

GADGETS FOR DIABETES

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Dr Alcolado started by reminding us that prior to the early 1920's there was no treatment available for diabetes. A diagnosis of diabetes meant progressive weight loss and worsening and sufferers would eventually die from malnutrition.

Insulin was discovered in the early 1920's and the Nobel Prize for Medicine in 1923 was awarded for the discovery of insulin. Once discovered and then refined, the next problem was how could it be used and administered? Initially it was administered using large glass syringes and huge reusable needles that needed sterilising.

There was a step forward in the late 1970's/early 1980's with the development of insulin syringes. In the late 1980's there was further progress with the development of gadgets such as semi automated pen devices to administer insulin (Dr Alcolado reminded the audience that the needles for the pens were not initially available on prescription, but this has now been reversed and they are available on prescription).

As insulin is a peptide, it is not active orally. Dr Alcolado went through a few potential routes of administration:

Air Canister – forces insulin into the skin. It has the advantage of no injections/needles for the needle phobic but has the disadvantages of being painful, causing bruising and the absorption can be erratic.

Topical – Studies have been done on patches of insulin but it is a large peptide molecule and there has been limited success in developing this route.

Inhalation – The first inhaled insulin was marketed by Pfizer (Exubera). It avoided the need for needles/injections and the absorption was good but it had the disadvantage of being a large appliance that needed a lot of manual dexterity to use. It was not to be used in smokers as absorption varied in smokers. A few weeks prior to Dr Alcolado's address, Pfizer had decided not to continue with manufacturing exubera.

Insulin Pumps – Early pumps were not robust and there were many problems with breakdowns. Also there were problems with wrong patient choice, the patients chosen to trial the pumps were often brittle diabetics. There are currently approximately 50 patients in Cardiff on insulin pumps. Dr Alcolado showed the audience a typical pump. Each costs approximately £2500, the consumables are also expensive and there is also the cost of training patients to take into account. The pumps have the advantage that they can be programmed so that the amount of insulin delivered can vary throughout the day and a bolus can be given before meals.

The pumps are used more widely in other countries – in Germany 30% of patients with diabetes have pumps, whereas in Wales only 0.3% of patients with diabetes have pumps.

GLUCOSE SENSING

After discussing the advances in insulin and its administration, Dr Alcolado then looked at Glucose sensing. The first “portable” meter was a huge box like device. Dr Alcolado gave examples of new gadgets for glucose sensing such as the glucoWatch that can measure glucose transcutaneously. He also mentioned a glucoPhone (that can measure blood glucose and transmit the information to healthcare professionals) and Bluetooth enabled continuous glucose monitoring systems that can communicate with insulin pumps.

THE FUTURE?

1. Glucose sensors becoming smaller – nano glucosensors are now in the process of being developed, which could potentially be injected into the bloodstream and circulate around the body.
2. Integrating glucose sensing with insulin delivery – moving towards an artificial pancreas.
3. Moving towards smaller implantable insulin pumps.

Dr Alcolado concluded by summarising the change from no treatment and certain death from diabetes 90 years ago, through to the discovery of insulin but with poor means of administering it, to current paradigm pumps and continuous glucose sensing.