868 to 1875 Examiner at the Royal College of Surgeons.

Wilks recognized ulcerative colitis in 1859, differentiating it from bacterial dysentery. His work was confirmed later (1931) by Sir Arthur Hirst. In 1868, he published the characteristic symptoms of alcoholic paraplegia (later to be named Korsakoff's syndrome). Wilks described the first case of myasthenia gravis, in 1877 (Fig. 12).[30–32]

Wilks had an enormous appetite for medicine and his many services and honors included; President of the Pathological Society (1881–1882), President of the Neurological Society (1887), member of the Senate of the University of London (1887–1900), member of the General Medicine Council (1887–1896) and President of the Royal College of Physicians (1896–1899) and was named Physician Extraordinary to Queen Victoria in 1897.

John Hilton (1805–1878) entered medical school at Guy's Hospital in 1824 and was appointed Demonstrator in Anatomy in 1828. Hilton was considered by some to be one of the greatest anatomist's of his time and was nicknamed "Anatomical John".[33] At the age of 34 he was appointed Fellow of the Royal Society based largely on his anatomical work especially the laryngeal nerves. A few years later Hilton was elected one of the Charter Fellows of the Royal College of Surgeons and in 1849 became a full surgeon at Guy's Hospital. Hilton was appointed Hunterian Professor of Human Anatomy at the RCS from 1859 to 1862 and became President in 1867. In 1871 he was appointed Surgeon-Extraordinary to Queen Victoria (Fig. 13).

Working in the pre-anaesthetic, pre-Listerian age of surgery, he was a cautious surgeon who relied on deep anatomical knowledge.[34] He was a very skilful observer, shrewd clinically and could interest students in the most mundane of topic. Between 1860 and 1862 while Professor of Anatomy to the Royal College of Surgeons, he delivered a series of lectures which became the basis for his classic, "On Rest and Pain" (originally published as, "On The Influence of Mechanical and Physiological Rest In The Treatment of Accidents and Surgical Diseases, And The Diagnostic Value of Pain"). His lecture on "hip-joint disease" was the first description of "sympathetic pain" in which "one of the earliest symptoms is remote from the actual seat of mischief." In particular he recognized the importance of knee symptoms in hip disease as a result of the innervation supplying both joints. He is perhaps best known for Hilton's Law:

> *"The nerve supplying a joint also supplies the muscles that move the joint and the skin covering the articular insertion of those muscles."*

However, it was he who together with Joseph Towne the artist, enriched Guy's Hospital with its unique collection of models. His grasp of the structure and functions of the brain and spinal cord was far in advance of his contemporaries. He detailed a method for opening deep abscesses which is known by his name. He was the first to reduce an obturator hernia by abdominal section and one of the first to practise lumbar colostomy.

Robert Bentley Todd (1809–1860) was the second of 16 children born in Dublin. Todd came to London in 1831. At the age of 27, he was elected to the Chair of Physiology and Morbid Anatomy at King's College in 1836. He was a brilliant administrator and organiser, revising the medical curriculum to emphasise the new scientific knowledge and principles, especially in the fields of anatomy, physiology and pathology. Described as one of the three greatest clinical teachers in Europe, he became Dean in 1842, transforming the Medical Department of King's College from the one of the worst in London, with only 42 students in 1836, to one of the best with 169 students in 1853.

He was a moving force behind the founding of the 1st and 2nd King's College Hospital and established the first London nurse training school. With Bowman he pioneered the microscope as an instrument of diagnosis and published 'Physiological Anatomy of Physiology of Man' in 1843, the standard textbook of the day. He became a leading physician in nervous system disorders. He died of liver disease at the age of 50 just before the rebuilt second hospital opened. His statue now stands in front of the Hambleden Wing main entrance.

Sir William Bowman (1816–1892) was originally apprenticed to a surgeon in Birmingham and came to King's in 1837 aged 21 to study for the MRCS. He soon came under the influence of Todd, working with him on his textbook 'Physiological Anatomy of Physiology of Man'. Bowman himself published on the microscopic structures of the skin, sense organs, nerves, the lining of alimentary canal, lungs, liver, kidneys (Bowman's capsule), testes, muscles – voluntary and involuntary, bone and cartilage. He was Surgeon to King's College Hospital from 1840 to 1865 before moving to Moorfield's Eye Hospital. He was one of the greatest ophthalmic surgeons of the time and helped to found the Ophthalmological Society of the United Kingdom.[35]

9. Pioneering nurses – order out of chaos

In the mid 19th Century, King's College Hospital was small in size and reputation when compared to Guy's or St Thomas', it was soon to become the most famous hospital in the world at the time. Under the supervision of Sister Mary, the nurses of St John's House took charge of the hospital wards and King's had the world's first training school for nurses founded in 1857. Under **Sister Mary Jones** (1812–1887), the order of decency and cleanliness of the wards at King's became one of the wonders of the 19th century and delegations arrived from all over the world to study the system.

Florence Nightingale's (1820–1910) was a nurse at St. Thomas, believing that God had called on her to be a nurse. She conducted pioneering work in the Crimean War, tending to wounded soldiers – known as "the lady with the lamp". Nightingale laid the foundation for professional nursing. In 1860 she started her Nursing School at St. Thomas, the first secular nursing school in the world. Nightingale's most famous pupil was **Linda Richards** (1841–1930). She was the first professionally trained American Nurse. Following seven months of training under Nightingale, she established nursing training programs in the US and Japan and created the first system for keeping individual patient records.[36]

10. The Listerian era

Joseph Lister (1827–1912) arrived at King's College Hospital in 1877 from Edinburgh to replace Sir William Ferguson. The appointment could not have been made easily as Lister was a Quacker. He ended up converting to the Anglican faith following his marriage to the daughter (Agnes) of his Consultant Mr James Syme in Edinburgh. Whilst at Edinburgh Lister became aware of a paper published (in French) by Louis Pasteur which showed that rotting and fermentation could occur without any oxygen if microorganisms were present. Lister confirmed this with his own experiments. If microorganisms were causing gangrene, the problem was how to get rid of them. Pasteur suggested three methods: filter, heat, or expose them to chemical solutions. The first two were inappropriate in a human wound, so Lister experimented with the third.

Fig. 14. Lord Joseph Lister.

Carbolic acid (phenol) had been in use as a means of deodorising sewage, so Lister tested the results of spraying instruments, the surgical incisions and dressings with a solution of it. He even made surgeons wear clean gloves and wash their hands before and after operations with 5% carbolic acid solutions. Instruments were also washed in the same solution and assistants sprayed the solution in the operating theatre. Lister found that carbolic acid solution swabbed on wounds remarkably reduced the incidence of gangrene and published a series of papers on his research in the Lancet.[37–41]

As Robert Kock's germ theory of disease became more widely accepted, preventing bacteria from getting into wounds in the first place became a priority and Lister augmented his views. This led to the rise of sterile surgery which Lister took to a new level at Kings.[42] Today Lister is considered the father of modern antisepsis (Fig. 14).

He became only the second man in England to operate on a brain tumour. He developed a method of repairing kneecaps with metal wire and improved the technique of mastectomy. Lister was president of the Royal Society between 1895 and 1900. His discoveries were greatly praised and he was made Baron Lister of Lyme Regis in 1897[43] and became one of the twelve original members of the Order of Merit and a Privy Councillor in the Coronation Honours in 1902.[44] Despite suffering a stroke, he still came into the public light from time to time. Edward VII came down with appendicitis two days before his coronation. The surgeons did not dare operate without consulting Britain's leading surgical authority. The King later told Lister, "I know that if it had not been for you and your work, I wouldn't be sitting here today". Lister died on 10 February 1912 at his country home in Kent at the age of 84. Following his death, a Memorial Fund was set up in his name to

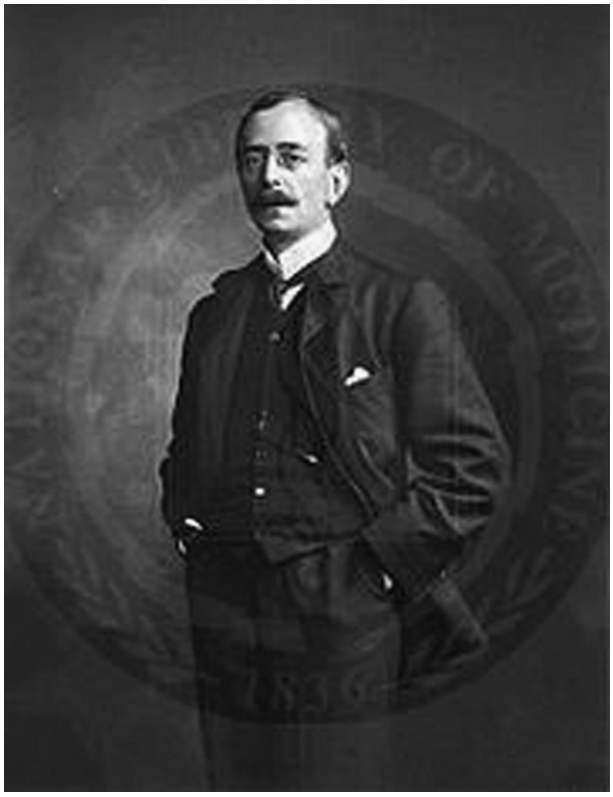

Fig. 15. Sir Charles Scott-Sherrington.

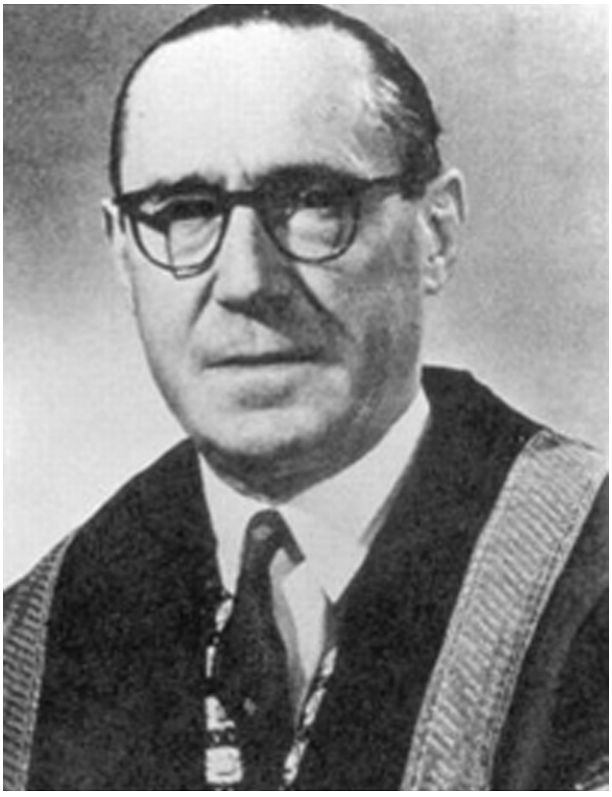

Fig. 16. Lord Brock.

honour his memory. Eventually, in 1924, the Memorial Fund was used to establish the Lister Medal, which became one of the most prestigious prizes that could be awarded to a surgeon.

Today his legacy lives on not just in operating rooms and wards but also through the mouthwash Listerine after his namesake. He is also one of the two surgeons in the United Kingdom who have the honour of having a public monument in London, Lister's stands in Portland Place (the other surgeon is John Hunter in Leicester Square). There is a statue of Lister in Kelvingrove Park, Glasgow, celebrating his links with the city.

David Ferrier (1843–1928) was born and trained in Edinburgh, coming to King's in 1871 as Professor of Forensic Medicine. He was particularly interested in the study of neural and cerebral pathology. He demonstrated the presence of localised areas in the brain associated with well-defined bodily functions. His work enabled the development of cortical maps, advancing the field of neurology and heralding modern neurosurgery. Ferrier was one of the founders in 1878 of the journal Brain, which was dedicated to the interaction between experimental and clinical neurology. In the same year he also delivered the Goulstonian Lecture to the Royal College of Physicians on "The localisation of cerebral diseases". In 1892, Sir David Ferrier was one of the founding members of what is now the National Society for Epilepsy.

In 1932 **Sir Charles Scott-Sherrington** (1857–1952), a former student and lecturer at St Thomas' received the Nobel Prize for his work on the nervous system, in particular the spinal cord, the distribution of segmented skin fields, the nerve supply of muscles (Fig. 15).

11. The post-war era

In1949at St Thomas' Hospital, **Sir Harold Ridley** (1906–2001) performed the first implant of an intraocular lens, an operation that has gone onto to save the sight of more than 200 million people around the world. **Russell Claude Brock** (1903–1980), later Lord Brock of Wimbledon, was one of the greatest pioneers of cardiac surgery. Working at Guys Hospital London he was one of three surgeons who in 1948 led the world into the modern era of mitral valve surgery – pioneering mitral valvotomy. The other two pioneers were Charles P Bailey and Dwight D Harken in the USA. Brock's first operations consisted of finger dilatation of the mitral valve but he then invented a mechanical dilator which gave better separation of the commissures of the valve. Brock also had a keen interest in the surgery of congenital heart disease which had been catalysed by the visit in 1947 to Guy's Hospital of Dr Alfred Blalock, co-inventor of the Blalock-Taussig shunt for Fallot's.

Lord Brock's work and interests extended beyond cardiac surgery. He was a great editor and contributor to the Guy's Hospital Reports and was deeply involved in the Royal College of Surgeons of England of which he became president from 1963 to 1966 (Fig. 16).

Sir Richard Doll (1912–2005) was the foremost epidemiologist of the 20th Century. Born in Hampton he was the son of a doctor. His father wished that he follow in his footsteps and become a doctor but Doll intended to study maths at Cambridge. However, Doll failed the mathematics scholarship from the effects of a heavy drinking session the night before. He subsequently chose to study medicine at St. Thomas' Hospital, graduating in 1937. During the World War II, he served in the Royal Army Medical Corps on a hospital ship. Doll was one of the significant figures in the Socialist Medical Association whose campaign led to the creation of the NHS in 1948. After the war, Doll returned to St. Thomas' to research asthma. In 1948, Doll joined the Medical Research Council's Statistical Research Unit based at the Central Middlesex Hospital. In 1950, he undertook a study[45] with Austin Bradford Hill on lung cancer patients in 20 London Hospitals – rapidly discovering that tobacco smoking was the factor they had in common – not tarmac or motor car fumes as was the initial suggestion. Doll himself stopped smoking as a result

and in 1954, the British doctors study[46] of some 40,000 doctors over 20 years confirmed the suggestion that smoking and lung cancer were related. The Government issued advice on the link following this study. In 1955, Doll reported a case controlled study that firmly established the link between asbestos and lung cancer[47] as well as pioneering work on the relationship between radiation and leukaemia. In 1966 (aged 44), Doll was elected to the Royal Society. The citation stated:

> *"Doll is distinguished for his researches in epidemiology, and particularly the epidemiology of cancer where in the last 10 years he has played a prominent part in (a) elucidating the causes of lung cancer in industry (asbestos, nickel & coal tar workers) & more generally, in relation to cigarette smoking, and (b) in the investigation of leukaemia particularly in relation to radiation, where using the mortality of patients treated with radiotherapy he has reached a quantitative estimate of the leukaemogenic effects of such radiation. In clinical medicine he has made carefully controlled trials of treatments for gastric ulcer. He has been awarded the United Nations prize for outstanding research into the causes & control of cancer & the Bisset Hawkins medal of the Royal College of Physicians for his contributions to preventative medicine."*

In 1969, Doll moved to Oxford University, to sit as the Regius Professor of Medicine. During time here he drove up the prestige of epidemiology, an area initially held in low regard. Doll helped to found the National Blood Service and was key to resisting a system of paying donors for blood, as had been adopted in the USA.

Doll was Knighted in 1971, and awarded the Edward Jenner Medal of the RSM in 1981. In 1996, he was made a Companion of Honour for "services of national importance". He received various international honours including the Presidential Award of the New York Academy of Sciences as well as a UN Award for his research into cancer. In April 2005, he was awarded the Saudi Arabian King Faisal International Prize for medicine jointly with Peto for their work on diseases related to smoking. In 2004, his contribution to modern cancer epidemiology led to the inaugural Shaw Prize for Life Sciences and Medicine. He was also awarded honorary degrees by thirteen different universities (Fig. 17).

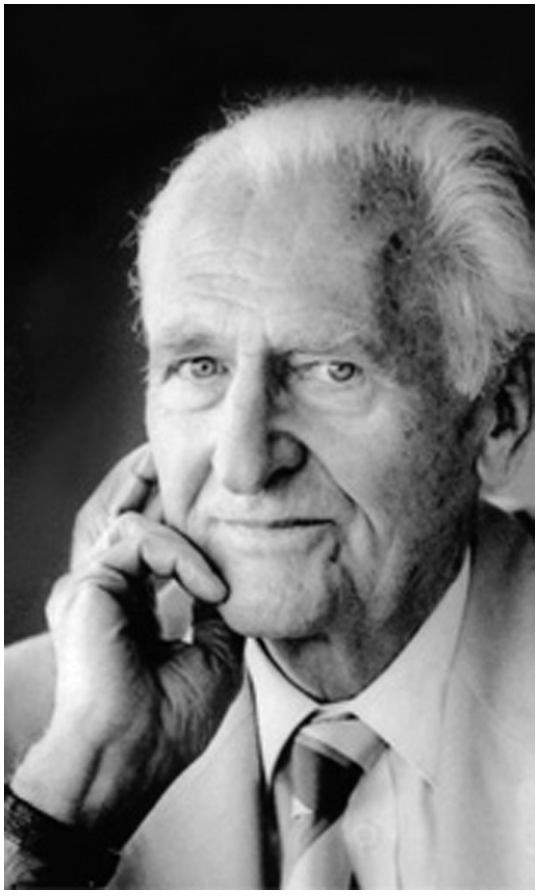

Fig. 17. Sir Richard Doll.

In 1954, **Professor Jean Hanson** (1919–1973), the first female Fellow of the Royal Society at King's College London co-proposed the sliding filament theory of muscle contraction in the journal Nature. In 1962, **Professor Maurice Wilkins** (1916–2004) at King's College London was awarded the Nobel Prize for his contribution to the discovery of the structure of DNA (Fig. 18).

In 1988 **Professor Sir James Black** (1924–2010) received the Nobel Prize for his development of Beta Blockers (Propanolol) and H_2 receptor antagonists (Cimetidine). The discovery of propranolol was hailed as the greatest breakthrough in the treatment of heart disease since the discovery of digitalis and Cimetidine under brand name Tagamet soon outsold Propanolol to become the world's largest-selling prescription drug. Despite working at a number of institutions, in his autobiography[48] he mentioned how much King's College had affected him:

> *"The real opportunity, however, came from King's College, London. The College and Medical School between them have not only solved problems and smoothed difficulties they have positively welcomed and supported my small unit. In intellectual terms the last five years at King's have been the most productive in my life. Surrounded by talented researchers and PhD students, I feel I have found my niche at last."*

Professor Michael Baum (1937), formerly professor of surgery at King's College Hospital further enhanced the reputation of this great institution in the late 20th Century. In 2007, he was presented in Switzerland with the St Gallen lifetime achievement award for his contributions to the treatment of breast cancer. In the early 1970s, when Baum's mother died of breast cancer,[49] the standard treatment was a radical mastectomy with extensive radiotherapy. He was one of the first surgeons to advocate lumpectomy and breast conservation. He led the group that was the first, to understand the importance of Tamoxifen in the adjuvant treatment of early breast cancer.[50] Adjuvant endocrine therapy with Tamoxifen had a dramatic effect on breast-cancer treatment as it significantly prolonged the disease-free interval and overall survival time in both pre and postmenopausal women with early-stage breast cancer (those who are hormone-receptor positive). It reduced the risk of breast-cancer recurrence by 47 per cent and the risk of death by 26 per cent. Later Baum was one of the leaders in the introduction of the aromatase inhibitors that are beginning to replace tamoxifen for postmenopausal women. Baum pushed the boundaries of breast cancer research, with new treatment strategies that have improved survival, he developed innovative approaches for caring for the whole person, and challenged practices that lack evidence – a truly modern surgeon (Fig. 19).

12. The present and future

In 1999, King's College London Medical School merged with Guy's and St. Thomas Medical Schools (known at the time as the United Medical and Dental School) to form the largest medical school in Europe with an undergraduate intake of over 400 each year. In 2009, King's College London together with Guy's and St. Thomas', King's College Hospital and South London and Maudsley NHS Foundation Trusts formed King's Health Partners. It is one of the UK's five Academic Health Science Centres, taking a lead in healthcare, translational research, science, training and education.

Fig. 18. Professor Maurice Wilkins.

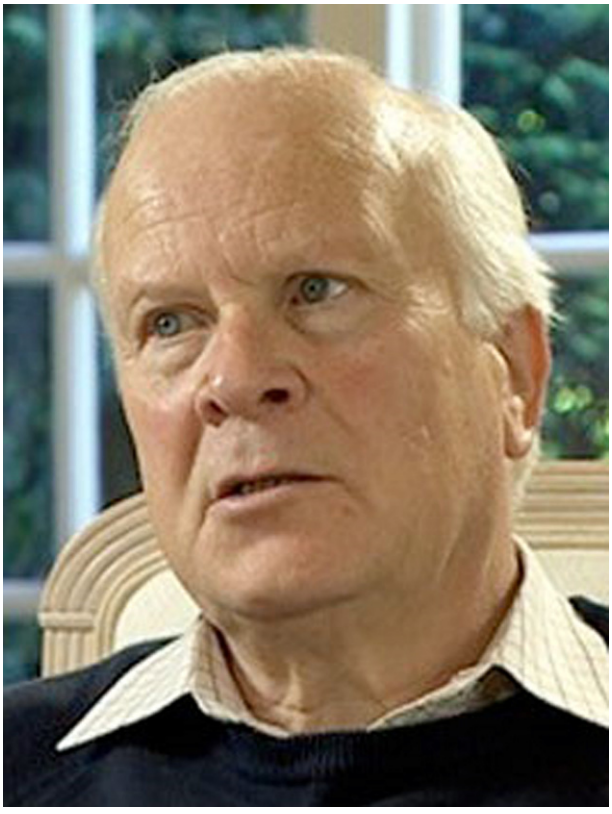

Fig. 19. Professor Michael Baum.

According to the King's Health Partners website[51]:

"It is the largest centre for healthcare education in Europe (with more applications per place in medicine than any other) and provides education and research in the widest range of subjects allied to medicine of any London institution. With our NHS partners, King's College is the only university associated with all three types of National Institute for Health Research biomedical research centre (comprehensive, specialised and patient safety and quality). It is the largest centre for the education of healthcare professionals in Europe; no university has more Medical Research Council Centres."

All three hospitals were rated "Excellent" for 2008/9 by the Care Quality Commission and met all core standards and national priorities. According to Dr Foster for 2008/9, King's College Hospital had an HSMR of 99.48 and Guy's and St. Thomas' NHS Foundation trust had an HSMR of 88.93. Translational and interdisciplinary research will be a key focus in years to come. In addition, the hospitals will have to treat more patients, with newer more costly treatments in the face of great public expectation and cost pressures.

Despite having a turnover of over £2bn, the institution still has its quirks. Guy's is the tallest hospital in the world, the Guys Gazette, launched in 1872, is the oldest hospital gazette in the world and the Gordon Museum houses one of the largest specimen collections with over 8000 pathological specimens and over 200,000 clinical transparencies.[52]

The strong tradition in anatomy continues with students still heavily involved in dissection despite the move by many medical schools to decrease the anatomical content within their syllabus and use computer based learning, models and/or pro-sections only.[53] On 26 September 2008, the 40th edition of Gray's Anatomy and its accompanying website were published under the editorship of **Professor Susan Standring**, Emeritus Professor of Anatomy at King's College London and the President of the Anatomy Society of Great Britain and Ireland. More than 350 years after Thomas Warton's seminar work, anatomists from

Table 1
Summary of key figures mentioned.

Name and Dates	Institutional Affiliation
Thomas Wharton (1614–1673)	St Thomas' Hospital
William Cheselden (1688–1752)	St Thomas' Hospital
Astley Cooper (1768–1841)	Guy's and St Thomas' Hospital
Thomas Wakley (1795–1862)	Guy's and St. Thomas' Hospital
James Blundell (1791–1878)	Guy's Hospital
Richard Bright (1789–1858)	Guy's Hospital
Thomas Addison (1793–1860)	Guy's Hospital
Thomas Hodgkin (1798–1866)	Guy's Hospital
Sir William Fergusson (1808–1877)	King's College Hospital
Benjamin Guy Babington (1794–1866)	Guy's Hospital
Sir Samuel Wilks (1824–1911)	Guy's Hospital
John Hilton (1805–1878)	Guy's Hospital
Robert Bentley Todd (1809–1860)	King's College Hospital
Sir William Bowman (1816–1892)	King's College Hospital
Sister Mary Jones (1812–1887)	King's College Hospital
Florence Nightingale's (1820–1910)	St Thomas' Hospital
Linda Richards (1841–1930)	St Thomas' Hospital
Joseph Lister (1827–1912)	King's College Hospital
David Ferrier (1843–1928)	King's College Hospital
Sir Charles Scott-Sherrington (1857–1952)	St Thomas' Hospital
Sir Harold Ridley (1906–2001)	St Thomas' Hospital
Russell Claude Brock (1903–1980)	Guy's Hospital
Sir Richard Doll (1912–2005)	St. Thomas' Hospital
Professor Jean Hanson (1919–1973)	King's College London
Professor Maurice Wilkins (1916–2004)	King's College London
Professor Sir James Black (1924–2010)	King's College London
Professor Michael Baum (1937)	King's College Hospital

Guy's, King's and St. Thomas' have edited the definitive anatomy guide Gray's Anatomy for 40 of its 150 years including the current edition.

This review is by no means exhaustive and notable names left out include: William Watson Cheyne (Lister's assistant who kept the flame of "antisepsis" alive), Charles Aston Key (surgeon to Prince Albert), R.D. Lawrence (who pioneered the use of insulin in the treatment in diabetes and who founded what is now know as Diabetes UK), Frederick Silk (who founded the first society of medically qualified anaesthetists in the world i.e. the Society of Anaesthetists in 1893, this became the Section of Anaesthetists at the RSM in 1908) and many others.

The review illustrates the power of the individual to create long lasting change and establish a legacy for future generations to build upon. The climate of discovery which was so pervasive in the past, continues today. Students at these institutions have big shoes to fill. The institutions must now work hard to ensure the magic and inspiration of the past can be translated successfully to the modern NHS (Table 1).

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None declared

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Author contribution

RA was responsible for the concept, performed the literature search and wrote the first draft. MA critically reviewed the first draft. RA is the guarantor of the manuscript.

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