

DIABETES CANADA

*2018 Clinical Practice Guidelines for the
Prevention and Management of
Diabetes in Canada*

The Essentials

Faculty/Presenter Disclosure

- **Faculty: Dr. TINA KADER**

- **Relationships with commercial interests:**

**Consultant/Advisory Board Honorarium: SANOFI; MERCK ; JANSENN; ELI LILLY
NOVARTIS NOVONORDISK; BI ; ABBOTT MEDTRONIC**

Speaker's Honorarium: AS ABOVE

Grant or other payments:

Product Patent :

Investments: NONE

Clinical Trials (last 2 years): NOVONORDISK; SANOFI

Learning Objectives

- **By the end of this session, participants will be able to:**
 - Understand the **major changes** within the *2018 Diabetes Canada clinical practice guidelines*
 - Understand the **rationale** behind these changes
 - Apply the recommendations in clinical practice

Key Message

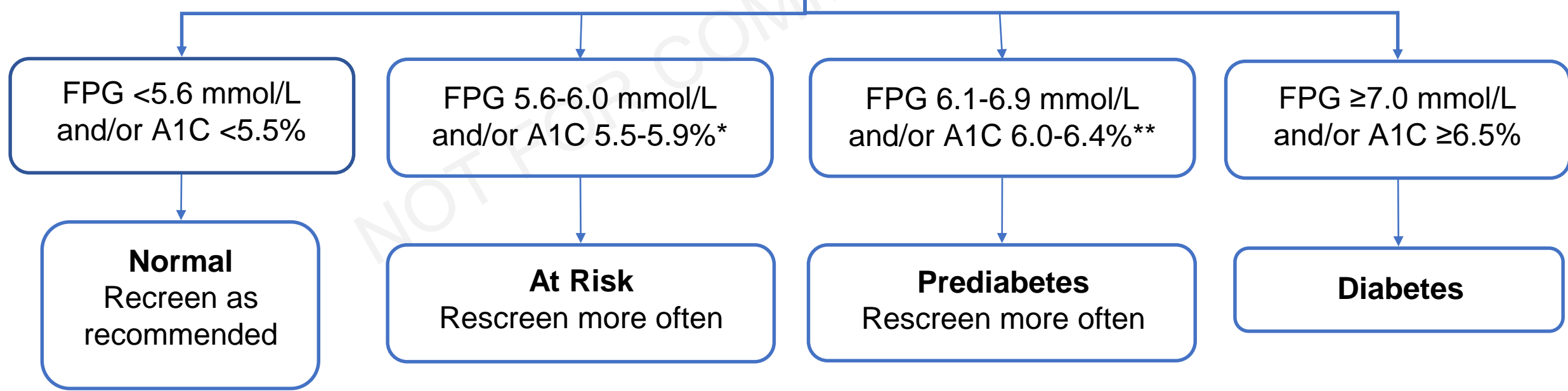
- Throughout the guidelines remains the importance of individualizing therapy for the person with diabetes



Screening for type 2 diabetes in adults

Screen every **3 years** in individuals **≥40 years of age** or in individuals at high risk using a risk calculator.

Screen earlier and/or more frequently (every 6 to 12 months) in people with additional risk factors for diabetes or for those at very high risk using a risk calculator



If both FPG and A1C are available, but discordant, use the test that appears furthest to the right side of the algorithm.

*Consider 75-g OGTT if 1 risk factors; ** Consider 75-g OGTT

Diagnosis of Diabetes

FPG ≥ 7.0 mmol/L

Fasting = no caloric intake for at least 8 hours

or

A1C $\geq 6.5\%$ (in adults)

Using a standardized, validated assay in the absence of factors that affect the accuracy of the A1C and not for suspected type 1 diabetes

or

2hPG in a 75 g OGTT ≥ 11.1 mmol/L

or

Random PG ≥ 11.1 mmol/L

Random = any time of the day, without regard to the interval since the last meal

Diagnosis of prediabetes

Tests	Result	Prediabetes category
FPG (mmol/L)	6.1-6.9	IFG
2h PG in a 75g OGTT (mmol/L)	7.8-11.0	IGT
A1C (%)	6.0-6.4	Prediabetes

2hPG, 2-hour plasma glucose; A1C, glycated hemoglobin; FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test.

ABCDE³ of Diabetes Care

- **A** • A1C – optimal glycemic control (usually $\leq 7\%$)
- **B** • BP – optimal blood pressure control ($< 130/80$)
- **C** • Cholesterol – LDL < 2.0 mmol/L or $> 50\%$ reduction
- **D** • Drugs to protect the heart
 - A – ACEi or ARB | S – Statin | A – ASA if indicated | SGLT2i/GLP-1 RA with demonstrated CV benefit if type 2 DM with CVD and A1C not at target
- **E** • Exercise / Healthy Eating
- **S** • Screening for complications
- **S** • Smoking cessation
- **S** • Self-management, stress and other barriers

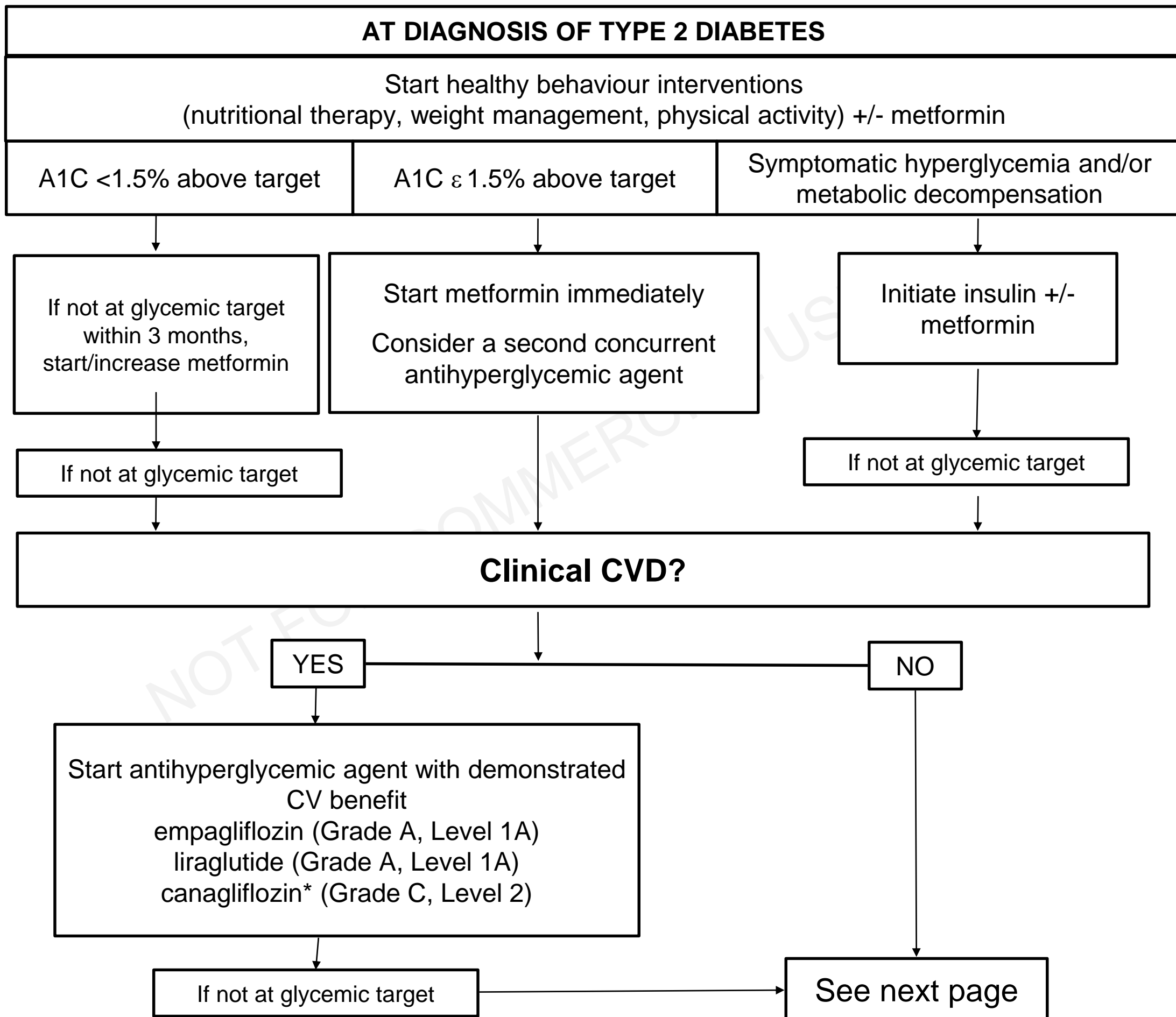
A1C Targets

≤6.5	Adults with type 2 diabetes to reduce the risk of CKD and retinopathy if at low risk of hypoglycemia
≤7.0	MOST ADULTS WITH TYPE 1 OR TYPE 2 DIABETES
<p style="text-align: center;">7.1</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">8.5</p>	<p>7.1-8.0%: Functionally dependent*</p> <p>7.1-8.5%:</p> <ul style="list-style-type: none"> • Recurrent severe hypoglycemia and/or hypoglycemia unawareness • Limited life expectancy • Frail elderly and/or with dementia**
Avoid higher A1C to minimize risk of symptomatic hyperglycemia and acute and chronic complications	
End of life	A1C measurement not recommended. Avoid symptomatic hyperglycemia and any hypoglycemia

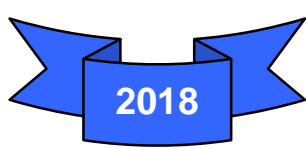
* Based on class of antihyperglycemic medication(s) utilized and person’s characteristics

** see Diabetes in Older People chapter

HEALTHY BEHAVIOUR INTERVENTIONS



* Avoid in people with prior lower extremity amputation



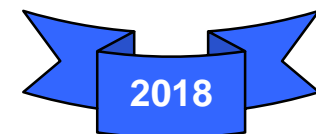
Clinical CVD?

NO

Add additional antihyperglycemic agent best suited to the individual based on the following

CLINICAL CONSIDERATIONS	CHOICE OF AGENT
Avoidance of hypoglycemia and/or weight gain with adequate glycemic efficacy	DPP-4 inhibitor, GLP-1 receptor agonist or SGLT2 inhibitor
Other considerations: Reduced eGFR and/or albuminuria Clinical CVD or CV risk factors Degree of hyperglycemia Other comorbidities (CHF, hepatic disease) Planning pregnancy Cost/coverage Patient preference	see Renal Impairment Appendix See Table Below

Add additional antihyperglycemic agent best suited to the individual by prioritizing patient characteristics <i>(agents listed in alphabetical order by CV outcome data)</i> :						
Class	Effect on CVD Outcomes	Hypo-glycemia	Weight	Relative A1C Lowering when added to metformin	Other therapeutic considerations	Cost
GLP-1R agonists	lira: Superiority in T2DM with clinical CVD exenatide LAR & lixi: Neutral	Rare	☐☐	☐☐ to ☐☐☐	GI side-effects, Gallstone disease Contraindicated with personal / family history of medullary thyroid cancer or MEN 2 Requires subcutaneous injection	\$\$\$\$
SGLT2 inhibitors	Cana & empa: Superiority in T2DM patients with clinical CVD	Rare	☐☐	☐☐ to ☐☐☐	Genital infections, UTI, hypotension, dose-related changes in LDL-C. Caution with renal dysfunction, loop diuretics, in the elderly. Dapagliflozin not to be used if bladder cancer. Rare diabetic ketoacidosis (may occur with no hyperglycemia). Increased risk of fractures and amputations with canagliflozin. Reduced progression of nephropathy & CHF hospitalizations with empagliflozin and canagliflozin in those with clinical CVD	\$\$\$
DPP-4 Inhibitors	alo, saxa, sita: Neutral	Rare	Neutral	☐☐	Caution with saxagliptin in heart failure Rare joint pain	\$\$\$
Insulin	glar: Neutral degludec: noninferior to glar	Yes	☐☐	☐☐☐☐	No dose ceiling, flexible regimens Requires subcutaneous injection	\$- \$\$\$\$
Thiazolidinediones	Neutral	Rare	☐☐	☐☐	CHF, edema, fractures, rare bladder cancer (pioglitazone), cardiovascular controversy (rosiglitazone), 6-12 weeks for maximal effect	\$\$
< -glucosidase inhibitor (acarbose)		Rare	Neutral	☐	GI side-effects common Requires 3 times daily dosing	\$\$
Insulin secretagogue:		Yes	☐	☐☐	More rapid BG-lowering response Reduced postprandial glycemia with meglitinides but usually requires 3 to 4 times daily dosing.	\$\$
Meglitinide		Yes	☐	☐☐	Gliclazide and glimepiride associated with less hypoglycemia than glyburide. Poor durability	\$
Sulfonylurea		None	☐	☐	GI side effects Requires 3 times daily dosing	\$\$\$
Weight loss agent (orlistat)		None	☐	☐	GI side effects Requires 3 times daily dosing	\$\$\$



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Sulfonylurea		Yes	↑	↓↓	Gliclazide and glimepiride associated with less hypoglycemia than glyburide. Poor durability	\$
Weight loss agent (orlistat)		None	↓	↓	GI side effects Requires 3 times daily dosing	\$\$\$

↓

If not at glycemic targets

↓

Add another antihyperglycemic agent from a different class and/or add/intensify insulin regimen
Make timely adjustments to attain target A1C within 3-6 months

Types of insulin			
Insulin type (trade name)	Onset	Peak	Duration
BOLUS (prandial or mealtime) insulins			
Rapid-acting insulin analogues (clear) <ul style="list-style-type: none"> • Insulin aspart (NovoRapid®) • Insulin glulisine (Apidra®) • Insulin lispro (Humalog®) U-100 U-200 • Faster-acting insulin aspart (Fiasp®) 	9–20min 10–15min 10–15min 4min	1–1.5h 1–1.5h 1–2h 0.5-1.5h	3–5h 3.5–5h 3–4.75h 3-5h
Short-acting insulins (clear) <ul style="list-style-type: none"> • Insulin regular (Humulin®-R, Novolin® ge Toronto) • Insulin regular U-500 (Entuzity® (U-500)) 	30min 15min	2–3h 4-8h	6.5h 17-24h
BASAL insulins			
Intermediate-acting (cloudy) <ul style="list-style-type: none"> • Insulin neutral protamine Hagedorn (Humulin® N, Novolin® ge NPH) 	1–3h	5–8h	Up to 18h
Long-acting insulin (clear) <ul style="list-style-type: none"> • Insulin detemir (Levemir®) • Insulin glargine U-100 (Lantus®) • Insulin glargine U-300 (Toujeo®) • Insulin glargine biosimilar (Basaglar®) • Insulin degludec U-100, U-200 (Tresiba®) 	90min	Not applicable	U-100 glargine 24h, detemir 16–24h U-300 glargine >30h degludec 42h
PREMIXED insulins			
Premixed regular insulin –NPH (cloudy) <ul style="list-style-type: none"> • Humulin® 30/70 • Novolin® ge 30/70, 40/60, 50/50 	A single vial or cartridge contains a fixed ratio of insulin (% of rapid-acting or short-acting insulin to % of intermediate-acting insulin)		
Premixed insulin analogues (cloudy) <ul style="list-style-type: none"> • Biphasic insulin aspart (NovoMix® 30) • Insulin lispro/lispro protamine (Humalog® Mix25 and Mix50) 			

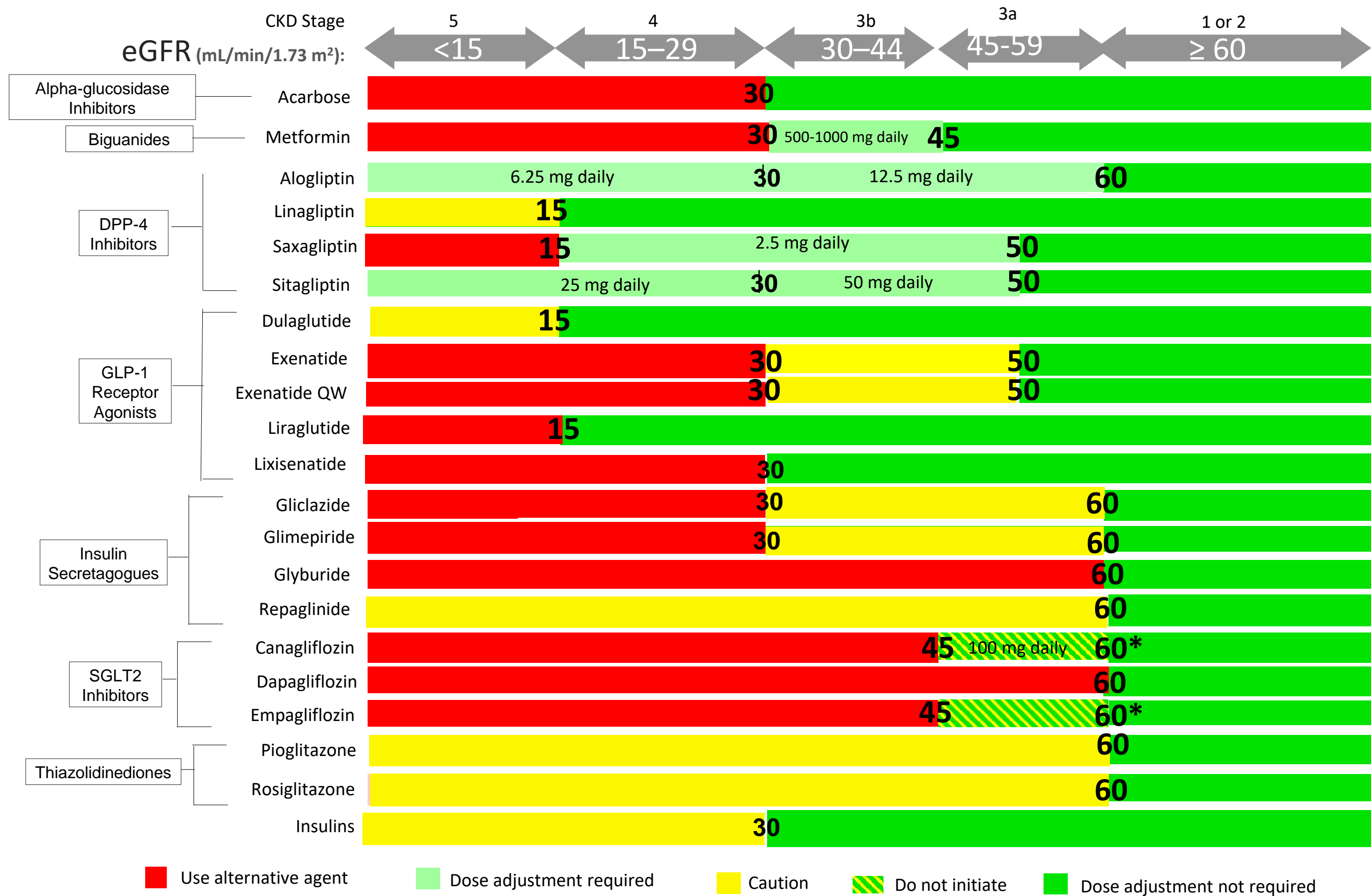
Examples of Insulin Initiation and Titration Regimens in People With Type 2 Diabetes

All people starting insulin should be counseled about the recognition, prevention and treatment of hypoglycemia. Consider a change in type or timing of insulin administration if glycemic targets are not being reached.

Example A: Basal insulin (degludec U-100 or U-200, detemir, glargine U-100 or U-300, NPH) added to non-insulin antihyperglycemic agents

- Insulin should be titrated to achieve target fasting BG levels of 4.0 to 7.0 mmol/L or individualized targets (e.g. 4.0 to 5.5 mmol/L if A1C target $\leq 7.0\%$ not achieved; higher fasting BG targets may be considered in some people with diabetes where the goal of avoiding hypoglycemia is important, see Chapter 8. Targets for Glycemic Control, p. S42).
- Individuals can be taught self-titration, or titration may be done in conjunction with a health-care provider.
- Suggested starting dose is 10 units once daily at bedtime.
- Suggested titration is 1 unit per day until target is reached. (Degludec should be titrated by 2 units every 3 to 4 days or 4 units once a week).
- A lower starting dose, slower titration and higher targets may be considered for elderly or normal-weight subjects.
- In order to safely titrate insulin, people with diabetes must perform self-monitoring of blood glucose at least once a day fasting.
- Insulin dose should not be increased if the individual experiences 2 episodes of hypoglycemia (BG < 4.0 mmol/L) in 1 week or any episode of nocturnal hypoglycemia.
- Non-insulin antihyperglycemic agents (especially insulin secretagogues) may need to be reduced if daytime hypoglycemia occurs.

Antihyperglycemic Agents and Renal Function



*May be considered when indicated for CV and renal protection with eGFR < 60 but > 30 ml/min/1.73²

ABCDE³ of Diabetes Care

□ **A** • A1C – optimal glycemic control (usually $\leq 7\%$)

□ **B** • BP – optimal blood pressure control ($< 130/80$)

□ **C** • Cholesterol – LDL < 2.0 mmol/L or $> 50\%$ reduction

□ **D** • Drugs to protect the heart

A – ACEi or ARB | S – Statin | A – ASA if indicated | SGLT2i/GLP-1 RA with demonstrated CV benefit
if type 2 DM with CVD and A1C not at target

□ **E** • Exercise / Healthy Eating

□ **S** • Screening for complications

□ **S** • Smoking cessation

□ **S** • Self-management, stress and other barriers

Who Should Receive ACEi or ARB Therapy?

(regardless of baseline blood pressure)

- **Clinical CVD**
- **Age >55 years with an additional CV risk factor or end organ damage** (albuminuria, retinopathy, left ventricular hypertrophy)
- **Microvascular complications**

At doses that have shown vascular protection [perindopril 8 mg daily (EUROPA), ramipril 10 mg daily (HOPE), telmisartan 80 mg daily (ONTARGET)]

Among women with childbearing potential, ACEi or ARB should only be used in the presence of proper preconception counselling & reliable contraception. Stop ACEi or ARB either prior to conception or immediately upon detection of pregnancy.

Who Should Receive Statins?

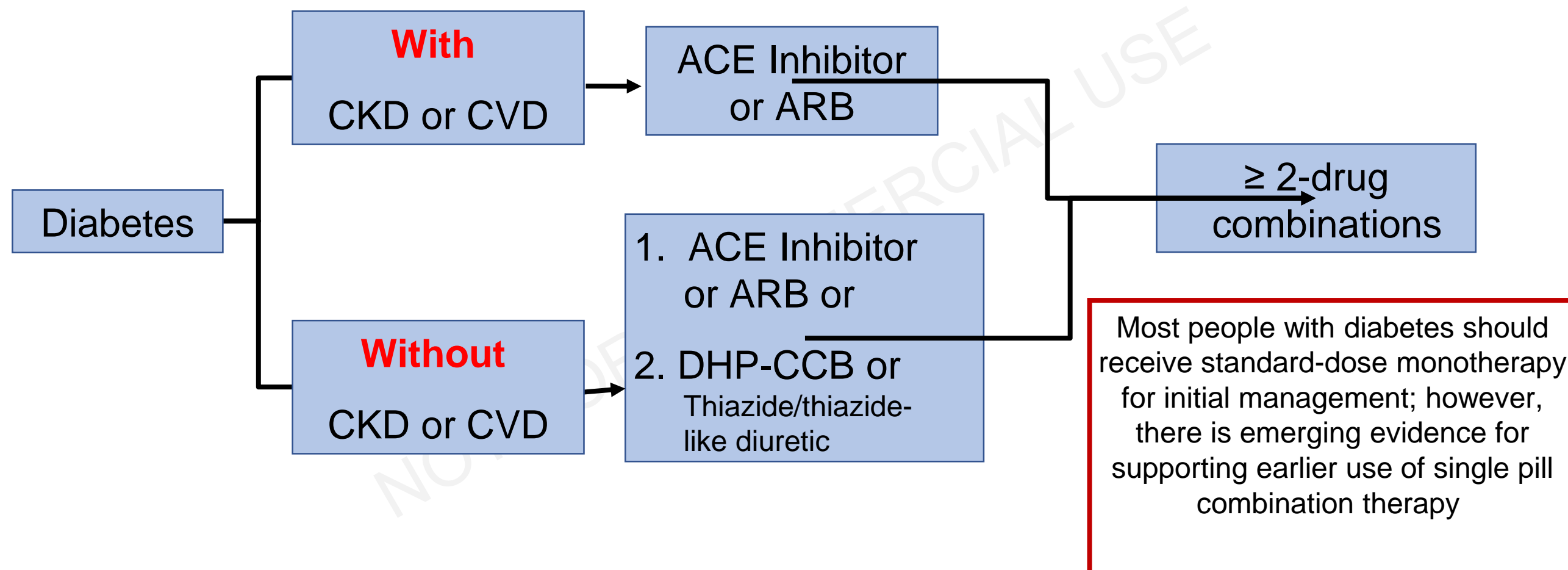
(regardless of baseline LDL-C)

- **Cardiovascular disease** *or*
- **Age ≥ 40 yrs** *or*
- **Microvascular complications** *or*
- **DM > 15 yrs duration and age > 30 yr** *or*
- **Warrants therapy** based on the *2016 Canadian Cardiovascular Society Guidelines for the Diagnosis and Treatment of Dyslipidemia*

Among women with childbearing potential, statins should only be used in the presence of proper preconception counselling & reliable contraception. Stop statins prior to conception.

Pharmacotherapy for Hypertension in Patients with Diabetes – Summary

Threshold $\geq 130/80$ mmHg and Target $< 130/80$ mmHg



Check serum **potassium** and **creatinine** at **baseline** and **within 1 to 2 weeks** of initiation of an **ACEI or ARB**

Combinations of agents that block the **RAAS** (ACEi, ARB, DRI) **should not be used**

More than 3 drugs may be needed to reach target values for people with diabetes

Who should receive ASA?

- In people with **established CVD**, low-dose ASA therapy (81-162 mg) should be used to prevent CV events [Grade B, Level 2]
- ASA should **not be used routinely for the primary prevention of CVD** in people with diabetes [Grade A, Level 1A]. ASA **may be used in the presence of additional CV risk factors** [Grade D, Consensus]

Antihyperglycemic therapy selection

In adults with type 2 diabetes with **clinical CVD** in whom glycemic targets are not achieved with existing antihyperglycemic medication(s) and with **eGFR >30 mL/min/1.73m²**, an antihyperglycemic agent with demonstrated **CV outcome benefit should be added** to reduce the risk of major CV events [Grade A, Level 1A for **empagliflozin**; Grade A, Level 1A for **liraglutide**; Grade C, Level 2 for **canagliflozin**]

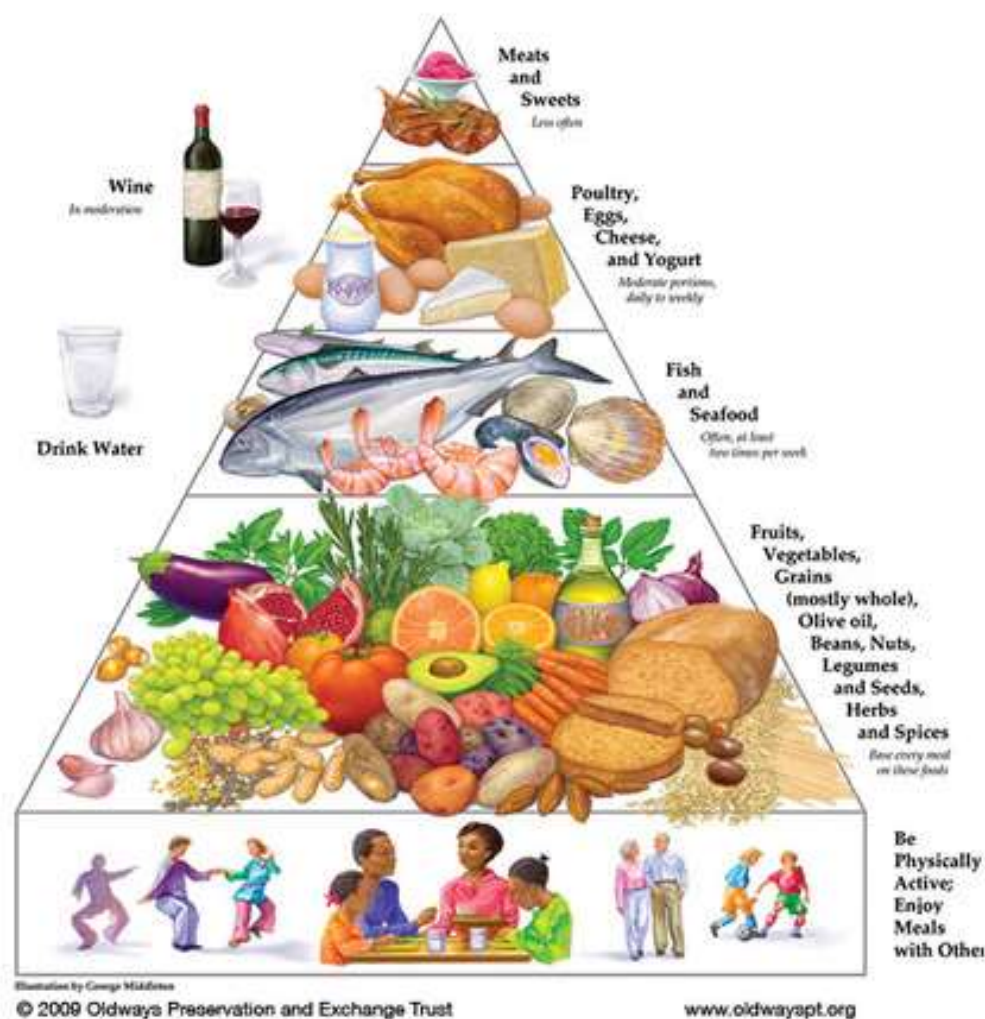
Physical Activity Checklist

- **TRY TO DO** a minimum of 150 minutes of moderate-to vigorous-intensity aerobic exercise per week
- **INCLUDE** resistance exercise ≥ 2 times a week
- **SET** physical activity goals and **INVOLVE** an interprofessional team
- **ASSESS** patient's health before prescribing a higher intensity exercise regimen

Choose “healthy” dietary patterns

Mediterranean diet

Vegetarian diet

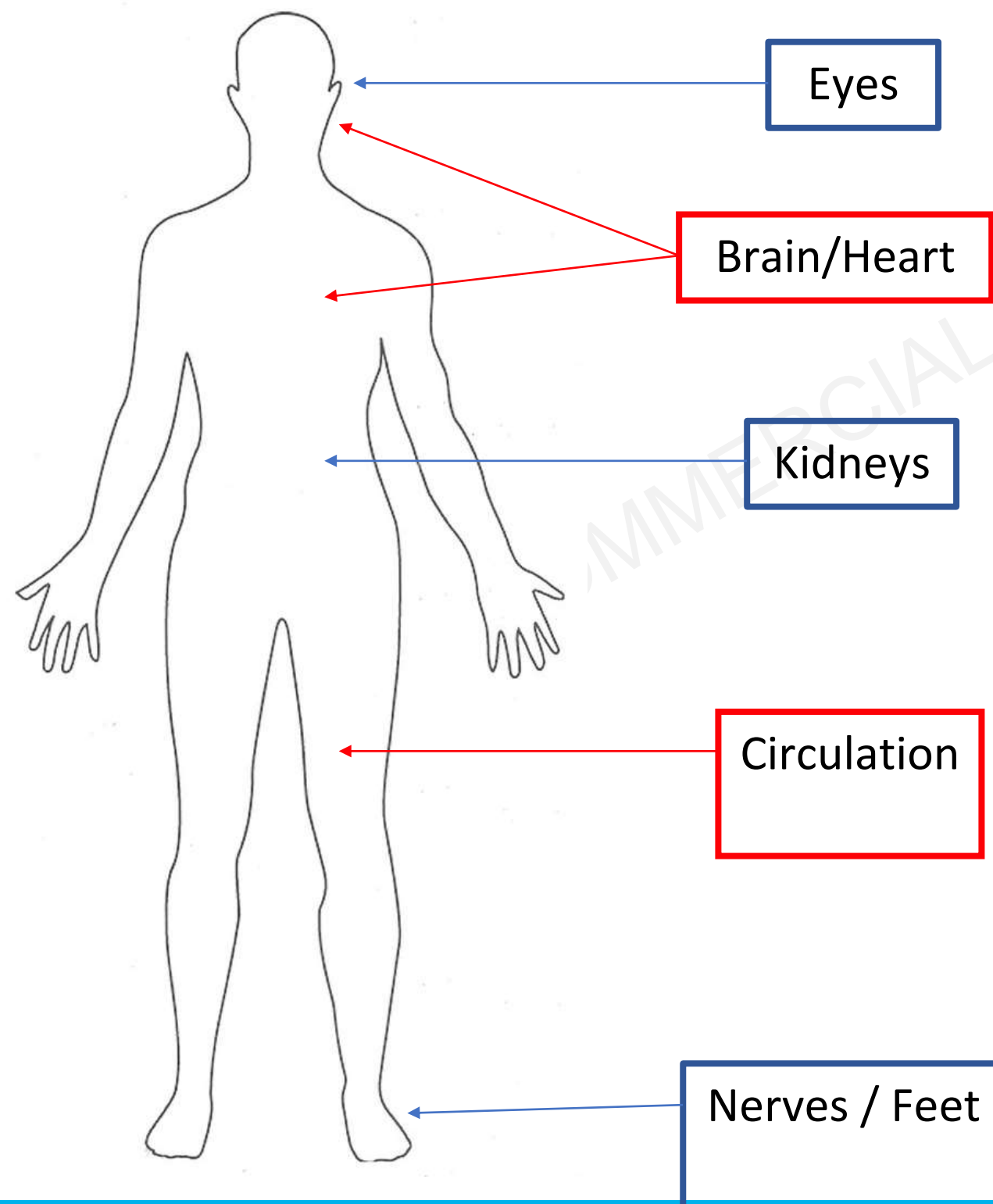


<https://oldwayspt.org/traditional-diets/mediterranean-diet>

<https://oldwayspt.org/traditional-diets/vegetarian-vegan-diet>

Patient resources available at guidelines.diabetes.ca/patientresources

Screening for complications



Immunization Checklist

- GIVE** annual influenza immunization
- OFFER** pneumococcal immunization if >18 years of age
- RE-VACCINATE** for pneumococcal for those >65 years of age; ensure ≥ 5 years between administrations

Diabetes and Driving

- The **fitness** of people with diabetes to drive should be assessed on an **individual** basis
- All drivers with diabetes should undergo a **medical examination** at least **every two years** to assess fitness to drive.
- **People with diabetes** should play an **active role in assessing their fitness to drive**
- Should **not drive** when **BG <4.0 mmol/L** and should **wait at least 40 minutes** after treatment of hypoglycemia has increased their BG level to **at least 5.0 mmol/L**

Counsel all Patients About Sick Day Medication List

Visit

guidelines.diabetes.ca

for patient handout

Instructions for Healthcare Professionals:

If patients become ill and are unable to maintain adequate fluid intake, or have an acute decline in renal function (e.g. due to gastrointestinal upset or dehydration), they should be instructed to hold medications which will:

A) Increase risk for a decline in kidney function:

- Angiotensin-converting enzyme inhibitor
- Angiotensin receptor blockers
- Direct renin inhibitors
- Non-steroidal anti-inflammatory drugs
- Diuretics
- SGLT2 inhibitors

B) Have reduced clearance and increase risk for adverse effects:

- Metformin
- Sulfonylureas (gliclazide, glimepiride, glyburide)

- S sulfonylureas
- A ACE-inhibitors
- D diuretics, direct renin inhibitors

- M metformin
- A angiotensin receptor blockers
- N non-steroidal anti-inflammatory
- S SGLT2 inhibitors

Please complete the following card and give it to your patient.

Patients should be instructed that increased frequency of self blood glucose monitoring will be required and adjustments to their doses of insulin or oral antihyperglycemic agents may be necessary.

Instructions for Patients

When you are ill, particularly if you become dehydrated (e.g. vomiting or diarrhea), some medicines could cause your kidney function to worsen or result in side effects.

If you become sick and are unable to drink enough fluid to keep hydrated, you should **STOP** the following medications:

- Blood pressure pills
- Water pills
- Metformin
- Diabetes pills
- Pain medications
- Non-steroidal anti-inflammatory drugs (see below)

Please be careful not to take non-steroidal anti-inflammatory drugs (which are commonly found in pain medications (e.g. Advil) and cold remedies).

Please check with your pharmacist before using over-the-counter medications and discuss all changes in medication with your healthcare professional.

Please increase the number of times you check your blood glucose levels. If they run too high or too low, contact your healthcare professional.

If you have any problems, you can call:

Diabetes in the Elderly Checklist

- **ASSESS** for level of functional dependency (frailty)
- **INDIVIDUALIZE** glycemic targets based on the above (A1C \leq 8.5% for frail elderly) but if otherwise healthy, use the same targets as younger people
- **AVOID** hypoglycemia in cognitive impairment
- **SELECT** or **ADJUST** antihyperglycemic therapy carefully
 - Caution with sulfonylureas or thiazolidinediones
 - DPP-4 inhibitors should be used over sulfonylureas
 - Basal analogues instead of NPH or human 30/70 insulin
- **GIVE** regular diets instead of “diabetic diets” or nutritional formulas in nursing homes

Preconception Checklist for Women with Pre-existing Diabetes

- Use **reliable birth control** until adequate glycemic control
- Attain a **preconception A1C of $\leq 7.0\%$** ($\leq 6.5\%$ if safe)
- May remain on **metformin + glyburide** until pregnancy, otherwise **switch to insulin**
- Assess for and manage any **diabetes complications**
- **Folic Acid 1 mg/d**: 3 months pre-conception to at least 12 weeks gestation
- **Discontinue** potential embryopathic meds:
 - **ACE-inhibitors / ARB** (prior to or upon detection of pregnancy in those with significant proteinuria)
 - **Statin** therapy

Chronic Kidney Disease (CKD) Checklist

- ❑ **SCREEN** with random urine albumin creatinine ratio (ACR) and serum creatinine for estimated glomerular filtration rate (eGFR) **at diagnosis** then **annually** (T2D)
- ❑ **DIAGNOSE** with repeat confirmed ACR ≥ 2.0 mg/mmol and/or eGFR < 60 mL/min
- ❑ **DELAY** onset and/or progression with glycemic and blood pressure control and ACEi or ARB
- ❑ **PREVENT** complications with dose adjustment, “sick day management” counselling and referral when appropriate