

# MANAGEMENT OF COMPLICATIONS OF DIABETES MELLITUS

14/04/2021

# Diagnosis- American Diabetes Association 2019

**TABLE 3. Criteria for the Screening and Diagnosis of Diabetes**

|      | Prediabetes                      | Diabetes                  |
|------|----------------------------------|---------------------------|
| A1C  | 5.7–6.4%*                        | ≥6.5%†                    |
| FPG  | 100–125 mg/dL (5.6–6.9 mmol/L)*  | ≥126 mg/dL (7.0 mmol/L)†  |
| OGTT | 140–199 mg/dL (7.8–11.0 mmol/L)* | ≥200 mg/dL (11.1 mmol/L)† |
| RPG  |                                  | ≥200 mg/dL (11.1 mmol/L)‡ |

# Classification of Complications

- Acute complications
  - 1) Hypoglycemia
  - 2) DKA, HHS
- Chronic complications
  - 1) Microvascular - Retinopathy, nephropathy, neuropathy
  - 2) Macrovascular – Coronary heart disease, Cerebrovascular disease, Peripheral arterial disease

# 1. Mx of Hypoglycemia

| Asymptomatic<br>(BG < 3.9mmol/L)                             | Ingest carbohydrate<br>Adjust medications                                                                                                                                 |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptomatic                                                  | 15-20g of fast acting carbohydrate (candy, sweetened juice, glucose tablets)<br>Patients on alpha glucosidase-inhibitors eg. acarbose should take pure glucose (dextrose) |
| Severe<br>-Bizarre behaviour<br>-Unconscious<br>-Convulsions | -IV 50mls 50% dextrose<br><br>OR<br><br>-IM/SC 1mg Glucagon                                                                                                               |

# 1. Mx of Hypoglycemia

| Asymptomatic<br>(BG < 3.9mmol/L)                             | Ingest carbohydrate<br>Adjust medications                                                                                                                                 |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symptomatic                                                  | 15-20g of fast acting carbohydrate (candy, sweetened juice, glucose tablets)<br>Patients on alpha glucosidase-inhibitors eg. acarbose should take pure glucose (dextrose) |
| Severe<br>-Bizarre behaviour<br>-Unconscious<br>-Convulsions | -IV 50mls 50% dextrose<br><br>OR<br><br>-IM/SC 1mg Glucagon                                                                                                               |

Don't forget to determine & deal with  
the cause of hypoglycemia....

- Excessive insulin dose
- Missed meal/fasting
- ↑d exercise
- ↓d insulin clearance ex. renal failure

## 2. Mx of DKA

### a. Fluid replacement

- IV normal saline 1L stat, 1L over ½ hr, 1L over 1hr, 1L over 2hrs, 1l over 4hrs
- Monitor urine output!!
- Alternate with 5% dextrose once BS <13mmol/L

### b. Insulin

- Soluble insulin 0.1U/kg IV bolus stat
- Then 0.1U/kg/hr infusion
- Once acidosis resolved revert to SC intermediate acting insulin

### c. Potassium

- Total body K<sup>+</sup> depleted usually due to both renal & GI losses

| K <sup>+</sup> level | Action      |
|----------------------|-------------|
| 4.5-5.5 mmol/L       | 10meq KCl   |
| 3.5- 4.4mmol/l       | 20meq KCl   |
| <3.5 mmol/L          | 40-80 meq/L |

### d. Bicarbonate

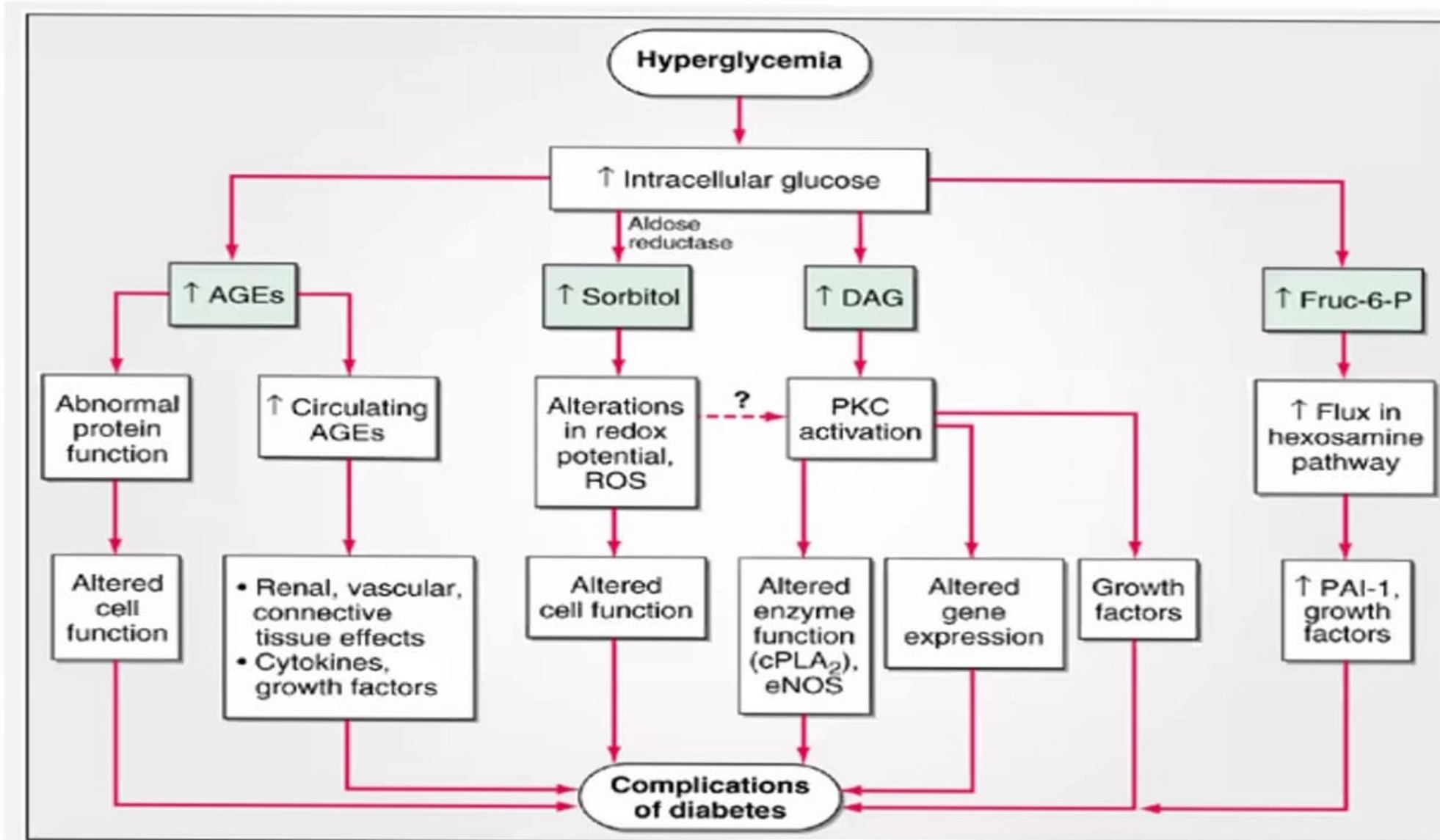
- Consider only if pH < 6.9

# Determine the precipitant.....

- Infection (Pneumonia/UTI/GE/Sepsis)
  - Infarction (Myocardial/Cerebral/Mesenteric)
  - Inadequate insulin
  - Drugs eg. cocaine
  - Pregnancy
- 
- ✓ Avoid complications of treatment:
    - Cerebral oedema
    - Noncardiogenic pulmonary oedema

**MX OF CHRONIC COMPLICATIONS**

# Possible molecular mechanisms of diabetes-related complications.



**PREVENTION: GOOD GLYCEMIC CONTROL!!!!**

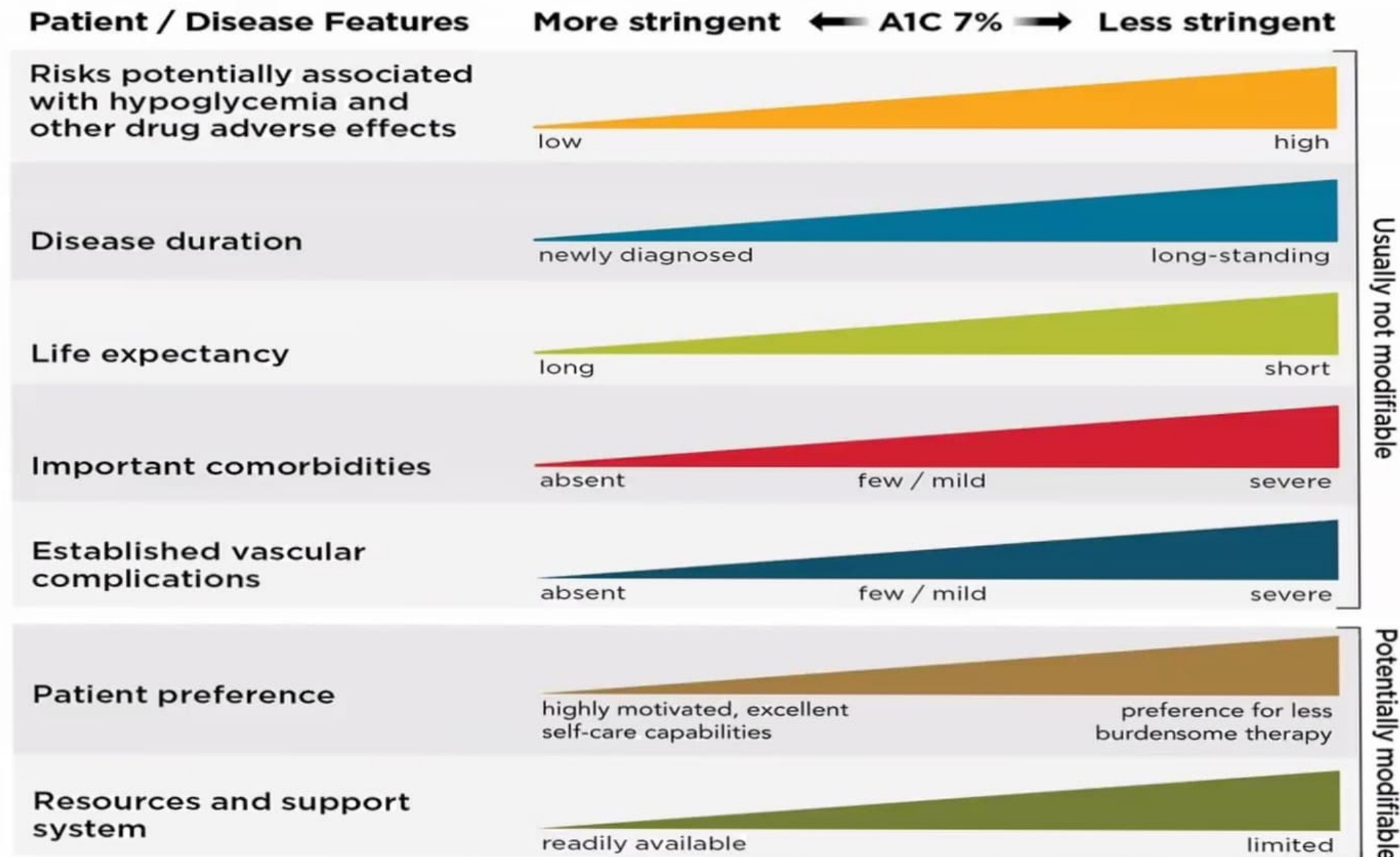
# What is good glycaemic control?

**TABLE 4. Summary of Glycemic Recommendations for Many Nonpregnant Adults With Diabetes**

|                                             |                                |
|---------------------------------------------|--------------------------------|
| A1C                                         | <7.0% (53 mmol/mol)*           |
| Preprandial capillary plasma glucose        | 80–130 mg/dL* (4.4–7.2 mmol/L) |
| Peak postprandial capillary plasma glucose† | <180 mg/dL* (10.0 mmol/L)      |

*\*More or less stringent glycemic goals may be appropriate for individual patients. Goals should be individualized based on duration of diabetes, age/life expectancy, comorbid conditions, known CVD or advanced microvascular complications, hypoglycemia unawareness, and individual patient considerations. †Postprandial glucose may be targeted if A1C goals*

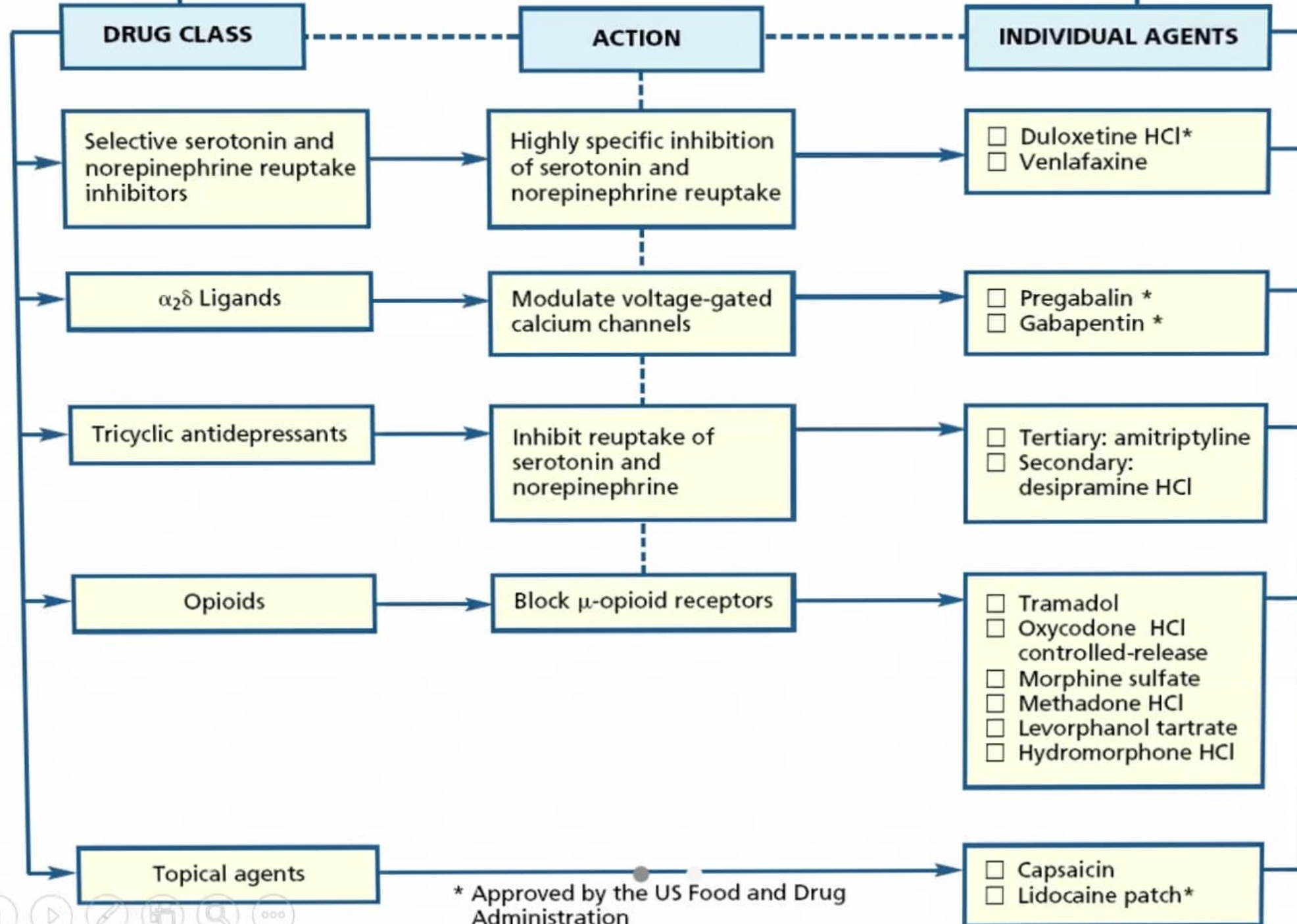
# Approach to Individualization of Glycemic Targets



American Diabetes Association Clin Diabetes 2020;38:10-38

# **1. DIABETIC NEUROPATHY**

# Pharmacologic Treatment of Diabetic Peripheral Neuropathic Pain



# TCA<sub>s</sub>

- Amitriptyline 25-100mg usually used
- Onset of analgesia is in 1-4wks
- Administered nocte
- Has anticholinergic side effects: constipation, dry mouth, urinary hesitancy

# Gabapentin

- Dose: 300mg day 1, 600mg day 2, 900mg day 3
  - Advantage: No significant drug interactions
  - Disadvantages: Can cause significant peripheral oedema
- : Req. dose adjustment in renal impairment

## Pregabalin

- Better bioavailability compared to gabapentin
- Starting dose 25-50mg PO
- Side effects: Dizziness, somnolence, oedema

# Gabapentin

- Dose: 300mg day 1, 600mg day 2, 900mg day 3
  - Advantage: No significant drug interactions
  - Disadvantages: Can cause significant peripheral oedema
- : Req. dose adjustment in renal impairment

## Pregabalin

- Better bioavailability compared to gabapentin
- Starting dose 25-50mg PO
- Side effects: Dizziness, somnolence, oedema

# **AUTONOMIC NEUROPATHY**

# Management

- **Gastroparesis:**

1. Metoclopramide PO 10mg QID, 30 mins before meals

- Increases gut motility through indirect cholinergic stimulation of gut muscle
- A/e: tardive dyskinesia

2. Domperidone

3. Cisapride

4. Erythromycin

- Interacts with motilin receptors, increasing gut motility

5. Eat smaller, more frequent meals

# Mx of Sexual dysfunction

- ED in males: Phosphodiesterase 5 inhibitors
- Females: Vaginal lubricants, Rx of vaginal infections, local or systemic oestrogen replacement

## Mx of Diabetic Diarrhoea

- Loperamide or octreotide

## Mx of Diabetic Cystopathy

- Timed voiding or self catheterization +/- bethanechol

## Mx of Orthostatic Hypotension

- Fludrocortisone, midodrine, octreotide

## **2. DIABETIC NEPHROPATHY**

# Interventions to Slow the Progression of Renal Disease in DM

---

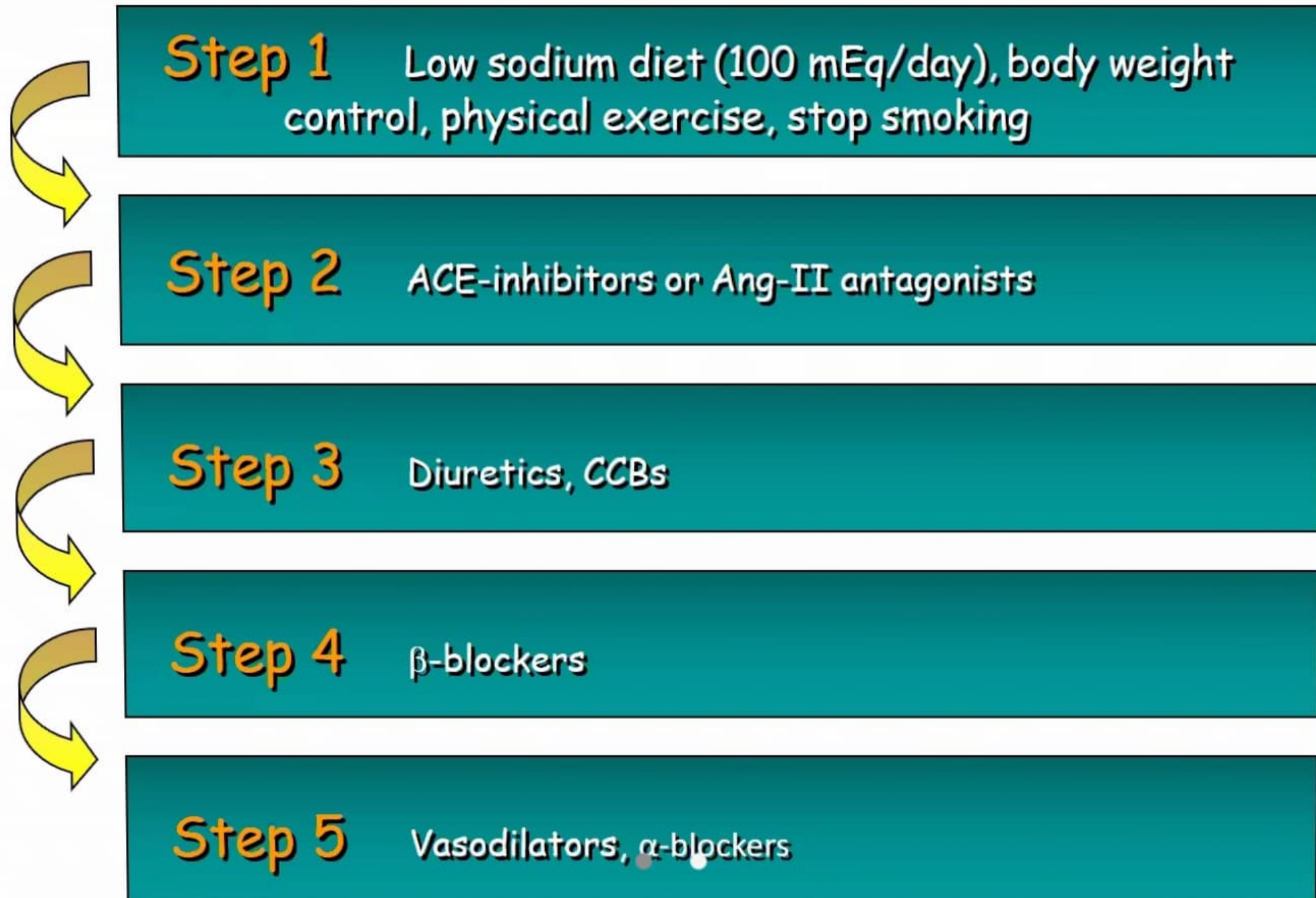
| INTERVENTION                           | TARGET                                          |
|----------------------------------------|-------------------------------------------------|
| Blood-pressure control                 | <130/80 mm Hg                                   |
| Inhibition of renin-angiotensin system | Urinary protein excretion,<br><0.3 g/24 hr      |
| Correction of dyslipidemia             | LDL cholesterol, <100 mg/dl<br>(2.6 mmol/liter) |
| Glycemic control                       | Glycosylated hemoglobin, <7%                    |

---

\*Cessation of smoking, loss of weight, exercise, and reduction of protein, salt, and alcohol intake are also recommended, as appropriate. LDL denotes low-density lipoprotein.

## Intensive blood pressure control in diabetic patients

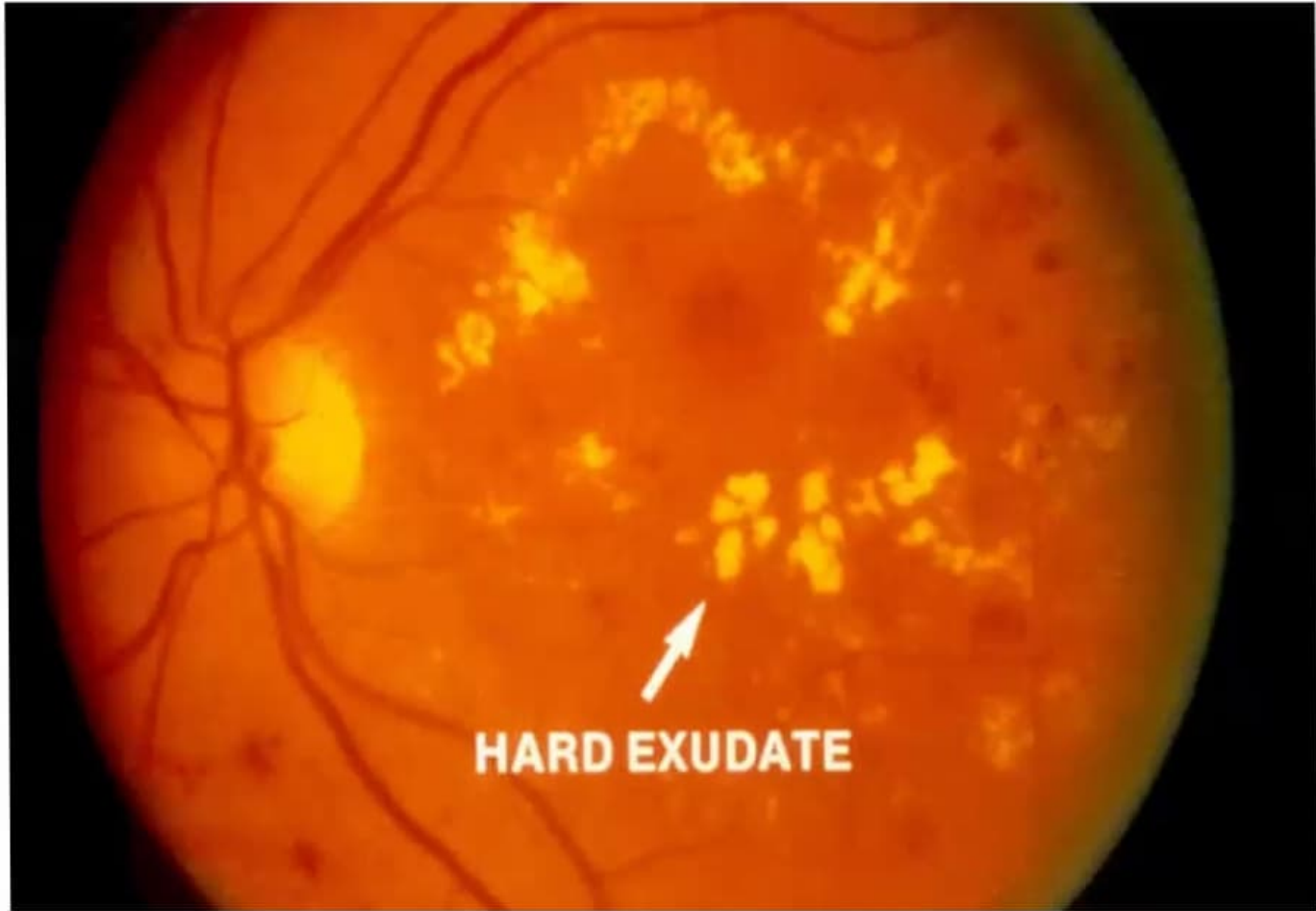
---



# Goal of Treatment of Hypertension

Lower target for diabetic patients than non-diabetic patients:

**130/80 vs. 140/90**



### **3. DIABETIC RETINOPATHY**

# Mx

- Most effective therapy is prevention
- Annual ophthalmology review for fundoscopy
- Proliferative retinopathy- treated with panretinal laser photocoagulation
- Macular oedema- focal laser photocoagulation, intravitreal injection of anti-vascular endothelial growth factor (anti-VEGF)

## **4. CARDIOVASCULAR AND CEREBROVASCULAR DISEASE**

# Additional risk factors- deal with these as well....

- Accelerated atherosclerosis/dyslipidemia
- Smoking
- Obesity
- Hypertension
- Reduced physical activity
- Micro- and macroalbuminuria
- Abnormal platelet function
- Insulin resistance

# Dyslipidemia Mx in DM

- DM usually associated with *hypertriglyceridemia* & reduced HDL.
- +/- raised LDL
- Initial treatment- dietary changes:
  - ✓ ↑ monounsaturated fat
  - ✓ ↓ saturated fats & cholesterol
- Drug of choice: HMG CoA reductase inhibitors (Statins)
  - ✓ Pleiotropic effects
  - ✓ Antiinflammatory, antioxidant, plaque stabilizing effects

# Antiplatelet therapy

## Primary prevention

DM1 and DM2 patients  $\geq 30$  years with high CV risk

- ✓ CAD family history
- ✓ Smoking
- ✓ Hypertension
- ✓ Obesity
- ✓ Dislipidemia
- ✓ Albuminuria (micro or macro)

## Secondary prevention

DM1 and DM2 patients with clinical history of cardiovascular disease

- ✓ myocardial infarction or angina
- ✓ Stroke or TIA
- ✓ Peripheral vascular disease
- ✓ By-pass surgery

aspirin (tablets)  
75-100mg/day

## Contraindications

- ✓ Allergy
- ✓ Bleeding tendency
- ✓ Anticoagulation treatment
- ✓ Recent gastro-intestinal bleeding
- ✓ Clinically active liver disease
- ✓ Age  $\leq 21$  years ( $\uparrow$  Reye's syndrome)

clopidogrel  
ticlopidine



## 5. DIABETIC FOOT ULCERS

# Prevention- Do's and Don'ts of foot care



## Patient should

- check feet daily
- Wash feet daily
- Keep toenails short
- Protect feet
- Always wear shoes
- Look inside shoes before putting them on
- Always wear socks
- Break in new shoes gradually
- Use moisturizing lotions

# Treatment of diabetic foot ulcers

1. Off-loading: complete avoidance of weight bearing on the ulcer, which removes the mechanical trauma that retards wound healing
2. Debridement
3. Appropriate antibiotics
  - ✓ Mixed infections (G +ve, G –ve & anaerobes)
  - ✓ Cephalosporin/Augmentin/Clindamycin/Metronidazole/Fluoroquinolone
4. Wound dressing

**THE END**