

Nobel laureates in Surgery

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Abstract: This article is about the legacy of the giants in field of surgery. These are inspirational surgeons whose selfless dedication and commitment have helped in extending the surgical frontiers. This article reflects upon those surgeons who have been recognized as worthy of this honor. By winning this highest accolade in science they have elevated the discipline of surgery and hence an encouragement for the capabilities of the future surgeons to be.

INTRODUCTION

“The important thing is to never stop questioning.”- Albert Einstein.

These lines match with the thoughts of our present day creative geniuses. Surgeons have always made significant contributions in understanding the complexity of the human body and helped in evolution of scientific knowledge. They have played a leadership role in improving outcomes and profoundly influencing the scientific thinking. **“Knowledge is like money: The more he gets, the more he craves”**, this was the thought which came in mind of man who is behind the highest accolade in science, Sir Alfred Bernard Nobel, a Swedish chemist, inventor of dynamite, industrialist and philanthropist. Since 1901, the Nobel Prize has been honoring men and women from all corners of the globe for outstanding achievements in physics, chemistry, medicine, literature, and for work in peace. The foundations for the prize were laid in 1895 when Alfred Nobel wrote his last will, leaving much of his wealth to the establishment of the Nobel Prize. The 6th Nobel prize in economics was unofficially awarded in memory of Alfred Nobel¹.

Emil. T. Kocher (1841-1917)



Fig 1 : Emil. T. Kocher (1841-1917)

Mr. Emil T Kocher was born in Bern, Switzerland, received his medical degree at the medical college of the University of Bern in 1865, and subsequently completed preceptorship under Theodor Billroth in Vienna, Joseph Lister in Glasgow, Louis Pasteur in Paris and others. In 1872, he became professor and director of the department of surgery at the age of 28 at the University of Bern. He was the first surgeon to become a Nobel Laureate and he received his award in 1909, “for his work concerning the physiology, pathology and surgery of the thyroid².”

Kocher’s (Fig 1) contributions to biliary tract surgery (incision). Mobilization of the duodenum, development of a toothed clamp (instrument) and description of the globe lag in hyperthyroidism are well known.

Alexis Carrel (1873-1944)



Fig 2 : Alexis Carrel

One of the most controversial surgeons of his time, was born in Sainte-Foy near Lyon, France, received his medical degree at the University of Lyon, and subsequently twice failed the examinations (Concours) for a faculty position at the same university. His earliest publication on a technique of vascular anastomosis for organ transplantation was based on his modification of the technique of end-to-end anastomosis by Professor Mathieu Jaboulay at the University of Lyon. This research was prompted by the assassination of Sadi Carnot, the president of the French Republic, from a stab wound of the portal vein in 1894. After a short period in Montreal, he was invited by the American surgeon Carl Beck to work in Chicago. He subsequently joined the

physiologist Charles C. Guthrie, Ph.D. at the Hull Physiological Laboratory at the University of Chicago where he had no title and was not paid. Guthrie and Carrel (Fig 2) pioneered or refined the following techniques: animal operations under aseptic conditions; the triangulation technique of end-to-end vascular anastomosis; arteriovenous anastomosis; vein grafts into arteries; patch method of vascular anastomosis; dog hind limb amputated/reimplanted; dog kidney from abdomen-to-neck; dog bilateral kidney homograft; dog head transplant to neck of second dog; and transplantation of ovary and thyroid glands. They collaborated on 29 publications. From 1906 to 1939, Carrel was a Fellow at the Rockefeller Institute in New York except for the period 1914 to 1918 when he was called up as a reservist into the French Army during World War I. In 1912, just 1 year following Gullstrand’s recognition, Alexis Carrel was awarded the Nobel prize “for his work on suturing of vessels and transplantation of organs”³. His contributions during this period are legendary and include tissue culture of connective tissue (1910), tissue culture of chicken heart (1912), organ transplant (1913), development of Carrel-Dakin’s solution (1915-1916), and the development of a pump oxygenator with Charles A. Lindbergh (1930-1935). It is of interest that all of these contributions followed the awarding of the Nobel Prize to Carrel. His extraordinary accomplishments in research have often been overshadowed by his writings and his activities in Nazi-controlled France after 1940. His book, *Man the Unknown*, was published in 1935 while he was still at the Rockefeller Institute in New York⁴.



Fig 3 : Frederick G. Banting

Frederick G. Banting (1891-1941)

He was born near Alliston in Ontario, Canada, received his medical degree at the University of Toronto, served as a medical officer with the Canadian Army during World War I, and was a resident surgeon in orthopaedics at the Hospital for Sick Children (Toronto) from 1918 to 1920. With a notable lack of success in his practice in orthopaedic surgery at the University of Western Ontario, he became a lecturer in physiology and was asked to lecture on pancreatic function. With increasing interest in the endocrine function of the pancreas, he met Dr. John J.R. Macleod (1876-1935), a physiologist and expert on diabetes mellitus, at the University of Toronto on several occasions in 1920. Macleod was not impressed with Banting and later (1922) wrote that “Dr. Banting (Fig 3) had only a superficial text-book knowledge of the work that had been done on the effects of pancreatic extracts in diabetes.” Nonetheless, Banting was allowed to use Macleod’s laboratory during the summer of 1921, and 21-year-old medical student Charles H. Best (1899-1978) was assigned to work with him. After making the mistake of ligating the pancreatic ducts of dogs with catgut suture, silk was used to cause atrophy of the exocrine pancreas. Extracts of the atrophied pancreas were later injected into pancreatectomized dogs, and blood sugar levels were noted to decrease⁵. Macleod returned to Toronto in September and changed the name of the extract from “Isletin” to “insulin”. Insulin was soon purified by James B. Collip (1912-1965), a biochemist from the University of Alberta who was on sabbatical leave at the University of Toronto. Frederick G. Banting and John J.R. Macleod were awarded the Nobel Prize in 1923 “for the discovery of insulin.”⁵

The exclusion of Charles H. Best and James B. Collip from the Nobel Prize remains one of the most controversial decisions ever made by a Nobel committee⁶.

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Walter R. Hess (1881- 1973)



Fig.4: Walter R. Hess (1881- 1973)

He was born in Frauenfeld, Switzerland, studied medicine at a number of universities in Europe before receiving his degree from the University of Zurich, and completed his training in ophthalmology in Zurich, as well. Despite success in the private practice of ophthalmology, Hess (Fig 4) chose to become part of the faculty of the Institute of Physiology in Zurich in 1912 and received his doctorate in 1913. After service with the Imperial German Army in World War I, Hess became Acting Chairman and men Chairman of the Department of Physiology at the University of Zurich in 1916. Hess originally studied blood viscosity, but switched to the study of diencephalon (interbrain connecting cerebral hemispheres to mesencephalon) in 1924. After spending 25 years in the field, Hess was awarded the Nobel Prize "for discovery of the functional organization of the diencephalon as a coordinator of the activities of internal organ." in 1949.

Werner T.O. Forssmann (1904-1979)



Fig 5: Werner T.O. Forssmann (1904-1979)

Werner Theodor Otto Forssmann (1904-1979) (Fig 5) was born in Berlin, Germany, received his medical degree from the Friedrich Wilhelm University Medical School (Berlin) in 1922, and completed his training in urology at the Virchow Hospital in Berlin. During the summer of 1929 while serving as a surgeon at the August Viktoria Home in Eberswalde, Germany, Forssmann was denied permission to catheterize a patient's heart or to self-catheterize his own heart with a ureteral catheter. He decided to proceed despite these denials⁶ and was first catheterized to 35 cm from a "right elbow vein" by a colleague reluctant to advance the catheter further. Through a self-made venous cutdown in his "left elbow" 1 week later, he passed a 65 cm long ureteral catheter toward the heart. He walked the "unusually long distance" (including going up stairs) to the X-ray department where the tip of the catheter was confirmed to be in the right ventricle⁸. Forssmann evidently received much criticism from the German medical establishment and was later fired by Ferdinand Sauerbruch (1875-1951) for impudence at the Charit Hospital in Berlin. He became a member of the Nazi Party and later served with the German Army from 1934 to 1945⁹. In 1956, Werner Theodor Forssmann was awarded the Nobel Prize "for discoveries concerning heart catheterization and the pathologic changes in circulatory system."

Charles Huggins (1901-1997)



Fig 6: Charles Huggins (1901-1997)

He was born in Halifax, Nova Scotia, Canada, received his medical degree from Harvard Medical School in 1924, and completed his training in general surgery at the University of Michigan. Charles Huggins (Fig 6) became a member of the faculty in the Department of Surgery at the University of Chicago in 1927 and was directed into the field of urology by the new chair, Dallas B. Pheemister (1882-1951). He remained at the University of Chicago for his entire career as urologist and dedicated researcher and founded the Ben May Laboratory for Cancer Research after receiving a donation in 1950. His contributions to the care of patients with malignancy included following: discovery of androgenic regulation of prostatic function, the beneficial effects of orchiectomy and administration of exogenous female hormones on advanced prostatic cancer (hormonal therapy of cancer)^{10,11}, the effects of adrenalectomy on advanced prostatic cancer, the effect of aromatic compounds on leukemia and breast cancer, and the development of animal models for the rapid induction of cancer. Of interest, he

made additional significant scientific contributions to the knowledge of bone growth, the development of chromogenic substrates for enzyme assays, and the effect of sulfhydryl groups on proteins. In 1966, Charles brenton Huggins was awarded the Nobel Prize and he became the second urologist to be so distinguished, "for discoveries concerning hormonal treatment of prostate cancer¹²."

Joseph E. Murray



Fig 7: Joseph E. Murray

Joseph E. Murray (Fig.7) was born in Milford, Massachusetts, received his medical degree from Harvard Medical School in 1943, and completed a 9-month surgical internship at the Peter Bent Brigham Hospital (now Brigham and Women's Hospital). He then became a First Lieutenant in the U.S. Army Medical Corps and was assigned to the Valley Forge General Hospital near Philadelphia from 1944 to 1947. He gained extensive experience there in reconstructive procedures on soldiers under Colonel James B. Brown, the chief of plastic surgery. In addition, he noted the inconsistent results with allograft skin transplanted on to burned aviators. He returned to the Brigham Hospital and completed his training in general surgery including 6 months on the head and neck service at Memorial Sloan-Kettering Cancer Center in New York City. This was followed by an additional year of training in plastic surgery in New York and Boston. After a long period perfecting the operative technique with the support of Francis D. Moore, M.D. (1913-2001) (Surgeon-in-Chief at the Brigham Hospital from 1948-1976), Murray performed the first successful renal transplant from one monozygotic twin to another on December 23, 1954, at the Peter Bent Brigham Hospital¹³. Murray's further accomplishments in renal transplantation include performing the first in dizygotic twins in 1959, the first living unrelated in 1961, the first in which the recipient received azathioprine, and the first cadaveric unrelated in 1962. His extraordinary accomplishments outside the field of transplantation included participation on the Harvard committee that defined "brain death" and seminal contributions to the development of craniofacial surgery in the United States. Joseph Murray served as Chief of Plastic Surgery at the Peter Bent Brigham Hospital from 1951 to 1986 and at Children's Hospital Medical Center in Boston from 1972 to 1985. He retired in 1985 and was awarded the Nobel Prize in 1990, for his pioneering work in the field of transplantation¹⁴, thereby becoming the most recent member to this group of distinguished surgeons.

CONCLUSION

The Nobel Prize is the highest scientific destination and by winning this coveted prize these men have raised the discipline of surgery to summit of scientific world. These great minds have not only contributed to the field of surgery but surgeons like Frederick G. Banting has contributed insulin, one of the biggest discoveries in medicine. All laureates have shown immense curiosity and spirit of enquiry and hence conferred benefit to mankind. Acknowledged by Nobel foundation, these contributions do not cover the whole story, but serve as a collective source of pride and inspiration for the entire surgical community.

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