was a complicated, unnecessary step) and also unaware that a number of researchers had already got this far with pancreas extracts – even using them (briefly!) in human diabetes – but all of the extracts so far produced were toxic and could not be tolerated by the dogs, or diabetic patients, receiving them. He resented Macleod’s experienced advice that repeated and more rigorous studies would be needed to produce safely reliable results. This was the beginning of what was to become lifelong suspicion and paranoia over Macleod’s motivation.

**Towards longer survival and purer extracts (late 1921)**

Macleod provided resources and facilities to allow Banting and Best to continue their studies, regularly advising on the necessary steps. The results were rather mixed but hopeful, especially when they were able to keep a dog alive for several weeks after removal of its pancreas. The problem remained of purifying an extract sufficiently to allow its use in diabetes patients and that is where Bertram Collip’s crucial contribution came into play. By December, Collip joined the team to work on the preparation of alcohol extracts, as advised by Macleod, with less contaminating and toxic contents. Collip also conducted studies to show the extract could reverse other abnormalities than high glucose levels in diabetic dogs, and developed a method using rabbits to measure the potency of different batches of extract.

**An Effective Treatment for Diabetes (January 1922)**

By the end of December 1921, the group was ready to present its preliminary results to the American Physiological Society. Banting gave the talk but public speaking did not come easy to him and support from Macleod – who was chairing the meeting session – was once again perceived by anting as the professor wanting to steal his success. Banting had been so concerned about the progress Collip was making that he had given his and Best’s extract by mouth to a diabetic patient in December; it had no effect. Banting next insisted on having their extract given by injection to a patient on 11th January when it had a slight effect on sugar but quickly produced abscesses where injected and so had to be abandoned. Collip meantime forged ahead with his experiments and soon had a cleaner and more potent extract ready for trial. On 23rd January 1922, Collip’s extract was injected into a patient in the late stages of exhaustion and wasting due to diabetes. The extract had a dramatic effect on the patient’s blood glucose levels and general well-being and clinically useful insulin had at last been discovered!

**Insulin – Finding Out and Sharing with the World**

Amidst the miraculous resurrections effected by the long sought for life-saving treatment for diabetes - soon to be known as *insulin* – an extraordinary amount of work still had to be done. Macleod turned over all of his research laboratory and staff to investigating insulin’s physiological properties. He took the lead in organising the dissemination of the news of the discovery – but let Banting and Best be named as the first two authors on the initial paper on the discovery in the Journal of the Canadian Medical Association and, unusual for the head of a research department, declined to have his own name included. There were problems in maintaining supplies and soon collaboration with the American pharmaceutical firm of Eli Lilly was established to facilitate mass production. A University of Toronto patent was taken out and Macleod ensured that arrangements were also made for production in Europe, that in the UK being overseen by the British Medical Research Council.

**Who got the credit – and who deserved it?**