



University of
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NEWER TREATMENTS FOR TYPE 1 & TYPE 2 DIABETES

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QUESTIONS TO ASK YOURSELF?

- How much do you really know about your current insulins?
- Do you want to see new insulins/sensors being developed?
- What impact are these likely to have on your health?
- Will you accept new insulins despite risk?

1889:
Pancreatic
Diabetes Discovered

1921:
Purification
of Insulin

1961:
Glucagon
Introduced

1967:
Laser Treatment
for Diabetic Blinding

1978:
First Human
Insulin Synthesized

1990:
Insulin
External Pump

2014:
Stem Cell
Islets Implant

DIABETES MILESTONES TIMELINE

1921:
Discovery
of Insulin

1959:
Type 1 and
Type 2

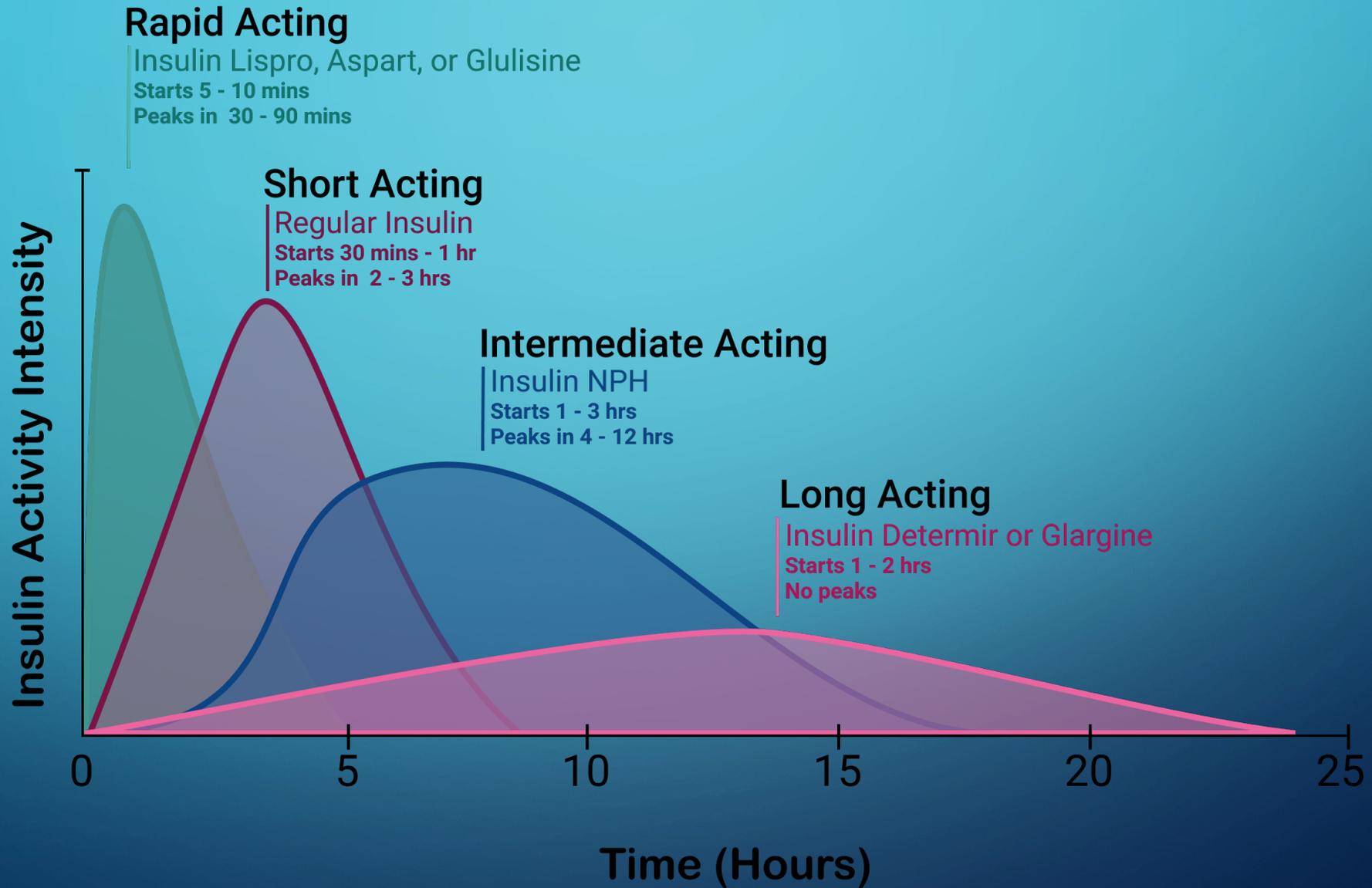
1966:
First Pancreas
Transplant

1976:
A1C Test
Developed

1986:
Insulin
Pen

2006:
First Inhaled Insulin
is FDA Approved

Types of Insulin



**FROM 2014 TO 2019,
THE AVERAGE PRICE**

**OF INSULIN
INCREASED BY**

54%



Table 1. Approved Biolns in Europe, the United States, and China

Company	Country
Amphastar Pharmaceuticals	U.S.
Biogenomics	India
Celltrion	South Korea
Genesys	China
Geropharm	Russia
HEC Pharm (in cooperation with Lannett)	China/U.S.
Hisun	China/U.S.
Julphar	UAE
Midas Pharma	Germany
MJ Bioscience	India
Paras Biopharmaceuticals	Finland
Polus	South Korea
Sihuan Pharmaceuticals	China
Wockhardt	India

ULTRA-LONG-ACTING BASAL INSULIN ANALOGUES

- Create ultra-long-acting basal insulin analogues
- Allow once-weekly subcutaneous administration
- Insulin icodec (Novo Nordisk) 
- Molecular engineering = 3 amino acid substitutions (A14Glu, B16His, B25His)
- Results in reduced insulin receptor affinity and clearance,
- Very protracted release
- Half-life of icodec extended to about 8 days with 
 - A flat & stable pharmacokinetic profile
 - low peak-to-trough variations &
 - Evenly distributed glucose-lowering efficacy within a weekly dosing interval



CLOSED LOOP SYSTEMS (ARTIFICIAL PANCREAS)

- Some people with type 1 diabetes use insulin pumps and continuous glucose monitors that ‘talk to each other’
- A Closed Loop System – CLS or An artificial pancreas
- Manages blood sugar levels
- The doses of insulin your body needs day/night help keep your blood sugar levels stable are released via your pump
- Some of these are adjusted automatically in response to your blood sugar levels which are monitored all the time by the Continuous Glucose Monitor (CGM)

CLOSED LOOP SYSTEM – CLS

- Two types of closed loop systems:
- Hybrid Closed Loop Systems
 - regulated and available to buy or offered to limited numbers of people through the NHS
- The other type of closed loop system is called a DIY system
 - These systems are developed by people in the diabetes community
 - They are unregulated and so not available through the NHS

HYBRID CLOSED LOOP SYSTEMS

There are four main licensed hybrid closed loop systems available

They are usually the ones offered by the NHS.

CamAPS FX

An app which uses the Dexcom G6 CGM or Dana Diabecare RS and DANA-i insulin pumps. Licensed for use from the age of one and over

Medtronic 780g

Insulin pump which works with a Guardian 4 Sensor CGM. Licensed for use from the age of seven up

Medtronic MiniMed 670G

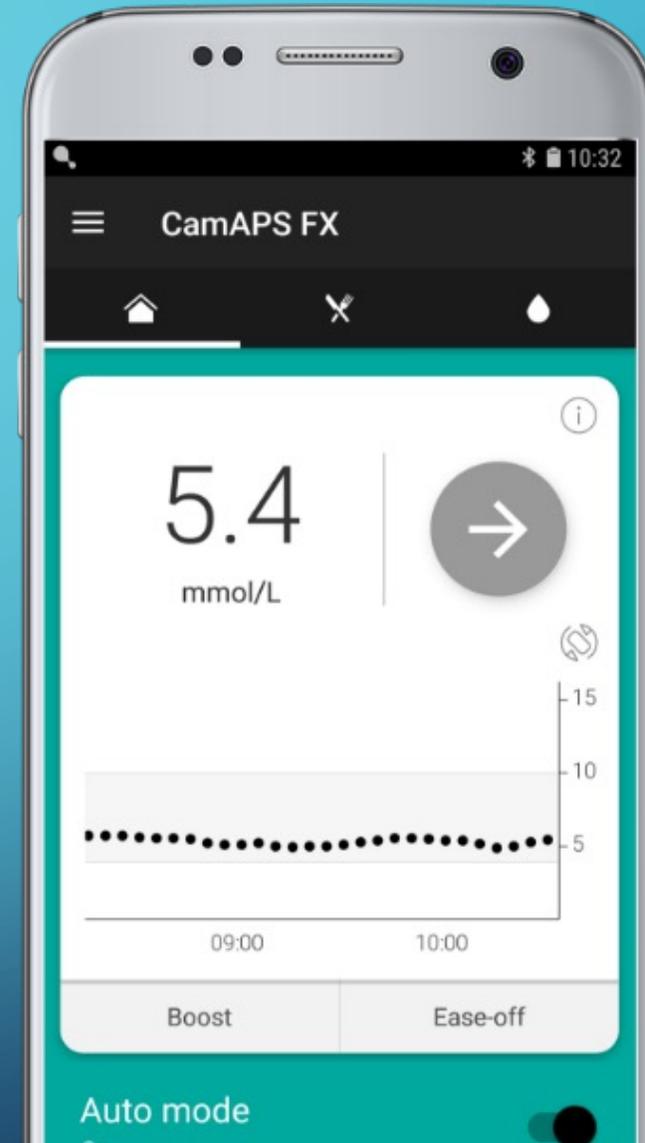
Insulin pump works with a Guardian 4 Sensor CGM. Licensed for use aged two and over

Tandem Tslim Control IQ

An insulin pump which works with the standard Dexcom G6 CGM. Licensed for use from the age of six

WHAT IS CAMAPS FX

Android app to manage glucose levels in people with type 1 diabetes (1- older) using Advanced Adaptive Hybrid Closed-Loop approach



- MiniMed™ 780G system with SmartGuard™ technology
- Most advanced insulin pump system with SmartGuard™ automation for self-adjusting basal delivery with autocorrection dosing
- Now with Guardian™ 4 sensor



- Insulin pump works with a Guardian 4 Sensor CGM
- Licensed for use aged two and over



- t:slim X2 insulin pump used as a standalone insulin pump, or
- Integrated with the Dexcom G6 continuous glucose monitoring (CGM) system
- When used with CGM, choose one of two predictive insulin delivery technologies



HOW DOES A CLOSED LOOP SYSTEM WORK?

- When you have type 1 diabetes, your pancreas can't make and release insulin like it should
- By releasing insulin whenever your body needs it, a closed loop system works like a pancreas
- So a closed loop system is sometimes called an artificial pancreas or an artificial pancreas system

WHO CAN USE A HYBRID CLOSED LOOP SYSTEM?

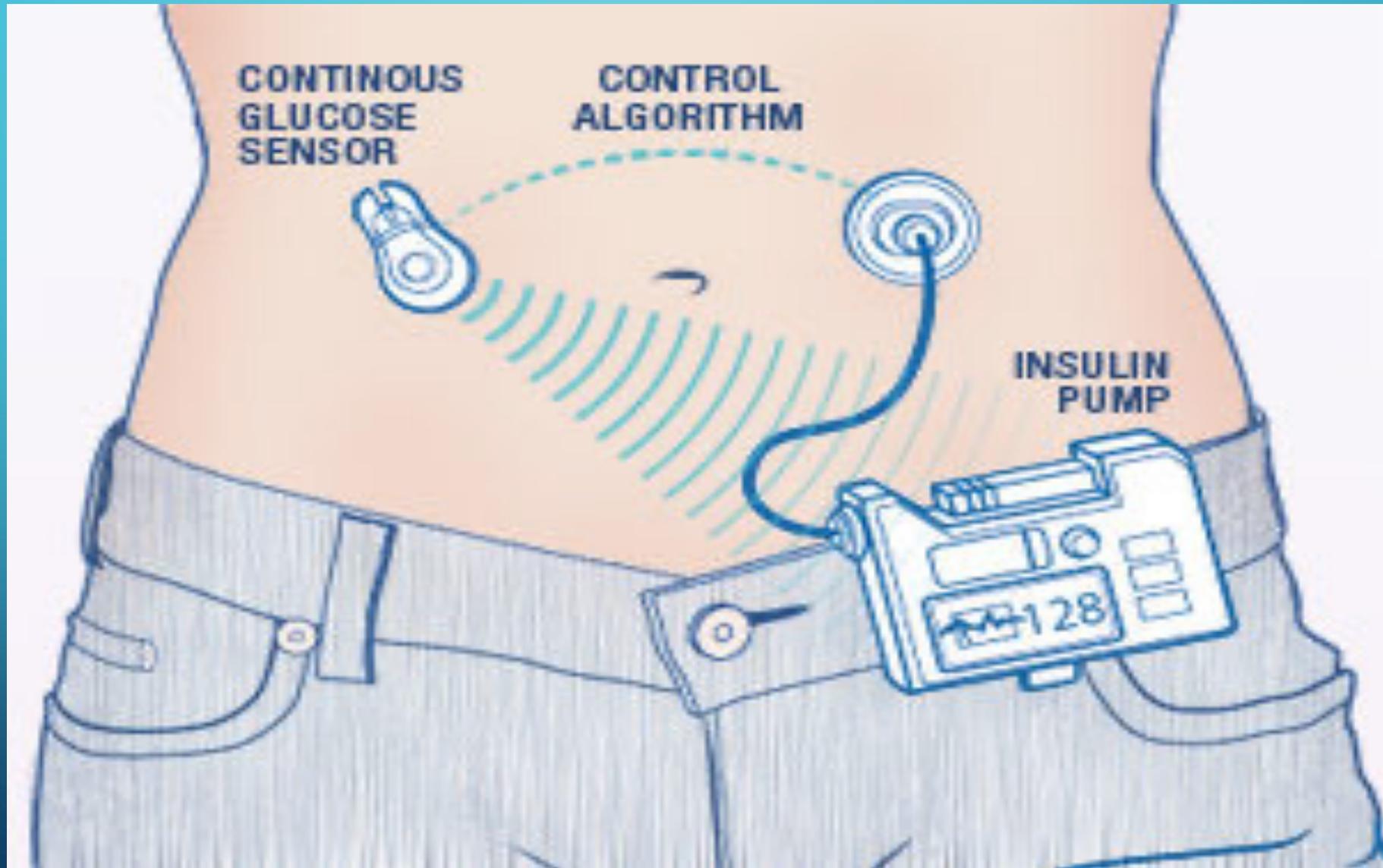
- HCL systems are generally suitable for children/adults with type 1 diabetes, (although it will depend on the licensing rules) for each system
- More funded research is being provided for Type 2 diabetes patients

DIFFERENT PARTS OF A HYBRID CLOSED LOOP SYSTEM

Three parts to a closed loop system

- 1. Continuous glucose monitor**
- 2. The algorithm**
- 3. An insulin pump**

HYBRID CLOSED LOOP SYSTEM - HCL



DIFFERENT PARTS OF A HYBRID CLOSED LOOP SYSTEM

Continuous glucose monitor

- Small sensor under your skin
- Continuously monitoring your blood sugar readings
- Separate device like a mobile phone or direct to your insulin pump

THE ALGORITHM

- A computer programme that reads blood sugar information and works out how much insulin is required
- The algorithm can be part of an app on a separate device like a mobile phone or may be part of the insulin pump itself

AN INSULIN PUMP

- The pump automatically releases insulin into your body whenever you need it based on your blood sugar readings
- To work as a hybrid closed loop, it needs to be able to communicate with a CGM sensor, sometimes called a looping, sensor augmented, or an integrated pump

BENEFITS OF HYBRID CLOSED LOOP SYSTEMS

- Increase amount of time in target range
- Reduce hypos and lower your HbA1c and risk of diabetes complications
- Better quality of life
- 9 out of 10 parents (Research study):
- Spend less time managing child's diabetes
- Spend less time worrying about their child's blood sugar levels
- Report less trouble sleeping

NEXT STEPS IN USING A HYBRID CLOSED LOOP SYSTEM

- Discuss with your healthcare team
- Or others on online fora using these systems
- Check the rules on what tech you may qualify for
- Seek guidance from GP/Hospital and NHS
- Check guidelines “getting an insulin pump”
in England/Wales/Scotland or NI

HOW MUCH DOES A CLOSED LOOP SYSTEM COST?

- A hybrid closed loop insulin pump can cost between £2,000 and £3,000
- Plus around £1500 per year for: the
 - cannulas,
 - reservoirs and
 - tubing required for its use

CONTINUOUS GLUCOSE MONITOR (CGM)

- Can cost about £2000 a year
- Using CGM with an insulin pump you may not need to purchase a standalone CGM reader
- You'll also need to change the sensor on your CGM about every 7 to 10 days
- Transmitters cost around £200 - £500 and last between 4 months to a year depending on the system

THE FUTURE

- Streamlined islet transplantation?
- Ultra-long biosimilars?
- Closed-Loop Systems
- Predictive insulin delivery technologies

The image features a blue gradient background with white circuit-like lines in the corners. These lines consist of straight paths that branch out and terminate in small circles, resembling a network or data flow diagram. The lines are positioned in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

THANK YOU