Weill Cornell-Qatar
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Management of diabetes

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Session objectives

- Discuss the initial approach to patients with newly-diagnosed type 2 diabetes
- Recognize the different non-insulin glucose-lowering agents including their characteristics, indications, advantages and disadvantages
- Explain the indications for insulin therapy and types of insulin
- Describe the aspects of standards of diabetes care

CASE 1

- A 41-year-old man with no past medical history
- Routine check up
- Normal physical exam
- Fasting plasma glucose of 10 mmol (180 mg)
- Kidney and liver function tests: normal
- Repeat (after 3 days) fasting glucose 9.5 mmol (171 mg)
- **How would you approach**?

Case approach

- Does he have diabetes?
- Fasting glucose 10 mmol (180 mg)
- Repeat glucose 9.5 mmol (171 mg)
- The diagnosis of diabetes can be made as fasting plasma glucose is ≥7 mmol (126 mg) confirmed on a repeat test
- **What is next?**

Approach to DM: history

- Duration of diabetes
- Medications and any side effects
- Adherence to medications
- Follow up (frequency, regular?)
- Presence of complications (acute or chronic)
- Screening for complications (eye, foot, lab. tests)
- Home glucose monitoring
- Comorbidities (HTN, ASCVD, HF, CKD…)

Approach to DM: history

- Social history: smoking, alcohol, work
- Social determinants of health (family support, housing stability, financial security, transportation access)
- Lifestyle changes (diet, exercise, sleep behaviors)
- Visits to the educator and dietitian
- Visits to the dentist
- Family history (DM, HTN, CVD)
- Vaccination

Approach to DM: physical exam

- Blood pressure
- Weight, height, BMI
- Thyroid
- Skin
- Foot

Approach to DM: lab. tests

- A1c
- Complete blood count (CBC)
- Lipids
- Serum creatinine, eGFR
- ALT, AST
- Urine albumin creatinine ratio (UACR)
- TSH for patients with type 1 DM

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S52

Setting glucose targets depends on:

- Age
- Duration of DM
- Comorbid conditions
- Vascular complications
- Life expectancy
- Risks associated with hypoglycemia
- Patient needs & preferences

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S111

Individualized A1c targets in DM

<7	→	General (for most adults)
<6.5	→	- Consider if low risk of hypoglycemia - Was shown to reduce the risk of CKD & retinopathy
7 to 8.5	→	- Advanced complications or - Extensive comorbid conditions or - Functionally dependent or - Severe hypoglycemia or - Limited life expectancy

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S111
Canadian Diabetes Association. Can J Diabetes 2018;42:S42

Home glucose monitoring: general targets

Before meals:

80-130 mg

(4.4-7.2 mmol)

2 hours after meals:

<180 mg

(10 mmol)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S111

Back to our patient

- Fasting glucose 10 mmol (180 mg)
- Repeated 9.5 mmol (171 mg)
- A1c 8.1%
- **What is next?**

Aspects of lifestyle in diabetes

1) Education
2) Medical nutrition therapy (MNT)
3) Physical activity
4) Smoking cessation counselling (when needed)
5) Psychological care
6) Sleep health

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S77

Self management education and support

- Provided by a diabetes (or health) educator
- Empower the patient with:
  - **Knowledge**
  - **Skills**
  - **Decision-making**
- Individual or group education
- Regular follow up

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S77
Power A, et al. Diabetes Care 2020;43:1636
Rutten G, Alzaid A. Lancet Diabetes Endocrinol 2018;6:264

Medical nutrition therapy in diabetes

- There is no “diabetic diet”
- There is no ideal calorie percentage (carbs, fat, protein)
- Assess willingness & ability to make behavioral changes
- Meal planning should be individualized
- Individualized session by a registered dietitian
- Consider personal and cultural preferences

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S77
European Association for the Study of Diabetes. Diabetologia 2023;66:965

Medical nutrition therapy in diabetes

- Aim for weight loss of at least 5% of body weight
- Weight loss of 10-15% in selected patients
- No specific diet has shown superiority
  - Low calorie diet with meal replacements
  - Mediterranean diet
  - Low carbohydrate diet
- Very low carbohydrate & high carbohydrate ketogenic diets are not recommended

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S77
European Association for the Study of Diabetes. Diabetologia 2023;66:965

Physical activity in diabetes

- Improves glucose, BP, and lipids parameters
- Target of ≥150 minutes/week
- Moderate to vigorous intensity aerobic activity
- Distributed over 3-5 days/week
- No more than 2 consecutive days without activity
- Prolonged sitting should be interrupted every 30 min.
- Resistance exercise: 2-3 sessions/week

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S77

Psychological care in DM

- Assessment for:
  - **Depression**
  - **Anxiety**
  - **Diabetes distress**
- Using age-appropriate validated tools (questionnaires) at the initial visit & at periodic intervals as needed
- Referral to mental health if positive screening

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S77

Sleep health in diabetes

- Higher risk of disturbed sleep, insomnia, obstructive sleep apnea, restless leg syndrome
- Abnormal sleep duration (<6 hours or >8 hours) negatively affects glucose, depression, quality of life
- Good quality of sleep improves glucose, BP, lipids, quality of life and ↓ depression
- Early chronotype vs late: has better glucose control

American Diabetes Association. Diabetes Care 2024;47 (suppl. 1):S77

When to start medications in DM 2?

- American diabetes association recommends starting medications at the time of diagnosis
- Canadian diabetes association provides an option to start with lifestyle changes only for 3 months
- If A1c is ≥1.5% above target (consider 2 medications)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158
Canadian Diabetes Association. Can J Diabetes 2020;44:575

When to start medications in DM 2?

- In the presence of any of the following (regardless of A1c level):
  - ♦ Atherosclerotic cardiovascular disease (ASCVD)
  - ♦ High risk for ASCVD
  - ♦ Chronic kidney disease (CKD)
  - ♦ Heart failure

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

Which medication to choose?

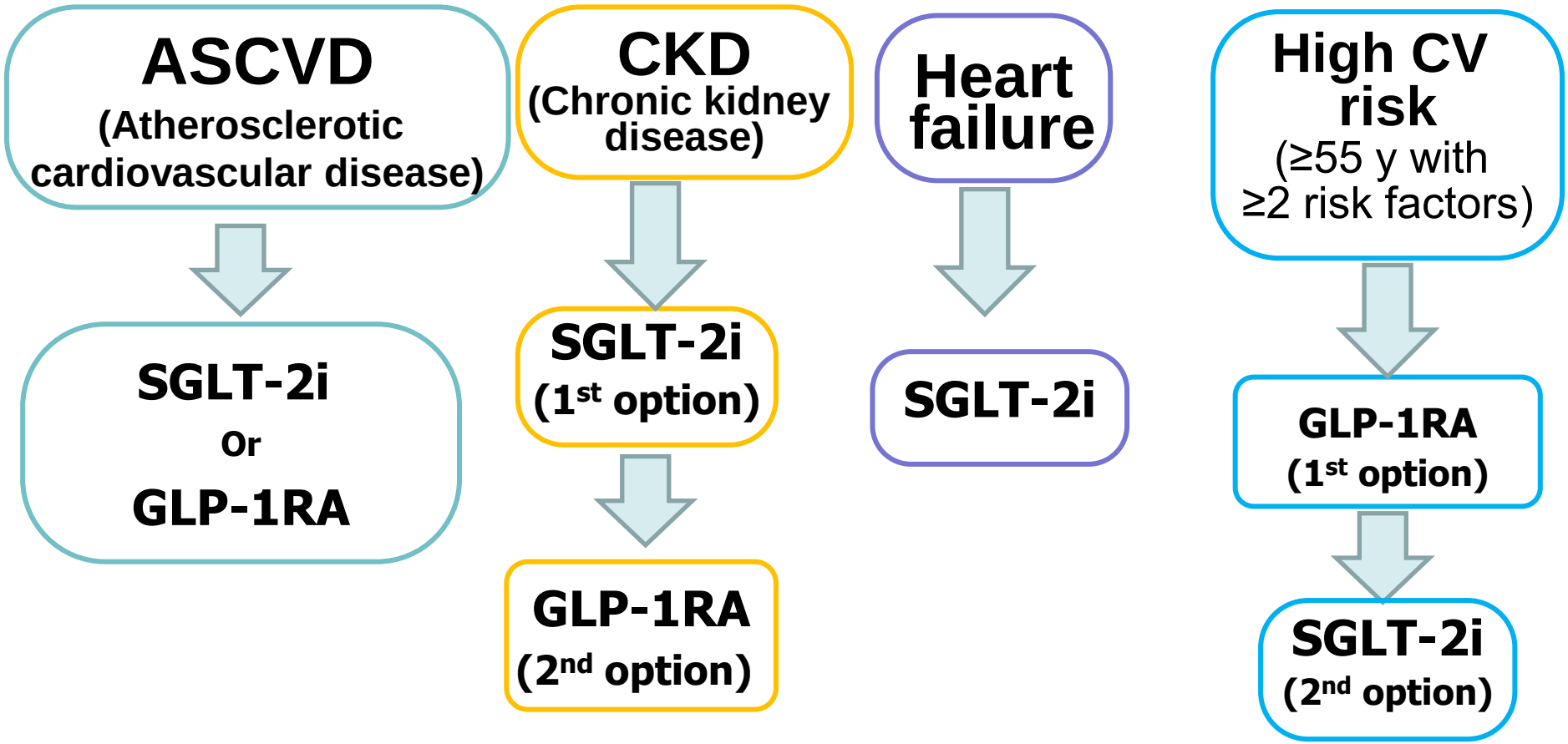
Metformin

or

Other agents (depending on the situation)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

Choice of DM agent and comorbid conditions



American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

Benefits of Metformin

- High efficacy:
  - ↓ A1c by 1 to 1.5%
- Rare hypoglycemia
- Weight loss or weight neutral
- Low cost
- Potential ↓ cardiovascular events & CV mortality

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

Metformin: Side effects

- GI side effects (gastric upset, nausea, diarrhea)
- Vitamin B_{12} deficiency:

  - Periodic monitoring is recommended after 4 years of use (especially if there is anemia or peripheral neuropathy)
- Avoid in unstable or hospitalized patient with heart failure. Can be used in stable HF
- Hold if contrast procedure when eGFR 30-60. Resume after 48 hours if serum creatinine is stable

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

CASE 2

- A 42-year-old woman with type 2 DM for 2 years
- On Metformin 1000 mg bid
- Following lifestyle changes
- BMI 29
- HbA_1c 8.2%, Fasting glucose 10 mmol (180 mg)
- Kidney and liver function tests are normal
- **How to approach?**

Case approach

- Complete history, exam and labs
- Adherent to lifestyle changes?
- Follows with educator/dietitian?
- Adherent to medication?
- What are glucose targets?

Patient assessment

- Uncontrolled DM (A_1c 8.2)
- A1c target:
  - <7
- Patient is already following lifestyle changes
- Metformin alone is not enough
- **We need to add another agent**
- **Which medication?**

What's best after Metformin?

- Decision is based on:
  - Comorbidities (such as ASCVD, HF, CKD)
  - Glucose lowering effect
  - Effect on weight
  - Side effects
  - Risk of hypoglycemia
  - Cost
  - Patient preference

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

2nd line agents

- Sulfonylureas
- SGLT-2 inhibitors
- DPP-4 inhibitors
- GLP-1 receptor agonists
- GLP-1/GIP agonists
- Glitazones (TZD)
- Basal insulin

(Meglitinides & Alpha-glucosidase inhibitors are less commonly used)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

Sulfonylureas

- Stimulate insulin secretion
- Examples: Glimepiride, Gliclazide, Glyburide, Glipizide
- **Advantages:**
  - Effective:
    - Lower A1c by 1 to 1.5%
  - Low cost
- **Disadvantages:**
  - Hypoglycemia
  - Weight gain
  - Glucose control may not be durable

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

SGLT-2 (sodium glucose cotransporter) inhibitors

- ↓ Glucose reabsorption at the kidney causing glucosuria
- **Canagliflozin, Dapagliflozin, Empagliflozin**
- Modest effect: lower A1c by 0.5-0.7%
- ↓ Weight
- Rare hypoglycemia
- Benefit in ASCVD, heart failure and CKD

American Diabetes Association. Diabetes Care 2023;46 (suppl 1):S140

SGLT-2i: disadvantages

- UTI, genital infections
- Dehydration, hypotension (in high-risk patients such as CKD, elderly, use with diuretics, low BP)
- Diabetic ketoacidosis (rare)
- ↑ risk of bone fractures (Canagliflozin)
- High cost

American Diabetes Association. Diabetes Care 2023;46 (suppl 1):S140
www.fda.gov

2nd line agents

- Sulfonylureas
- SGLT-2 inhibitors
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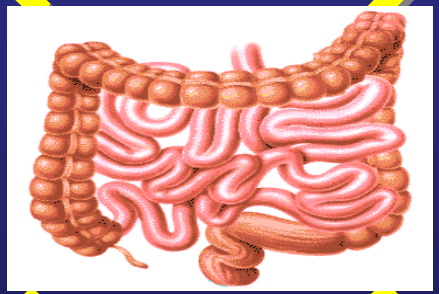
- GLP-1RA/GIP agonists
- Glitazones (TZD)
- Basal insulin

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

The incretin system

↑ **Insulin secretion**

↓ **Glucagon secretion**



GLP-1
(Glucagon-like peptide 1)

↓ **Gastric emptying**

↓ **Appetite**

DPP-4 inhibitors

- **DPP-4= "Dipeptidyl peptidase"** inhibits GLP-1
- Inhibition of DPP-4 will make more GLP-1 available

DPP-4i: pros & cons

- Moderate effect (↓ A1c by 0.5 to 0.7%)
- **Advantages:**
  - Well tolerated
  - Weight neutral
  - Rare hypoglycemia
- **Disadvantages/side effects:**
  - GI upset, upper respiratory tract infections, joint/limb pains, acute pancreatitis
  - High cost

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

DPP-4 inhibitors (Gliptins)

- Taken with or without food
- Sitagliptin (Januvia®)
- Vildagliptin (Galvus®)
- Linagliptin (Trajenta®)
- Saxagliptin (Onglyza®)

GLP-1 receptor agonists

- ↑ GLP-1: leading to ↑ insulin, ↓ glucagon, ↓ appetite
- Effective (↓ A1c by 0.5-1.8%)
- Weight loss
- Rare hypoglycemia
- Benefit in ASCVD
- Benefit in high CV risk
- Kidney benefit (↓ albuminuria)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

GLP-1 receptor agonists

- Subcutaneous injection
  - Exenatide, Liraglutide, Dulaglutide, Semaglutide
- Oral formulation (Semaglutide)
- GI side effects (nausea, vomiting, diarrhea)
- Acute pancreatitis?
- Should not be used in cases of medullary thyroid cancer (based on animal studies)
- Gall bladder disease (stones, cholecystitis)
- Very high cost

GIP/GLP-1 receptor agonists

- GIP (glucose-dependent insulinotropic polypeptide) & GLP-1 receptors agonist
- Tirzepatide
- Subcutaneous injection
- Very high glucose lowering efficacy
- Very high weight loss efficacy
- GI side effects (nausea, vomiting, diarrhea)
- Very high cost

TZD (Gitazones)

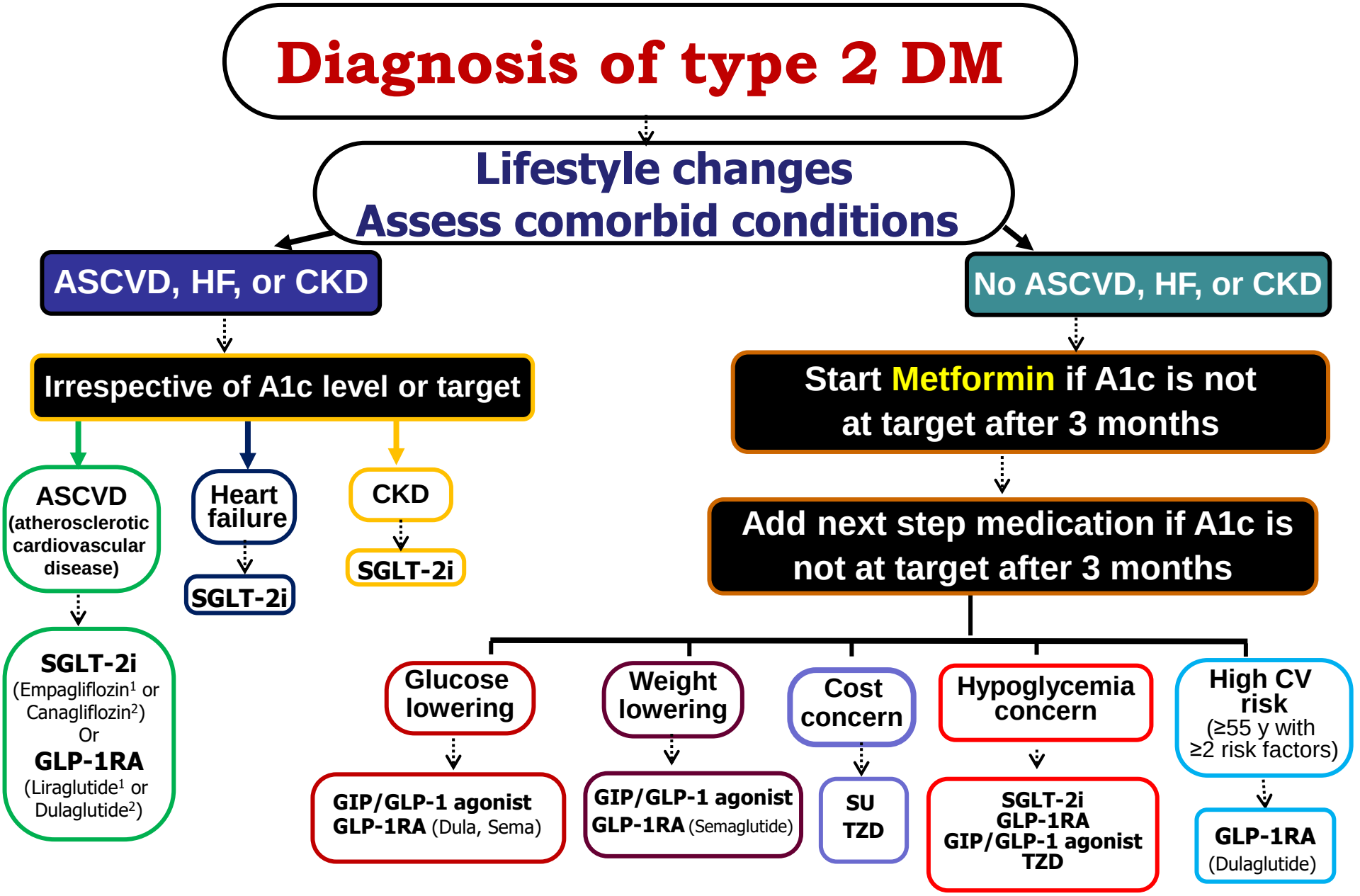
- ↑ glucose uptake in muscle and fat tissue
- Pioglitazone (Actos®)
- Taken at any time of the day
- Advantages:
  - Effective (but variable: ↓ A1c 0.5 to 1.5%)
  - Rare hypoglycemia
  - Low cost
  - Potential benefit in ASCVD
  - Benefit in NASH (nonalcoholic steatohepatitis)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158

Disadvantages of TZD

- Lower limb edema
- Weight gain
- Increased risk of heart failure
- Bone fractures
- Urinary bladder cancer (FDA & EMA warnings)

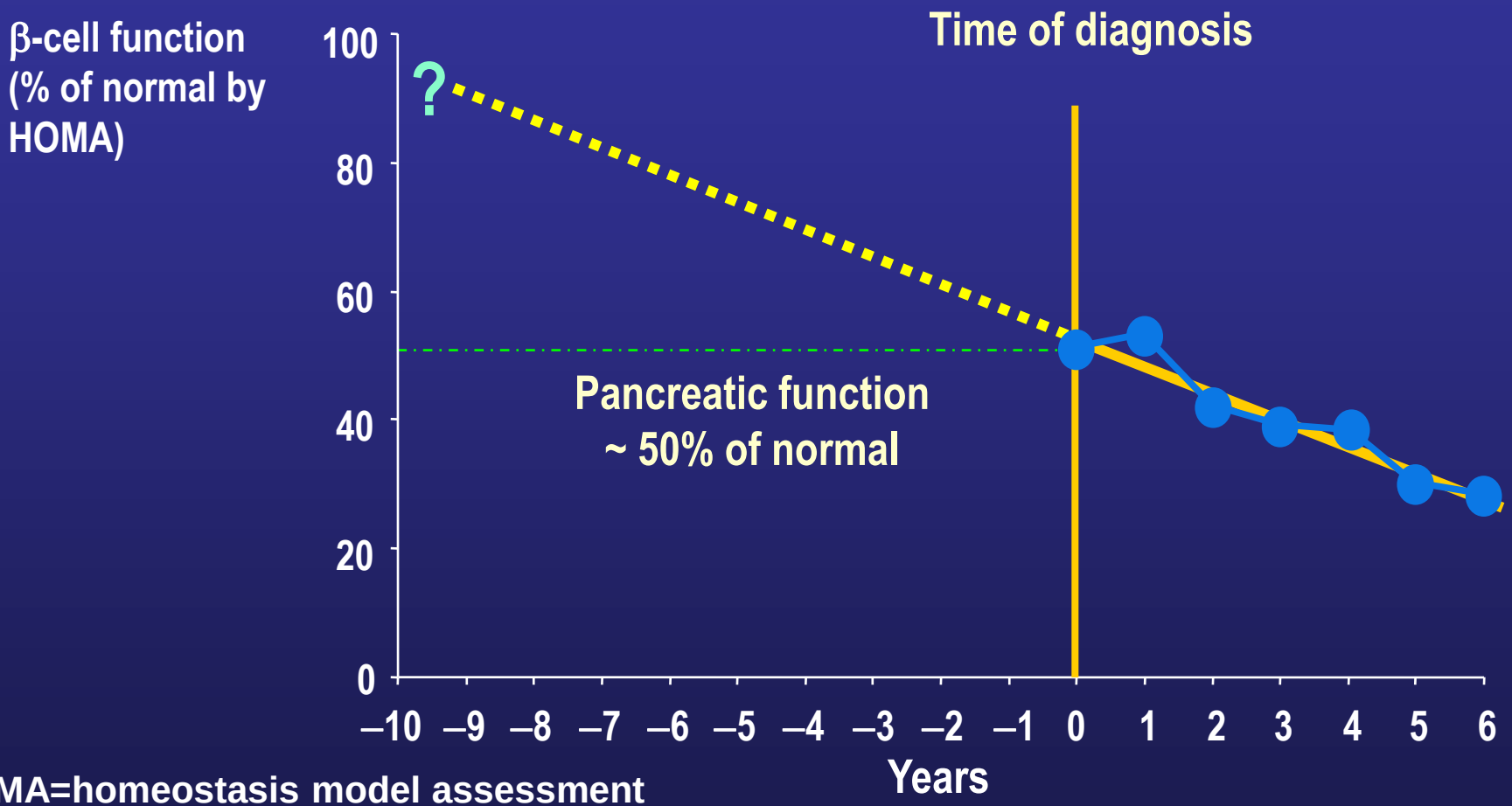
American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S158


Diagnosis of type 2 DM
Lifestyle changes
Assess comorbid conditions
ASCVD, HF, or CKD
No ASCVD, HF, or CKD
Irrespective of A1c level or target
Start Metformin if A1c is not at target after 3 months
ASCVD (atherosclerotic cardiovascular disease)
Heart failure
CKD
SGLT-2i
SGLT-2i
SGLT-2i
Add next step medication if A1c is not at target after 3 months
SGLT-2i (Empagliflozin1 or Canagliflozin2) Or GLP-1RA (Liraglutide1 or Dulaglutide2)
Glucose lowering
Weight lowering
Cost concern
Hypoglycemia concern
High CV risk (≥55 y with ≥2 risk factors)
GIP/GLP-1 agonist GLP-1RA (Dula, Sema)
GIP/GLP-1 agonist GLP-1RA (Semaglutide)
SU TZD
SGLT-2i GLP-1RA GIP/GLP-1 agonist TZD
GLP-1RA (Dulaglutide)

CASE 3

- A 52-year-old man with type 2 DM diagnosed 8 years ago.
- He is on Metformin 1000 mg twice daily, Gliclazide MR 60 mg daily, Sitagliptin 100 mg daily, and Dapagliflozin 10 mg daily
- He is following the advised diet and exercise.
- HbA1c 8.8. Liver & kidney function tests are normal.
- His physician decided to start insulin.
- **Do you agree? How would you approach?**

Diabetes: a progressive disease



HOMA=homeostasis model assessment

At diagnosis, ~ 50 % of insulin production is lost

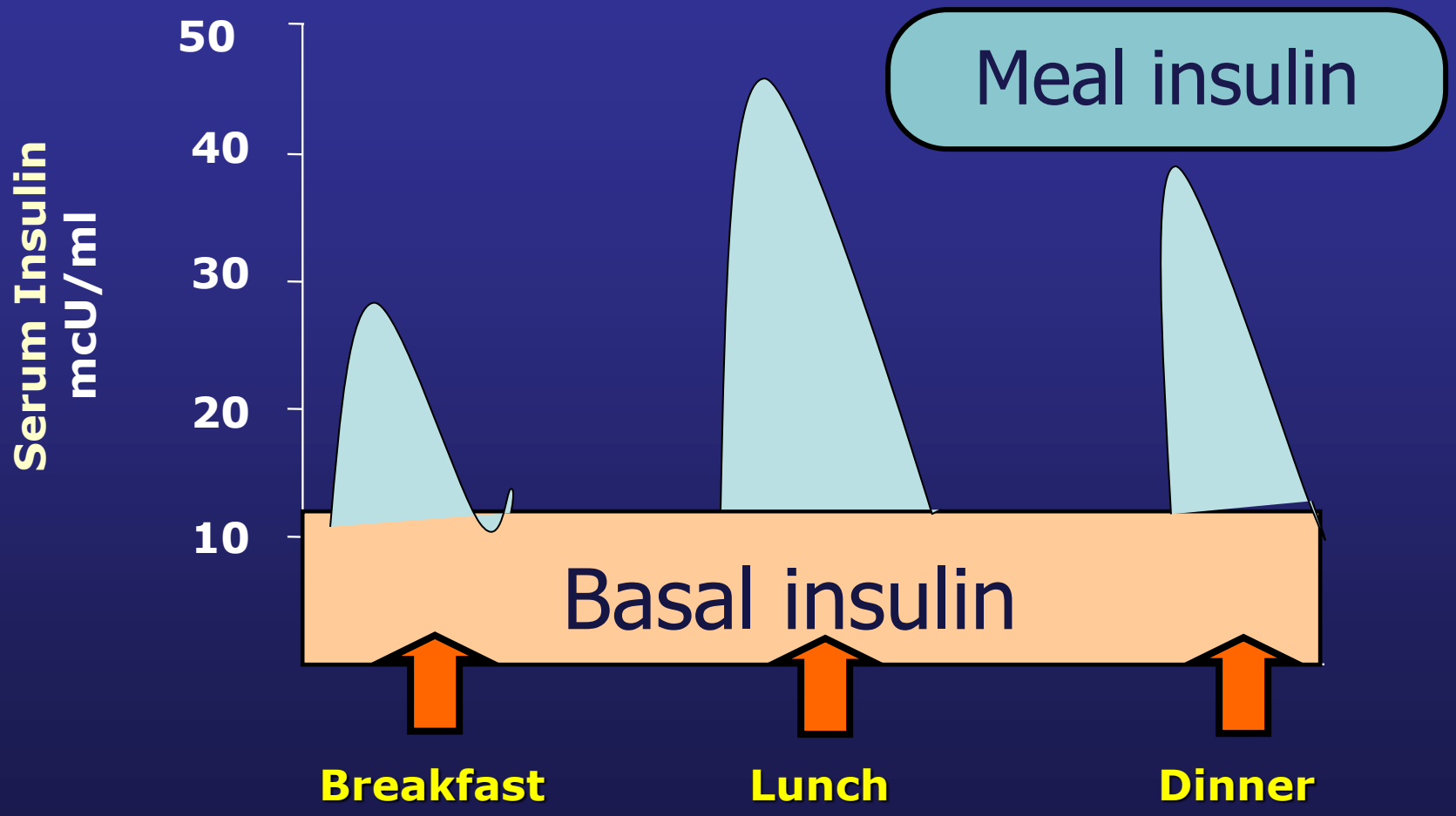
Holman RR. *Diab Res Clin Pract*. 1998;40(suppl):S21
UKPDS. *Diabetes*. 1995;44:1249

Indications for insulin

- Failure of non-insulin glucose-lowering therapy
- Type 1 DM
- Pregnancy
- Significant symptomatic hyperglycemia (≥300 mg or A1c ≥10)
- During hospitalization

Types of insulin

Insulin secretion



Polonsky K et al. New Eng J Med 1988;318:1231

Types of insulin

- Basal insulin
- Meal insulin

Basal insulin

Intermediate -acting:

NPH (Humulin N®, Insulatard®)

Long-acting:

Glargine U-100 (Lantus®)

Glargine U-300 (Toujeo®)

Detemir (Levemir®)

Degludec (Tresiba®)

Meal Insulin

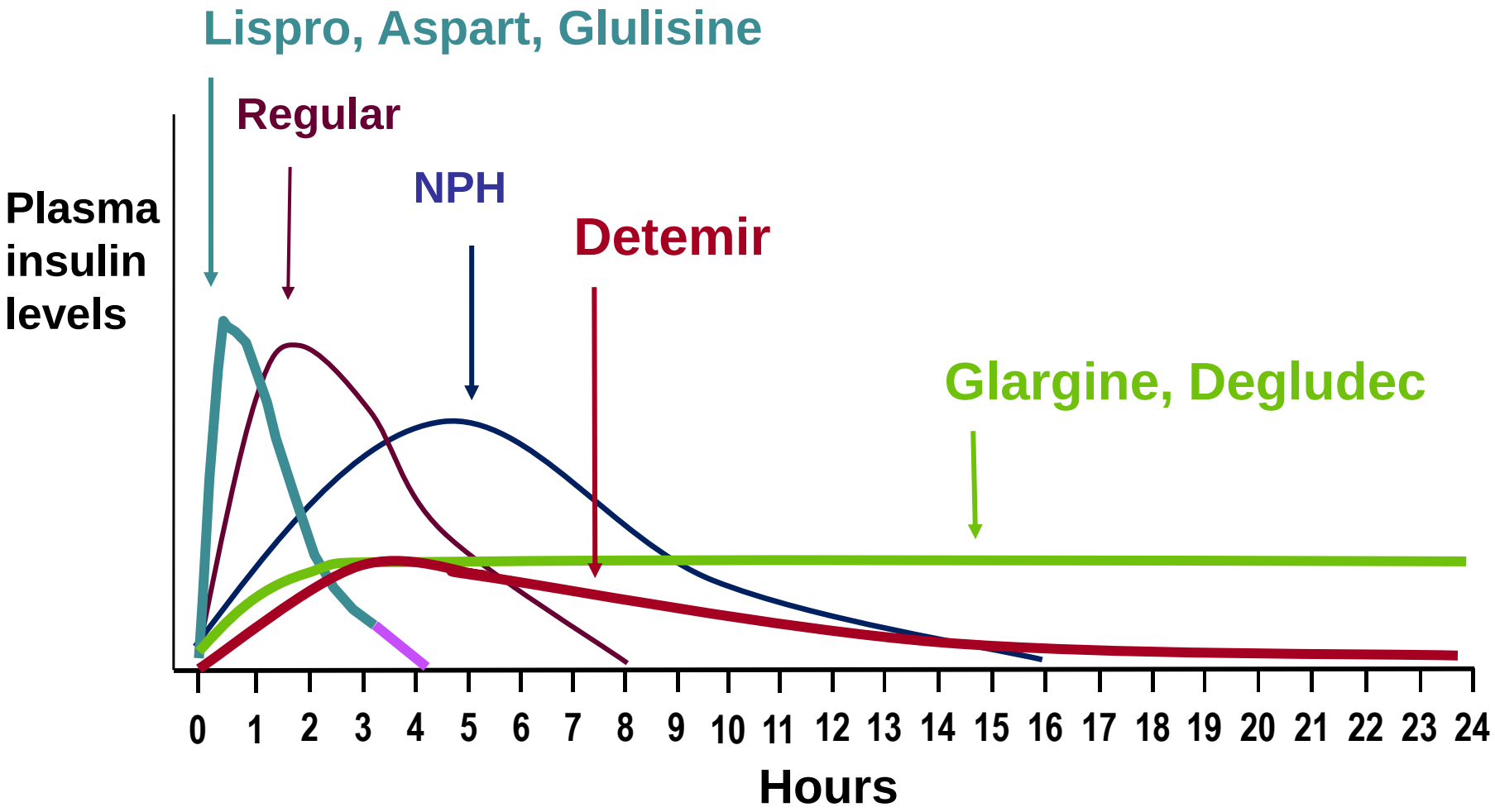
- **Short-acting:**

  Regular insulin (Actrapid®, Humulin R®, Novolin R®)

- **Rapid-acting:**

  - Aspart (Novorapid®, Novolog®)
  - Glulisine (Apidra®)
  - Lispro (Humalog®)

Action Profiles of Insulins



Hirsch I. New Eng J Med 2005;352:174
Danne T et al. Diabetes Care 2003;26:3087

Premixed insulins

- **70/30 (Mixtard 30®, Humulin 70/30®)**

70% NPH, 30% Regular

- **Aspart 70/30 (Novomix 30®,** Novolog® mix 70/30 **)**

70% Aspart protamine + 30% Aspart

Premixed insulins

- **Lispro 75/25 (Humalog 25®, Humalog Mix 75/25®)**

75% Lispro protamine + 25% Lispro

- **Lispro 50/50 (Humalog 50®, Humalog Mix 50/50®)**

50% Lispro protamine + 50% Lispro

Which insulin to use?

Depends on:

- Glucose control
- Patient characteristics
- Lifestyle
- Patient preference

Insulin regimens in DM 2

Basal only

Insulin regimens in DM 2

Basal + 1 Meal

Insulin regimens in DM 2

Basal + 2 Meal

Insulin regimens in DM 2

Basal + 3 Meal

Insulin regimens in DM 2

2 Premixed

Insulin regimens in DM 2

3 Premixed

CASE 4

- A 55-year-old man with DM 2 and hypertension
- Tries with lifestyle changes, but no regular exercise
- Metformin, Insulin, Lisinopril, Amlodipine
- B.P. 152/84, BMI 32
- HbA1c 8.1
- LDL 2.4 mmol (92 mg), HDL 1 mmol (38 mg), TG 1.7 mmol (150 mg)
- Kidney & liver function tests are normal
- **How to apply a comprehensive plan of care?**

Standards of diabetes care

- History, physical examination & basic labs
- Lifestyle changes
- Glucose control
- Screening for complications (periodic exams/tests)
- Cardiovascular disease
  - Lifestyle changes
  - Blood pressure
  - Statins for high risk
- Liver health
- Vaccination

Standards of diabetes care

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Approach to DM: history

- Duration of diabetes
- Medications and any side effects
- Adherence to medications
- Follow up
- Presence of complications (acute or chronic)
- Screening for complications (eye, foot, tests)
- Home glucose monitoring
- Comorbidities (HTN, dyslipidemia,…)

Approach to DM: history

- Social: smoking, work, alcohol
- Social determinants of health (family support & financial status)
- Lifestyle changes (diet, exercise)
- Visits to educator and dietitian
- Psychological status & support
- Family history (DM, HTN, CVD)
- Vaccination

Approach to DM:
physical exam

- Blood pressure
- Weight, height, BMI
- Thyroid
- Skin
- Foot

Approach to DM: baseline lab. tests

- A1c
- CBC
- Lipids
- Serum creatinine, eGFR
- ALT, AST
- Urine albumin:creatinine ratio (UACR)
- TSH for type 1 DM

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S52

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Aspects of lifestyle in diabetes

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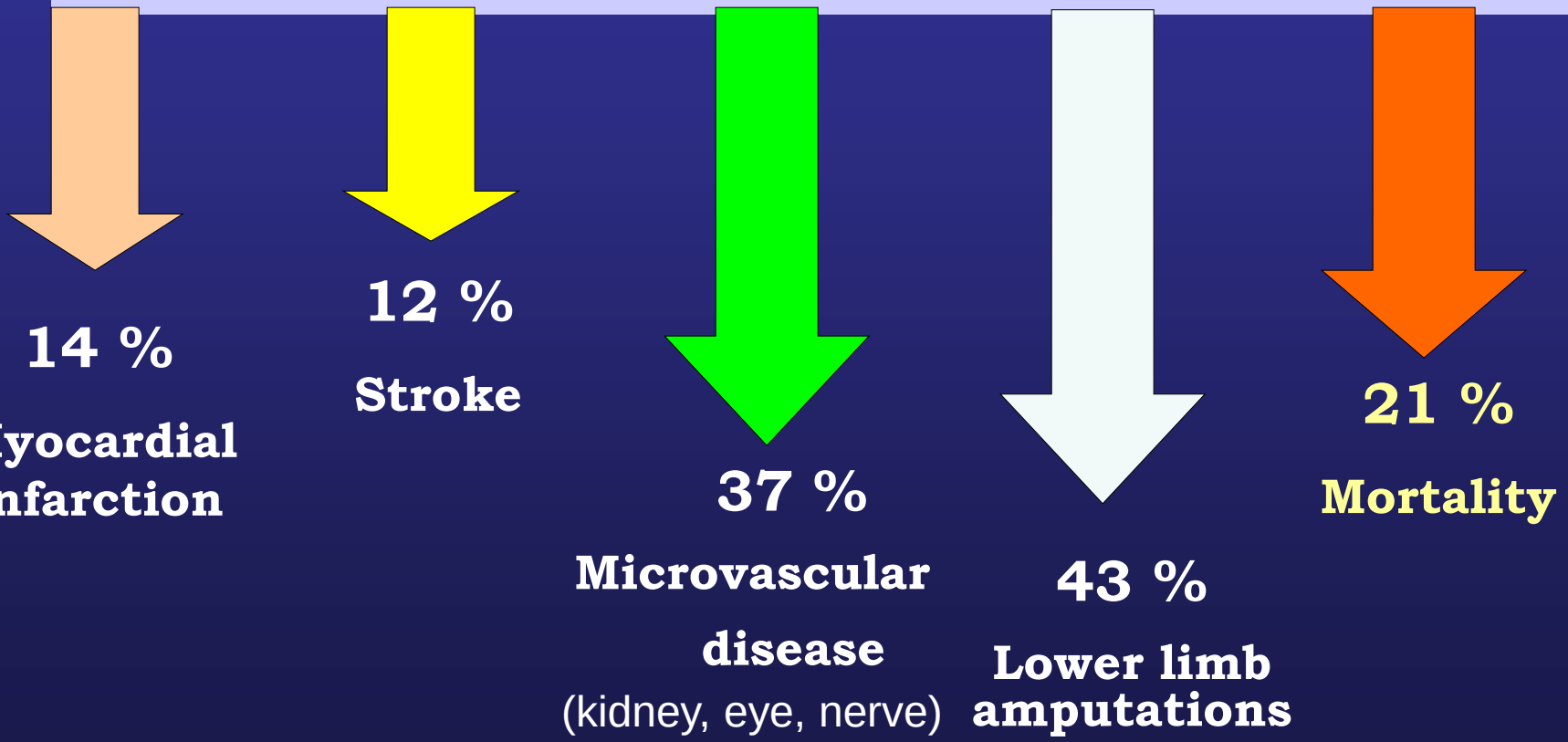
7 to 8.5	- Advanced complications or - Extensive comorbid conditions or - Functionally dependent or - Severe hypoglycemia or - Limited life expectancy

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S111
Canadian Diabetes Association. Can J Diabetes 2018;42:S42

Benefits of glucose control

Effect of ↓ A1c by 1 %



UKPDS. BMJ 2000;321:405

Standards of diabetes care

- History, physical examination, basic labs
- Lifestyle changes
- Glucose control
- Screening for complications (periodic exams/tests)
- Cardiovascular disease
  - Lifestyle changes
  - Blood pressure
  - Statins for high risk
- Liver health
- Vaccination

Periodic exams & referrals

- Refer to educator
- Refer to dietitian
- Dilated eye exam
- Comprehensive foot exam
- Dental examination
- Family planning for women of reproductive age

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S52

Screening for diabetic retinopathy

Dilated eye examination

- Type 2 DM:
  - At the time of diagnosis then yearly
- Type 1 DM:
  - Start 5 years after diagnosis then yearly

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S231

Screening for diabetic neuropathy (distal symmetric)

- History & comprehensive foot examination:

- Type 2 DM :
  - ♦ At the time of diagnosis then at least yearly
- Type 1 DM :
  - ♦ Start 5 years after diagnosis then every year

- Inspect feet at each visit for high-risk patients (sensory loss or prior ulceration or amputation)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S231

Foot examination

- Visual inspection
- Vibration sensation (for large fiber function)
- 10-gram monofilament test (for large fiber function)
- Temperature or pinprick sensation (for small fiber function)
- Ankle reflex
- Pedal pulses (dorsalis pedis, posterior tibial)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S231

Periodic lab. tests

1) A1c
   - Every 6 months if controlled
   - Every 3 months if not controlled
2) Serum creatinine, eGFR:
   - Yearly
   - More frequent if CKD or changing HTN medications
3) Urine albumin creatinine ratio:
   - Yearly
   - More frequent if abnormal

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Periodic lab. tests

4) Lipids
 - Yearly
 - More frequent if not at target or changing doses/therapy
5) ALT, AST
 - Yearly
6) Serum vitamin B_{12}:
 - Monitoring if on metformin for >4 years
 - Every year in such cases
7) Complete blood count (CBC):
 - Yearly

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S52
KDIGO guidelines. Kidney Int 2020;98:4S

DM & the kidneys

- Diabetes: the commonest cause of CKD & dialysis
- Serum creatinine, eGFR at least yearly
- Check random urine albumin:creatinine ratio (UACR)
  - If normal, check every year

Screening for diabetic kidney disease

Urine albumin:creatinine ratio

- Type 2 DM:
  - At the time of diagnosis then yearly
- Type 1 DM:
  - Start 5 years after diagnosis then yearly

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S219

Urine albumin:creatinine ratio (UACR)

- A spot random urine sample
- Normal: <3 mg/mmol (30 mg/g)
- If high: **Repeat**
- Causes of high UACR:
  - Exercise within 24 hours, infection, fever, menses, heart failure, menses, marked hyperglycemia, uncontrolled BP
- **Albuminuria**: 2 out of 3 abnormal UACR samples collected within 3-6 months

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S219

Management of albuminuria

- Glucose control
- Blood pressure control
- ACEI or ARB
- Combination of ACEI & ARB is not recommended
- Follow UACR & electrolytes
- ACEI/ARB are not recommended for primary prevention of diabetic kidney disease (*normal B.P. & normal UACR*)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S219

Standards of diabetes care

- History, physical examination, basic labs
- Lifestyle changes
- Glucose control
- Screening for complications (periodic exams/tests)
- Cardiovascular disease
  - Lifestyle changes
  - Blood pressure
  - Statins for high risk
- Liver health
- Vaccination

DM & cardiovascular disease

- ↑ Risk of coronary artery disease by 200-400%
- ↑ Risk of ischemic stroke
- ↑ Rate of heart failure hospitalization
- ↑ Short- & long-term mortality after acute coronary syndrome
- ↑ Post-MI complications (recurrent ischemia, failure, shock)
- It is the major cause of death in DM

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179
McAllister DA, et al. Circulation 2018;138(24):2774

Primary prevention of CVD in DM

- Lifestyle (diet, exercise, healthy weight)
- Smoking cessation
- Blood pressure control
- Statins for high-risk patients
- Glucose control
- Need for aspirin?

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179

Assess patient's risk of CVD

Using ACC/AHA 10-year ASCVD risk calculator

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179

Diabetes & blood pressure

- Patients with DM have higher risk of hypertension
- Hypertension ↑ risk of cardiovascular complications (MI, stroke, PAD)
- Hypertension ↑ risk of microvascular complications (nephropathy, retinopathy, possibly neuropathy)
- Treatment of HTN reduces ASCVD events, heart failure & microvascular complications

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179

Lifestyle changes in HTN

- Diet
  - DASH diet
    - Rich in fruits, vegetables, whole grains, nuts
    - Low fat dairy products, poultry, fish, vegetable oil
    - Reduce saturated and trans fat
    - Limit red meat, sweets and sweet beverages
  - Reduced salt (<2300 mg/day)
- Weight loss, physical activity, smoking cessation

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179
ACC/AHA guidelines. Circulation. 2018;138(17):e426.

CVD protection in DM

- **HTN control:**
  - Target BP: < 130/80
  - Some guidelines recommend ACEI or ARB as 1st choice
- **Statins:**
  - Secondary prevention for ASCVD
  - Primary prevention for all patients age ≥40 years
- **Aspirin:**
  - Is generally not recommended
  - Consider if high CVD risk with low bleeding risk

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179
AACE 2020 guidelines. NICE 2022 guidelines

Statins in DM

With ASCVD
(Atherosclerotic Cardiovascular disease)
All ages

↓

High intensity statin

Statins in diabetes

Primary prevention

Age ≥40 years

Moderate intensity statin

- Age 40-75 with no CV risk
- Age >75 years

High intensity statin if:

- Age 40-75 & ≥1 CV risk factor(s): (HTN, smoking, CKD, albuminuria, family history of premature CVD)

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179

Statins in diabetes
Primary prevention for age 20-39 years

Consider moderate intensity statin

if multiple CV risk factors

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S179

Moderate-intensity statins

- Atorvastatin 10 or 20 mg
- Pravastatin 40 or 80 mg
- Rosuvastatin 5 or 10 mg
- Simvastatin 20 or 40 mg

High-intensity statins

- Atorvastatin 40 or 80 mg

- Rosuvastatin 20 or 40 mg

Standards of diabetes care

- History, physical examination & basic labs
- Lifestyle changes
- Glucose control
- Screening for complications (periodic exams/tests)
- Cardiovascular disease
  - Lifestyle changes
  - Blood pressure
  - Statins for high risk
- Liver health
- Vaccination

NAFLD & diabetes

- NAFLD = Non-alcoholic fatty liver disease
- NASH = Non-alcoholic steatohepatitis
- DM 2 is a major risk factor & causes worse outcomes
- Number 1 cause of liver disease in western countries
- The most rapidly growing contributor to liver mortality and morbidity
- Asymptomatic, underdiagnosed & underrecognized

American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S55
Rinella M, et al. Hepatology 2023;77:1797; Brill F, et al. Hepatology 2017;65:1132

Screening for NAFLD should be done for patients with type 2 DM

- **Using FIB-4 index**
  (Age, ALT, AST,
  platelet count)

https://www.mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis

Import favorites | New tab | YouTube | Discord | Microsoft Teams - i... | Seesaw | Lenovo | Other favorites

MD+CALC

Search "QT interval" or "QT" or "EKG"

Log in SIGN UP

Fibrosis-4 (FIB-4) Index for Liver Fibrosis

Noninvasive estimate of liver scarring in HCV and HBV patients, to assess need for biopsy.

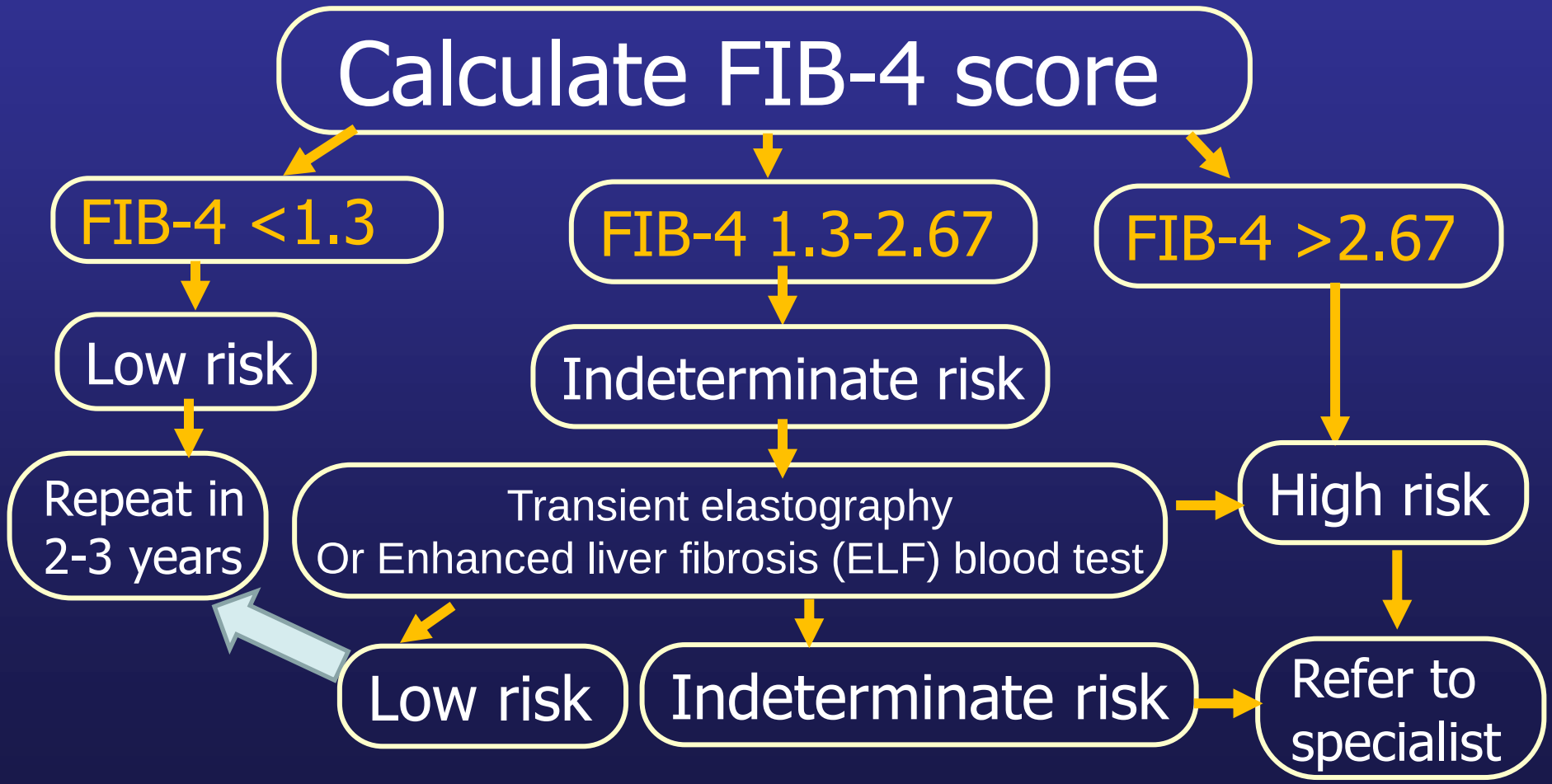
When to Use | Pearls/Pitfalls | Why Use

Age Use with caution in patients <35 or >65 years old, as the score has been shown to be less reliable in these patients		years
AST Aspartate aminotransferase	Norm: 15 - 41	U/L
ALT Alanine aminotransferase	Norm: 1 - 35	U/L
Platelet count	Norm: 150 - 350	$\times 10^9$/L

Result:

Please fill out required fields.

Screening for NAFLD in DM 2



American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S52

Standards of diabetes care

- History, physical examination & basic labs
- Lifestyle changes
- Glucose control
- Screening for complications (periodic exams/tests)
- Cardiovascular disease
  - Lifestyle changes
  - Blood pressure
  - Statins for high risk
- Liver health
- Vaccination

Vaccination in DM

- Influenza
- Pneumococcal
- COVID-19
- Hepatitis B
- Others as people without DM

Center for disease control & prevention. www.cdc.gov
American Diabetes Association. Diabetes Care 2024;47 (suppl 1):S52

Do patients with DM need vitamins?

- No evidence for benefit for vitamins or supplements in patients with no deficiency
- Routine supplements with vitamins/antioxidants is not recommended
- Omega-3 supplements are not recommended for the prevention or treatment of CVD

American Diabetes Association. Diabetes Care 2024;47 (suppl. 1):S77

Treatment of DM: Summary

- Lifestyle changes for all patients with DM 2
- ADA recommends medication at the time of diagnosis of DM 2; some start by lifestyle changes alone
- The choice (Metformin or others) depends on:
  - Comorbid conditions, effect on weight, cost, risk of hypoglycemia & patient's preference
- Use insulin if uncontrolled glucose on 3 or 4 agents

Diabetes Care (1)

- **Lifestyle:** Education, diet, exercise, psychological care, sleep health
- **Glucose**: Target A_1c <7 (individualize)
- **Vascular:** Statins for age ≥40
- **Blood pressure:** Target: <130/80
  ACEI or ARB for hypertension
- **Kidneys**: Serum creatinine, urine albumin creatinine ratio

Diabetes Care (2)

- **Eyes**: Dilated eye exam
- **Foot:** Comprehensive exam
- **Liver health:** Screen for NAFLD with FIB-4 index
- **Vaccination:** Influenza, Pneumococcal,

  COVID-19, Hepatitis B