

G: Learning more about your Diabetes

G1: History of Type 1 Diabetes

Description of type 1 diabetes: Type 1 diabetes was first thought to have been described in the papyrus manuscripts of ancient Egypt where it was recognised that people could develop an illness associated with loss of weight, passing urine all the time day and night, profound dehydration and the urine tasted very sweet (this was how the condition was diagnosed). There was no recognised treatment.

The origin of insulin: At the end of the 1800 it was known that diabetes occurred if the pancreas was removed - suggesting that there was 'a chemical' produced in the pancreas which controlled glucose levels in the blood.

Paul Langerhans subsequently described cells seen under the microscope within the pancreas, which later were named 'Islets of Langerhans' and eventually shown to be the source of insulin.

The term 'insulin' comes from the Latin 'insula' meaning island. At the time the only treatment on offer was a diet containing no carbohydrate, this was unpleasant and of very limited success but it showed that diet, in particular carbohydrates, was important in the management of diabetes.

Isolation of insulin: Several attempts have been made to isolate 'insulin' but all failed until in the early 1920s Banting, a surgeon from Canada, moved to Toronto to work in the laboratory of Prof *Macleod*. Banting had the idea that everyone else had failed because in the insulin extraction process they were destroying the islet cells and therefore destroying the insulin.

Banting was joined by Best who was still a medical student looking for a holiday job and they successfully isolated a crude form of insulin by removing the pancreas from a dog and purifying the insulin from the islet cells. They then were able to show that they could correct the high glucose levels by injecting it back into the same dog.

Treatment using insulin: 'Marjorie', a dog, is allegedly the first dog to be successfully treated in this way. Subsequently, Collip, a biochemist joined the team and succeeded in purifying the insulin to a much higher quality.

Banting and *Macleod* were awarded the Nobel Prize (1923) but shared it with Best and Collip.

Commercial development of insulin: Within a year Eli Lilly had started to produce insulin from animal pancreases to purity such that it could be used to treat children and adults, the first commercially available insulin.

Human insulin: Frederick Sanger in Cambridge UK managed to sequence the insulin protein into its basic building blocks or amino acids, leading to the commercial development of human insulin in the laboratory and subsequently its preferential use to animal insulin's for the treatment of diabetes.

This then led to the modification of insulin to improve its function (**analogue insulins**). Sanger was awarded a Nobel prize for this work



Blood glucose testing: Glucose meters were developed from 1962 so that rather than testing urine a blood test using a figure prick and test strip would give an accurate blood glucose reading.

There are lots of different meters and your diabetes team will advice on the best; most enable you to measure your blood glucose very rapidly and to store the results.

Injection of insulin: To inject insulin, glass syringes have been replaced initially by plastic syringes and then more recently by **insulin pens**.

This makes it easier to dial the correct dose and give the injection quickly.



Importance of good diabetes control: From 1983 to 1993 the Diabetes Control and Complications Trial (DCCT) in America showed conclusively that good control improved the long-term outcome of type 1 diabetes, considerably reducing the risk of eye and kidney disease. To obtain good control it required 'intensive insulin therapy' using fast insulin with carbohydrates and a background insulin-**basal bolus regimen**.

Insulin pumps: Over the last 10 years insulin pumps have become one of the mainstays of treatment. This is simply another way of giving insulin but when used properly can be very successful, but not always suitable for everyone. This allows insulin to be given continuously (**basal insulin**) and as a bolus (**bolus insulin**) with carbohydrates. Some pumps can be linked with continuous glucose sensors.



Future advances: Since 2000 Dr James Shapiro in Canada has pioneered islet cell transplants to try to cure diabetes. These are still experimental but are showing some success - watch this space.

Research over the last few years has focused on isolating primitive **stem cells** converting them into islet cells and then injecting them into animals - this shows promise but considerable work needs to be done before this may be applicable to humans.

Key message: Large research projects across the world are attempting to find cures for diabetes with exciting ideas on the horizon.

G2: Diabetes facts and information



Type 1 diabetes affects about 350,000 people in the UK and about 26,000 are children.

- Type 1 diabetes is nobody's fault. It can happen to anyone at any age and is not caused by eating too many sweets.
- Type 1 diabetes can only be treated by insulin injections administered several times a day via a pen device or an insulin pump.
- Children with diabetes can eat the same food as everyone else. Healthy food choices are important for all of us.
- Children with diabetes are allowed sweets and chocolate. For example having them after a meal as a treat. The team will be able to advise how best to enjoy them.
- Children with diabetes are still like other children: they can play, run, go to school and parties just like everyone else.
- Type 1 diabetes is not the same as Type 2 diabetes. Type 2 diabetes is usually diagnosed in adults and is associated with lifestyle factors such as increased body weight. This can be controlled initially by careful monitoring, diet and lifestyle changes. Eventually it needs other treatments including tablets and insulin.

Guide for when to contact the diabetes team so that changes can be made before the next clinic appointment.

The diabetes team is here to help. Please email or contact your nurse if you are not sure what to do next. Always ring the office or emergency numbers (if urgent out of hours). Some ideas about when to contact us are listed:

Hypoglycaemia

- Following a severe hypo
- If there are more hypos than usual or they occur regularly with exercise
- If there is hypo unawareness or night time hypos
- Always contact your team if you have any worries or questions

High Blood glucose levels

- If there is a trend with your blood glucose levels rising into double figures.
- If your weekly average blood glucose level (see meter) is rising above 9.5mmol/l

Variable swinging blood sugars

- If your glucose levels are swinging and you are uncertain what to do.

E mail the results to your diabetes specialist nurse.

Make a note of questions you may want to ask: