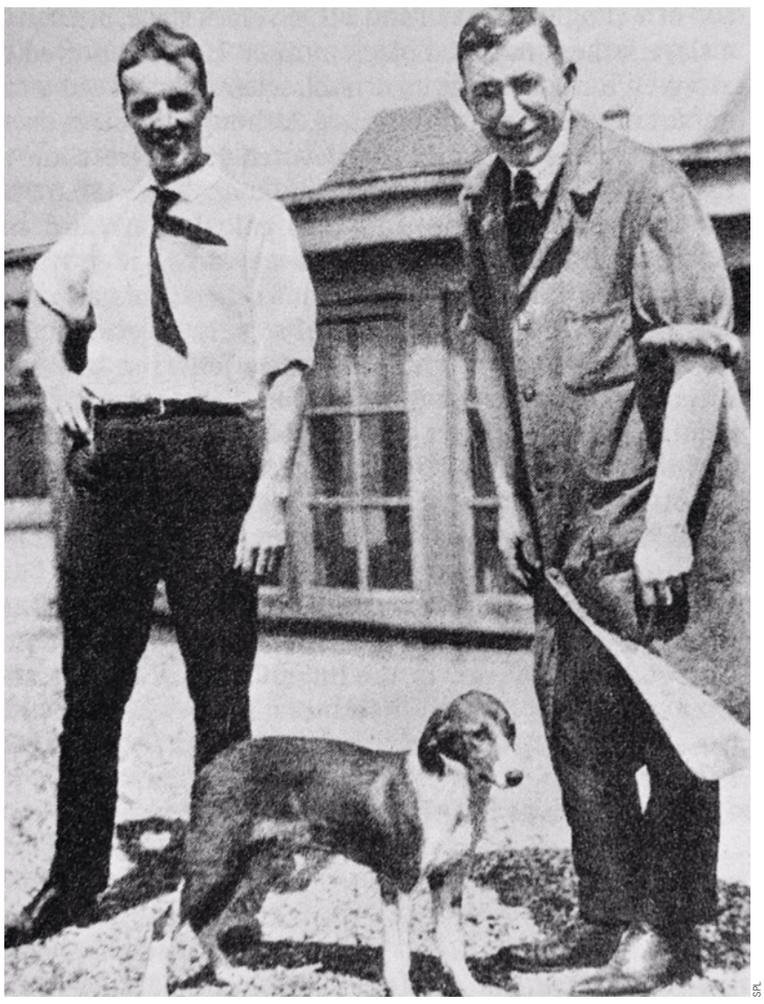
Students who shook the medical world

One medical student's contribution to medicine nearly won him a Nobel prize, and others have been immortalised eponymously. **Sanjay A Pai** investigates

Who discovered insulin? Ask any medical student, and chances are that the answer will be "Banting and Best." Some students might even be aware that Charles Best was a medical student at the time he was involved in this exciting research. Few will know of other medical students who were involved in research of historical interest. Research, after all, is usually associated with senior scientists working in laboratories. But the list of students who've made important contributions to science is long—and you'll be surprised to see some familiar names.



Thanks for the gesture, Banting

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Nobel prize, almost

To head the list, of course, is the name already mentioned—Charles Best. Frederick Banting, an orthopaedic surgeon with an unsuccessful practice, decided to switch to research. In 1921, he approached John Macleod, professor of physiology at the University of Toronto, with a project to discover a cure for diabetes mellitus, then a great killer. He asked for an assistant and, after a toss of a coin, decided upon second year medical student Charles Best.

Joined later by James Collip, they discovered and purified insulin. The Nobel Committee, however, awarded the prize only to Banting and Macleod. Irritated, Banting shared half of his prize money with Best. Not to be outdone, Macleod shared his with Collip. Much has been written about the relative contributions of the investigators and it is generally accepted by scholars now that all four indeed made important contributions. The story of the discovery of insulin illustrates many things—the importance of luck and of the selection of an important topic for research; how controversy can follow research and the Nobel prize; and, of course, of student discoverers in science.[w1 w2]

Eponymised and immortalised

Paul Langerhans was also a medical student in 1869 when he discovered the islets in the pancreas that now bear his name. Incredibly, this was his second finding. A year earlier, he had already showed cells in the skin, using gold chloride stain. These cells are known as Langerhans cells.[w3] Niels Stensen, too, was a medical student when he discovered the parotid duct in sheep in 1661.

Two other things about Stensen are interesting. He gave up the practice of medicine to become the founding father of the science of geology. And Stensen must be one of the earliest examples of what would be called nominative determinism in the 20th century. Nominative determinism is the term used when one's profession or occupation is reflected in one's name—"sten" is Danish for stone, and "sen" means "son."[w4]

One too many

Other students too have made contributions. In Lima, the capital of Peru, is a statue to the medical student Daniel Carrión. Carrión believed that Oroya fever and verruga peruana were the same disease. To prove this, he inoculated himself with blood from a verruga, developed Oroya fever, and proved his theory. Sadly, he also succumbed to the disease.[w5] Other well known student discoverers include Bruce MacCallum, Martin Flack, and Helen Taussig, who made important contributions to pulmonary and cardiovascular anatomy and pathology.[w6] Their stories as well as those of many other curious undergraduate discoverers have been documented by the neurologist W C Gibson in his articles and books.[w6–w9]

Other medical students, whose stories are not well known, include some of my personal favourites, perhaps partly because they involve people I know and because they are fairly recent stories. As an undergraduate at Goa Medical College in 1986, Jayant Vaidya, realised while lying in bed one warm night that although he was lying on his right side the left side was sweating profusely. This was surprising because the left side of the body was directly receiving breeze from a fan. He turned, only to find that the left side quickly dried and the right side started sweating. Puzzled, he checked this in his father and brother the next day and found the same effect (J S Vaidya, personal communication). He then performed an experiment on 16 people to confirm the findings and published the findings in a journal[w10] and was later quoted in the *BMJ's* Minerva column.[w11]

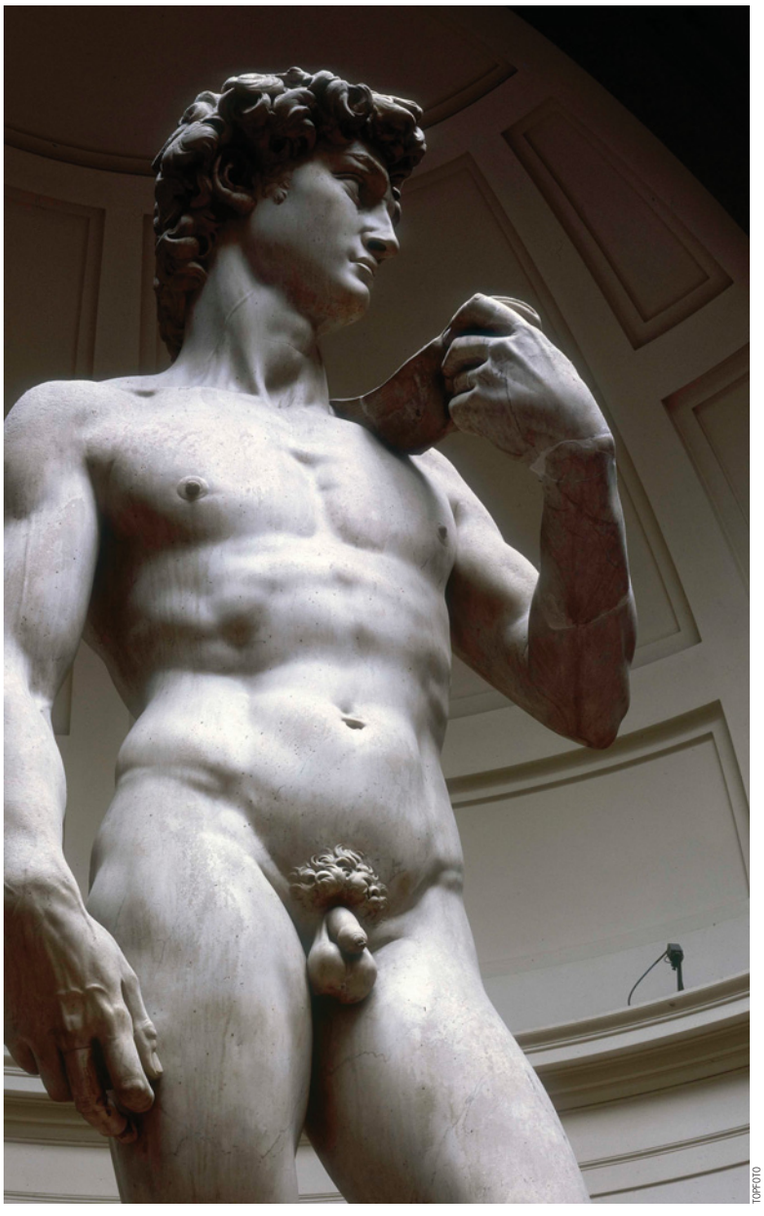
"The mechanism of this effect of posture on autonomic control of sweating, which is controlled by the sympathetic cholinergic outflow, is up for speculation. Perhaps the hypothalamus, from where the sympa- »

thetic chains start, has lateralised functions that are dependent on signals from the vestibular apparatus" (J S Vaidya, personal communication). Vaidya is now a senior lecturer in surgery at the University of Dundee.

Another medical student you should know is Manu Kothari, a retired professor of anatomy from King Edward Memorial Hospital, Mumbai. In December 1955, having just passed his first year bachelor of medicine-bachelor of surgery exams (MBBS), he was perusing Hamilton Bailey's *Physical Signs in Surgery*. He was yet to enter the hospital wards and start seeing patients. Seeing the pictures in the book, two thoughts occurred to him. He wrote, "In inflammations of hip, the fixed adduction deformity can be measured visually without having to move the patient's painful limb as the text advised. All that involved was to measure visually the angle between lines joining anterior superior iliac spine and the deformed position with a line drawn bang horizontally from the spine on the normal side." He says, "Inguinal hernia in the male and the female can be differentiated from the femoral hernia by inspecting the inguino-scrotal or inguino-labial curve. This curve loses its concavity in inguinal hernia but does not do so in femoral hernia" (M L Kothari, personal communication).

He wrote this to Hamilton Bailey and was rewarded, in 1959, when, in the 13th edition of *Demonstrations of Physical Signs in Surgery*, a method was described, named after him and with a footnote on his biographical data.[w12] Kothari's findings are an excellent example of how simple and logical observations, in a field of clinical medicine unexplored to him, made discoveries that were not obvious to trained surgeons for many years.

Medical students can also have fun while doing research, as shown by Chris McManus. In 1973, McManus wrote the first of his many papers on laterality, a topic on which he is today one of the world's experts.[w13] Later, he examined 107 antique statues in Italy to see which testicle was larger and higher and whether the art of ancient Greek sculptors had imitated real anatomy.[w14] He discovered that right handed people have higher right sided testicles—which, surprisingly, is the heavier. This led to a paper in *Nature* in 1976, and to his being awarded the IgNobel prize in 2002 for research that "cannot and should not be repeated."[w15]



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Guess I'm ambidextrous…

21st century

Many of these discoveries by students were done in the 18th and 19th centuries, when medical science was young and much was remaining to be discovered, especially in anatomy and dissection. Similar opportunities may not easily be available today. But a significant number of findings have been made in the past 50 years. Often they involve common sense observations followed by a hypothesis or experiment, as the last two examples prove. Thus, it is not entirely impossible for many medical students to do or to contribute to research. Research opportunities exist in many universities. For instance, at Birmingham University, in England, the department of public health and epidemiology has run numerous projects involving students over the years.[w16] Many of these result in publications in journals.[w17 w18]

Colin Ross, a medical student who worked in a laboratory at about 1980, says that experience in a research laboratory will not provide answers or any new dogma. Rather it provides an education and will better equip the physician to adjust to and shape a better future.[w19] Of course, the research need not be restricted to laboratory work but may include diverse fields such as epidemiology or clinical medicine. Working on research projects teaches students the importance of a systematic approach to a problem, something that could well be of use in clinical medicine later on. Working with thinkers or researchers exposes different ways of thinking or tackling an intellectual problem.

Come come, students

The benefits of the student-scientist interaction are many. Students, of course, benefit from working and learning from experts in the field—but senior researchers may also benefit from intelligent students with their "out of the box" thinking and lack of preconceptions. A research paper in a journal can be tremendously encouraging and, indeed, may even lead to the foundation of a future professional interest and career. At the least, students will learn how to search the scientific literature and to evaluate it properly, lessons which should stand them in good stead for the future. Working on research projects may help expose students to areas such as medical statistics or laboratory research and would contribute to their increased understanding of these fields.

Mentors thus have the responsibility of encouraging medical students, the "medical comets," to use Gibson's phrase, to contribute to medical research—a duty which may be beneficial to the student, the teacher, and, ultimately, to science itself.

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References w1-w19 are on studentbmj.com.