**November 1920 and Diabetes:**

**One Month, Two FPs and Millions of Lives Changed.**

Ken McHardy, Retired Diabetologist. (AGS 1964-73)

One hundred years before the new health challenges of Covid 19, life expectancy in the UK in 1920 was around 55 years for men and 59 for women. Poverty, malnutrition and poor social conditions conspired with contagion and non-contagious illnesses to limit both quantity and quality of life. Among the many hitherto unconquered diseases was diabetes mellitus. This condition typically presented with weakness, wasting, unquenchable thirst and the passage of large volumes of sweet urine; hence its colloquial name, ‘sugar diabetes’. Any young person developing diabetes in 1920 would have a life expectancy of weeks to months. There was no known cure. The only temporarily effective treatment was a form of supplemented starvation involving severe calorie restriction. The metabolism could cope for a time with so little nutrition but at a cost of progressive weight loss, muscle wasting and, inevitably, early death. A diagnosis of diabetes left the afflicted individual in a parlous situation bereft of hope.

At the beginning of 1920, Dr Robin Lawrence was looking forward to his new job as House Surgeon in the Casualty Department of Kings College Hospital (KCH) in London. This was a prestigious post for a medic from outside the capital – especially from as far outside as Lawrence. Born in Ferryhill, Aberdeen in 1892 he had been educated at Aberdeen Grammar School (1900-09) and his local university (MA 1912; MB ChB 1916). He had served in the Royal Army Medical Corps, including 3 years in India, before returning to his civilian medical career. He must have impressed his seniors at Kings when after 6 months in Casualty he was appointed Assistant Surgeon in Ear, Nose & Throat. Contemporary medical graduates would have been vaguely aware of diabetes and its dire consequences but it would have been of little interest to a budding surgeon. That was all to change in November when Dr Lawrence developed the condition.

In his despondency at abandoning hope of becoming a surgeon, and accepting that his life expectancy had in an instant been greatly shortened, Lawrence could have had no inkling that within a few days and more than 3000 miles away, another of 1916’s new doctors was embarking on a liaison that would greatly alter prospects for both. Fred Banting and his classmates at the University of Toronto had their final year studies accelerated so they could graduate early in December 1916. All who were fit were immediately enrolled for war service. Fred spent a year in military hospitals in England before being sent to the front in France. He was wounded and won the Military Cross for courage under fire at Cambrai. On his return to Toronto, he had two more years in surgery: one in military service and one at the Children’s Hospital. When his appointment was not extended further, he too had to abandon a career in surgery and with some ambivalence he set up in single-handed General Practice in London, Ontario. While preparing for some student teaching, undertaken to supplement his meagre practice income, Banting had a research idea that he thought may lead to preparation of a pancreas extract that could be the postulated, but unproven, key to treating diabetes. He was advised to take his idea to the University of Toronto to discuss it with Professor Macleod, the recently appointed Professor of Physiology and one of the world’s leading authorities on the metabolic abnormalities in diabetes.

John James Rickard Macleod, son of a clergyman, was born near Dunkeld in 1876. At age 7 his family moved to Aberdeen on his father’s appointment as minister at John Knox Free Church in Gerrard Street. Some years ahead of Lawrence, Macleod had also studied at Aberdeen Grammar School (1883-93) and the University of Aberdeen (MB ChB 1898). He won a scholarship to undertake research in Leipzig and Aberdeen. In 1900, took up an appointment at the London Hospital where he became lecturer in Biochemistry and Clinical Pathology. He soon started contributing chapters to contemporary texts and showed great aptitude for physiological research. In 1903 he was appointed to the post of Professor of Physiology at the Western Reserve University in Cleveland, Ohio precociously taking up post as he turned 27! In 1906 when writing further textbook chapters he developed an enduring interest in carbohydrate metabolism and by 1913 had published his monograph ‘Diabetes: Its Pathological Physiology’. In light of his academic prowess in research and writing, and his considerable skills in organising and delivering training, he was head-hunted for the Chair of Physiology at the University of Toronto where he duly moved in 1918.

On Monday 8th November, 1920 – just as Lawrence’s diabetes was diagnosed in England – Banting met Professor Macleod and set off a rare, wonderful and tragic chain of events. It was undoubtedly rare that a professor with an international reputation could conclude this initial meeting with Banting, a failed surgeon with no research experience, by offering guarded encouragement and an opportunity to undertake experiments in his department the following summer. It was undoubtedly wonderful that this collaboration was destined to lead to the discovery of insulin. It was undoubtedly tragic that this major and long-awaited advance in medical treatment led to such enduring rancour over attribution of credit – and to Macleod‘s reputation being unfairly tarnished.

But that was all in the future at the time of that first meeting; the same time as Robin Lawrence was contemplating his now limited future. He abandoned surgical aspirations for a less physically demanding post in Geoffrey Harrison’s biochemistry laboratory at KCH. His diabetes had an unusually slow early phase and on restricted rations he remained reasonably well, if thin, through 1921. He undertook research for a higher degree, graduating MD (Aberdeen) in March 1922 – knowing nothing of the breakthrough made in Toronto a few weeks before. Even when reports of the discovery in Canada started appearing in the British literature that summer, they were unconvincing, particularly over supplies. Lawrence remained sure his end was near and decided to move to Florence to do some medical practice, enjoy the climate – and waste and die out of sight of his family!

Banting arrived to start work with Macleod in May 1921. A detailed yet very readable account of what ensued was produced by historian Michael Bliss in Toronto in 1982. This definitive history clarified many aspects of how clinically useful insulin was extracted and purified over the subsequent eight months. Firstly, while Banting’s repeated attacks on Macleod and others for stealing credit for what he seemingly considered to be largely his own discovery, his initial ‘big idea’ was neither original, nor did it lead directly to the discovery of insulin. Secondly, Macleod was already an academic physiologist, author and teacher of enormous experience and skill, and an accomplished departmental leader. Thirdly, while agreeing that Banting’s drive and endeavour were crucial to the cause, it was beyond doubt that, with his student assistant Best, he would have got no further than numerous previous research teams all of whom had failed to isolate insulin. Macleod’s scientific rigour, and visiting Professor Bertram Collip’s skill in purifying extracts, were essential to the team’s success. So Bliss concludes that Banting, Best, Collip and Macleod all deserve to share credit for discovering insulin. He was also clear that largely as a result of Banting’s lobbying against Macleod, history has been less than fair to the latter. Even when the Nobel Committee decided to award the 1923 Prize for Medicine or Physiology jointly to Banting and Macleod there was no reconciliation; in fact, Banting briefly considered refusing the award altogether if Macleod were also to get a share.

Whatever the rights and wrongs regarding credit, the fact was that from late January 1922, usable insulin had been isolated. Emaciated diabetes patients were miraculously resurrected from the brink of death to robust health. Banting worked for the next two years treating patients with diabetes while Macleod undertook research on the physiology of insulin and oversaw the complexities of promoting worldwide availability requiring reliable large scale production. As already noted there was no immediate acceptance everywhere that a new era in diabetes management had truly arrived. For example, it took until late April 1923 for the Medical Research Council to announce that insulin was now available in the UK.

Shortly afterwards, Lawrence, by now extremely weak in his Italian retreat, received a telegram from Harrison at KCH which read: ‘I’VE GOT SOME INSULIN COME BACK QUICK IT WORKS’. Lawrence closed his affairs in Italy, hired a driver for a 10 day road journey to London, and on the last day of May received his first injection of insulin. This treatment postponed his hitherto imminent death by 45 years during which time he became a colossal champion in the development of diabetes services at home and abroad. He established a diabetic clinic at KCH and in 1925 wrote ‘The Diabetic Life’ – a book styled uniquely in its day ‘for both patients and their doctors’. He produced many research papers on the use of insulin – some describing his personal experiences. His work in trying to ensure supplies of insulin for all who needed it was critical – especially in the 25 years of relative poverty between the advent of insulin and of the NHS. He was instrumental in 1934 in the establishment of the Diabetic Association (now Diabetes UK) as one of the first ever self-help groups for patients and influenced the establishment of scientific and lay societies in various countries in Europe and beyond. Almost 40 years after his death, a memorial plaque was erected by the City Council in 2007 outside Lawrence’s birthplace at 10, Ferryhill Place.

Macleod returned to Aberdeen in 1928 as Regius Professor of Physiology in the University of Aberdeen and was President of our FP Club in 1930-31. Ill health dogged his later years and he died in post in 1935, in his 59th year. He was buried in Allenvale Cemetery where the lettering on the neglected headstone – including reference to his being the ‘Co-discoverer of insulin’ - was redone by the local branch of the Diabetic Association in the late 1980s.

JJR Macleod’s team produced clinically usable insulin in the nick of time for many – including his fellow Grammarian, RD Lawrence. The latter’s survival led to his pioneering work on diabetes management and services available to patients with the condition. This has had lasting influence on care provision for almost 4M people living with diabetes in the UK today. Around 10% of these, with Type 1 diabetes, could not survive without insulin; the health of at least as many again, with Type 2 diabetes, is better for the addition of insulin to their treatment. Worldwide there are almost 200M cases of diabetes and that number continues to rise. It is no exaggeration, therefore, to claim that millions of lives have been changed as a consequence of the work of not one but two Scottish diabetes pioneers whose influence was triggered by entirely separate events that happened 100 years ago come November. Was it simply chance that both were former pupils of our school?

**Bibliography**

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