

Update on Diabetes Mellitus Management



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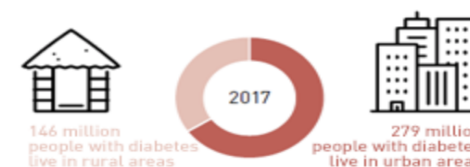
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Pendahuluan

1 in 11 adults has diabetes (425 million)



Two-thirds of people with diabetes live in urban areas (279 million)



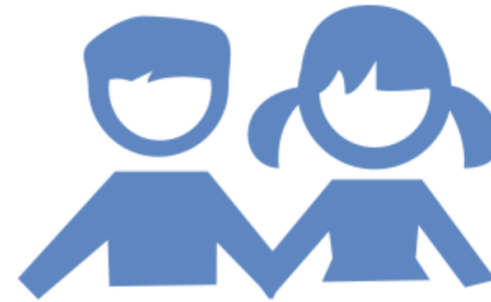
1 in 2 adults with diabetes is undiagnosed (212 million)



Two-thirds of people with diabetes are of working age (327 million)



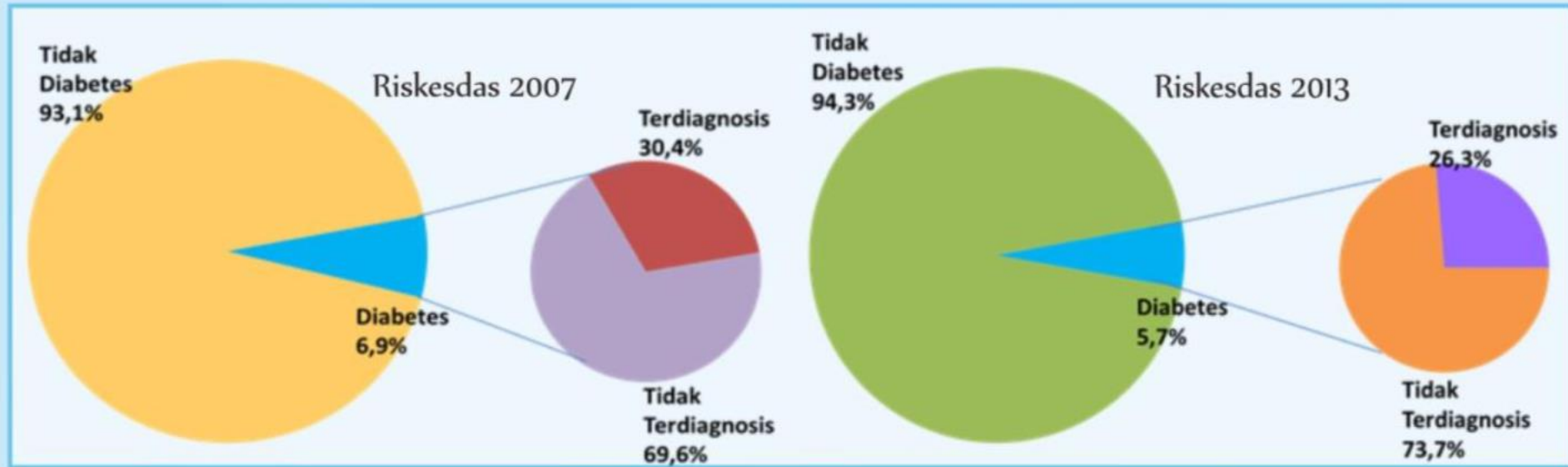
**Over 1 million children
and adolescents** have type 1
diabetes



1 in 6 births is affected by
hyperglycaemia in pregnancy



- Di Indonesia prevalensi kasus DM berdasarkan Riskesdas (2013) mencapai 12.191.564 (6.9 %)
- Menempati peringkat ke 6 dunia (IDF, 2017)



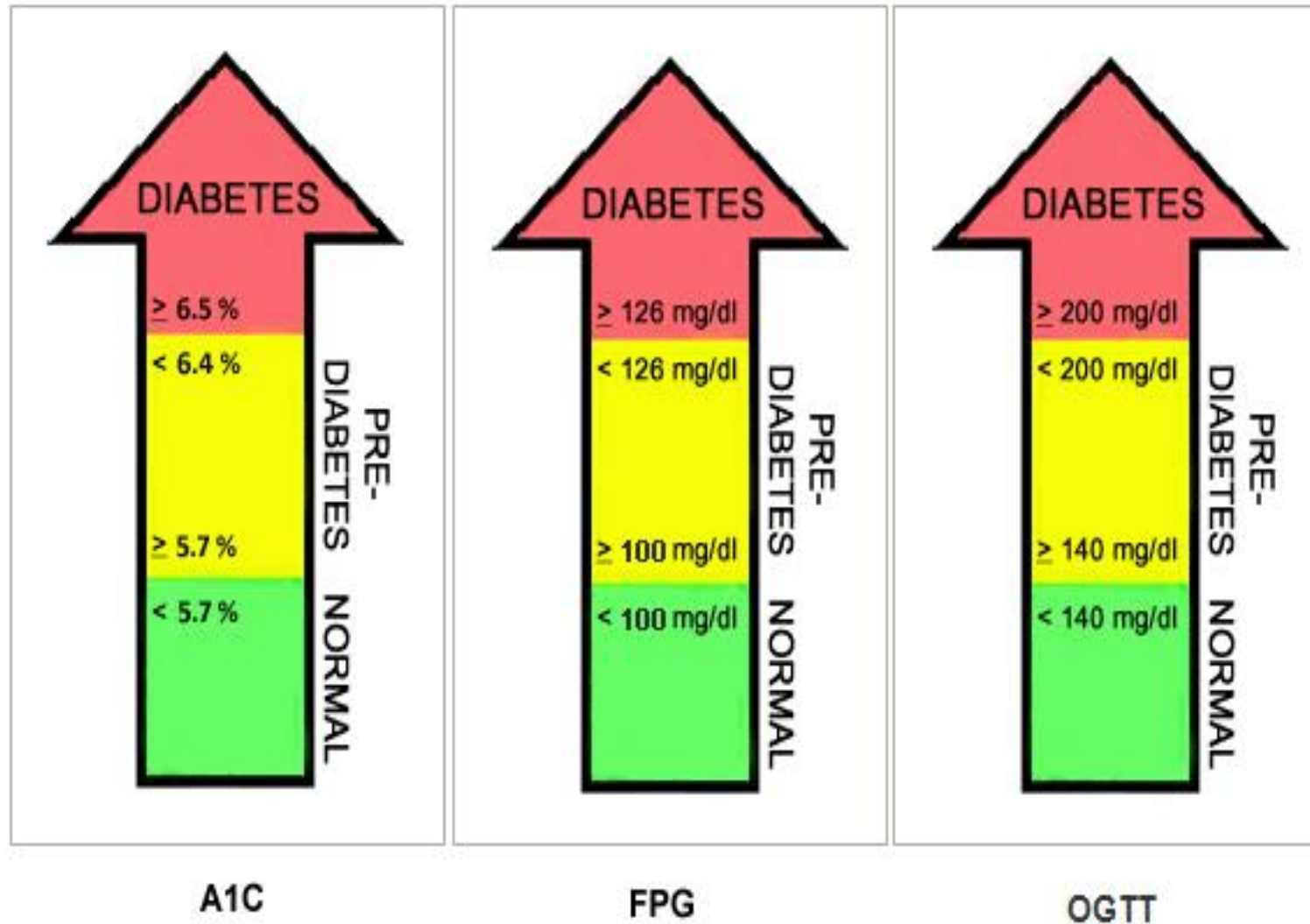
Sumber: Riskesdas 2007,2013, Kementerian Kesehatan
Dit. Pengendalian Penyakit Tidak Menular Kementerian Kesehatan

What is diabetes ?



- Diabetes merupakan penyakit kronik yang terjadi saat pankreas tidak lagi mampu menghasilkan insulin atau ketika tubuh tidak dapat memanfaatkan insulin yang dihasilkan dengan baik.
- Merupakan penyakit metabolik dengan karakteristik tingginya kadar glukosa dalam darah (hiperglikemia)

Diagnosis Diabetes Mellitus



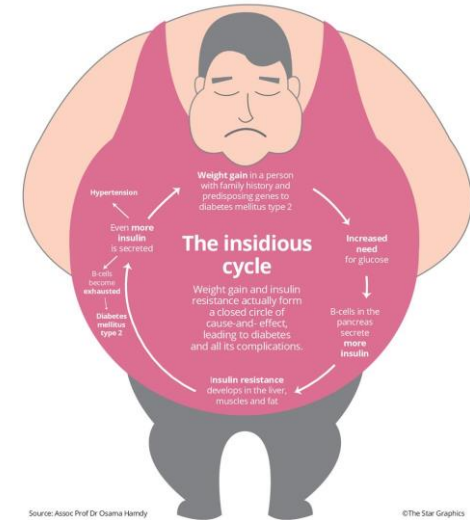
HbA1c and Average Plasma Glucose Correlation

HbA1C	Pasma Glukosa
6	120
7	150
8	180
9	210
etc	



Type Diabetes

- Diabetes tipe 1
- Diabetes tipe 2
- Diabetes Gestational (GDM)



Diabetes tipe 1

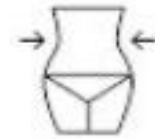
- $\pm 10\%$ orang dengan DM adalah diabetes tipe 1
- Dapat terjadi pada berbagai umur, tetapi terjadi lebih sering pada anak-anak & dewasa
- Disebabkan oleh reaksi autoimun dimana sistem pertahanan tubuh menyerang sel-sel yang menghasilkan insulin $\rightarrow$ tubuh menghasilkan sedikit atau tidak menghasilkan insulin
- Membutuhkan insulin
- Penyebab pasti tidak diketahui $\rightarrow$ genetik & kondisi lingkungan
- Tidak dapat dicegah



Gejala Diabetes Tipe 1



Abnormal thirst and dry mouth



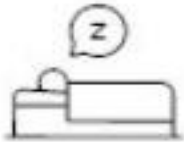
Sudden weight loss



Frequent urination



Bedwetting



Lack of energy, fatigue



Constant hunger



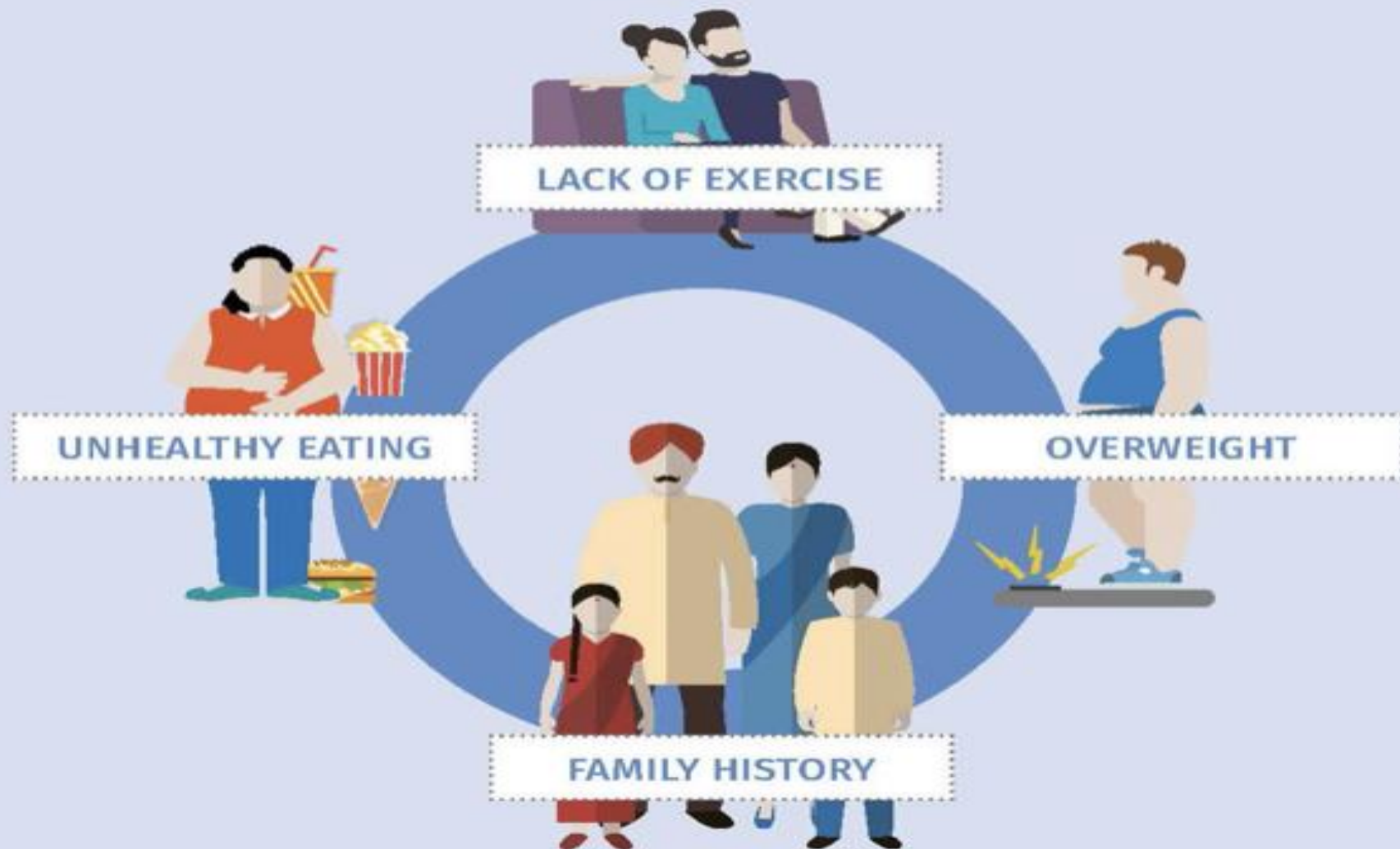
Blurred vision

Diabetes Tipe 2

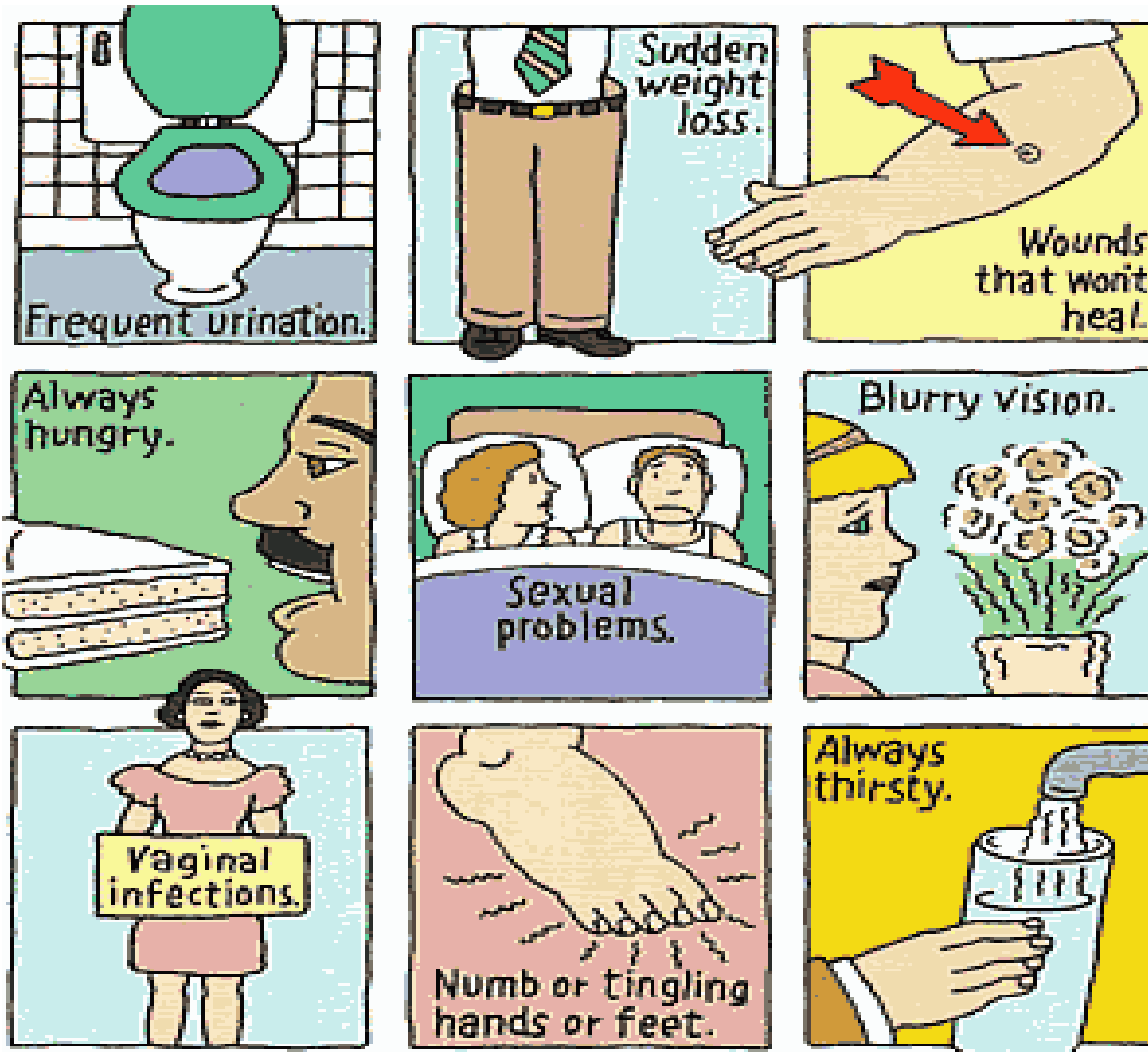
- Tipe diabetes yang paling umum
- Menurunnya sensitifitas insulin dan menurunnya fungsi sel beta pankreas
- Umumnya terjadi pada orang dewasa, meningkat pada anak dan remaja → meningkatnya obesitas, kurangnya aktifitas dan diet yang buruk



TYPE 2 DIABETES RISK FACTORS

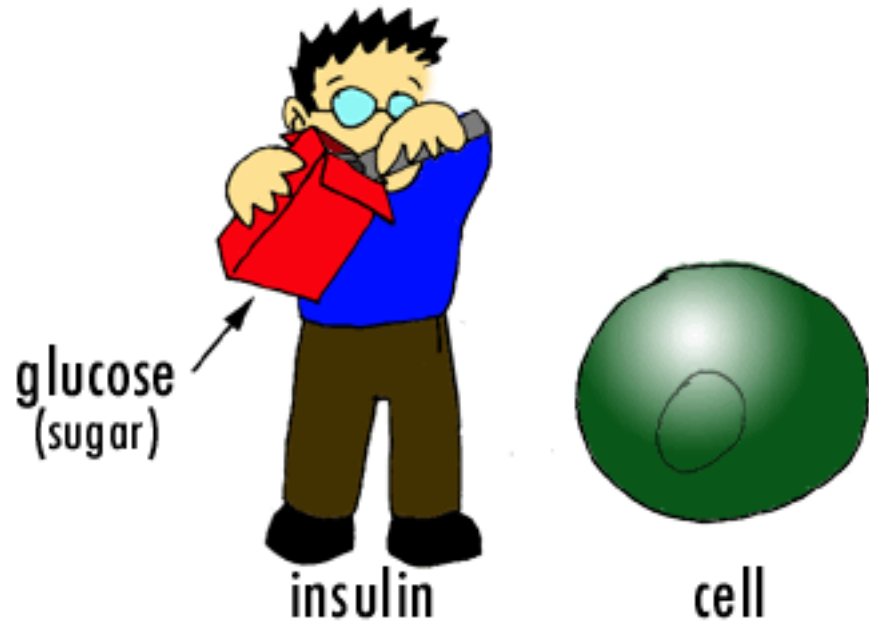


Gejala DM Tipe 2

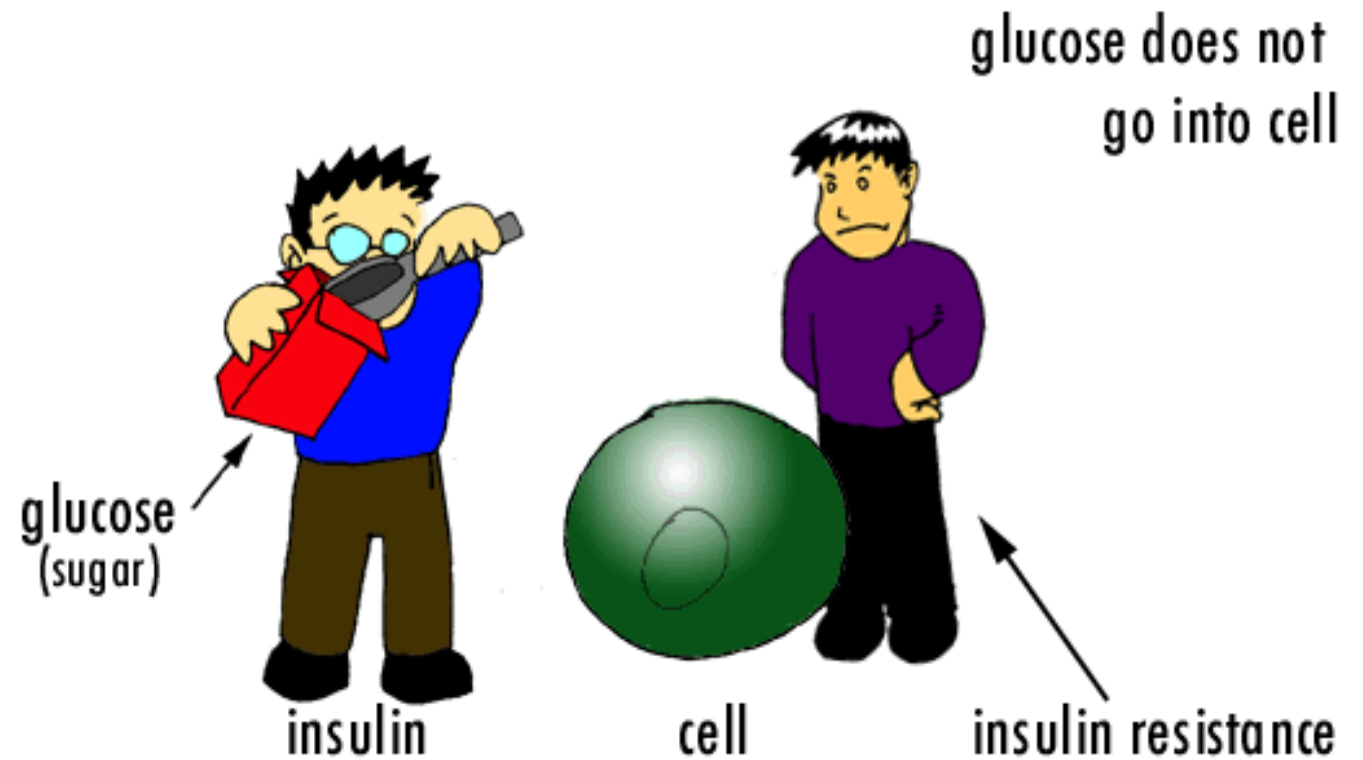


Patofisiologi

Normally in the body

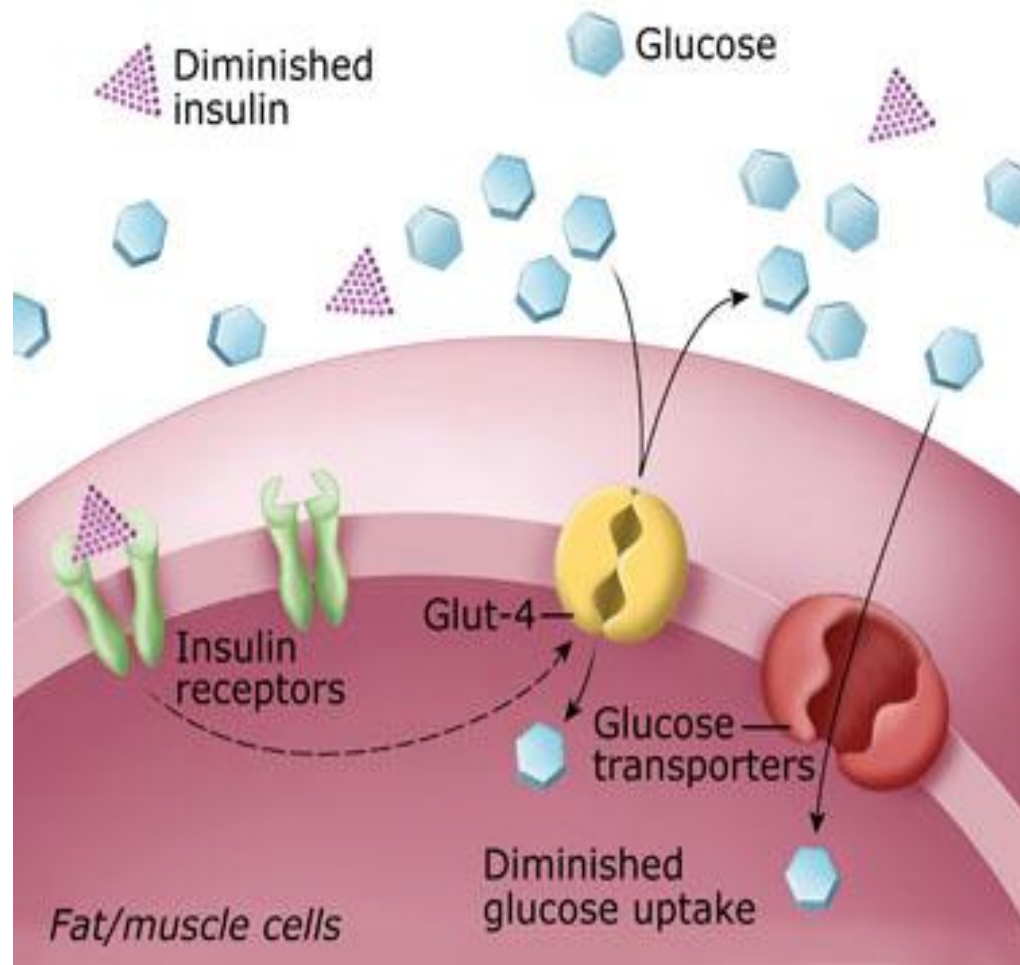


Insulin Resistance

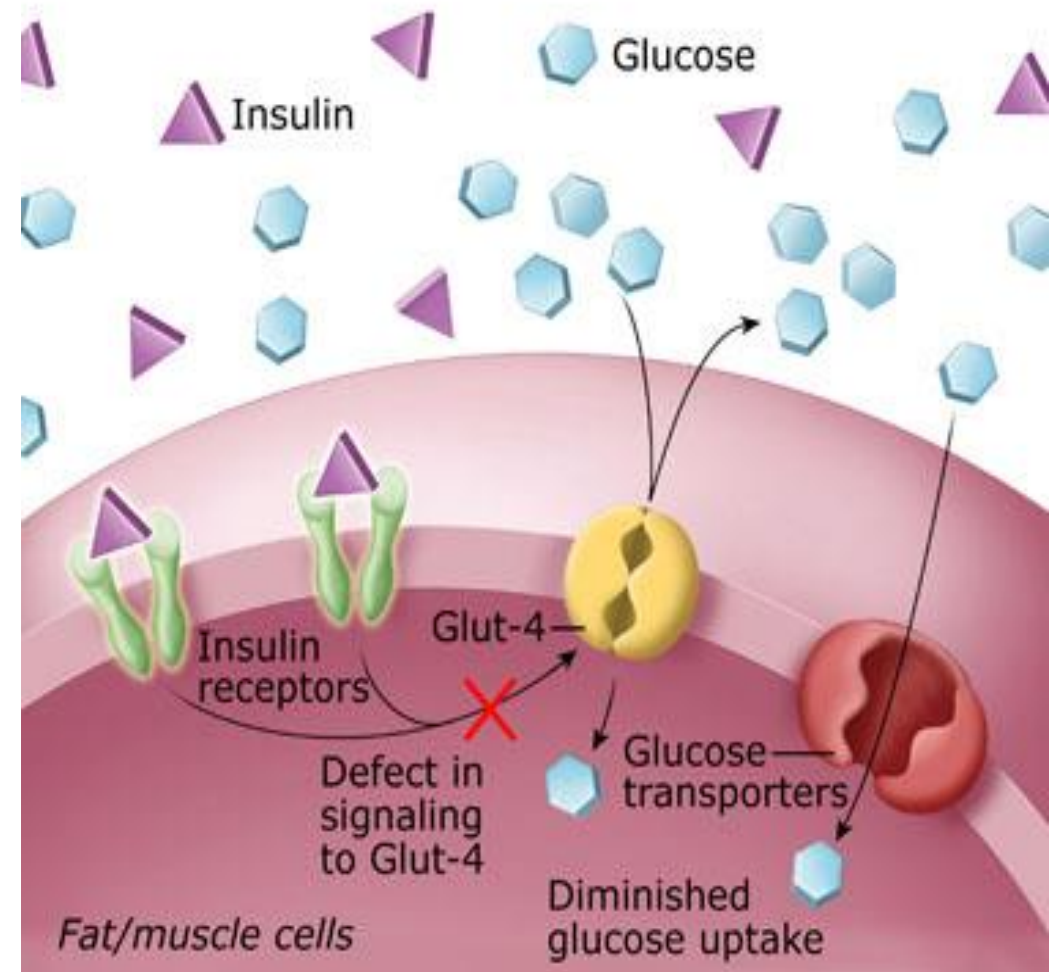


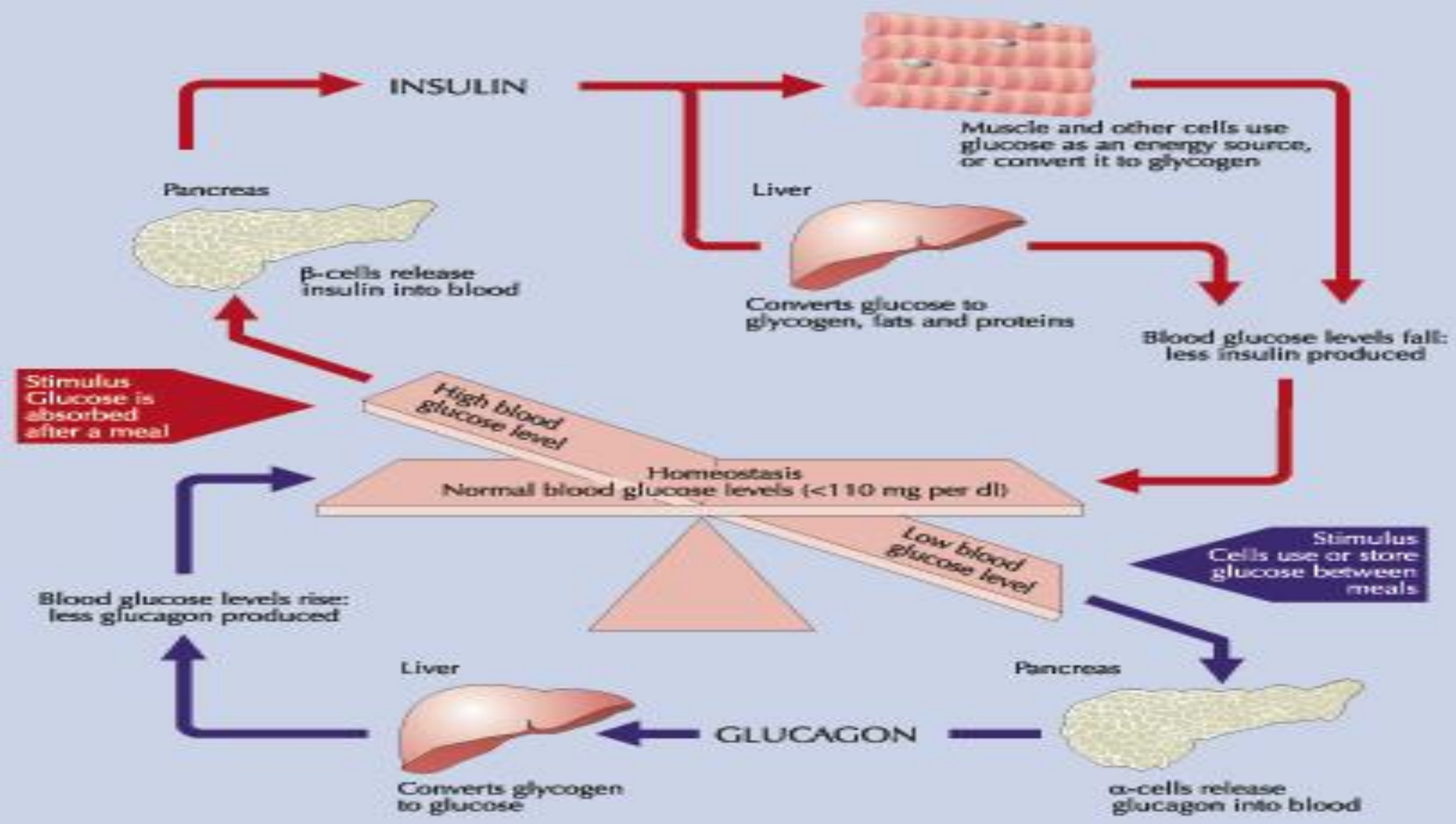
Patofisiologi

Type 1 Diabetes: Insufficient Insulin



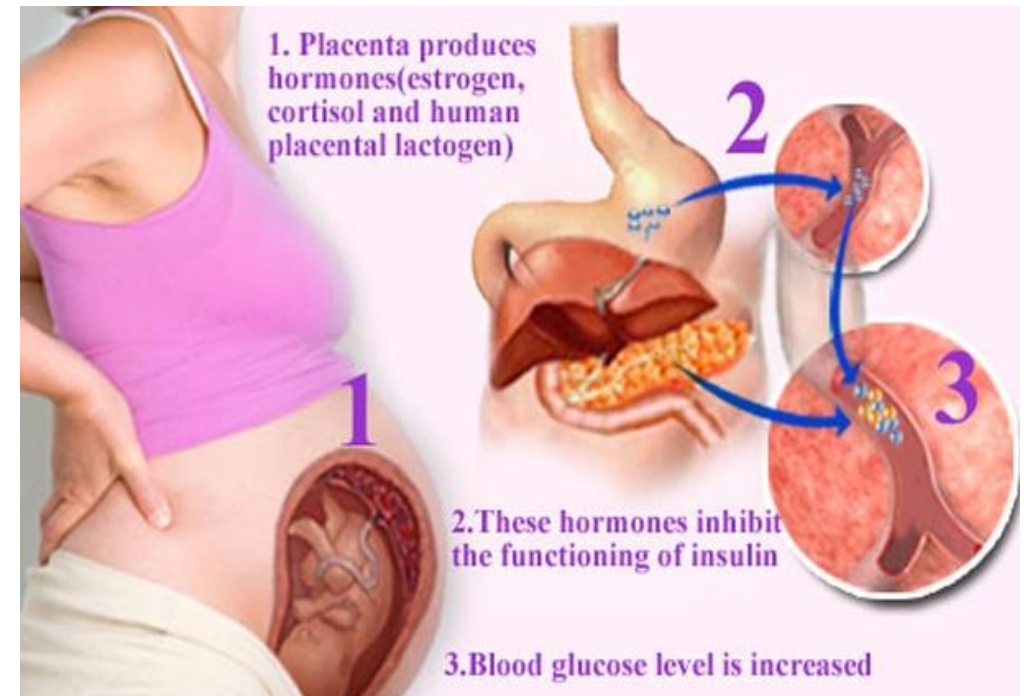
Type 2 Diabetes: Insulin Resistance





Diabetes Gestational

- Diabetes muncul pertama kali saat kehamilan
- Terjadi 2 – 10 % kehamilan
- 30 – 60 % menjadi DM tipe 2
- Semakin meningkat pada wanita yang hamil diatas 45 tahun



Complications

Microvasuclar: damage to eyes, kidneys, nerves (retinopathy, nephropathy, neuropathy)

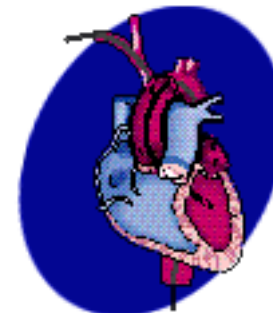
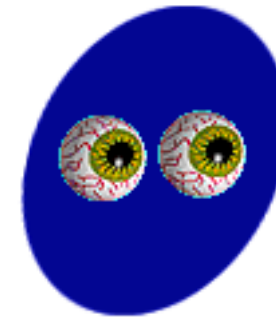
Macrovascular: 2X risk for heart attack and stroke, peripheral vascular disease



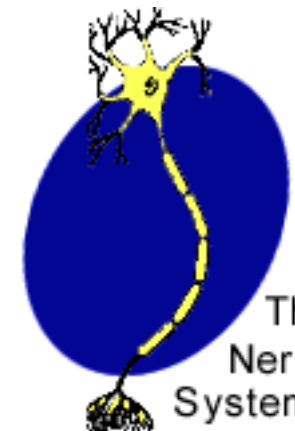
The Kidney



The Feet



The Heart



The Nervous System

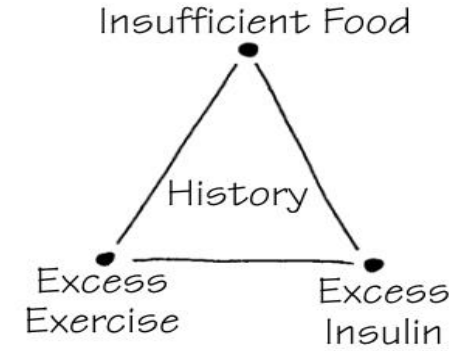
Hypoglycemia

- Definition: plasma glucose <70
- A complication of treatment!
- Normal plasma glucose 70-150
- 40 is the minimum for brain function
 <40 = Risk for diabetic coma, seizures





HYPOLYCEMIA



Onset
Rapid...
1 - 3 Hours



- Anxious
- Sweaty
- Hungry
- Confused
- Blurred or Double Vision
- Shaky
- Irritable
- Cool, Clammy Skin

Needs...
BLOOD SUGAR ↑
Increased

Hypoglycemia Treatment

- Glucose
 - 15 grams of simple carbohydrates
 - 240 ml fruit juice
 - Half can regular soda
 - 3 glucose tabs
 - 1 tablespoon honey
- Glucagon injection
 - Stimulates glycogen breakdown



Drink glucose



Prevention or delay of diabetes: Life style modification

- ▶ Research studies have found that lifestyle changes can prevent or delay the onset of type 2 diabetes among high-risk adults.
- ▶ These studies included people with IGT and other high-risk characteristics for developing diabetes.
- ▶ Lifestyle interventions included diet and moderate-intensity physical activity (such as walking for 2 1/2 hours each week).
- ▶ In the Diabetes Prevention Program, a large prevention study of people at high risk for diabetes, the development of diabetes was reduced 58% over 3 years.



Prevention or delay of diabetes: Medications

- ▶ Studies have shown that medications have been successful in preventing diabetes in some population groups.
- ▶ In the Diabetes Prevention Program, people treated with the drug metformin reduced their risk of developing diabetes by 31% over 3 years.
- ▶ Treatment with metformin was most effective among younger, heavier people (those 25-40 years of age who were 25 to 40 kg overweight)
- ▶ Similarly, in the STOP-NIDDM Trial, treatment of people with IGT with the drug acarbose reduced the risk of developing diabetes by 25% over 3 years.
- ▶ Other medication studies are ongoing. In addition to preventing progression from IGT to diabetes, both lifestyle changes and medication have also been shown to increase the probability of reverting from IGT to normal glucose tolerance.





Diabetes Treatment



Penatalaksanaan DM

- The major components of the treatment of diabetes are:

A

- Diet and Exercise

B

- Oral hypoglycaemic therapy

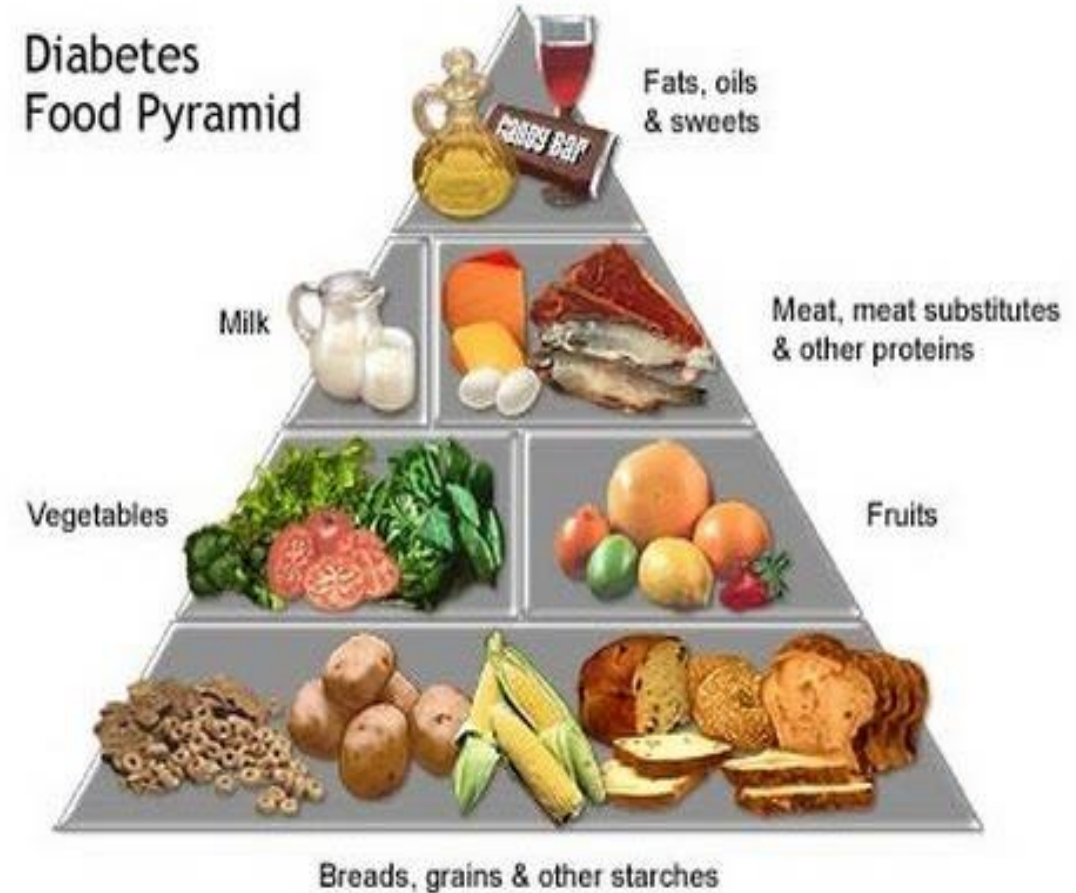
C

- Insulin Therapy



A. Diet

- ▶ Diet is a basic part of management in every case. Treatment cannot be effective unless adequate attention is given to ensuring appropriate nutrition.
- ▶ **Dietary treatment should aim at:**
 - ensuring weight control
 - providing nutritional requirements
 - allowing good glycaemic control with blood glucose levels as close to normal as possible
 - correcting any associated blood lipid abnormalities



The following principles are recommended as dietary guidelines for people with diabetes:

- ▶ Dietary fat should provide *25-35% of total intake of calories but saturated fat intake* should not exceed 10% of total energy. Cholesterol consumption should be restricted and limited to 300 mg or less daily.
- ▶ Protein intake can range between 10-15% total energy (0.8-1 g/kg of desirable body weight). Requirements increase for children and during pregnancy. Protein should be derived from both animal and vegetable sources.
- ▶ Carbohydrates provide *50-60% of total caloric content of the diet*. Carbohydrates should be complex and high in fibre.
- ▶ Excessive salt intake is to be avoided. It should be particularly restricted in people with hypertension and those with nephropathy.

Exercise

- ▶ Physical activity promotes weight reduction and improves insulin sensitivity, thus lowering blood glucose levels.
- ▶ Together with dietary treatment, a programme of regular physical activity and exercise should be considered for each person. Such a programme must be tailored to the individual's health status and fitness.
- ▶ People should, however, be educated about the potential risk of hypoglycaemia and how to avoid it.

EXERCISE GUIDE FOR DIABETIC FITNESS

- F** Frequency
Regular (3x to 4x Per Week)
- I** Intensity
60-80% Of Maximal Heart Rate
- T** Time
Aerobic Activity
20-30 Min.
With 5-10 Min.
Warm Up



Oral Hypoglycaemic Medications

AGENTS & ACTIONS

Drug Class	Drug Name	Brand Name	Mechanism of Action
Biguanides	Metformin	Glucophage®	Inhibit glucose production by the liver
Sulfonylureas (second-generation)	Glimepiride Glipizide Glyburide	Amaryl® Glucotrol® Diabeta®, Glynase PresTab®, Micronase®	Increase insulin secretion by pancreatic beta cells
Meglitinides	Repaglinide Nateglinide	Prandin® Starlix®	Increase insulin secretion by pancreatic beta cells
Thiazolidinediones (TZDs)	Pioglitazone Rosiglitazone	Actos® Avandia®	Increase glucose uptake by skeletal muscle
Alpha-glucosidase inhibitors	Acarbose Miglitol	Precose® Glyset®	Inhibit carbohydrate absorption in the small intestine

General Guidelines for Use of Oral Anti-Diabetic Agent in Diabetes

- ▶ Oral anti-diabetic agents are not recommended for diabetes in pregnancy
- ▶ Oral anti-diabetic agents are usually not the first line therapy in diabetes diagnosed during stress, such as infections. Insulin therapy is recommended for both the above
- ▶ Targets for control are applicable for all age groups. However, in patients with co-morbidities, targets are individualized
- ▶ When indicated, start with a minimal dose of oral anti-diabetic agent, while reemphasizing diet and physical activity. An appropriate duration of time (2-16 weeks depending on agents used) between increments should be given to allow achievement of steady state blood glucose control

C. Insulin Therapy

Diperlukan pada:

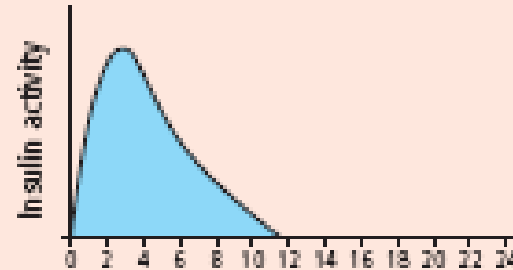
- ▶ HbA1c > 9 % dengan kondisi dekompensasi metabolik
- ▶ Penurunan berat badan yang cepat
- ▶ Hiperglikemia berat yang disertai ketosis
- ▶ Pregnancy/ DM gestasional yg tidak terkendali dengan makanan
- ▶ Gagal dengan kombinasi OHO dosis optimal
- ▶ Stres berat (infeksi sistemik, operasi besar, infark miokard akut, stroke)
- ▶ Gangguan fungsi ginjal atau hati yang berat
- ▶ Kontraindikasi & atau alergi terhadap OHO
- ▶ Kondisi perioperatif sesuai dengan indikasi



Overview of Insulin and Action

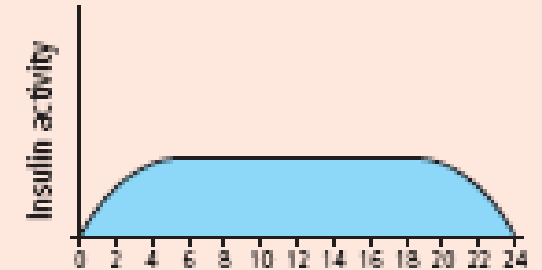
Soluble Human Insulin: Actrapid, Humulin S

Onset: 30 mins
Peak: 2-4 hours
Duration: 6-8 hours



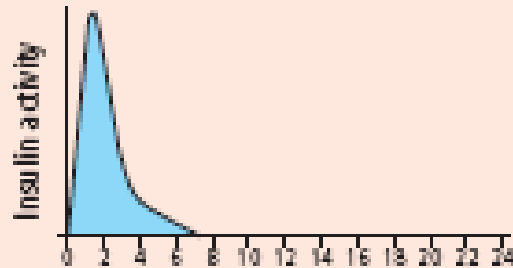
Long Acting Basal Analogues: Glargine (Lantus), Detemir (Levemir)

Onset: ~ 2 hours
Peak: None
Duration: 18-24 hours



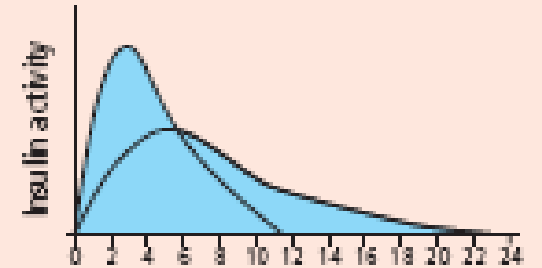
Rapid Acting Insulin Analogue: Novorapid Aspart, Humalog Lispro, Apidra

Onset: 0-15 mins
Peak: 1-2 hours
Duration: 3-5 hours



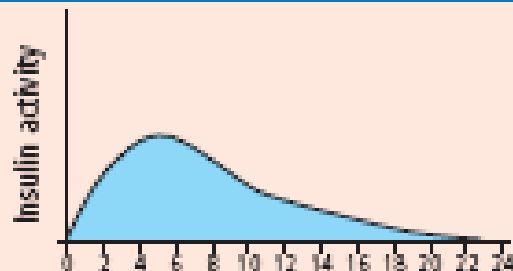
Pre-mixed Human Soluble/Isophane: Mixtard 30, Humulin M3 etc

Onset: See above
Peak: See above
Duration: See above
Mixtard 30, M3 refers to % of soluble insulin ie. 30% Soluble 70% Isophane



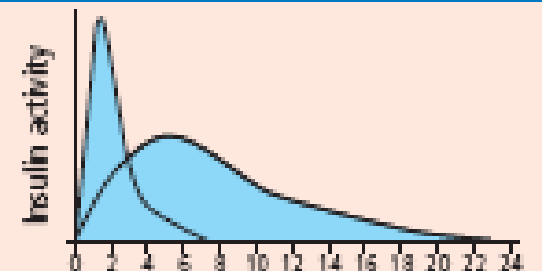
Intermediate Human Isophane Insulin's: Insulatard, Humulin I

Onset: -
Peak: 4-8 hours
Duration: 14-16 hours



Pre-mixed Analogues/Isophane: Novo Mix 30, Humalog Mix50, Mix25

Onset: See above
Peak: See above
Duration: See above
Novo Mix 30, Humalog Mix50/ Mix25 refers to % of rapid acting analogue insulin

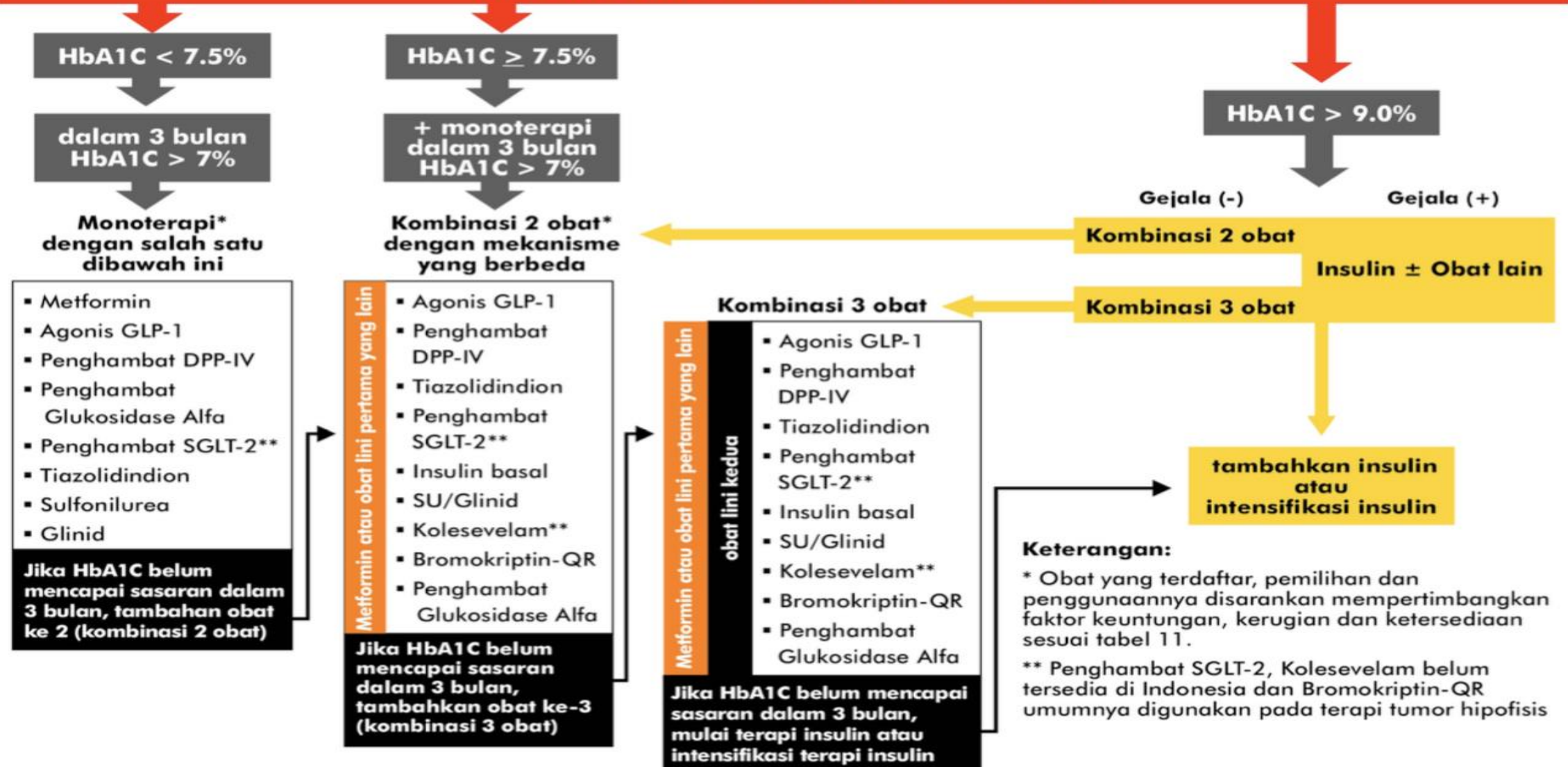


Types of insulin

Insulin type/action (appearance)	Brand names (generic name in brackets)	Basal/bolus	Dosing schedule
Rapid-acting analogue (clear) Onset: 10–15 minutes Peak: 60–90 minutes Duration: 4–5 hours	Humalog® (insulin lispro) NovoRapid® (insulin aspart)	Bolus	Usually taken right before eating or to lower high blood glucose
Short-acting (clear) Onset: 0.5–1 hour Peak: 2–4 hours Duration: 5–8 hours	Humulin®-R Novolin®ge Toronto	Bolus	Taken about 30 minutes before eating, or to lower high blood glucose
Intermediate-acting (cloudy) Onset: 1–3 hours Peak: 5–8 hours Duration: up to 18 hours	Humulin®-N Novolin®ge NPH	Basal	Often taken at bedtime, or twice a day (morning and bedtime)
Extended long-acting analogue (Clear and colourless) Onset: 90 minutes Peak: none Duration: 24 hours	Lantus® (insulin glargine) Levemir® (insulin detemir)	Basal	Usually taken once or twice a day
Premixed (cloudy) A single vial contains a fixed ratio of insulins (the numbers refer to the ratio of rapid- or fast-acting to intermediate-acting insulin in the vial)	Humalog® Mix 25™ Humulin® (20/80, 30/70) Novolin®ge (10/90, 20/80, 30/70, 40/60, 50/50)	Combination of basal and bolus insulins	Depends on the combination

Konsensus Perkeni 2015: Algoritme Pengelolaan DM Tipe 2 di Indonesia

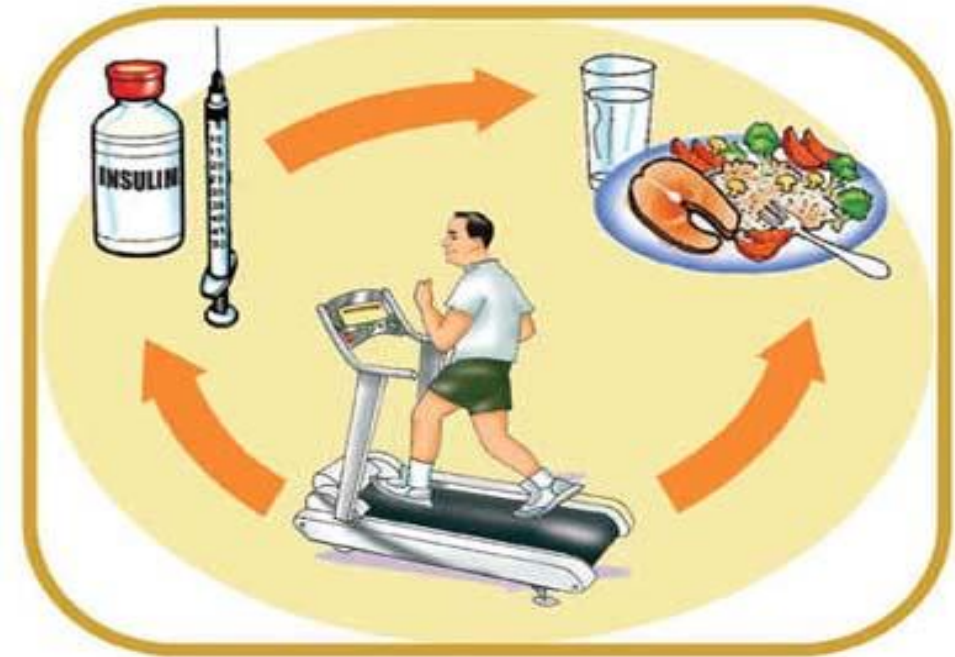
MODIFIKASI GAYA HIDUP SEHAT



Self-Care

► Patients should be educated to practice self-care. This allows the patient to assume responsibility and control of his / her own diabetes management. Self-care should include:

- Blood glucose monitoring
- Body weight monitoring
- Foot-care
- Personal hygiene
- Healthy lifestyle/diet or physical activity
- Identify targets for control
- Stopping smoking



nk you

