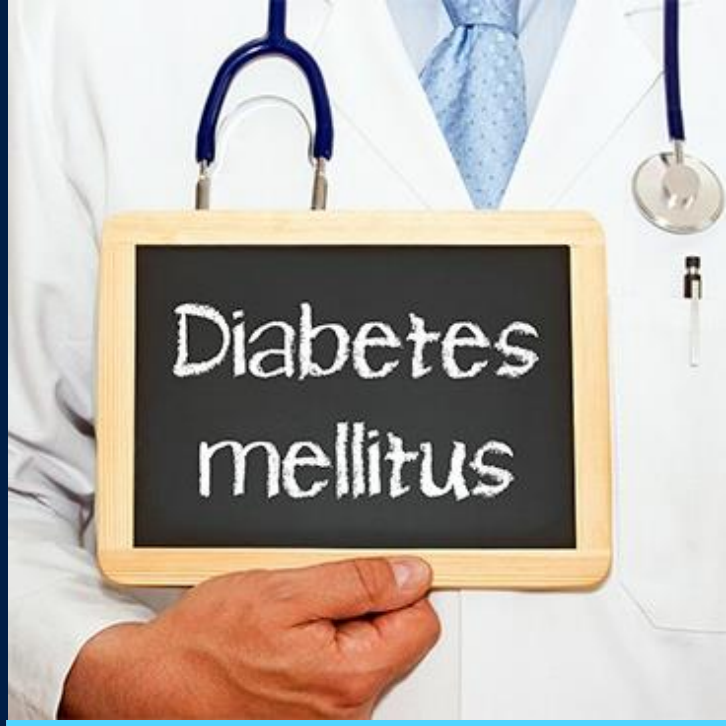
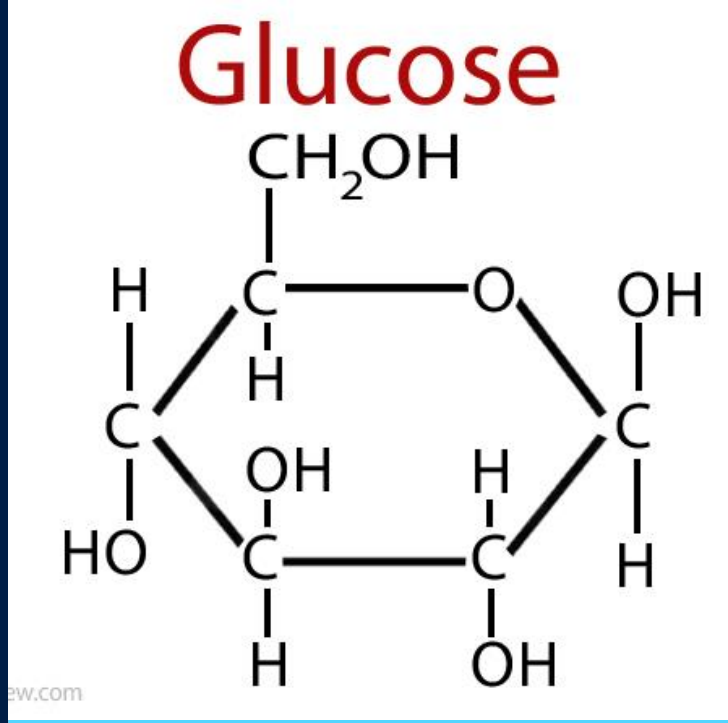
DIABETES MELLITUS



What is glucose?

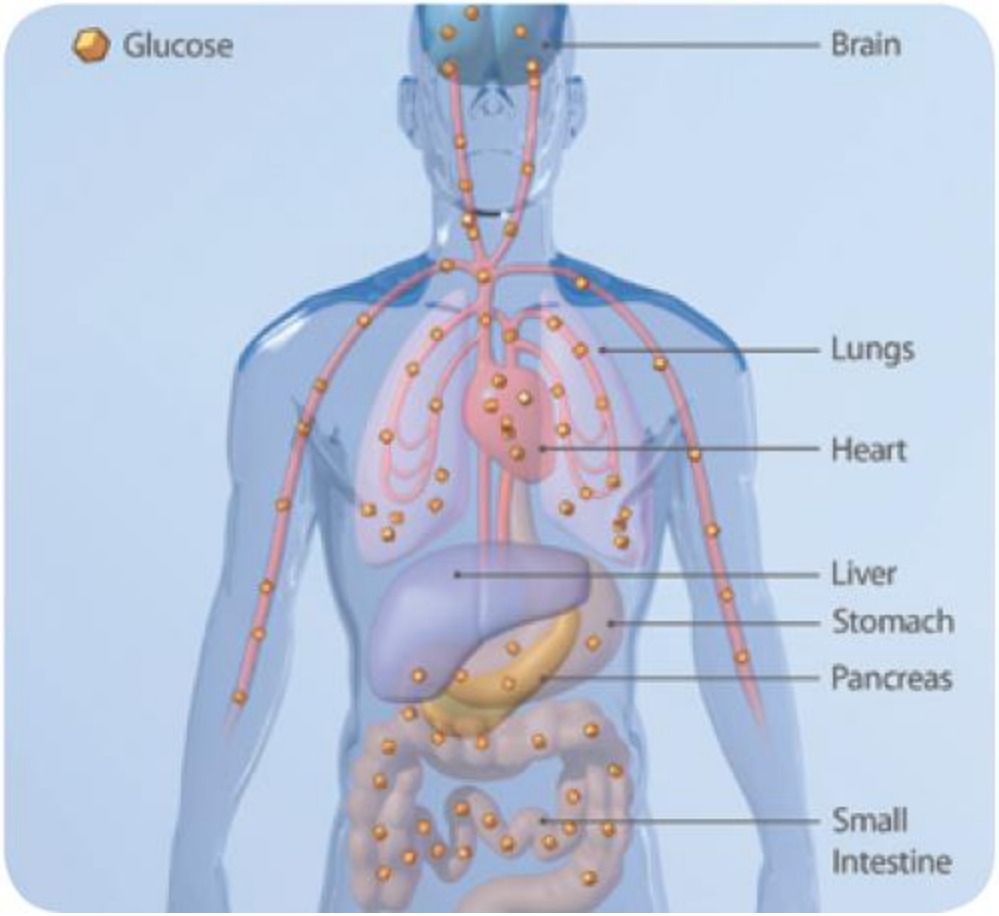


What is glucose?

- ✓ Glucose is a type of **sugar** your body uses as its **primary** source of **energy / fuel**
- ✓ Just like a car needs fuel to run, the body needs glucose to run

What is glucose?

Energy is needed for every single movement and every function your body perform



Every cell uses glucose for energy.
Glucose is distributed throughout the body.

Which foods contain glucose?

BIPT
Pg 12 – 14

Protein

Fats

Carbohydrates

Which foods contain glucose?

BIPT
Pg 12 – 14

CARBOHYDRATES

Simple

“sugars”

Complex

“starches”

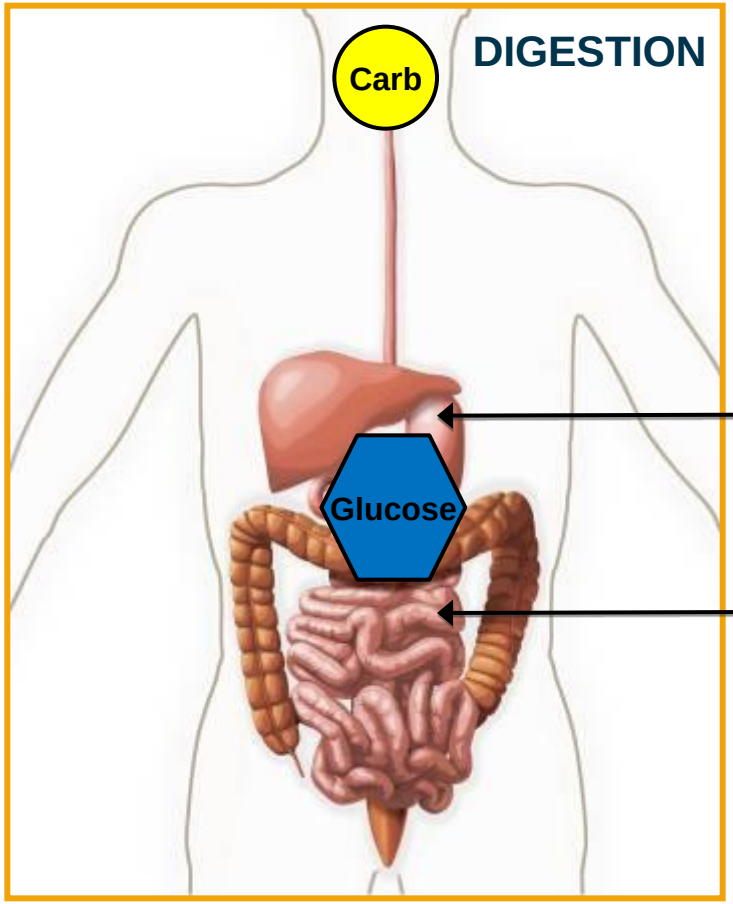
Where does glucose come from?

BIPT
Pg 12 – 14

- ✓ Other foods that contain glucose

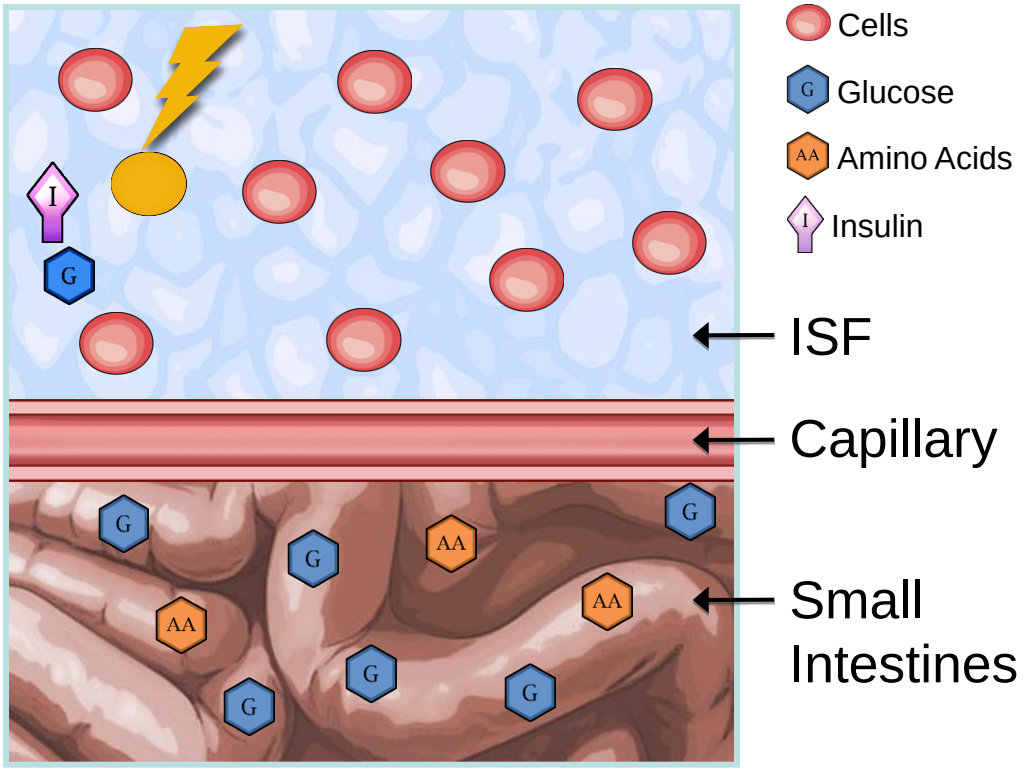
Glucose Transport Is the Reason for the Physiologic Delay

- ✓ When carbohydrates are eaten, it goes from mouth to stomach to the small intestine
- ✓ In the small intestine, it is converted from carbohydrates into glucose



Glucose Is Transported to Cells for Energy

- ✓ Glucose is absorbed from the small intestines into the vascular (blood) system
- ✓ Once in the vascular system, glucose is transported from the capillaries into the interstitial fluid
- ✓ From the interstitial fluid, glucose is transported to the cells where it is used for energy

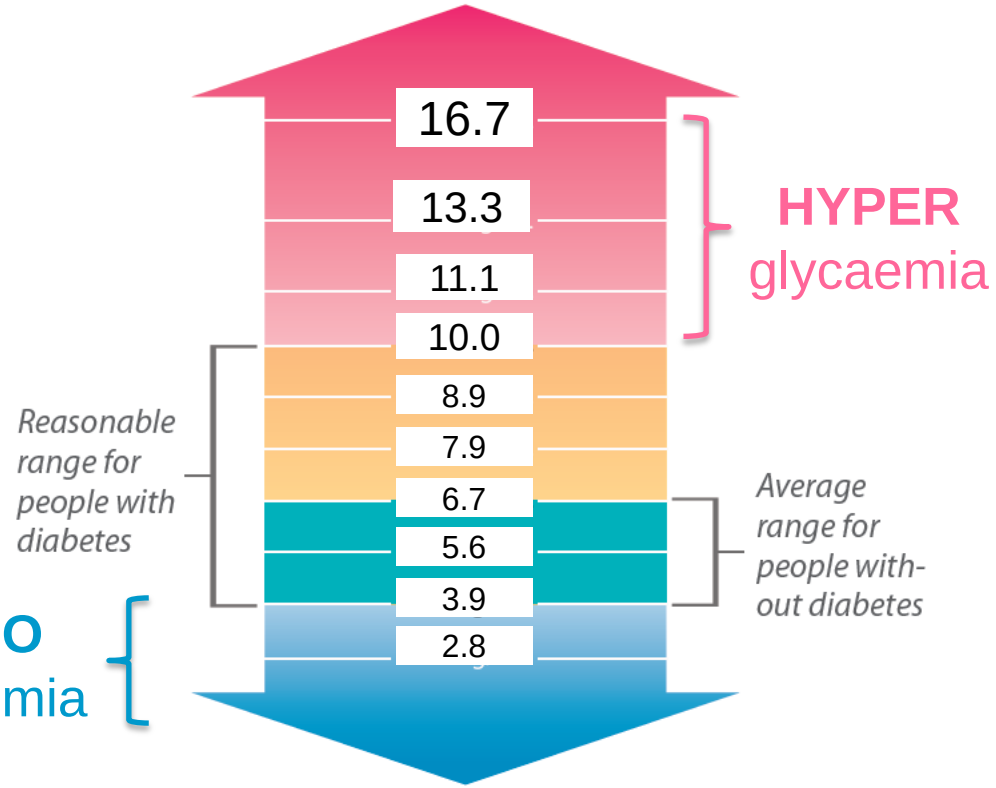


Blood glucose measurements

- ✓ Current blood glucose levels is measured in mmol/L or mg/dL
- ✓ Measured with a glucometer

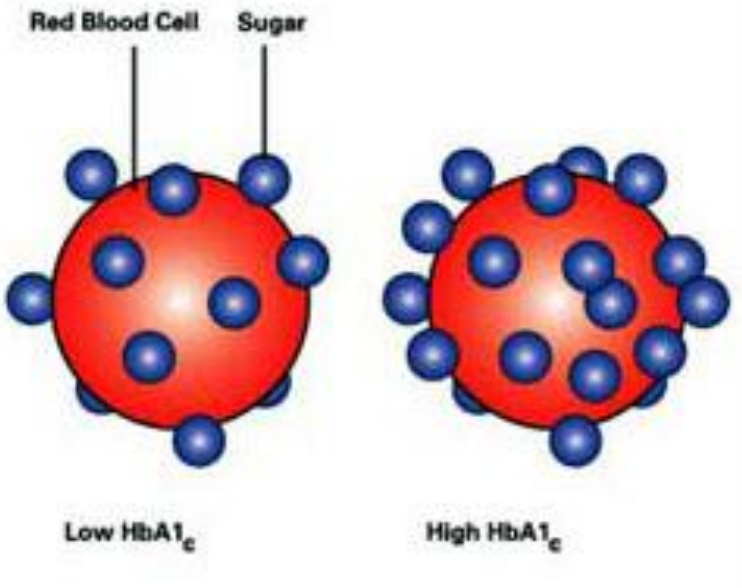
ADA Recommendations
Pre-meal: 5 – 7.2 mmol/L
Post meal: <10 mmol/L

AACE Recommendations
Pre-meal: <6.1 mmol/L
Post meal: 7.8 mmol/L.



Blood Glucose Measurements

- ✓ HbA1C
  - "glycosylated haemoglobin" i.e. the amount glucose attached to the haemoglobin of a red blood cell (RBC)
  - High glucose → more glucose attaches to RBC → more glycosylated the haemoglobin becomes
  - Indicates an individual's **average blood glucose** level for a **2 – 3 month period**



Normal HbA1C
6 – 7 %

Glucose – Review Questions

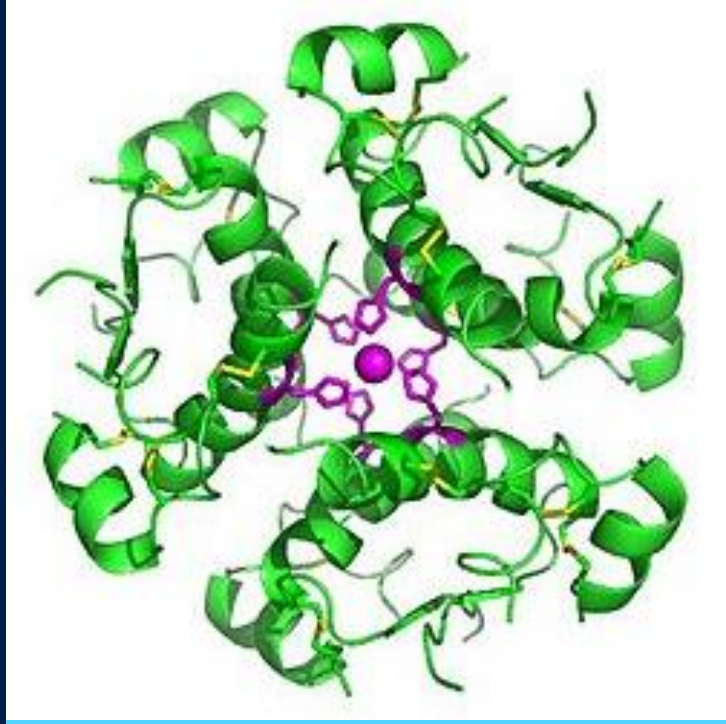
BIPT
Pg 12 – 14

- ✓ The body's primary source of fuel or energy is:
  - A. Proteins
  - B. Fats
  - C. Glucose

- ✓ Which food is not a carbohydrate?
  - A. Cereal
  - B. Cheese
  - C. Honey

- ✓ HbA1C is a measure of:
  - A. Current blood glucose levels
  - B. Oxygenation of red blood cells
  - C. Average blood glucose level for a 2 – 3 month period

What is insulin?

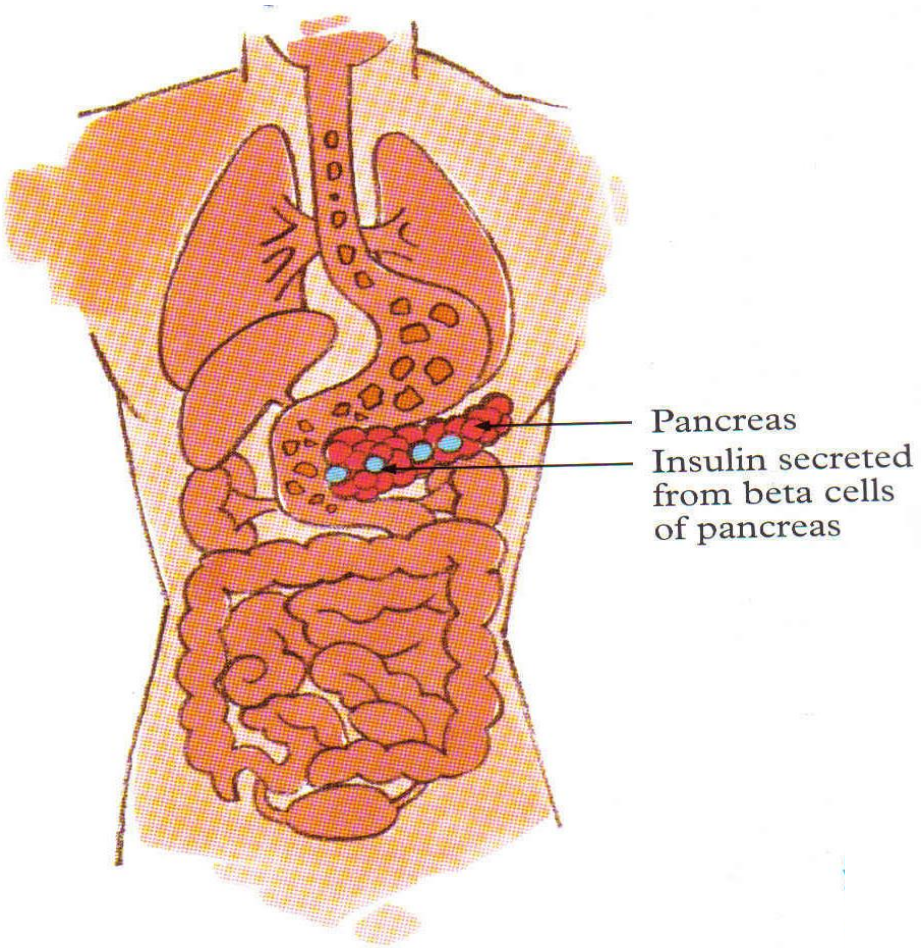


What is insulin?

BIPT
Pg 18 – 24

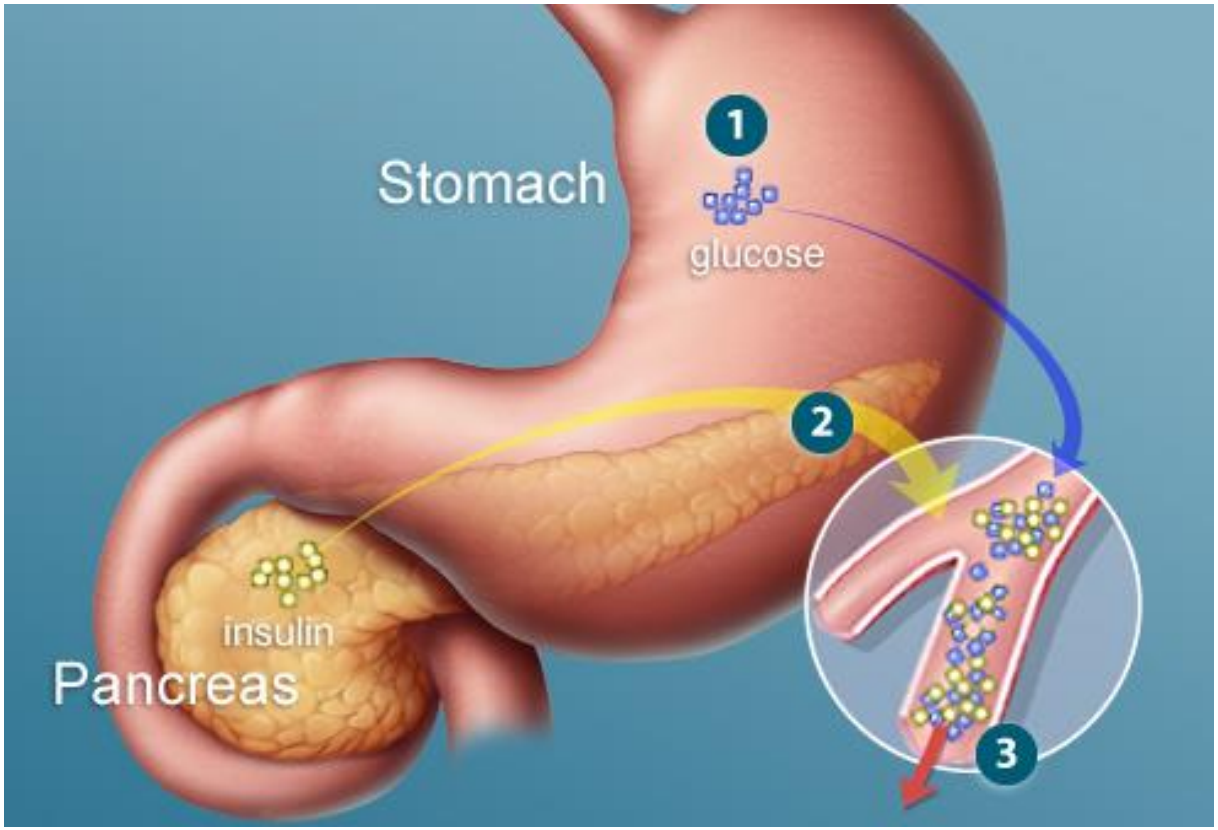
Insulin is a **hormone** produced the beta cells of <u>pancreas</u>

A **hormone** is a chemical carried in the blood stream of the body, that exerts effects throughout the body in order to achieve normal biological functioning



What is insulin?

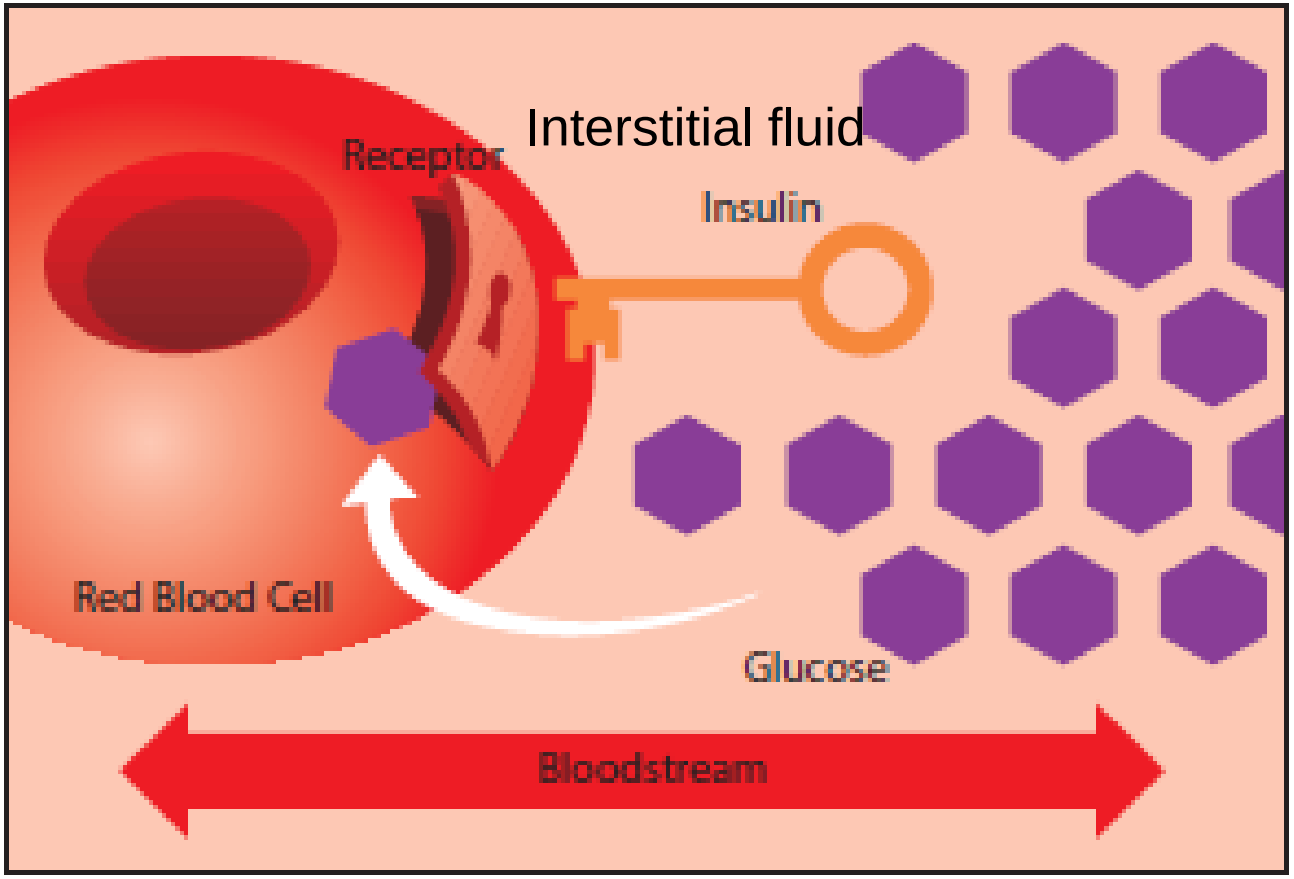
Insulin lowers blood glucose levels in the body



Insulin prevents blood glucose levels from becoming too high

How does lower glucose levels?

BIPT
Pg 14 – 17

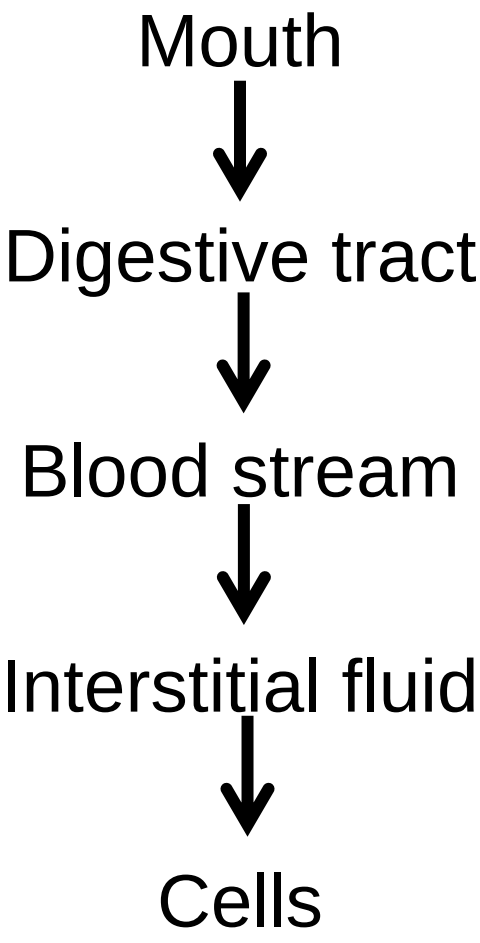


Insulin allows glucose to move from the interstitial fluid (ISF) into the cell

This decreases glucose concentration in the ISF and this in the blood

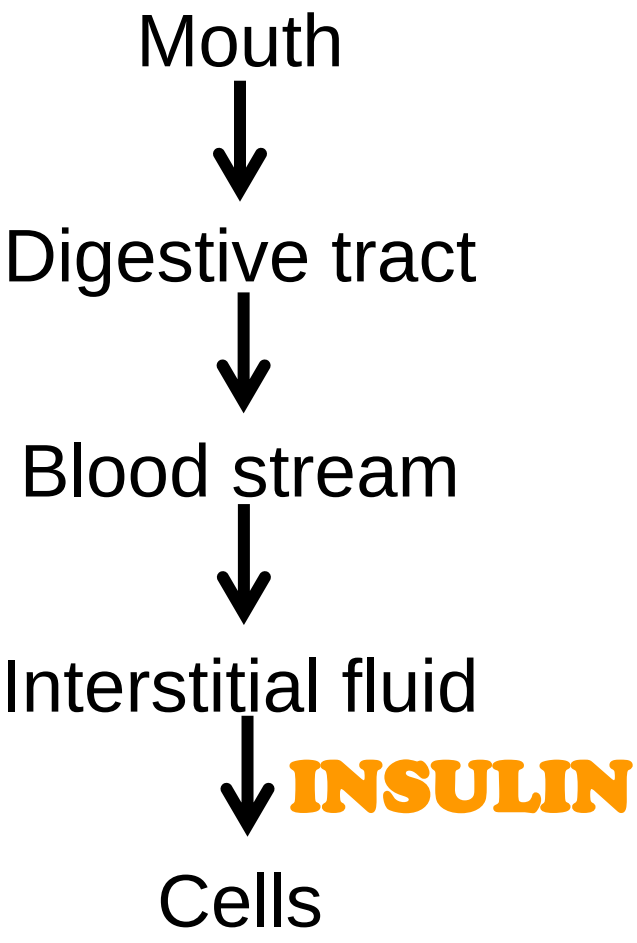
How does glucose move into cells?

BIPT
Pg 14 – 17



How does glucose move into cells?

BIPT
Pg 14 – 17



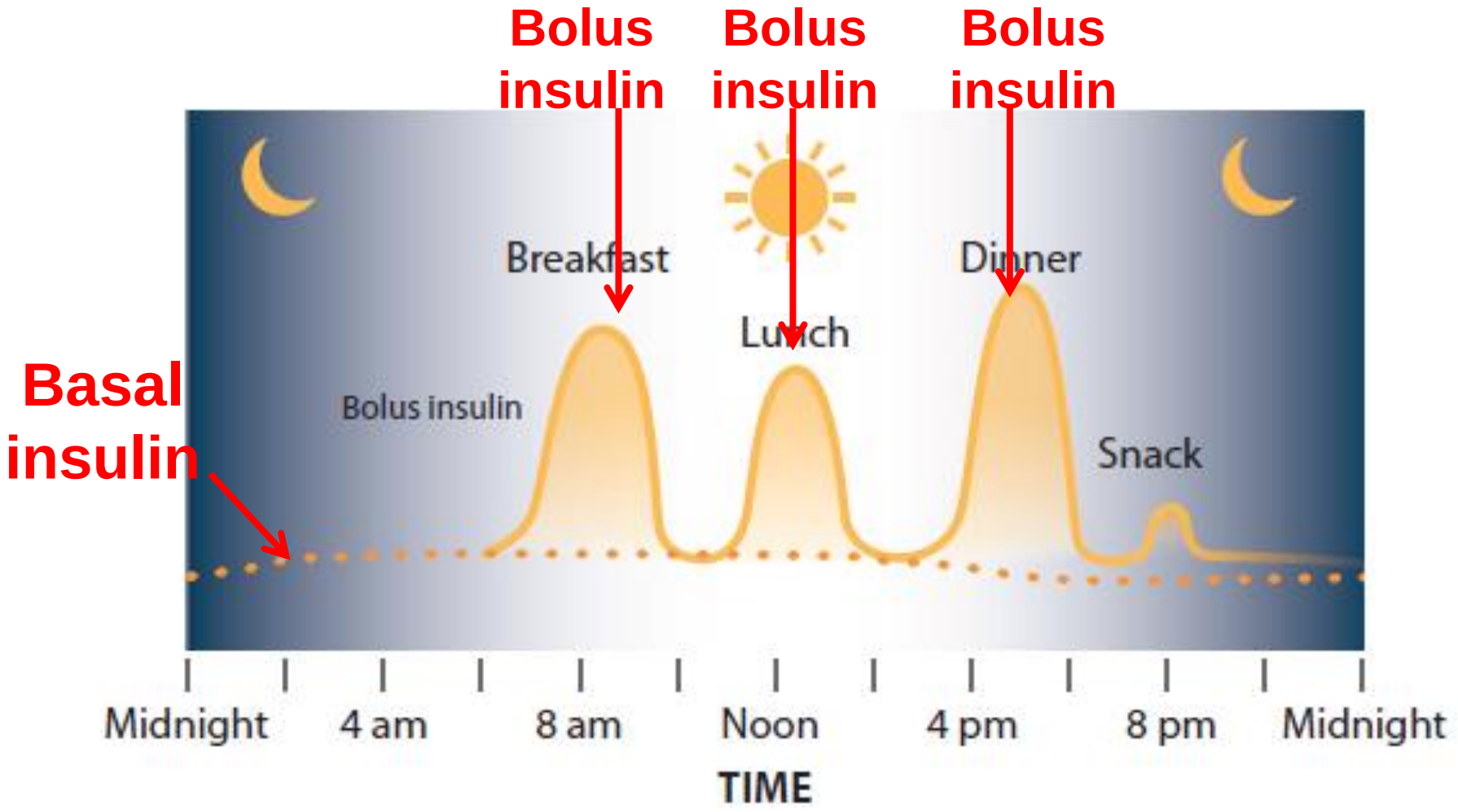
Basal vs Bolus Insulin

BIPT
Pg 18 – 24

Basal Insulin	Bolus Insulin
Background insulin	Food insulin
Small amounts of insulin released continuously	Large amounts of insulin released with food eaten
Covers stored glucose that is released from the liver	Covers glucose absorbed from food
Covers glucose in the blood between meals and during the night	Covers glucose in the blood during meals to match the food intake

Basal vs Bolus Insulin

BIPT
Pg 18 – 24



Insulin – Review Questions

BIPT
Pg 18 – 24

- ✓ Insulin is produced and secreted by the beta-cells of the:
  - A. Liver
  - B. Pancreas
  - C. Stomach
- ✓ Insulin helps to _____ glucose levels.
  - A. Lower
  - B. Raise
- ✓ Which insulin is your background insulin that runs inbetween meals and while you are sleeping
  - A. Basal
  - B. Bolus
- ✓ Which insulin is released in large amounts to cover meals
  - A. Basal
  - B. Bolus

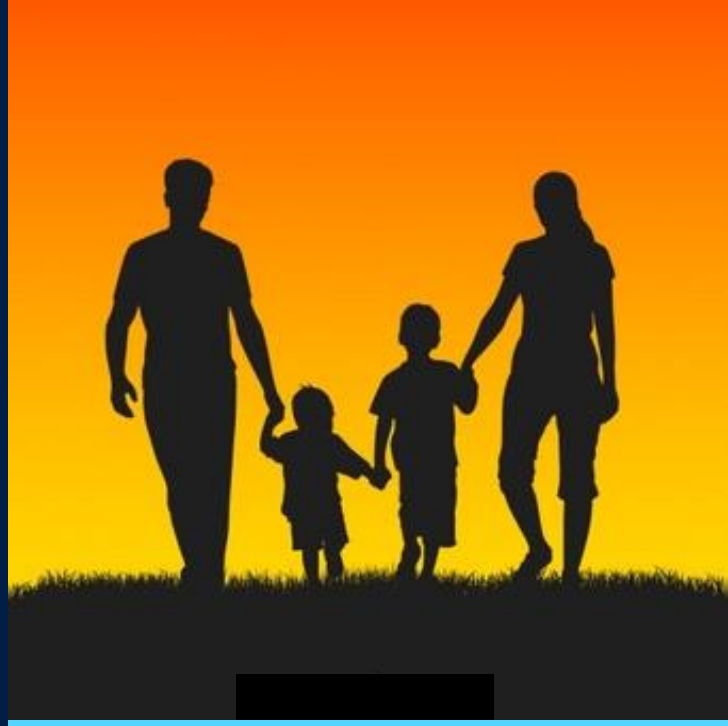
Glucose & Insulin – Review Questions

BIPT
Pg 14 – 17

- ✓ What is the correct sequence of digestion and absorption of carbohydrates
  - A. Mouth → digestive tract → blood stream → interstitial fluid → cells
  - B. Mouth → digestive tract → interstitial fluid → blood stream → cells
  - C. Mouth → digestive tract → cells → interstitial fluid → blood stream

- ✓ Glucose cannot pass into the cell and provide energy for your body without the assistance of insulin
  - A. True
  - B. False

Type 1 versus Type 2 diabetes



Lets discuss…

What do you know about diabetes?

Lets discuss…

What is difference between type 1 and type 2?

What is gestational diabetes?

What is diabetes?

Diabetes is a **chronic condition** that occurs when the body cannot **produce enough insulin (Type 1)** or **cannot use insulin (Type 2)**

This results in **raised levels of glucose** in the blood (**hyperglycaemia**)

Hyper (high) + Glycaemia (glucose in blood)

= high blood glucose levels

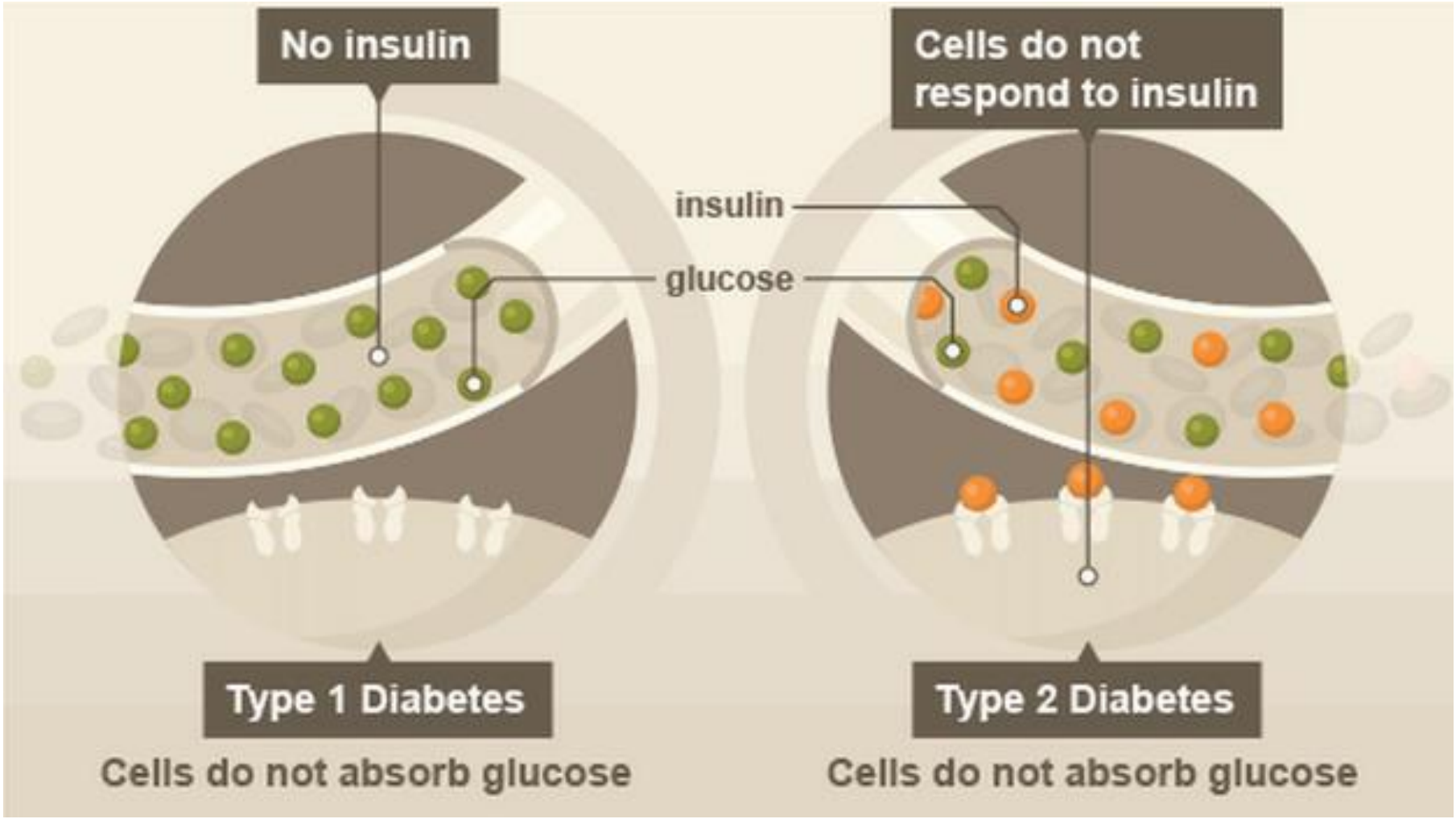
Type 1 vs Type 2 Diabetes Mellitus

Type 1	Type 2
High blood glucose levels	
Outdated terms: • Insulin-dependent diabetes mellitus (IDDM) • Juvenile-onset diabetes	**Outdated terms:** • Non-insulin-dependent diabetes mellitus (NIDDM) • Adult-/ mature-onset diabetes
• Diagnosed mainly in childhood	• Diagnosed mainly in adulthood
• Auto-immune disease	• Chronic disease of life-style

Type 1 vs Type 2 Diabetes Mellitus

Type 1	Type 2
• Results from an **auto-immune destruction** of pancreatic cells that produce insulin thus results in **absolute insulin deficiency**	• Still producing insulin but are **insulin resistant** (a decreased response to insulin) – i.e. the key (insulin) cannot open the door (glucose cannot move into cells) • Pancreas thus overcompensates and increases insulin production
• Completely dependent on injecting biosynthetic insulin from diagnosis	• First start on **diet** & **exercise** to improve insulin resistance • Next **oral medication** (e.g. glucophage) • When pancreas is exhausted, it will ↓ & eventually stop producing → start **injecting biosynthetic insulin**

Type 1 vs Type 2 Diabetes Mellitus



Type 1 vs Type 2 – Risk Factors

Type 1	Type 2
• Auto-immune disorders • Genetic predisposition • Environmental factors (virus)	• Obesity • Sedentary lifestyle • Family history • Race (e.g. Indian) • Age (e.g. older) • Gestational diabetes • PCOS

NB! Type 1 and Type 2 is very different

- ✓ Myths you must dispel
  - T1 DM results from a child eating too much sugar
    - It results from an auto immune reaction where the body's immune system mistakenly attacks the pancreas cells and kills them
  - T1 DM can be cured or improved by improving diet and exercise regularly.
    - T1 DM can only be managed with insulin from the beginning

NB! Type 1 and Type 2 are very different

- ✓ Myths you must dispel
  - People with diabetes can't eat sugar
    - All diabetic patients should follow a healthy diet, like the rest of the population
    - T1DM patients can bolus for sugar like all the carbohydrates they eat
  - Children with diabetes are "sick" or "disabled"
    - No, they have a condition that needs to be carefully managed
    - They can live full, healthy and productive lives and that when they receive insulin and eat regularly

NB! Type 1 and Type 2 are very different

- ✓ Myths you must dispel
  - T1 DM can be prevented with a good diet and exercise
    - There is no know cause for T1 DM, therefor prevention measures are unknown
    - However, with T2 DM maintaining a healthy weight through good diet and regular exercise can prevent the onset of T2 DM

Diabetes Summary

Diabetes Mellitus

Type 1: Lack of insulin
Type 2: Insulin resistance

High blood glucose (**hyper**glycaemia)

Treatment: biosynthetic insulin delivery

Low blood glucose (**hypo**glycaemia)

Type 1 vs Type 2 – Review Questions

- ✓ Which statement is NOT true about Type 1 Diabetes Mellitus?
  - A. It is usually but not always diagnosed in childhood
  - B. It results from poor diet and lack of exercise
  - C. Patients are completely reliant on biosynthetic insulin delivery

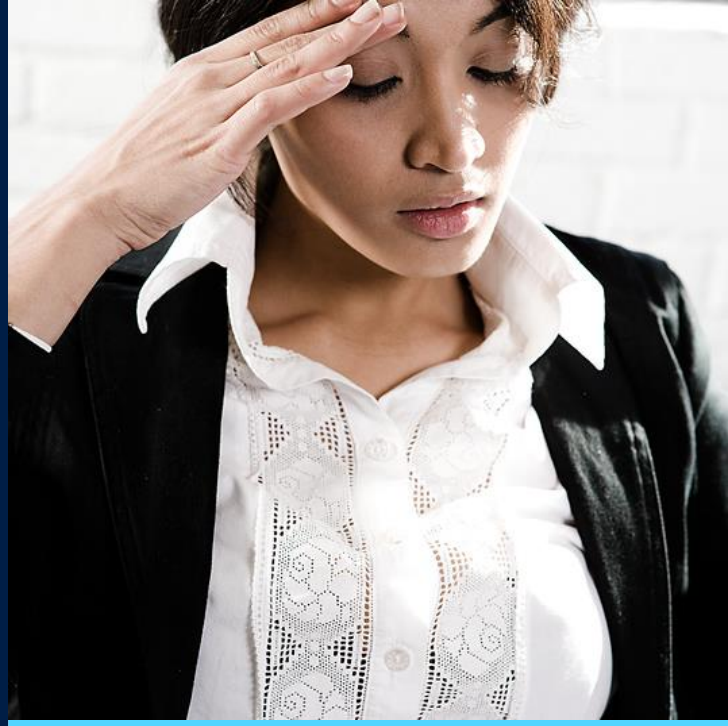
- ✓ Which statement is NOT true about Type 1 Diabetes Mellitus?
  - A. Patients do not produce insulin at all
  - B. Patients start with oral medication first and then move onto injecting biosynthetic insulin when the pancreas is exhausted
  - C. It results from an auto-immune destruction of beta cells

Type 1 vs Type 2 – Review Questions

- ✓ Which statement is NOT true about Type 2 Diabetes Mellitus?
  - A. It is a chronic disease of lifestyle
  - B. Treatment begins with injecting insulin
  - C. Patients produce insulin

- ✓ Which statement is NOT true about Type 2 Diabetes Mellitus?
  - A. Patients produce insulin but their cells are not responsive to insulin
  - B. It is usually but not always diagnosed in childhood
  - C. Treatment usually begins with oral medication, improving diet and exercise

Hyperglycaemia versus hypoglycaemia



Acute signs & symptoms of HYPERglycaemia (high glucose)

- ✓ Polydipsia (extreme thirst)
- ✓ Polyuria (frequent urination)
- ✓ Polyphagia (extreme hunger)
- ✓ Weight loss
- ✓ Fatigue (tiredness)
- ✓ Blurred vision (transient)
- ✓ Slow healing of cuts and wounds
- ✓ Frequent infections including skin infections
- ✓ Coma and death
- ✓ DKA
  - Body burns fat instead of glucose as the primary energy source
  - Ketones (acidic waste product from burning fat) build up in the blood causing **diabetic ketoacidosis**
  - Ketones in urine
  - Fruity Breath Odor
  - Kussmaul's Respirations (deep deliberate respirations; SOB)

Long term complications of HYPERglycaemia (high glucose)

- ✓ Retinopathy – blurred vision → blindness
- ✓ Nephropathy – kidney failure → ESRD → dialysis
- ✓ **CVD – arteriosclerosis→ heart attack**
- ✓ Stroke
- ✓ Neurophathy (nerve damage) – pins & needles, numbness → amputations

HYPOglycaemia (low glucose)

BIPT
Pg 50 – 55

- ✓ Insulin lowers blood glucose
- ✓ **Hypoglycemia:** when blood glucose falls below normal range (<3.9 mmol/L), caused excessive insulin injected into the body
- ✓ Symptoms
  - Nervous, Shakey
  - Dizzy, Confused
  - Pallor
  - Slurred speech
  - Headache
  - Hunger
  - Cold Clammy Skin
  - Fast Heartbeat
  - Irritability
  - Seizures
  - Coma
  - Death

HYPOglycaemia (low glucose)

BIPT
Pg 50 – 55

- ✓ **Severe hypoglycaemia**: a low blood sugar that is severe enough to require assistance from another individual to manage the hypoglycemic event
- ✓ **Hypoglycaemic unawareness**: individuals who have had diabetes for several years lose their ability to feel sensations associated with low blood glucose. They feel normal and appear to function as usual until they are suddenly rendered unconscious from a severely low blood sugar level

Treatment of HYPOglycaemia

BIPT
Pg 50 – 55

- ✓ When blood glucose < 3.9 mmol/L → test to check
- ✓ Apply “Rule of 15”:
  - Eat 15 grams of carbohydrates
  - Wait 15 minutes, then recheck blood glucose
  - If blood glucose is still low, repeat

Treatment of HYPOglycaemia

BIPT
Pg 50 – 55

- ✓ 15g carbohydrate foods:
  - 3 to 4 glucose tablets (preferred treatment)
  - Small tube of glucose gel
  - 1/2 cup of orange juice
  - 1/3 can of sugar carbonated drink
  - 1 tablespoon of honey
  - 1 tablespoon of sugar
  - 1 cup of low fat or skim milk

HYPER- vs HYPO-glycaemia – Review Questions

BIPT Pg 50 – 55

- ✓ Hyperglycaemia refers to
  - A. High blood glucose levels
  - B. Low blood glucose levels

- ✓ Hypoglycaemia refers to
  - A. High blood glucose levels
  - B. Low blood glucose levels

- ✓ When do you apply the “Rule of 15”?
  - A. When patient is suffering from hyperglycaemia
  - B. When patient is suffering from hypoglycaemia

- ✓ Hypoglycaemia can result in seizures, coma and death
  - A. True
  - B. False

HYPER- vs HYPO-glycaemia – Review Questions

BIPT Pg 50 – 55

- ✓ Diabetic patients can suffer from hypoglycaemia when they
  - A. Eat too many foods containing carbohydrate
  - B. Inject too much insulin
  - C. Do not exercise enough

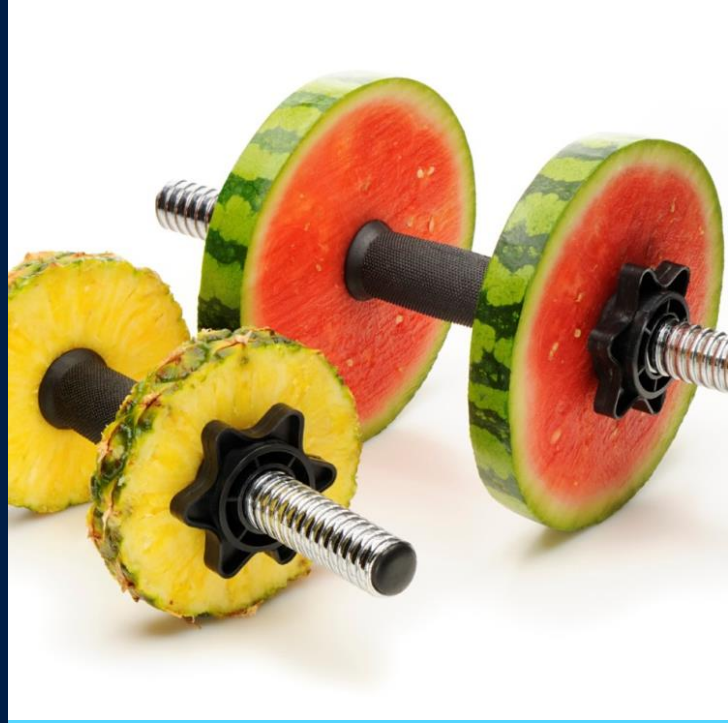
- ✓ Long-term complications of Diabetes Mellitus
  - A. Dizziness
  - B. Blindness
  - C. Kidney failure
  - D. Polyuria (frequent urination)
  - E. A and D
  - F. B and C
  - G. C and D

TREATMENT OF DIABETES MELLITUS

Treatment of Diabetes

Type 1	Type 2
• Biosythetic insulin delivery 1. MDI (multiple daily injections) ✓ Insulin syringe ✓ Insulin pen 2. Insulin pump	• To increase insulin sensitivity: ✓ Oral medication ✓ Diet ✓ Exercise ↓ Exhaustion of pancreas • Biosynthetic insulin delivery 1. MDI 2. Insulin Pump

Prevention & Treatment of TYPE 2 Diabetes Mellitus



Prevention and Treatment of T2 DM

- ✓ T2 DM is a disease of **lifestyle**

- ✓ Being overweight and physical inactivity puts you at higher risk for T2 DM

Prevention and Treatment of T2 DM

- ✓ Maintaining a **healthy weight** through **healthy diet** and **regular exercise** can **prevent** the onset of T2 DM
- ✓ **Healthy diet** and **regular exercise** is also the first line treatment for pre-diabetic patients

Prevention and Treatment of T2 DM

- ✓ Diseases of lifestyle (e.g. obesity, diabetes) raise health care costs unnecessarily.
- ✓ They impose a huge preventable burden on our economy

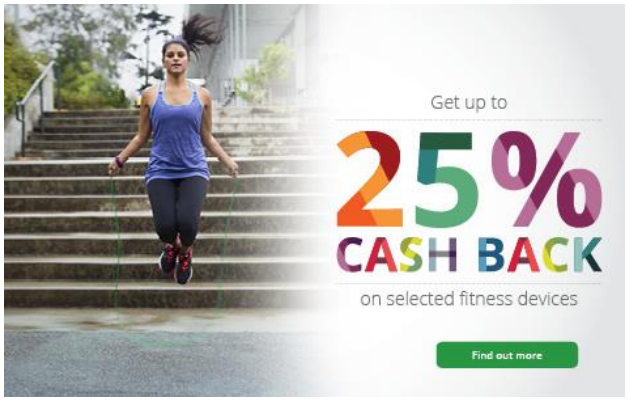
Prevention and Treatment of T2 DM

- ✓ **Public Health Law** is designed to prevent overweight/ obesity and associated co-morbidities such as T2 DM, e.g.:
  - Sugar tax: The aim of the sugary drinks tax is to influence purchasing behaviour and thus reduce consumption of sugary beverages.
  - Fruits and vegetables are subsidized and therefore cheaper to buy
  - Adding bicycle lanes in the street (town planning)

Prevention and Treatment of T2 DM

- ✓ **Insurance companies** have **Wellness programmes** that encourage healthy eating and regular physical, in order to prevent diseases of lifestyle and the associated costs treatment
- ✓ They believe that if they can prevent theses diseases, it will save them money in the long run

Discovery Vitality



GET HEALTHY
GET REWARDED

Treatment of TYPE 1 Diabetes Mellitus

Multiple daily injections (MDI)

Treatment - MDI

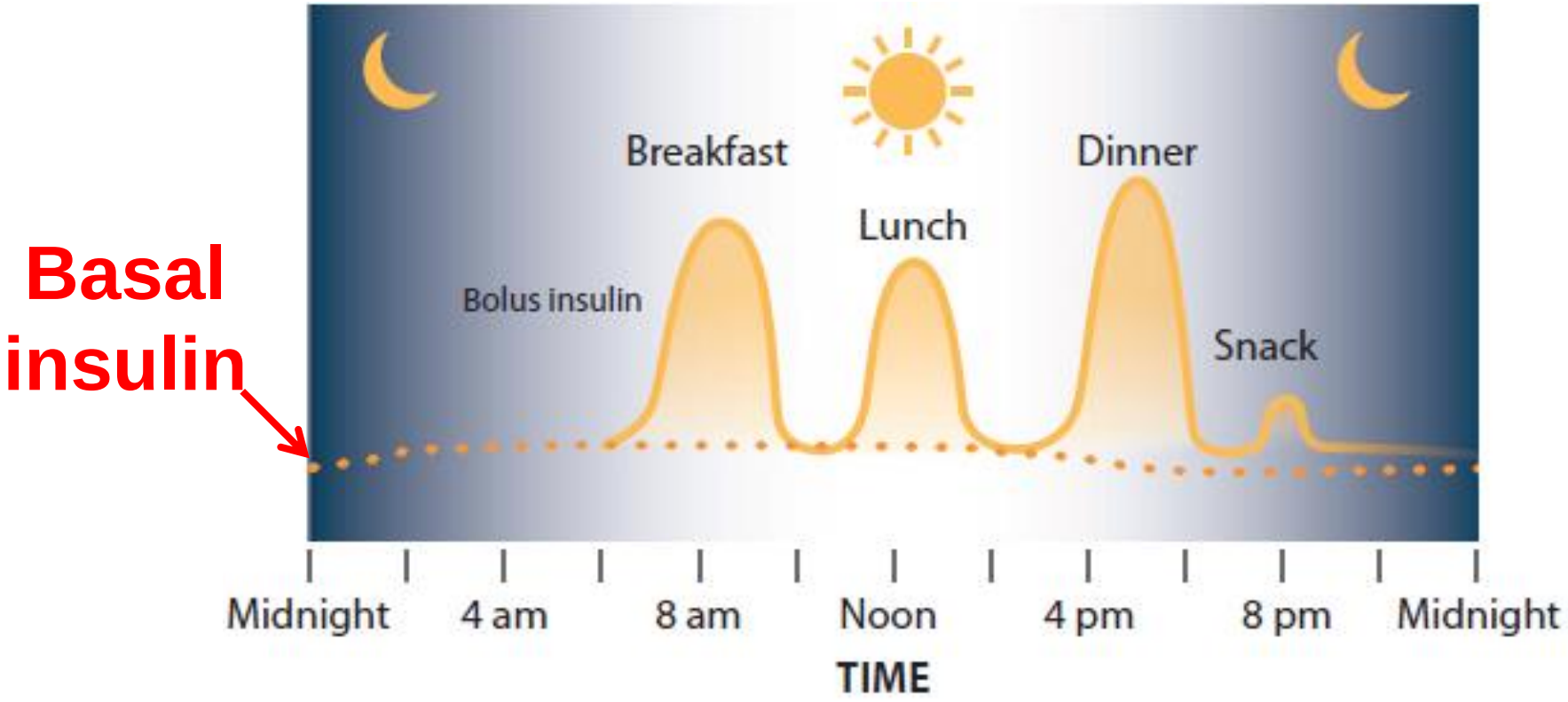
MDI (MULTIPLE DAILY INJECTIONS)

Inject 4 – 6 times per day

- ✓ 1 – 2 Basal injection (night/morn) with long/ intermediate-acting insulin
- ✓ 3 meal bolus injections with rapid/short-acting insulin

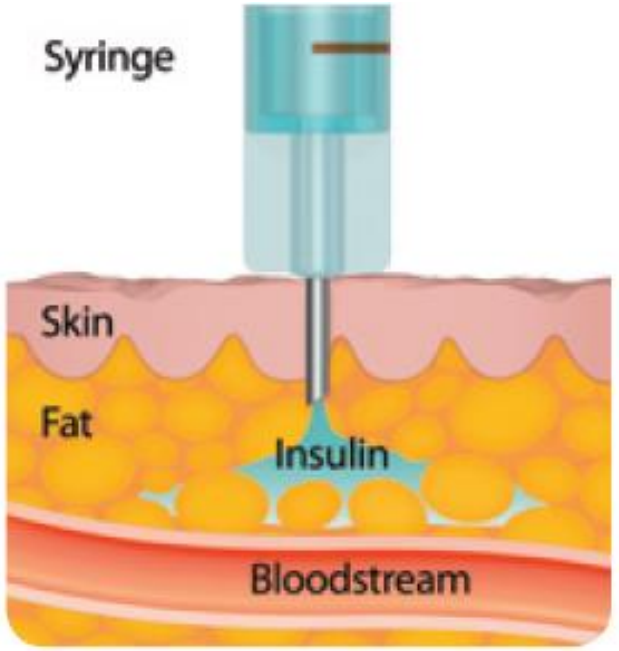
MDI and BASAL insulin

- ✓ **Basal Insulin**



Treatment - MDI

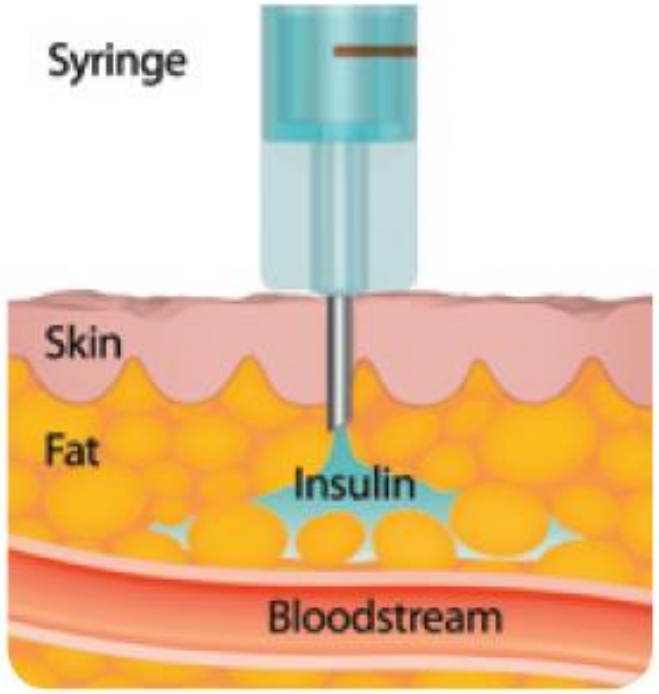
- ✓ Basal insulin is injected as your "background insulin"
- ✓ Covers glucose produced by your liver
  - While sleeping
  - Between meals
- ✓ Long acting-insulin
  - Levemir
  - Lantus
- ✓ Intermediate-acting insulin
  - Humulin N
  - Novolin N



Intermediate and long-acting insulin "pool" under the skin.

Treatment - MDI

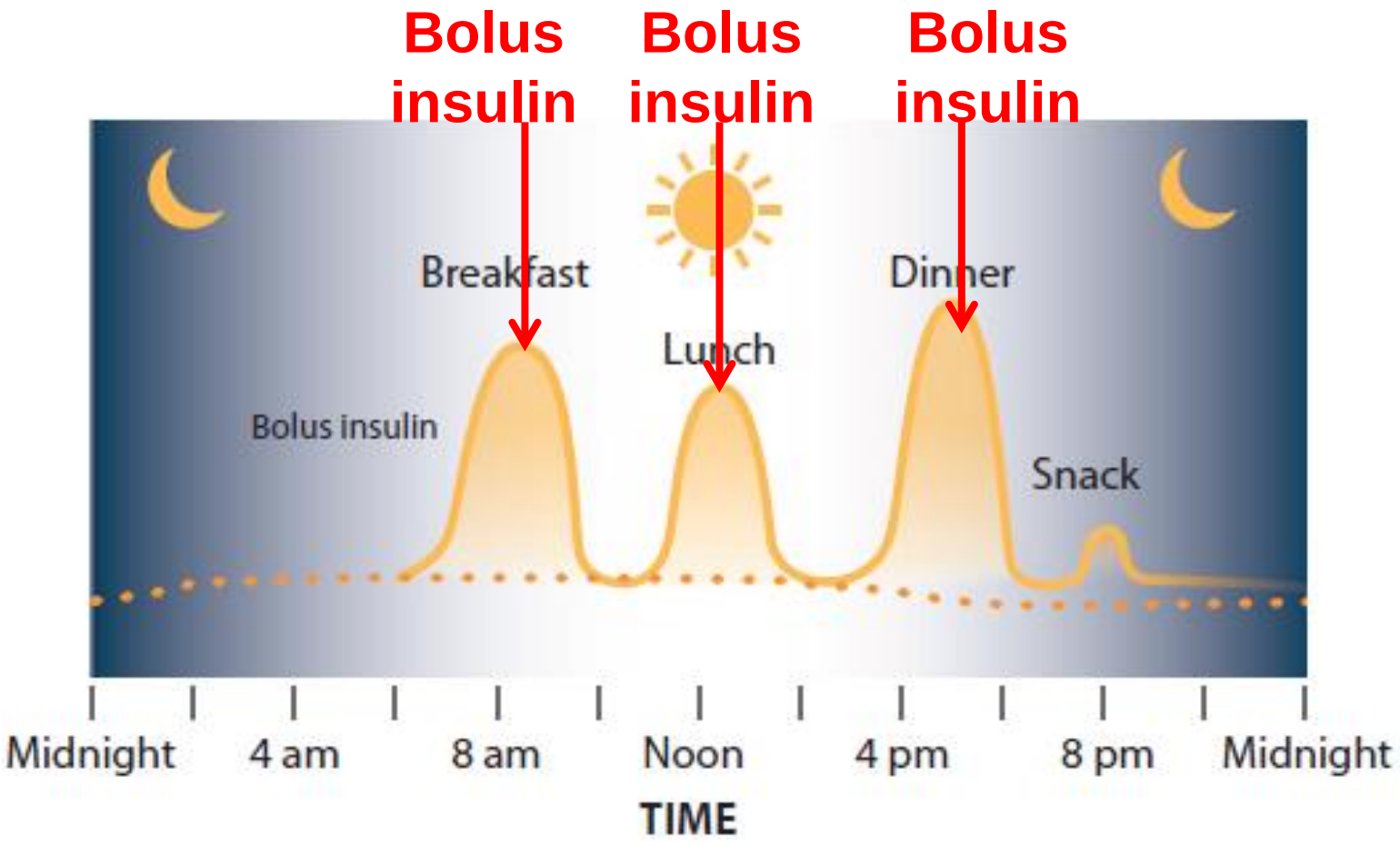
- ✓ Inject long/ intermediate-acting insulin
  - → insulin pools under the skin
  - → insulin gradually gets absorbed into the blood stream in small amounts throughout the day
- ✓ **Inconsistent absorption → unexplained low → possible rebound high**



Intermediate and long-acting insulin "pool" under the skin.

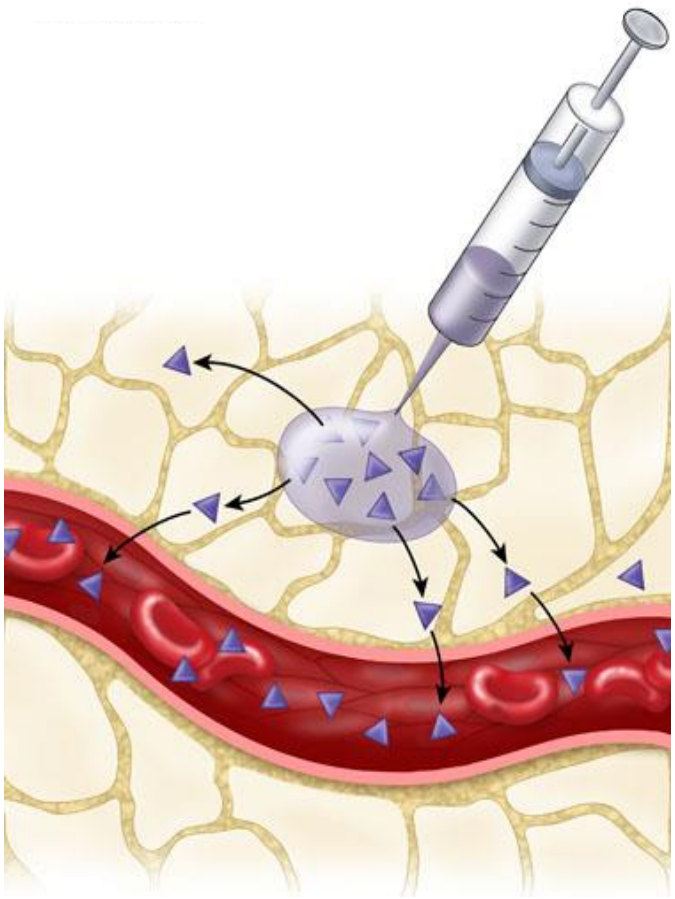
MDI and BOLUS insulin

- ✓ **Bolus Insulin**



Treatment - MDI

- ✓ **Bolus** insulin injected for **meals** and making **corrections** of high blood glucose
- ✓ Rapid-acting insulins (5 – 15 min)
  - Novolog
  - Humolog
  - Apidra
- ✓ Short acting insulins (30 – 60 min)
  - Humilin R
  - Novolin R



HYPER- vs HYPO-glycaemia – Review Questions

- ✓ Injection therapy uses intermediate- or long-acting insulin to cover the body's:
  - A. Basal insulin needs
  - B. Bolus insulin needs

- ✓ Injection therapy uses rapid- or short-acting insulin to cover the body's:
  - A. Basal insulin needs
  - B. Bolus insulin needs

- ✓ Intermediate or long-acting insulin is unpredictable in its action and absorption time which contributes to:
  - A. Better glucose control
  - B. Erratic glucose control and many unexplained lows and highs

Insulin pump therapy (IPT)

Treatment – IPT

BIPT
Pg 30 – 37

INSULIN PUMP THERAPY (IPT)

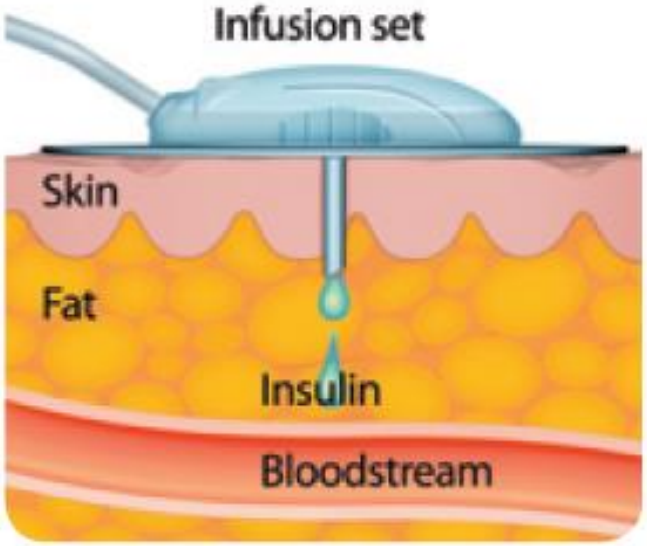
Continuous subcutaneous insulin infusion (CSII)

- ✓ Approved by FDA: Humalog, NovoRapid and Apidra and short-acting insulin

Insulin Pump Therapy

BIPT
Pg 30 – 37

- ✓ IPT uses only rapid-acting insulin
- ✓ Pump delivers tiny amounts of rapid-acting insulin each hour
  - Eliminates the use of long action insulin
- ✓ Provides improved glucose control not possible with injections



The pump delivers tiny amounts of insulin each hour.

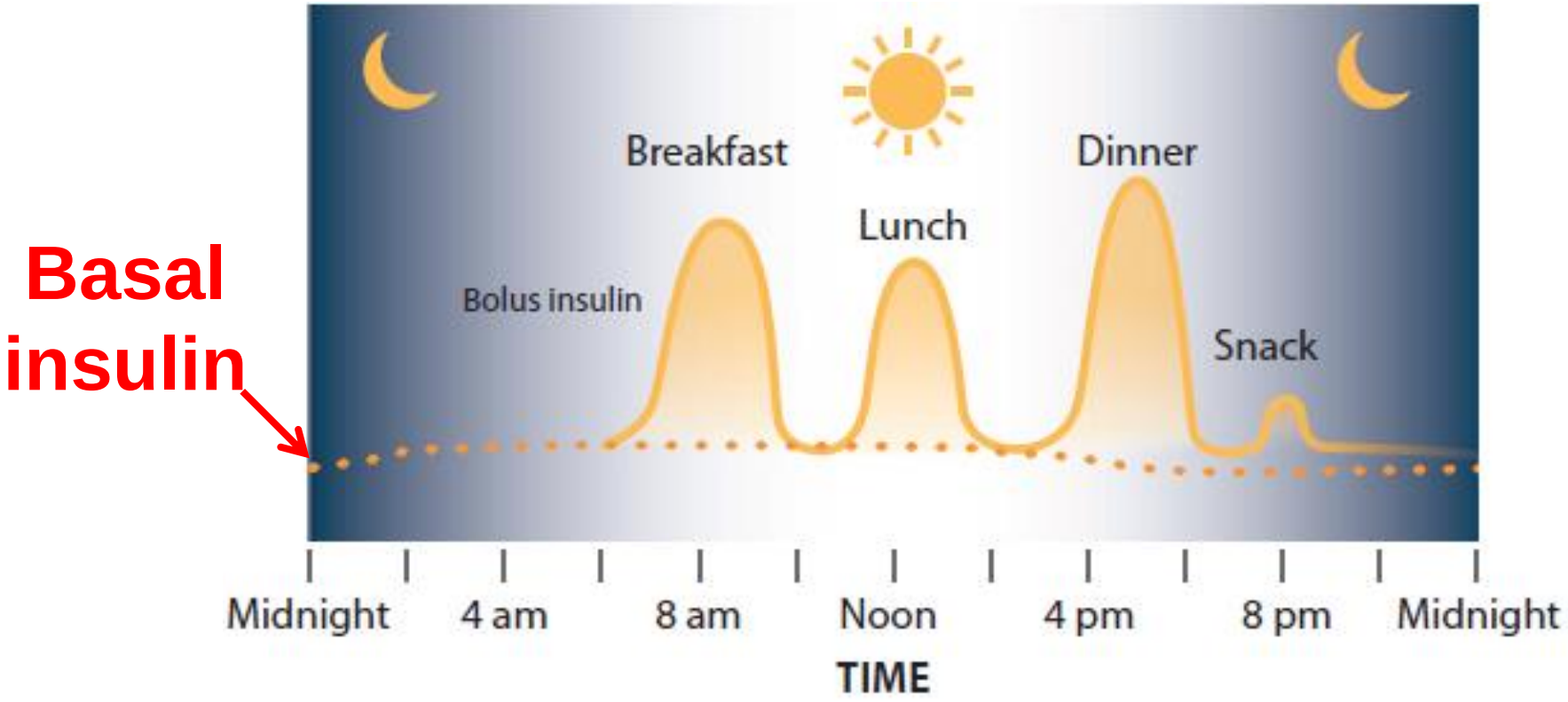
Insulin Pump Therapy

BIPT
Pg 30 – 37

- ✓ Aim of treatment is to provide insulin delivery as close to the way a normal healthy pancreas would
- ✓ An insulin pump comes closer to delivering insulin the way a pancreas does **than any other delivery method**
- ✓ Insulin pump therapy is considered the **"gold standard"** in diabetes management because it provides the best glucose control

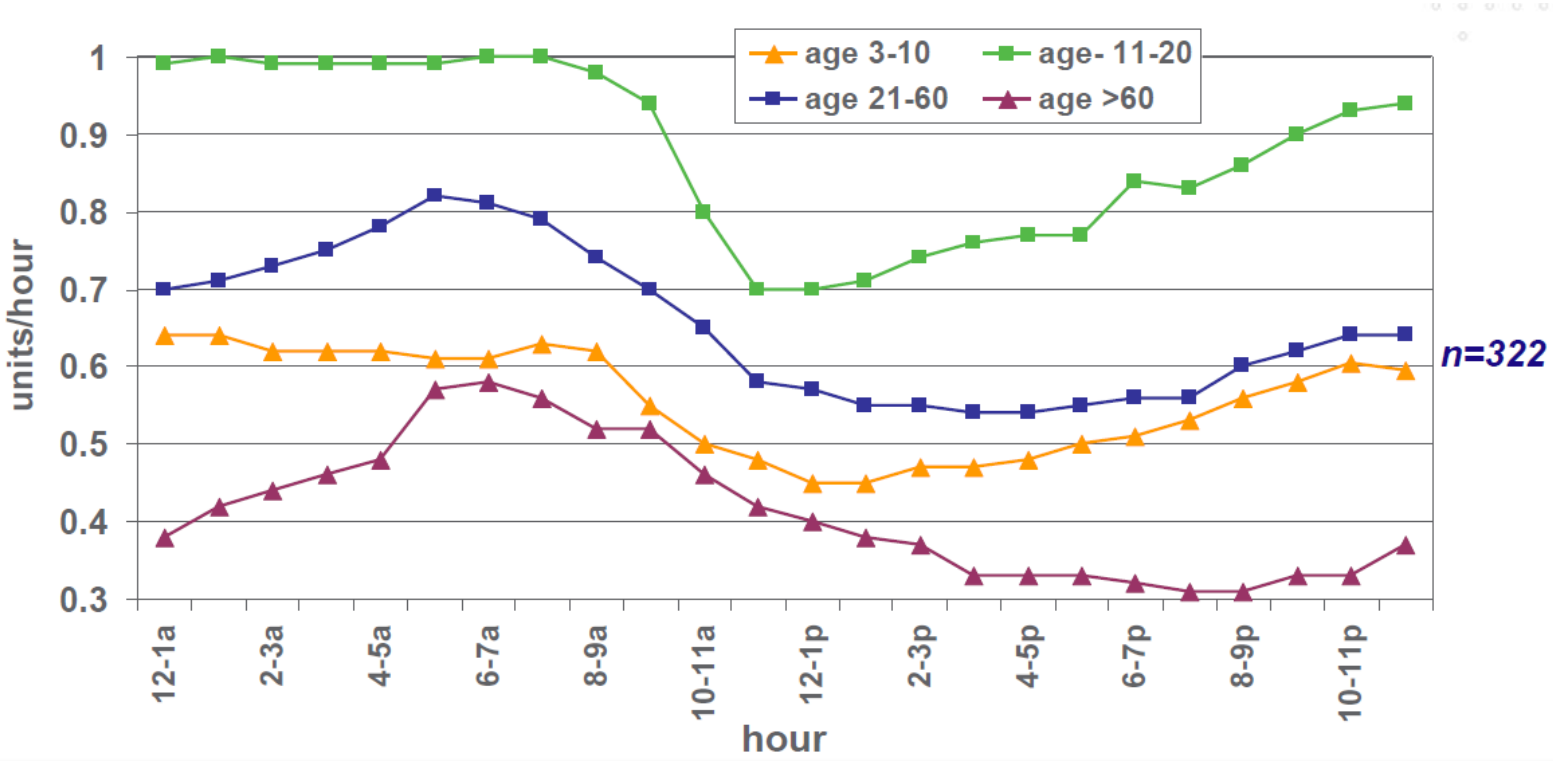
IPT and BASAL insulin

- ✓ **Basal Insulin**



IPT and BASAL insulin

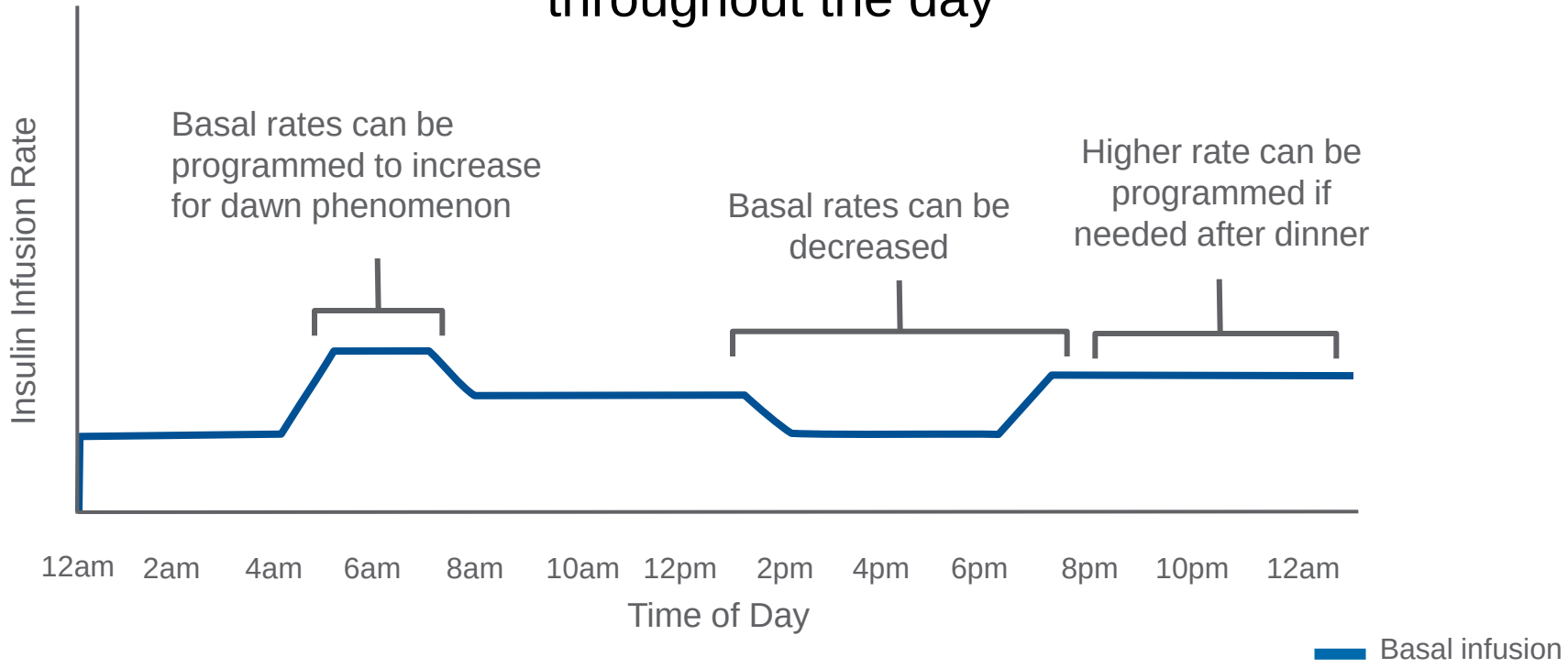
Human basal insulin needs vary throughout the day



Is it reasonable to expect one flat rate of basal insulin delivery to meet varying insulin requirements throughout the day?

IPT and BASAL insulin

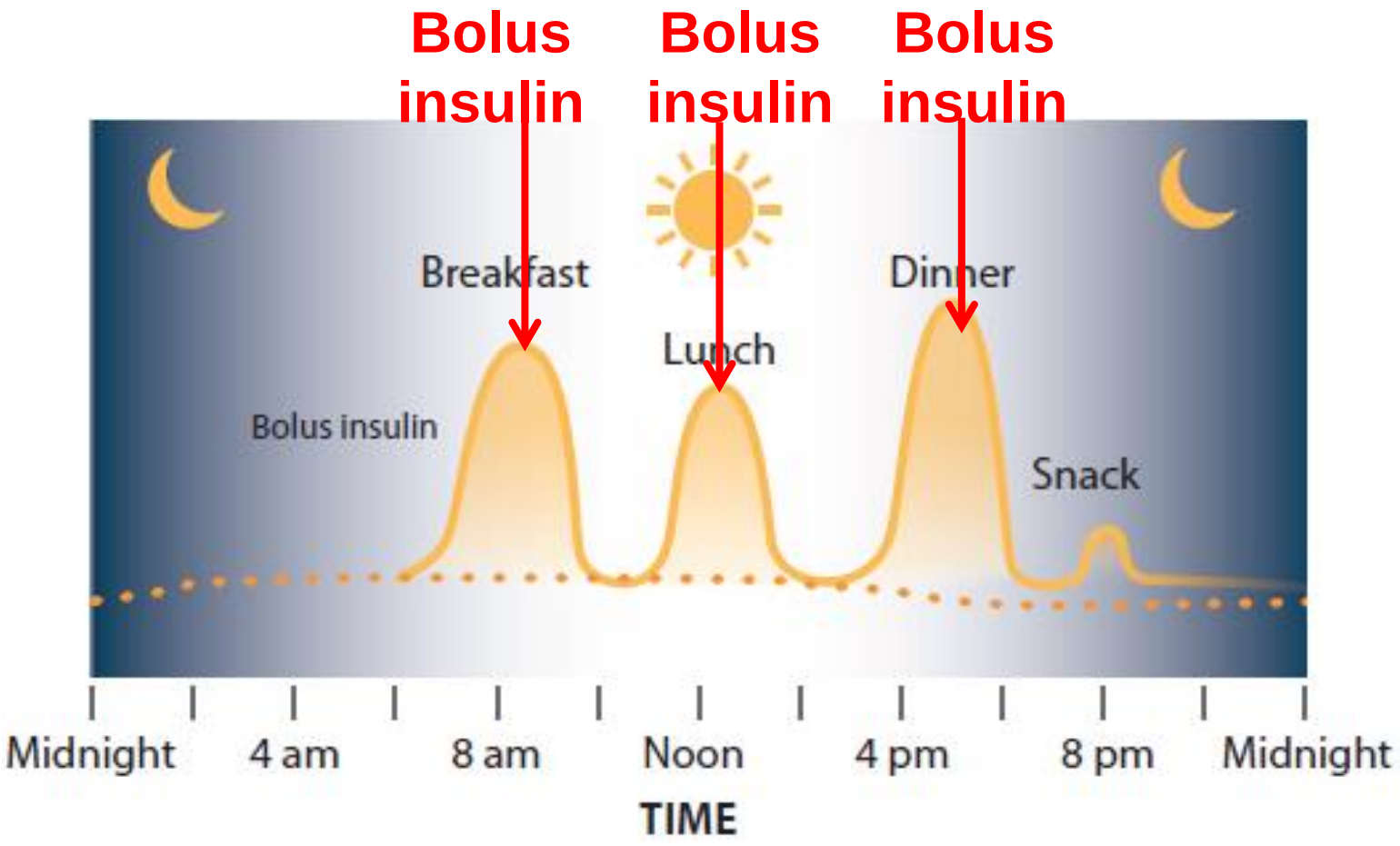
The amount of basal insulin the pump delivers can be adjusted to **match** the body's varying insulin requirements throughout the day



Thus provides better glucose control over MDI

IPT and BOLUS insulin

- ✓ **Bolus Insulin**



IPT and BOLUS insulin

BIPT
Pg 30 – 37

- ✓ The pump can also deliver boluses (large single doses) of insulin
- ✓ A bolus of insulin is given:
  - when you eat **food** that contains carbohydrate, or when you have a
  - to **correct** a high blood glucose (BG) level
- ✓ With the pump, the Bolus Wizard calculate very precise doses for food and correction boluses
  - It basis its calculations on:
    - **Carbs** to be eaten (grams)
    - Current **BG** of patient
  - Thus the Bolus Wizard takes the patient's parameter into account → more precise dosing
  - Thus provides better glucose control

Benefits of IPT

- ✓ Improved glycemic control and decreased glycemic variability
- ✓ Improved control of dawn phenomenon
- ✓ Decreased severity and frequency of hypoglycemia
- ✓ Increased flexibility, normalization of lifestyle and sense of well-being

IPT – Review Questions

- ✓ Why does IPT provide better blood glucose control over MDI?
  - A. Uses rapid-acting insulin only
  - B. Delivers insulin similar to the way the human pancreas
  - C. Insulin infusion pool under the skin and is gradually absorbed into the blood throughout the day
  - D. A and B
  - E. A and C
  - F. B and C

- ✓ What is NOT true about IPT?
  - A. The pump delivers tiny amounts of insulin each hour
  - B. IPT is the “gold standard” in diabetes management
  - C. The aim of treatment is to deliver insulin similar to that of MDI

IPT – Review Questions

- ✓ What type of insulin is used for insulin pump therapy?
  - A. Long-acting insulin
  - B. Rapid-acting insulin
  - C. Basal insulin

- ✓ Rapid-acting insulin enters the blood and begins to work within 10 to 15 minutes after given.
  - A. True
  - B. False

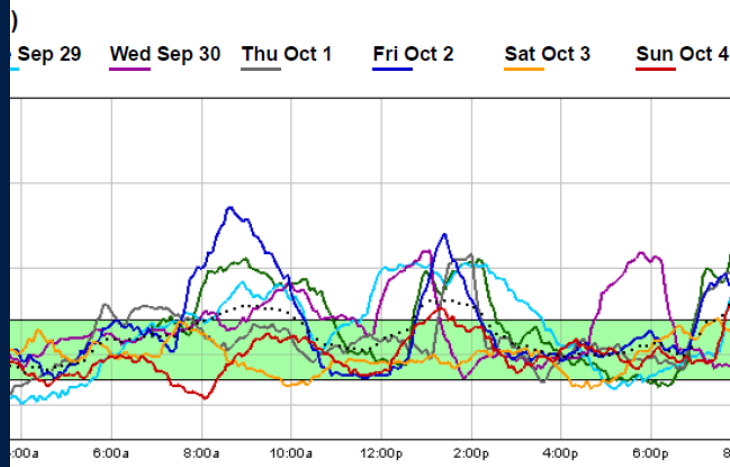
- ✓ Which statement is NOT true regarding IPT basal insulin delivery?
  - A. Multiple basal rate can be set for different times of the day
  - B. Small amounts of insulin is infused over the 24 hours of a day
  - C. One standard rate can be set for different days of the week

IPT – Review Questions

- ✓ Which statement is NOT true regarding IPT bolus insulin delivery?
  - A. Long-acting insulin is used for bolus doses
  - B. The pump can estimate the bolus dose you need to cover a meal
  - C. Bolus doses are used to correct high blood glucose values

- ✓ Which statement is NOT true regarding IPT bolus insulin delivery?
  - A. The bolus amount calculated by the pump cannot be adjusted
  - B. The amount of each bolus is determined by your current BG reading
  - C. The amount of each bolus is determined by the amount of carbohydrates you plan to eat

Real-Time Continuous Glucose Monitoring



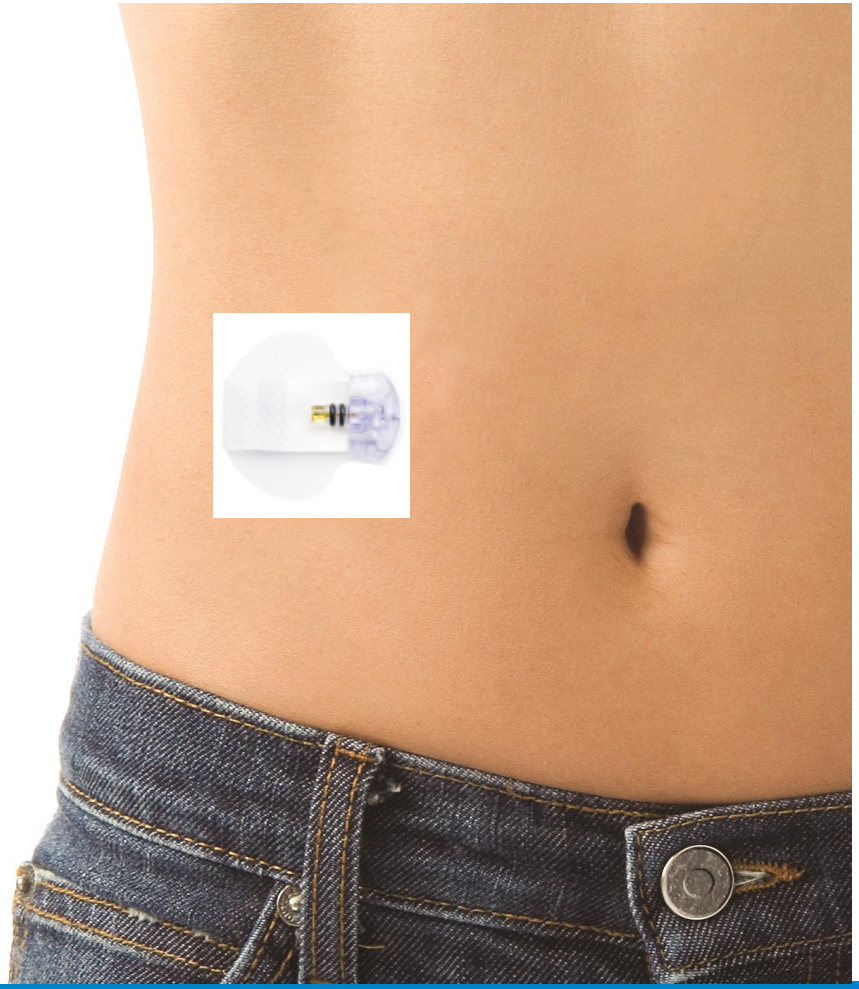
Sep 28	Tue Sep 29	Wed Sep 30	Thu Oct 1	Fri Oct 2	Sat Oct 3
205	288	288	288	288	288
268	254	221	218	272	142
60	40	66	41	70	59
141	128	123	111	124	99
52	58	36	35	46	18
6.0	13.7	16.3	9.1	7.3	11.3
.99	0.84	N/A	N/A	N/A	N/A
4	4	5	3	4	5

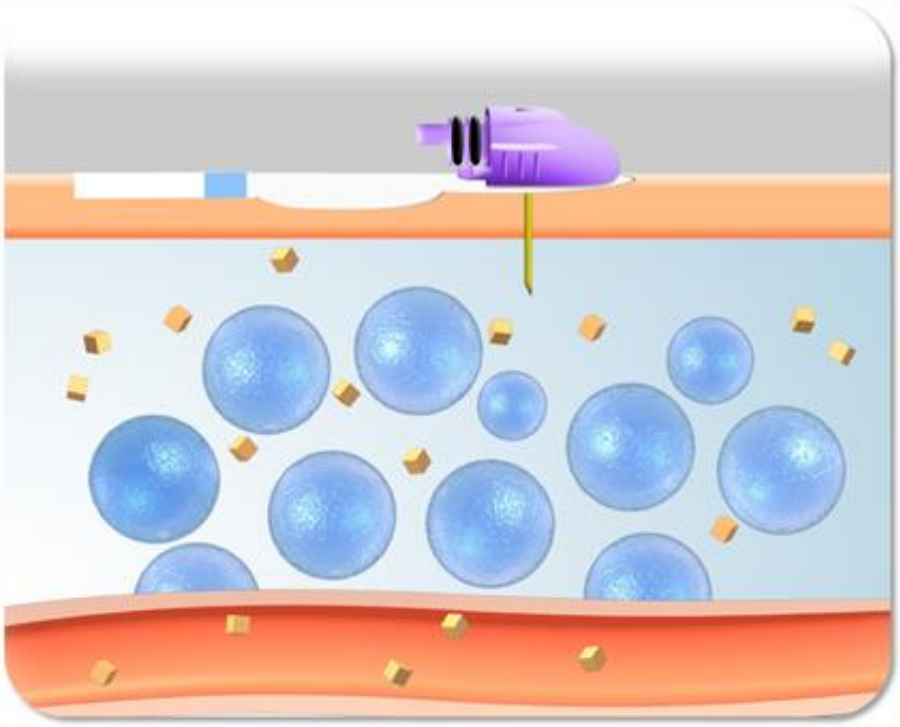
Judgment

S: No Sensor Data

CONTINUOUS GLUCOSE MONITORING

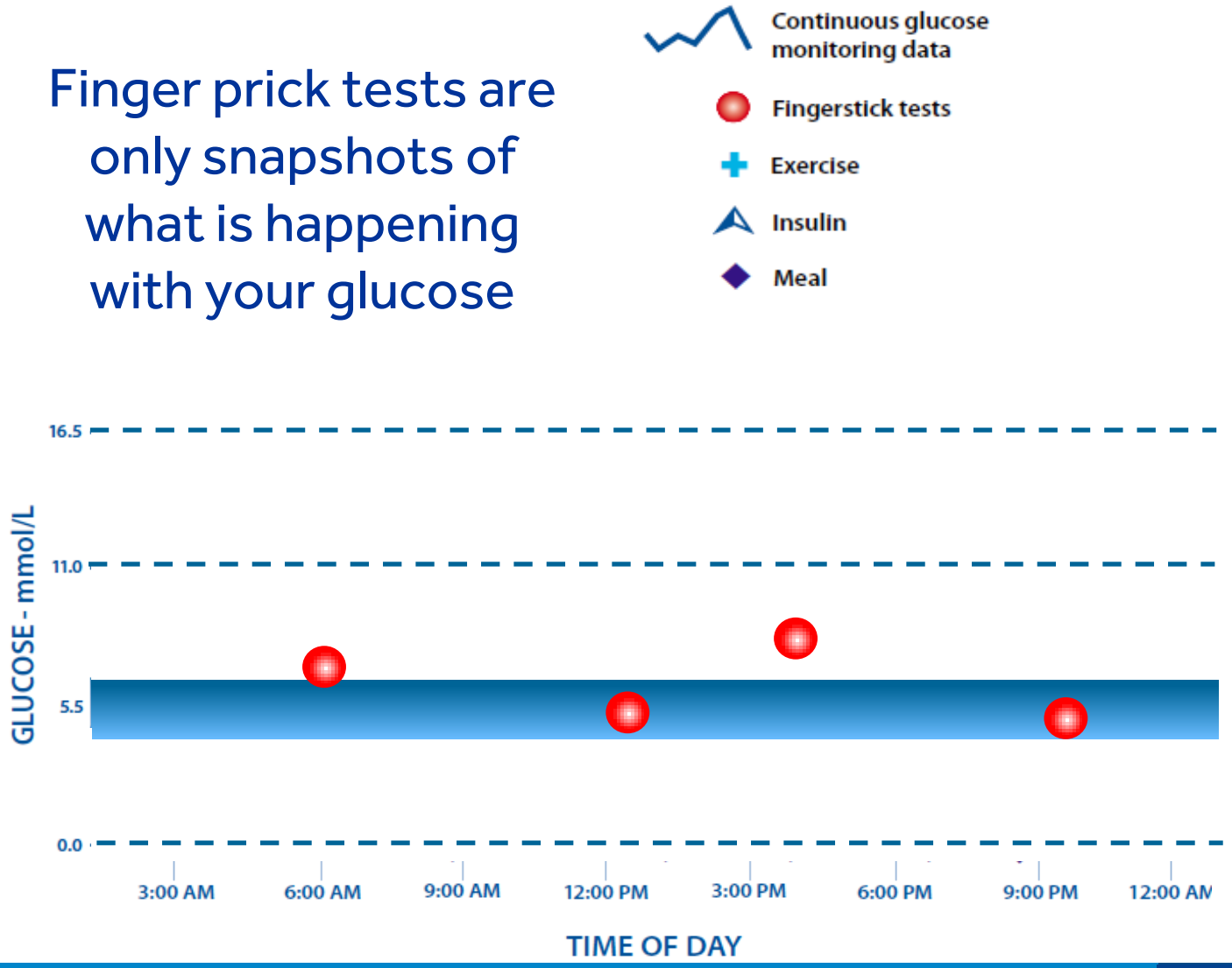
ENHANCED® ENLITE SENSOR





WHY CGM?
LIMITATIONS OF SMBG

Finger prick tests are only snapshots of what is happening with your glucose



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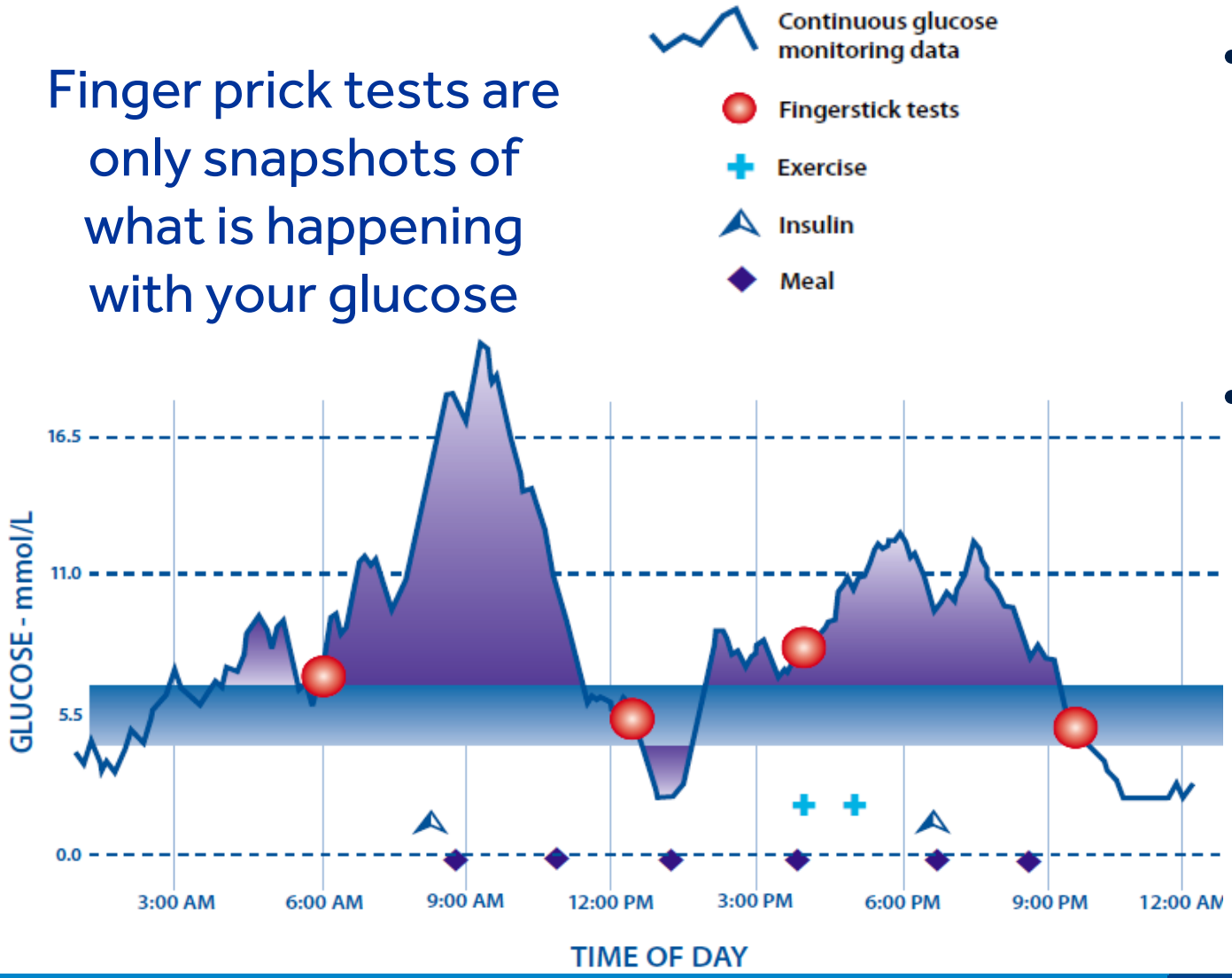


- 60% of glucose low may not be revealed by SMBG alone
- CGM identifies 4 time more serious glucose excursions than SMBG

REAL-TIME
GLUCOSE MONITORING SYSTEM

Sending glucose values every **5 minutes** to a mobile phone.

Sensor + transmitter

+

Smartphone

REAL-TIME CGM
HOME SCREEN

Status Menu

Sensor glucose number

Event markers

Time until next calibration

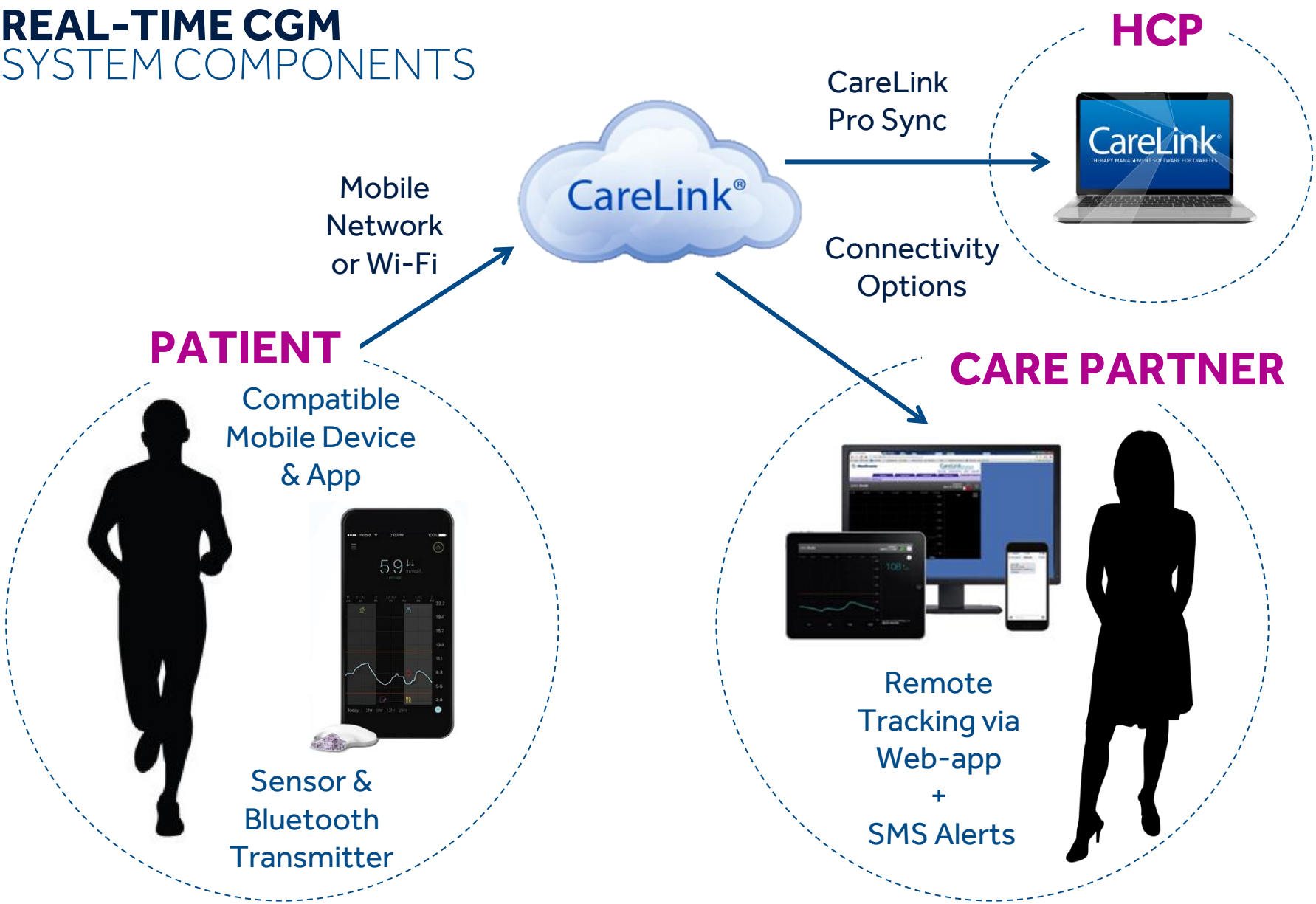
Rate of change arrow

Sensor Glucose trend line

Event marker

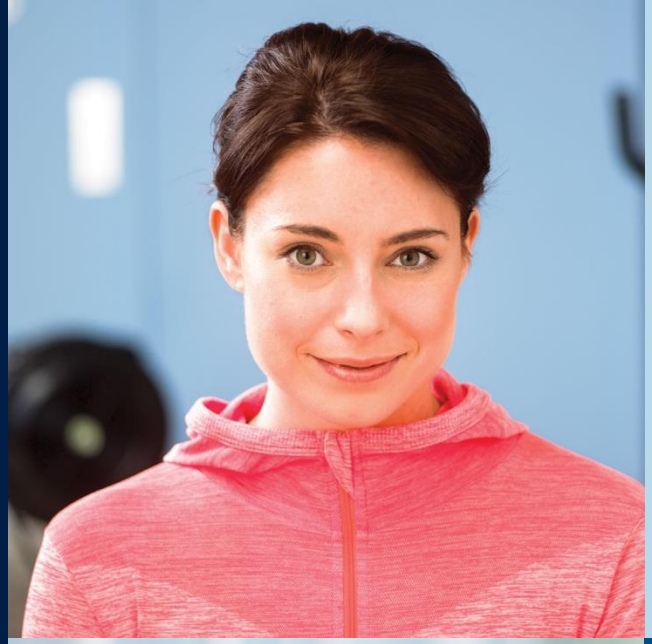
For a listing of indications, contraindications, precautions, warnings, and potential adverse events, please refer to the Instructions for Use.

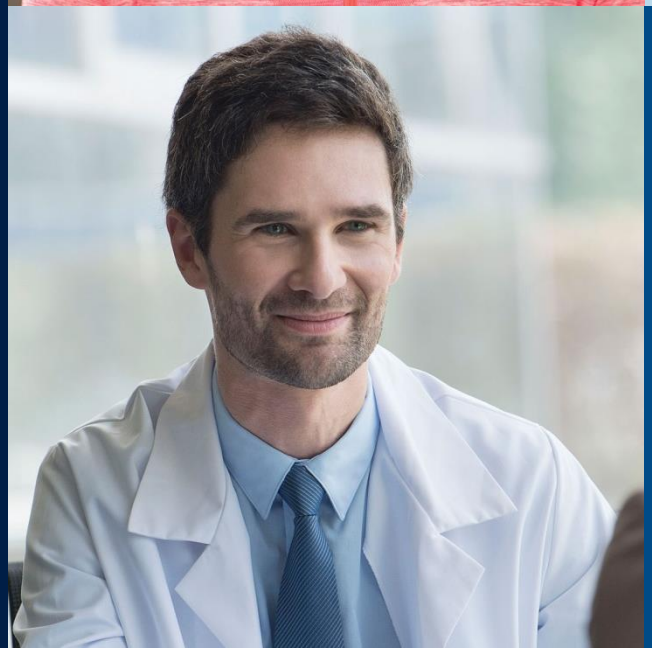
REAL-TIME CGM
SYSTEM COMPONENTS



REAL-TIME CGM

PRODUCT BENEFITS AT A GLANCE





FOR PATIENTS

- **24/7** glucose monitoring and trends
- Predictive **alerts** for high and low
- Real time **remote monitoring** and **SMS** alerts for care partners

FOR PHYSICIANS

- Availability of patient's **CGM data**
- Automatic **data upload** to CareLink Professional*
- Personalized patient's **reports**

* If accounts are linked.
For a listing of indications, contraindications, precautions, warnings, and potential adverse events, please refer to the Instructions for Use.

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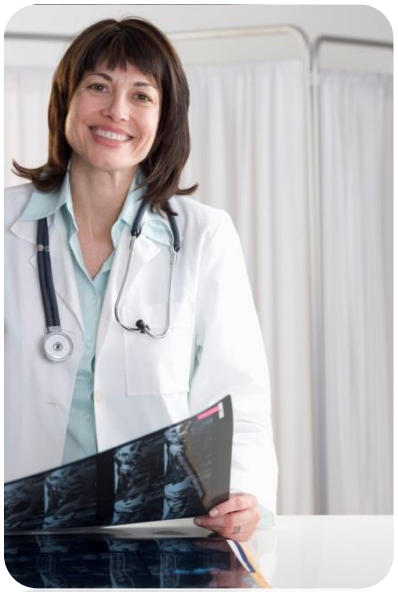
What about in the Cath Lab?

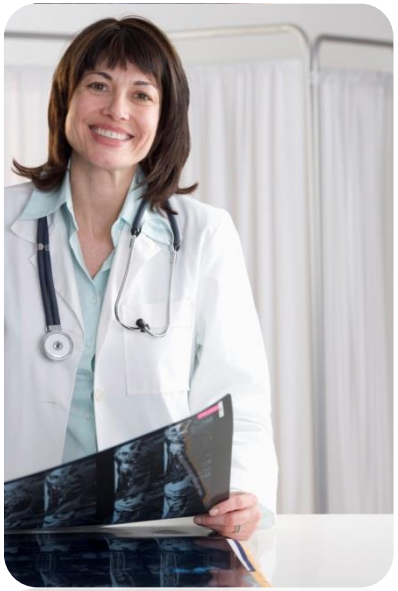
- ✓ Do not expose your pumps and transmitters to **diathermy** devices, or devices that generate **strong magnetic fields**
  - MRI
  - X-Ray
  - CT scan
  - Does this include the Cath lab?
- ✓ Always remove your sensor and transmitter **before entering a room** that has x-ray, MRI, diathermy, or CT scan equipment.
- ✓ Steel cannula infusion sets must also be removed



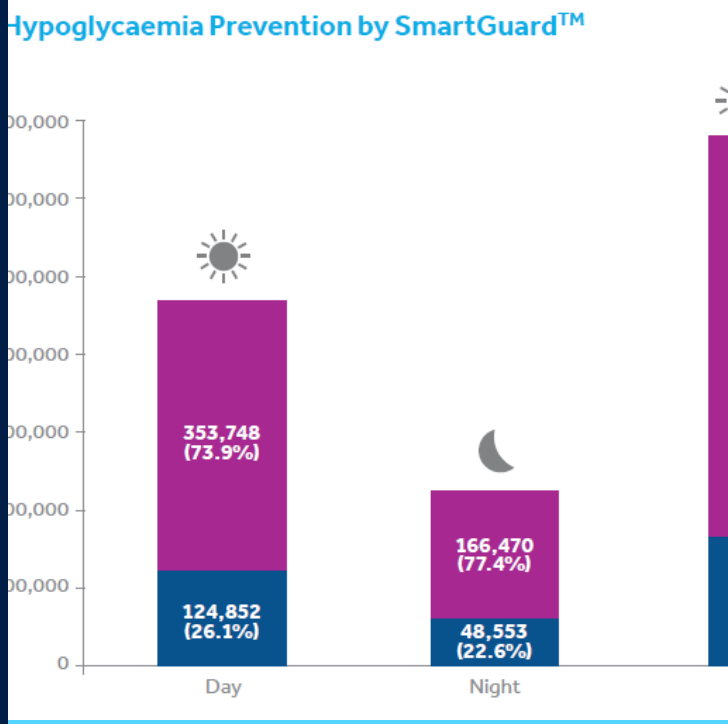
What about in the Cath Lab?

- ✓ The strong magnetic fields can cause the device to malfunction, and result in serious injury

- ✓ If your transmitter is inadvertently exposed to a strong magnetic field, discontinue use and contact the **24 Hour HelpLine** or your local representative for further assistance



CLINICAL EVIDENCE



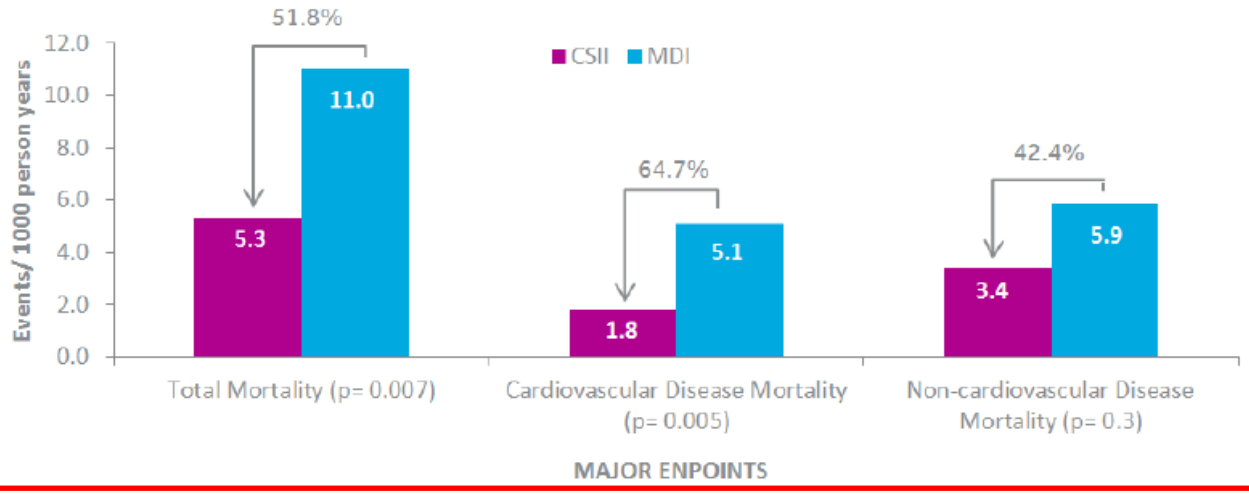
CSII AND MORTALITY, 2015
LONG TERM EFFECT OF CSII ON MORTALITY VS MDI

OBJECTIVES The aim of the study was to investigate the long term effects of Continuous Subcutaneous Insulin Infusion (CSII) on mortality in people with type 1 diabetes, as compared to Multiple Daily Injection (MDI).

RESULTS

CSII therapy was associated with 51.8% less mortality events compared to MDI

- 64.7% less fatal cardiovascular disease events
- 42.4% less fatal non-cardiovascular disease events



INSIGHT CSII is associated with significantly lower mortality compared to MDI for people with Type 1 Diabetes

DESIGN

- Observational study
  Data Source: Swedish National Diabetes Register (2005-2012)
- CSII vs MDI
- 18 168 people with type 1 diabetes
  - 2441 using CSII
  - 15 727 using MDI
- 6.8 years mean follow up
  Total of 114,135 person years

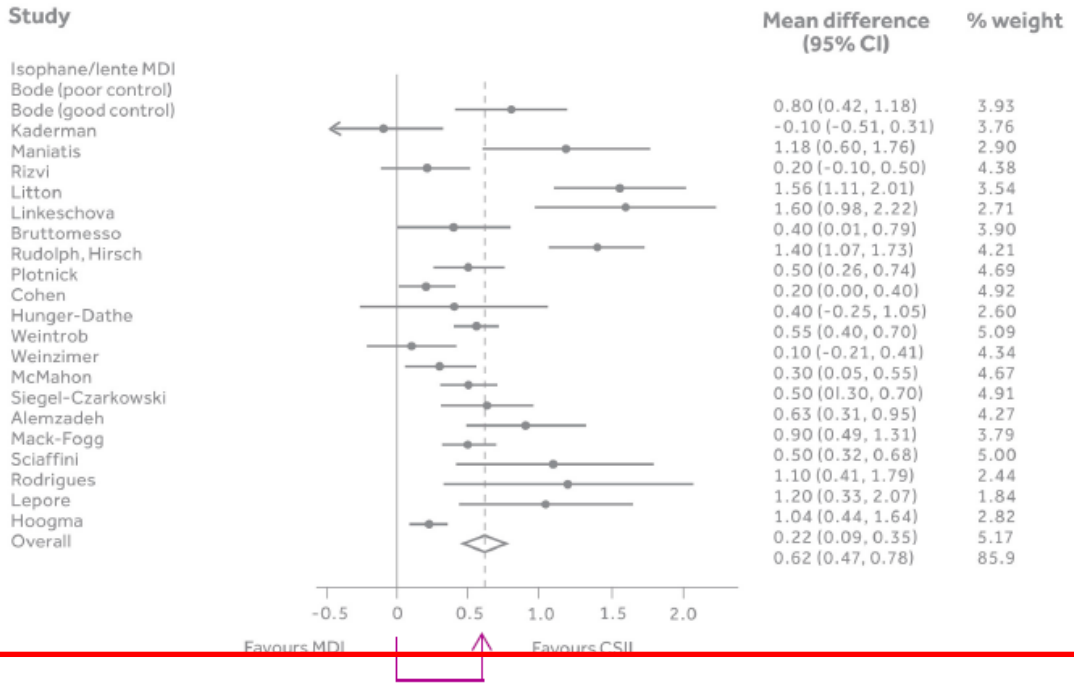
REFERENCE

Insulin pump therapy, multiple daily injections, and cardiovascular mortality in 18 168 people with type 1 diabetes: observational study. Steineck et al. BMJ. 350:h3234, 2015.

CSII META–ANALYSIS:
BENEFIT OF CSII VS MDI

OBJECTIVES This meta-analysis aimed to evaluate the clinical effectiveness of CSII therapy in reducing severe hypoglycaemia frequency and HbA1c levels, as compared to MDI therapy.

RESULTS The mean HbA1c level was 0.62% lower with CSII therapy compared to MDI therapy (0.72% and 0.21% in B/A studies and RCTs, respectively)



INSIGHT CSII significantly reduces HbA1c and rate of severe hypoglycemia vs MDI

DESIGN

- Meta-analysis of 22 RCTs or B/A studies
- CSII vs MDI
- CSII therapy duration between 6 to 48 months
- 1414 subjects with Type 1 diabetes

REFERENCE

Severe hypoglycaemia and glycaemic control in Type 1 diabetes: metaanalysis of multiple daily insulin injections compared with continuous subcutaneous insulin infusion. Pickup J.C., Sutton A.J. Diabetes Medicine 25(7):765-774, 2008.

IMPACT OF HbA1c REDUCTION

HOME

A 1% reduction in HbA1c is associated with significant reductions in the long-term complications of chronically elevated blood glucose levels[5†]

- Improved glycemic control reduces the risk for both development and progression of diabetes complications.[1, 2]
  - Patients with lower A1C have lower diabetes-related hospitalisation costs.[3]
- Over 3 years, patients with lower A1C had a lower hospitalisation incidence rate than patients with higher A1C.[4]

The VALUE of Insulin Pumps are supported by numerous meta-analyses, RCTs , HTA's and cost-effectiveness publications

HbA1c[5]

1%

37%[5]	Microvascular complications e.g. kidney disease and blindness*
43%[5]	Amputation or fatal peripheral vascular disease*
21%[5]	Deaths related to diabetes*
14%[5]	Heart attack*
12%[5]	Stroke**

*p<0.0001
**p=0.035

†Study performed in Type 2 diabetic patients.

1. Gubitosi-Klu et al. *Diabetes care.* 2014 37(1), pp.44–9. 2. The DCCT Research Group. *N Engl J Med* 1993;329(14):977-986. 3. Menzin J et al. *J Manag Care Pharm.* 2010;16(4):264-75. 4. Menzin J et al. *Diabetes Care.* 2001;24(
5. Stratton IM et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): Prospective observational study. BMJ 2000;321:405–412

Patients need to take responsibility

- ✓ If we can prevent diabetes OR if diabetic patients control their diabetes well
  - Less acute and long term complications
  - Less hospitalisations
  - less burden on our economy
  - Fewer sick days and more economically productive people
  - Better medical aid benefits