

## OBITUARY

### SIR CHARLES HERBERT BEST : THE END OF AN ERA (1899-1978)



DR. CHARLES H. BEST, co-discoverer of insulin, died on Friday, the 31st March, 1978, in Toronto General Hospital, Canada. Most tragically his elder son, Alexander had died just 5 days earlier of a heart attack on the 26th March.

Charles Herbert Best was born in West Pembroke, Maine, USA, on February 27th, 1899. Two of his ancestors William Best and John Burbidge went from Isle of Wight with Governor Cornwallis to found Halifax, Nova Scotia, in 1749. They both sat in the first Legislative Assembly of Canada in 1758. This great factor of heredity seems to have exerted considerable influence in making Charles Best eager to remain in Canada.

After receiving his early education in Maine, Charles went to Toronto in 1916 for his university education. He volunteered repeatedly for military service but a cardiac systolic murmur prevented his acceptance until at one of his attempts the examining physician did not listen to his heart and gave him a A 1 grading. He was enrolled in the 70th Battery of Field Artillery and was subsequently promoted to Sergeant. By the time he reached England, the end of the war was in sight.

Charles Best returned to Canada where he resumed his studies in the University of Toronto at the age of 19 and took a course in Physiology and Biochemistry which was designed to provide a training for medical research. However, his first exposure to disease and human suffering was at a much younger age. His father was a family physician who practised Medicine for nearly 50 years. Charles was initiated into medical work

when at the age of 12 he administered anaesthesia to the patients who came for surgery to his father. His interest in diabetes developed under somewhat tragic circumstances. His father's sister - Anna Best who was trained as a nurse in Boston, developed diabetes at a young age. In 1918 while she was living with her brother's family, she died in diabetic coma.

Before graduation Charles Best worked in the Department of Physiology at the University of Toronto under Prof. J.J.R. Macleod. His research problem at that time was the study of the pathways of Claude Bernard's piqure impulses from the medulla to the liver. This fascinating problem kindered his interest in Neurophysiology as well as in the biochemical pathways involved in the hepatic regulation of intermediary metabolism. The investigative procedures that he mastered were concerned with metabolic parameters including estimation of blood and urine sugar, nitrogen, ketone bodies, respiratory quotients and glycogen etc. He finished his final examination in Physiology and Biochemistry on May 16, 1921 and a day later was asked to join Dr. Fredrick Grant Banting. The story of the discovery of insulin has been told many times and critically reviewed\*. Working day and night Banting and Best set up the critical experiment on August 6, 1921. A page from their notebook reflects the intensity of struggle in their research endeavours. The dog was prepared for experiment at 5 P.M. but the first dose of the material possibly containing insulin was administered at mid-night. The blood sugar then was 430 mg. Repeated hourly administration of the material resulted in a steady drop of the blood sugar so that by 4 A.M. on August 7, there was an ample demonstration of the fact that an anti-diabetic substance has been successfully extracted from the pancreas. Insulin was born!

Perhaps the discovery of insulin will be recorded by posterity as one of the great events of this century. At that time the life of a diabetic child was measured in days and weeks; the adults with diabetes lived less than five years. The excitement of the physicians and the hopes of the patients suddenly found an echo which reverberated across the continents. One of the first physicians to use insulin was Dr. Elliott P. Joslin. He once mentioned, "When I learned on August 7, 1922, that I was to receive insulin for Miss Mudge, whose weight had fallen from 157 to 72 pounds in five years, I stayed awake all night." Thus suddenly there was hope for millions of patients all over the world belonging to every nation, race, religion and caste.

The first public recognition of this work was the Reeves Prize of \$50 awarded to Banting and Best in 1923 for the best scientific research accomplished in any department of Faculty of Medicine of the University of Toronto by members of the staff. Soon after followed the Nobel Prize in 1923 which was awarded jointly to Banting and Macleod. However, Banting rose to the occasion and in a telegram, sent to various international societies, he stated, "At any meeting or dinner please read following. I ascribe to Best equal share in discovery. Hurt that he is not so acknowledged by Nobel Trustees. Will

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\*INSULIN AND METABOLISM, The Discovery of Insulin — A Critique, Ed. J.S. Bajaj, Vol. 1, 1972, p. 35-48.

share with him. —BANTING“ As a most benevolent gesture the co-discoverers of insulin assigned the patent rights for the discovery of insulin to the University of Toronto for a nominal sum of One Dollar; their only stipulation was that no royalty be charged for the manufacture of insulin.

In 1925 Charles and his wife Margaret went to England to work in Sir Henry Dale's laboratory at the National Institute for Research. Charles was very keen to secure D.Sc. degree from the University of London. However, Dale did not share this view, "This will not make you a better physiologist," said Dale. In deference to Charles's wishes, Dale got himself appointed as a recognised teacher at the University of London. Charles Best was his first graduate student. During his year in Dale's laboratory Charles Best was associated with the isolation of histamine from the tissues. He extended this subsequently and worked on the enzyme system(s) involved in the destruction of histamine; the term histaminase was coined by him.

In 1929, on the retirement of Prof. Macleod, Charles Best was offered the chair of Physiology at the University of Toronto. Thus at the age of 30 he had become Head of the Department where Banting and he had conducted their experiments. He continued in the same position till 1965 when he was designated Professor Emeritus. Concurrently, he was also associated with the Banting and Best Department of Medical Research at the University and took over as the Director of this Institute when Sir Fredrick died in an air crash in 1941. He was appointed Director Emeritus in 1968.

The Department of Physiology under the leadership of Charles Best contributed significantly to the knowledge of heparin. It was found that beef lung was an excellent source of heparin and that heparin had an action on the agglutination of platelets. The recognition of a heparinase system, the first use of silicone tubing to minimise clotting, and the isolation of heparin in crystalline form from the blood of dogs in anaphylactic shock were other significant contributions from his Department. Indeed the first paper on the prevention of the occurrence of experimentally induced coronary thrombosis in dogs by the use of heparin was published in the Lancet in 1939 by Best and his colleagues. The clinical interest in the use of heparin in acute myocardial infarction mainly stems from such experimental contributions. Another major field of interest that Best pursued was that of lipotropic agents specially choline. However, insulin and diabetes remained his life long passions.

Charles Best received many awards and distinctions during his life time. He was the first Canadian to be elected to the Pontifical Academy of Sciences, and was the first President of the International Union of Physiological Sciences. In 1967 he became one of the first Companions of the Order of Canada. In 1971, during the Golden Jubilee Anniversary of the discovery of insulin he was created a Companion of Honour of the United Kingdom. He was the recipient of Honorary Degrees and Medals from the Uni-

versities and professional associations all over the world. He was the Honorary President of the International Diabetes Federation.

Throughout life he was ably supported by his wife, Margaret. Indeed on glancing through the original manuscript reporting the discovery of insulin one is struck by the fact that the writing in four different hands can be recognised; at least three of these pages were written by Miss Margaret Mahon who later became Mrs. Charles Best. During one of the reminiscences Charles Best said, "We were engaged at the time and I remember dictating this material to her at her parent's home at 370 Brunswick Avenue." This comradeship based on deep love and mutual friendship lasted for more than half a century till the cruel hands of death took him away from Margaret. Most remarkably, Margaret has continued to demonstrate a rare courage with an unmatched degree of devotion and dedication to her late husband.\*

A scientist of brilliant intellect, a man of deep sensitivity, an investigator with an intuitive foresight, a teacher with a golden gift of communication and above all one of the finest human beings Dr. Charles Best was indeed a true Citizen of the World. He has left idelible footprints on the eternal sands of life. Millions of diabetics will join in paying their humble tributes to a man who added so many years to their lives - and generations of diabetics will continue to do so.

J.S. BAJAJ

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\*In response to my condolence letter of April 8, 1978, Mrs. Margaret Best replied.

105 Woodlawn Ave. West,  
Toronto

April 22, 1978.

Dear Dr. Bajaj

I thank you most sincerely for your kind and most understanding letter of sympathy to me. I am quite overwhelmed by the loss of our dear older son and then within a week, of my beloved husband. But from your letter, I know that you understand that it is more than I can bear.

Thank you,

Sincerely,  
MARGARET BEST