

DIABETES
and the
Thomas Addison Unit
An Overview

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Topics covered

- Introduction to diabetes
- The different types of diabetes
- The treatment of diabetes
- The complication of diabetes
- The diabetic clinic at St George's Hospital

What is Diabetes?

- Diabetes is a disorder of metabolism ie the way our bodies convert the food we eat into energy
- Food is broken down by digestive juices into chemicals, including a simple sugar called glucose
- Glucose is the bodies main source of energy

Complex CARbs



Simple CARbs



What is Diabetes?

- Glucose passes in the blood and is available for cells to use as energy
- BUT- a hormone called insulin must be present
- Insulin is produced by cells called islets in an organ called the pancreas which lies behind the stomach

- In healthy people the pancreas automatically produces the right amount of insulin to enable glucose to enter cells
- In diabetes glucose can not enter the cells and builds up in the blood
- A high blood glucose (hyperglycaemia) is the hallmark of diabetes

Types of Diabetes

- Diabetes has two main forms

Type-1

Type-2

- Nine out of ten people with diabetes have type-2 diabetes
- Genetic variations cause a special type of Diabetes (MODY)
- Type-3 diabetes due to inflammation of the pancreas
- Gestational Diabetes

DIABETES

3.7 MILLION

DEATHS DUE TO DIABETES
AND HIGH BLOOD GLUCOSE

1.5 MILLION
DEATHS CAUSED
BY DIABETES



**DIABETES IS
ON THE RISE**

2015

one in **11** adults
has diabetes

2040

one in **10** adults
will have diabetes

388 MILLION
ADULTS HAVE DIABETES



**THE GLOBAL PREVALENCE OF DIABETES AMONG ADULTS
OVER 18 YEARS OF AGE HAS RISEN FROM 4.7% IN 1980
TO 8.5% IN 2014**

Diabetes facts and figures

- More people than ever have diabetes. More people than ever are at risk of type 2 diabetes. If nothing changes, we predicts that 5.5 million people will have diabetes in the UK by 2030.
- Around 90% of people with diabetes have type 2 diabetes. Around 8% of people with diabetes have type 1 diabetes. About 2% of people with diabetes have rarer types of diabetes.

- More than 4.9 million people in the UK have diabetes
- 13.6 million people are now at increased risk of type 2 diabetes in the UK
- 850,000 people are currently living with type 2 diabetes but are yet to be diagnosed

DIABETES- Symptoms

- Due to build up of glucose in the blood, there may overflow into the urine at certain levels
- Glucose draws water with it
- This produces a great flow of urine
- As a result the body is drained of fluid and chemical reserves

Symptoms of Diabetes

Type 1 diabetes

- Frequent urination
- Extreme thirst
- Extreme weight loss
- Extreme Fatigue and irritability
- Extreme hunger
- Severe dehydration
- Cramps

Type 2 Diabetes

- Any of the type 1 symptoms
- Frequent infection
- Blurred vision
- Cuts and bruises slow to heal
- Tingling and numbness in hands and feet
- Recurrent skin or bladder infections

DIABETES- Symptoms

- If the levels of sugar in the blood are very high and prolonged, a condition ketoacidosis can occur
- This leads to shortness of breath and even coma
- But type-2 diabetes may present with no symptoms....

DIABETES

Beware the Silent Assassin



Type-1 Diabetes



Type-1 Diabetes

- The pancreas can not make insulin
- islet cells in the pancreas are attacked by the bodies own immune defence system
- Islet cells are mistaken for germ cells
- ? Cause not known
- ? Viruses in susceptible people

Type-1 Diabetes

‘Team work’

- Patients feel very sick very quickly
- Due to complete lack of insulin
- Insulin injections must be given daily to stay alive and reduce glucose levels
- Close working relationship is needed between the patient, doctor, diabetes nurses and dietician to achieve this

Treatment



- Only way to treat type-1 diabetes is by insulin
- Insulin is given as an injection as stomach juices would destroy it if taken by mouth
- Insulin can be given in different ways, including syringes and insulin pens
- Treatment will need to be adjusted to lifestyle

Treatment

- Maintaining a blood glucose between 4-7 mmol avoids the risk of diabetes complications
- If blood glucose falls below 3 mmol, symptoms of hypoglycaemia (low blood sugar) occurs
- This results in shaking, hunger, confusion and unconcoiusness

Treatment

- Blood needs to be tested at least once a day at different times
- Insulin doses change and it is important to learn how to adjust the dose according to food (carbohydrates)
- NEVER stop insulin
- DAFNE course- run in the TAU 6 times a year

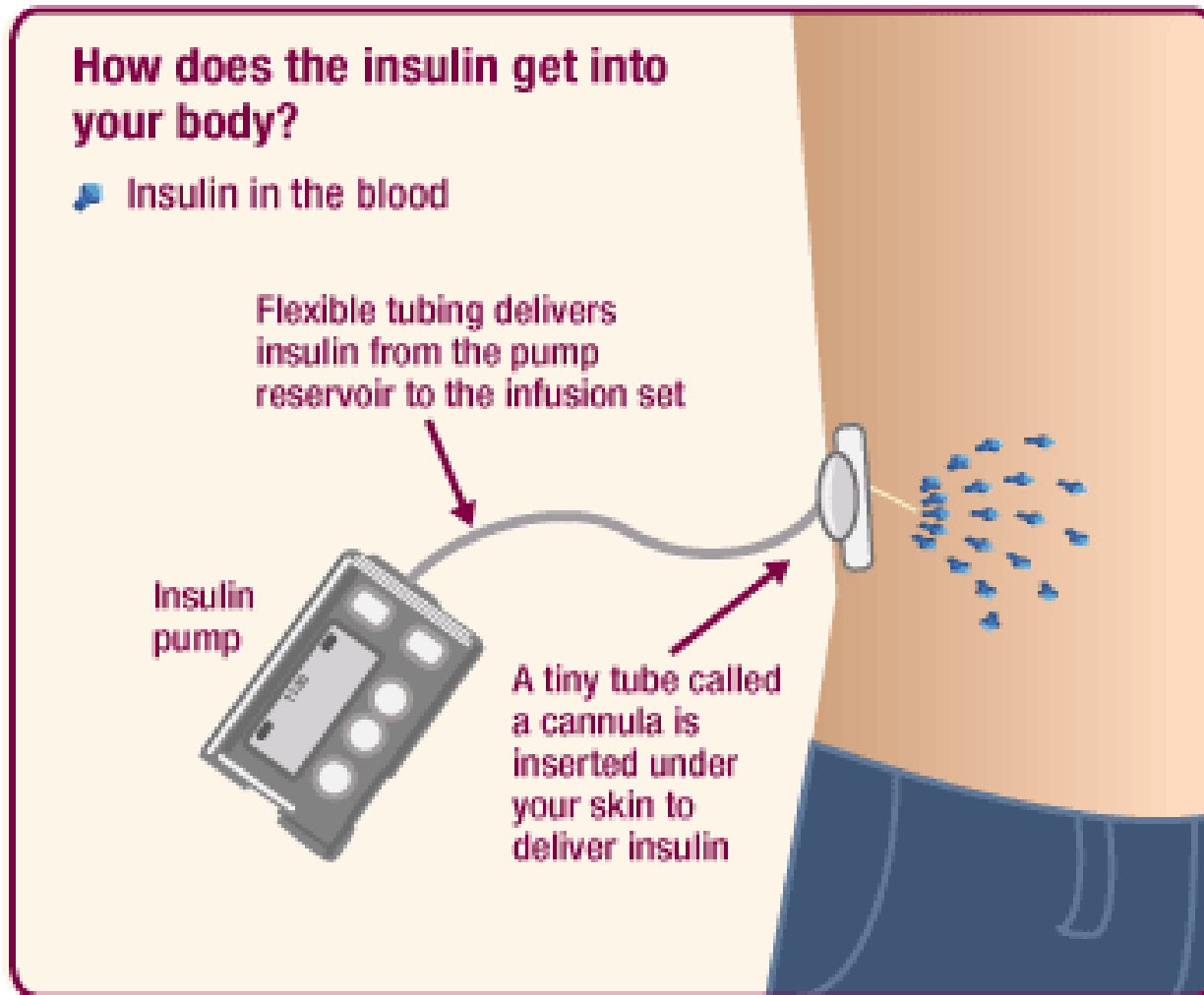
DAFNE

Dose Addjustment For Normal Eating

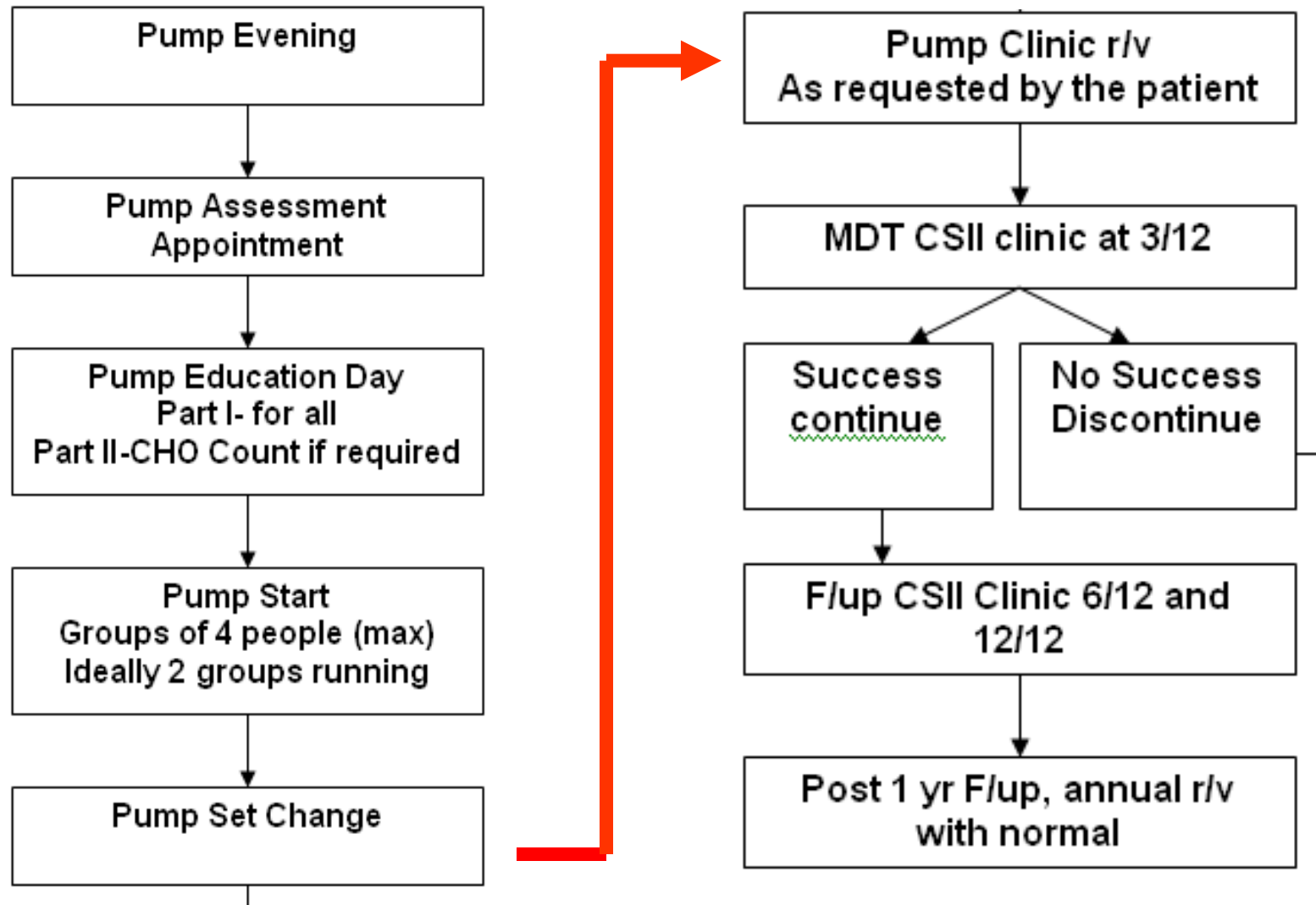
- One week course for patients with type-1 diabetes
- Education on carbohydrate counting and giving the correct dose of insulin
- Helps patients to lead a normal life



How does insulin pumps work?



Insulin pump service in TAU

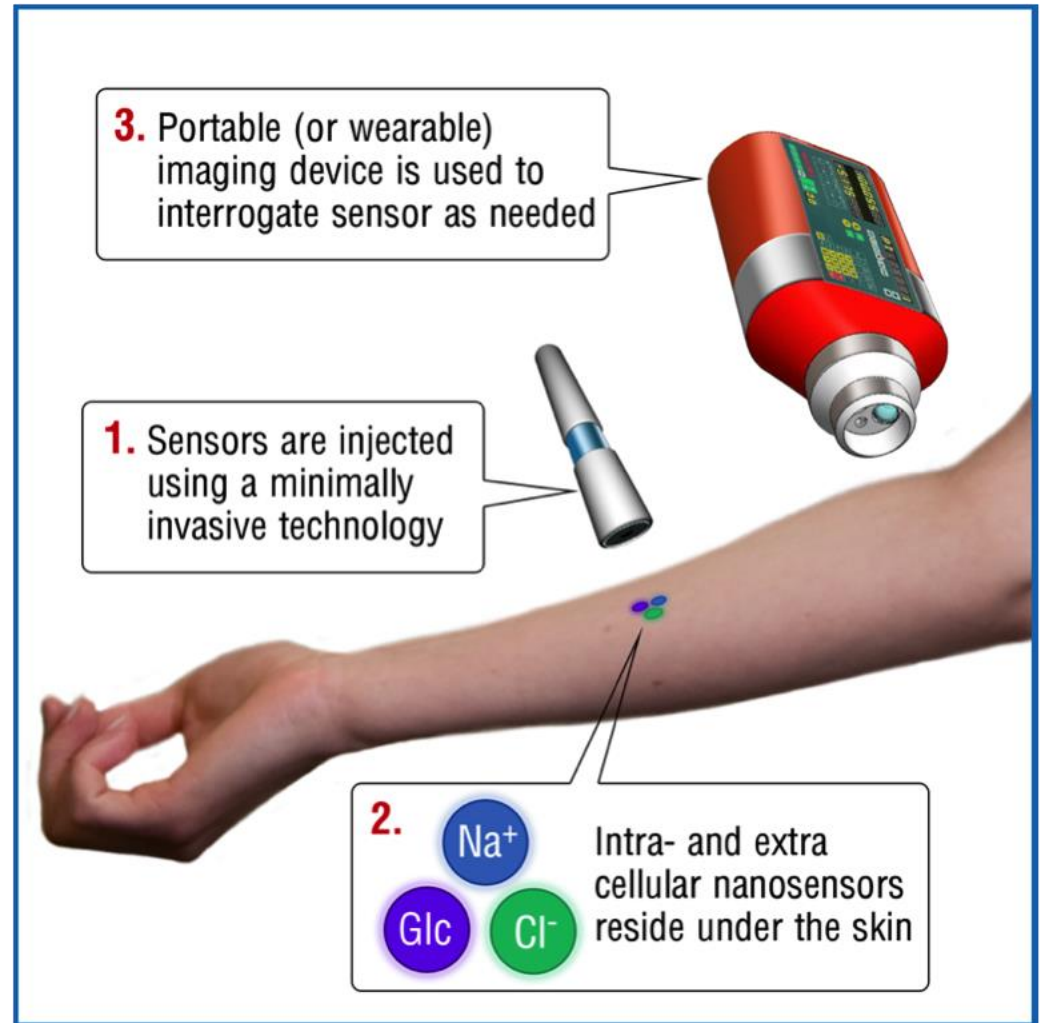
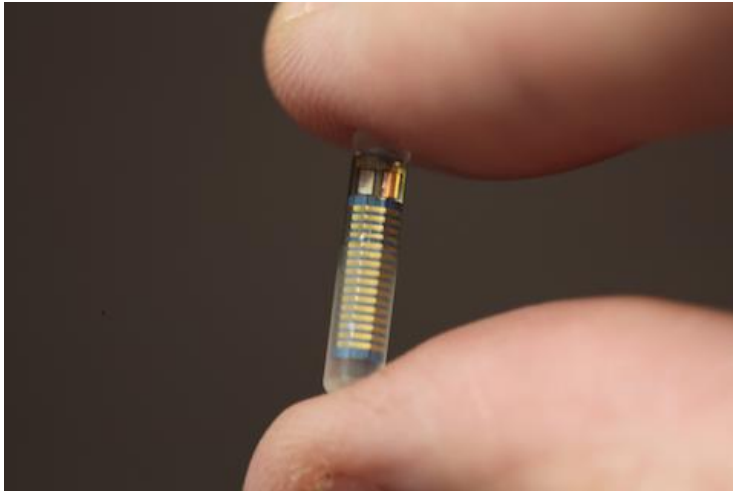


New methods of monitoring blood glucose



Blood Glucose Monitoring





Medals from Diabetes UK

- **The Alan Nabarro medal**
- This medal is awarded to people who have lived with diabetes for 50 years. Alan Nabarro waged a lifelong battle against discrimination against people with diabetes. In 1968 he was awarded the OBE for his work with young people in London.



Hypoglycaemia

Symptoms



SHAKING



SWEATING



ANXIOUS



DIZZINESS



HUNGER



FAST HEARTBEAT IMPAIRED VISION



WEAKNESS,
FATIGUE



HEADACHE

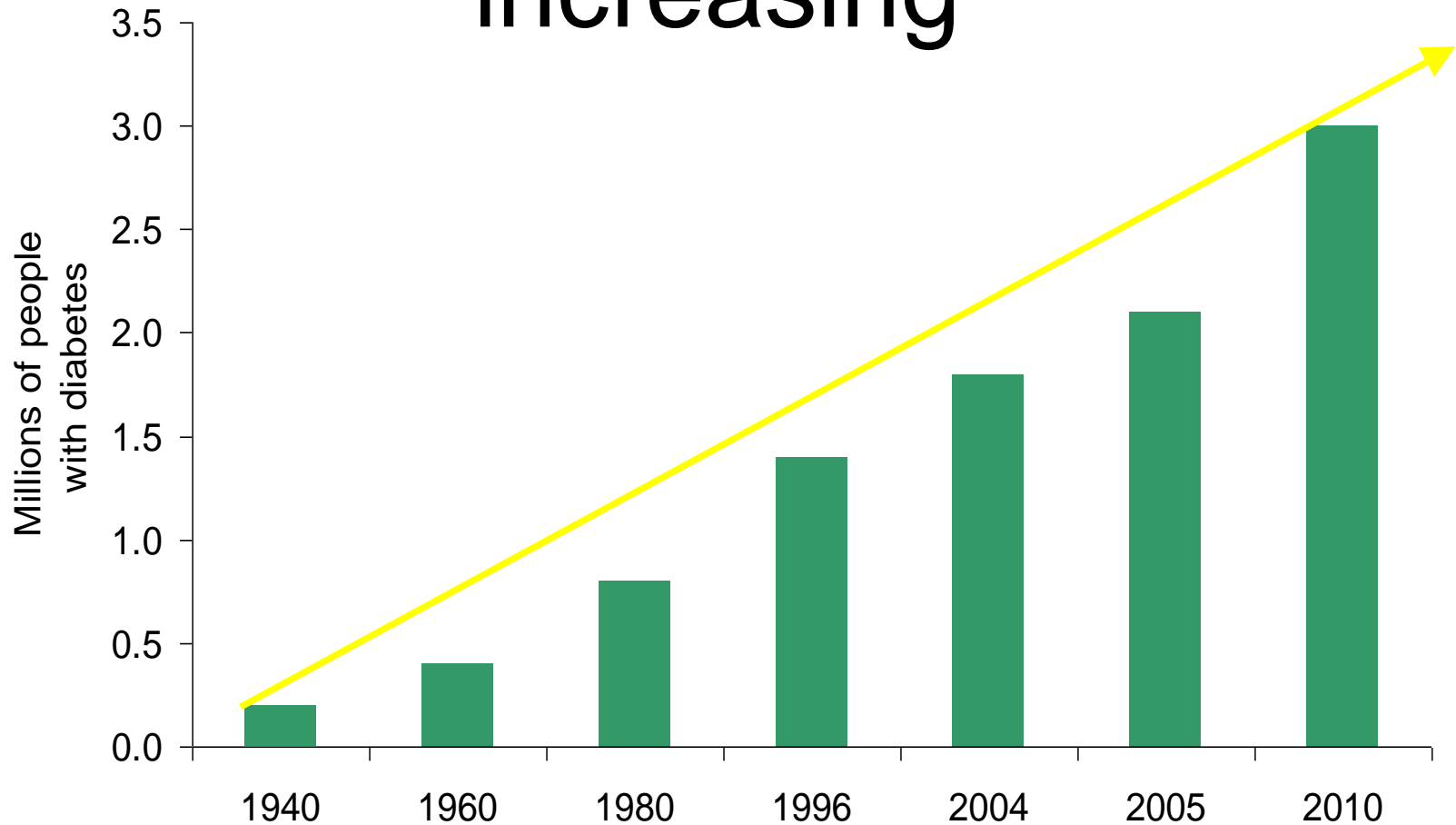


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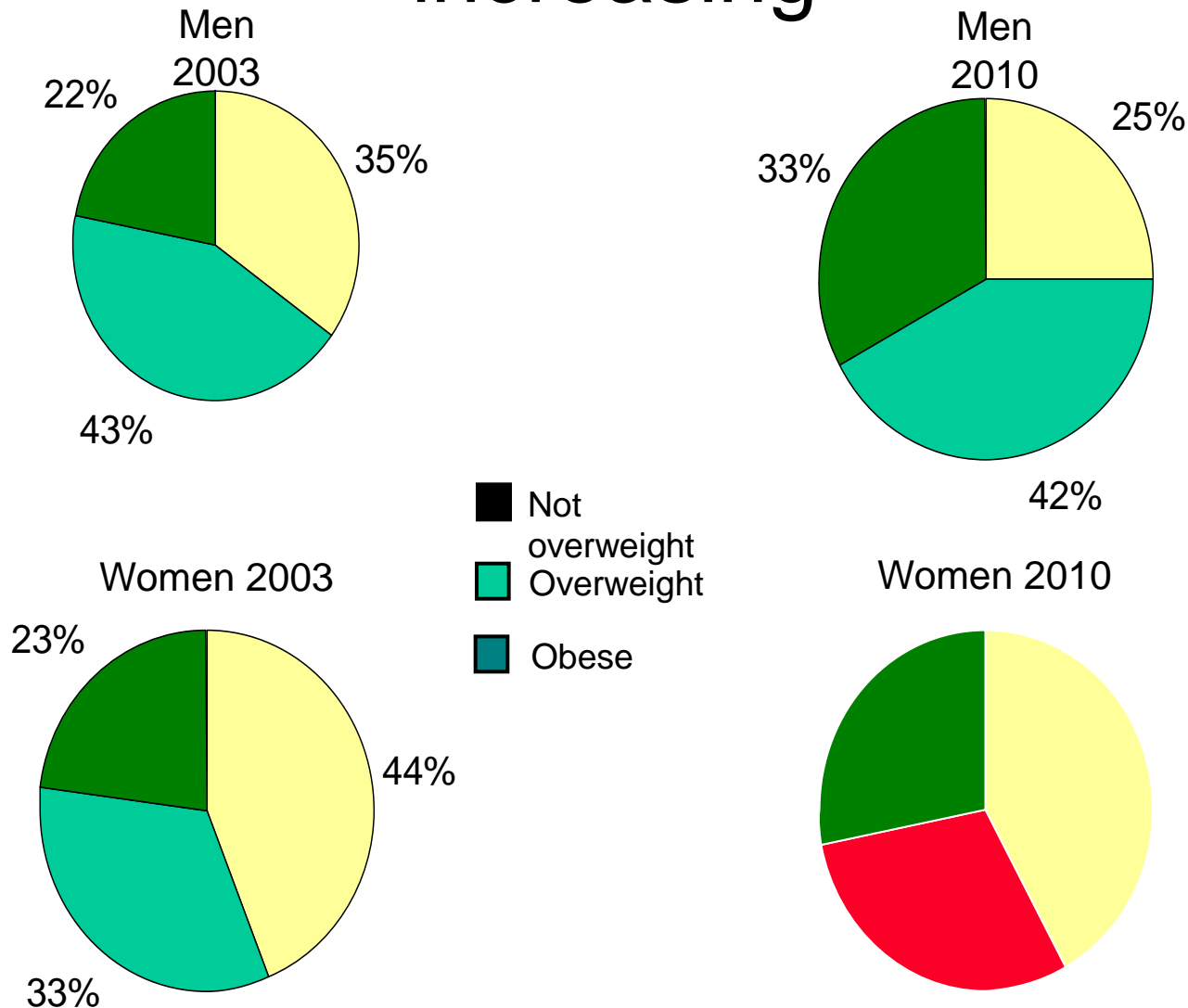
Type-2 Diabetes



Diabetes in the UK is increasing



Overweight and obesity in the UK is increasing



Type-2 Diabetes

- Due to partial lack of insulin and the inability of the body to use insulin
- 2-5% of the population suffer from type-2 diabetes
- Incidence is increasing world wide
- Due to obesity and a lack of exercise
- With weight gain the body becomes resistant to the effects of insulin

Type-2 Diabetes

- Type-2 diabetes is considered a silent disease as it works its destruction over many years
- Initially it may cause little symptoms
- Half the people with type-2 diabetes don't know they have it

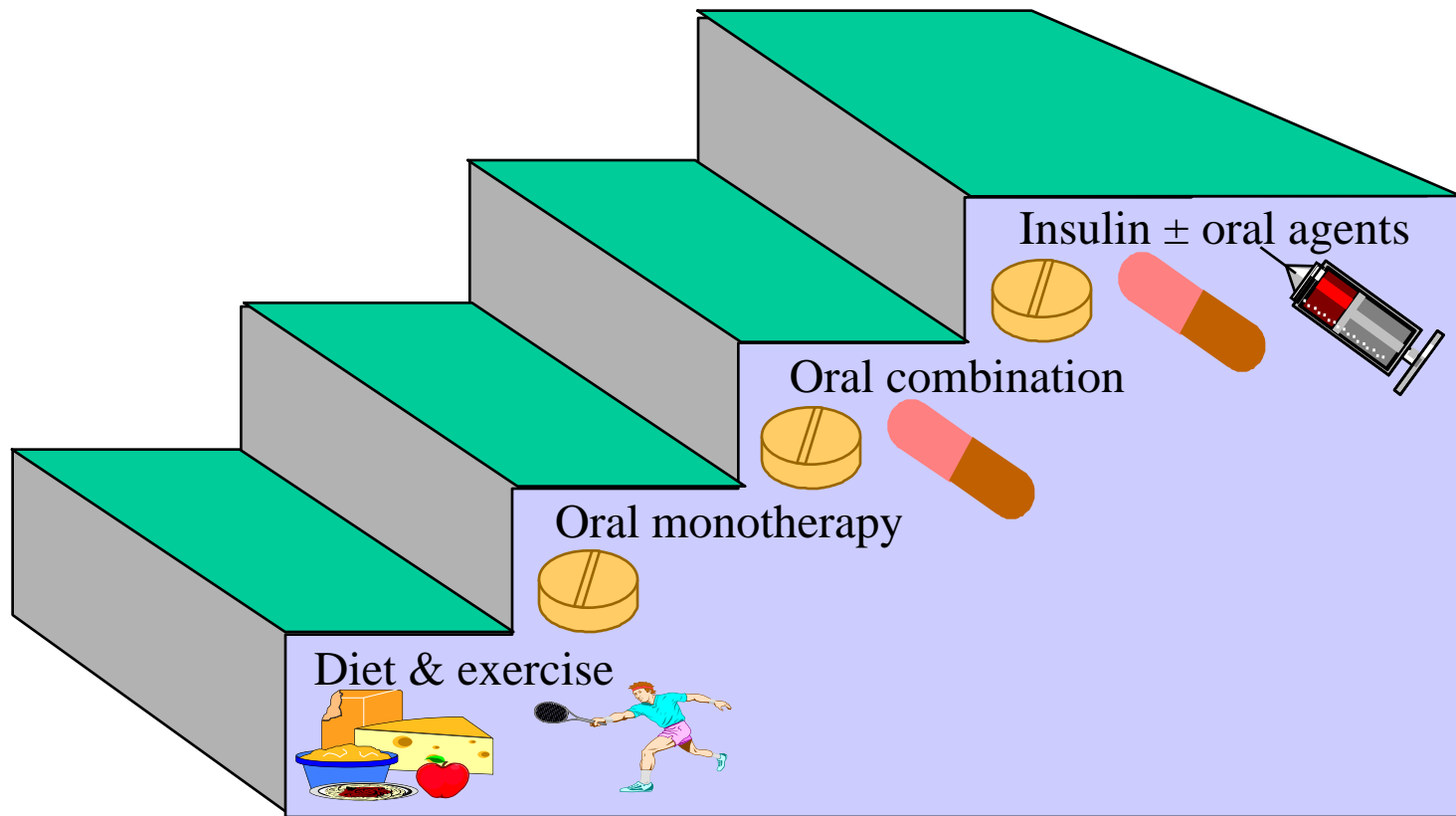
Type-2 Diabetes-Treatment

- Healthy living
 - Exercise
 - Weight loss, try to achieve ideal weight
 - Stop smoking
 - Alcohol in moderation
- Healthy eating
 - Less sugar and fat
 - More fibre

Type 2 Diabetes Remission

- Remission is when your HbA1c— a measure of long-term blood glucose levels — remains below 48mmol/mol or 6.5% for at least six months.
- Weight loss 15 kg (2 stone 5lbs)
- NHS low calorie programme based on the DiRECT trial.

Stepwise Management of Type 2 diabetes



Development of exenatide: an incretin mimetic

- Synthetic version of salivary protein found in
- the Gila monster¹
- More than 50% overlap with human GLP-1¹
 - Binds GLP-1 receptors on β -cells (*in vitro*)²
 - Resistant to DPP-IV inactivation³



Site of DPP-IV Inactivation^{2,3}

- Following injection, exenatide is measurable in plasma for up to 10 hours⁴

¹Eng J, et al. *J Biol Chem* 1992;267:7402–7405; Adapted from ²Nielsen LL, et al. *Regul Pept* 2004;117:77–88;

³Drucker DJ. *Diabetes Care* 2003;26:2929–2940; ⁴Calara F, et al. *Clin Ther* 2005;27:210–215.

Surgery for weight loss

‘Cure for Diabetes’

Adjustable
Gastric Band
(AGB)



Roux-en-Y
Gastric Bypass
(RYGB)



Vertical Sleeve
Gastrectomy
(VSG)



Adapted from an illustration by Walter Pories, MD, FACS

Gestational Diabetes



Weekly joint antenatal Diabetic clinic in TAU

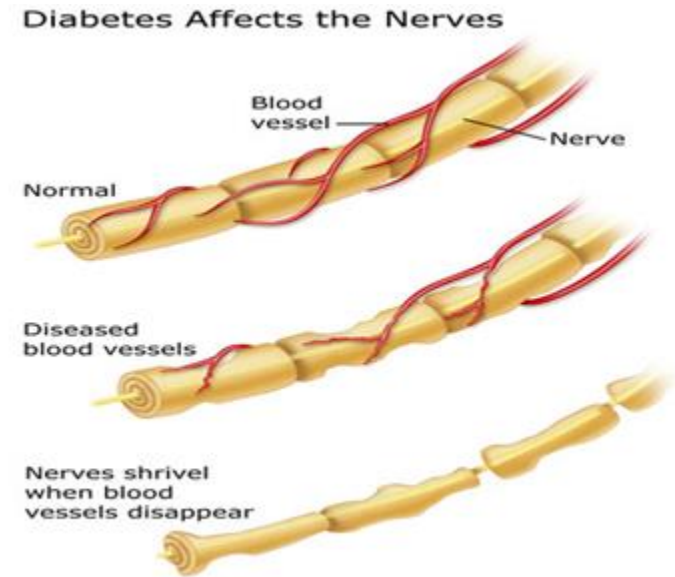
- Gestational Diabetes
- Patients with existing type-1 and type-2 diabetes
- Multidisciplinary with obstetricians, midwives, diabetes nurses and dieticians

Complication of Diabetes

- Circulation
- Legs and feet
- Nerves
- Kidneys
- Eyes
- Heart

FEET

- Peripheral neuropathy
 - Damage to nerves in feet
- Peripheral vascular disease
 - Poor circulation
 - Reduced blood flow in arteries in the leg



Peripheral neuropathy-

Lack of sensation

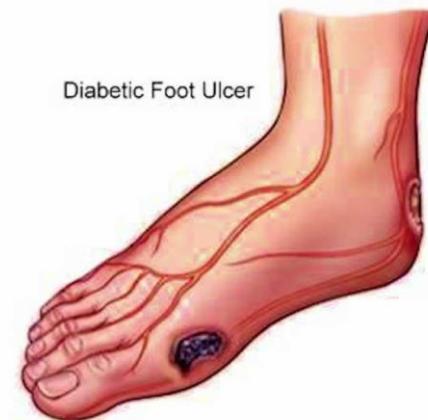


128HZ TUNING FORK



Lack of blood supply

- If foot pulses are not palpable, blood flow should be measured using a Doppler Ultrasound



Diabetic Retinopathy

- Diabetic eye disease
- Can cause blindness if left undiagnosed and untreated
- High blood glucose levels cause damage to the blood vessels in the back of the eye (retina)

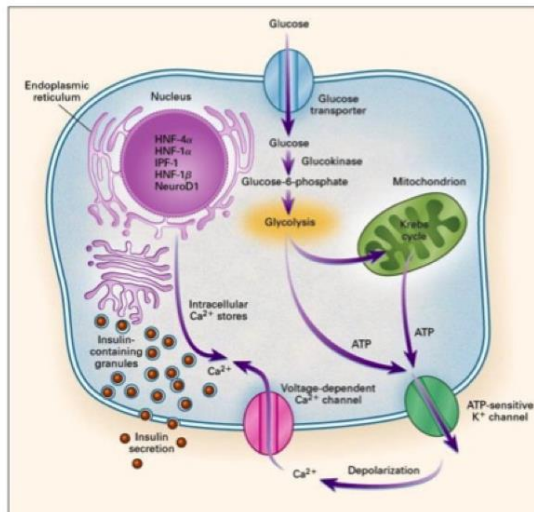
Diabetic Nephropathy (Kidney Disease)

- Weekly joint renal diabetic clinics held in the TAU - multidisciplinary
- Diabetes one of commonest cause or renal failure in the UK-preventable



Diabetic Genetic clinic

- Run monthly with Genetics Department
- Look for rare inherited forms of Diabetes such as MODY
- May present like type-1 diabetes but can be controlled by tablets



The Thomas Addison Unit Team!

