THE EVOLVING ROLE OF INSULIN THERAPY

HISTORICAL PERSPECTIVE OF INSULIN USE OF PAST 30 YEARS

Presenter Disclosure

Relationships with commercial interests:

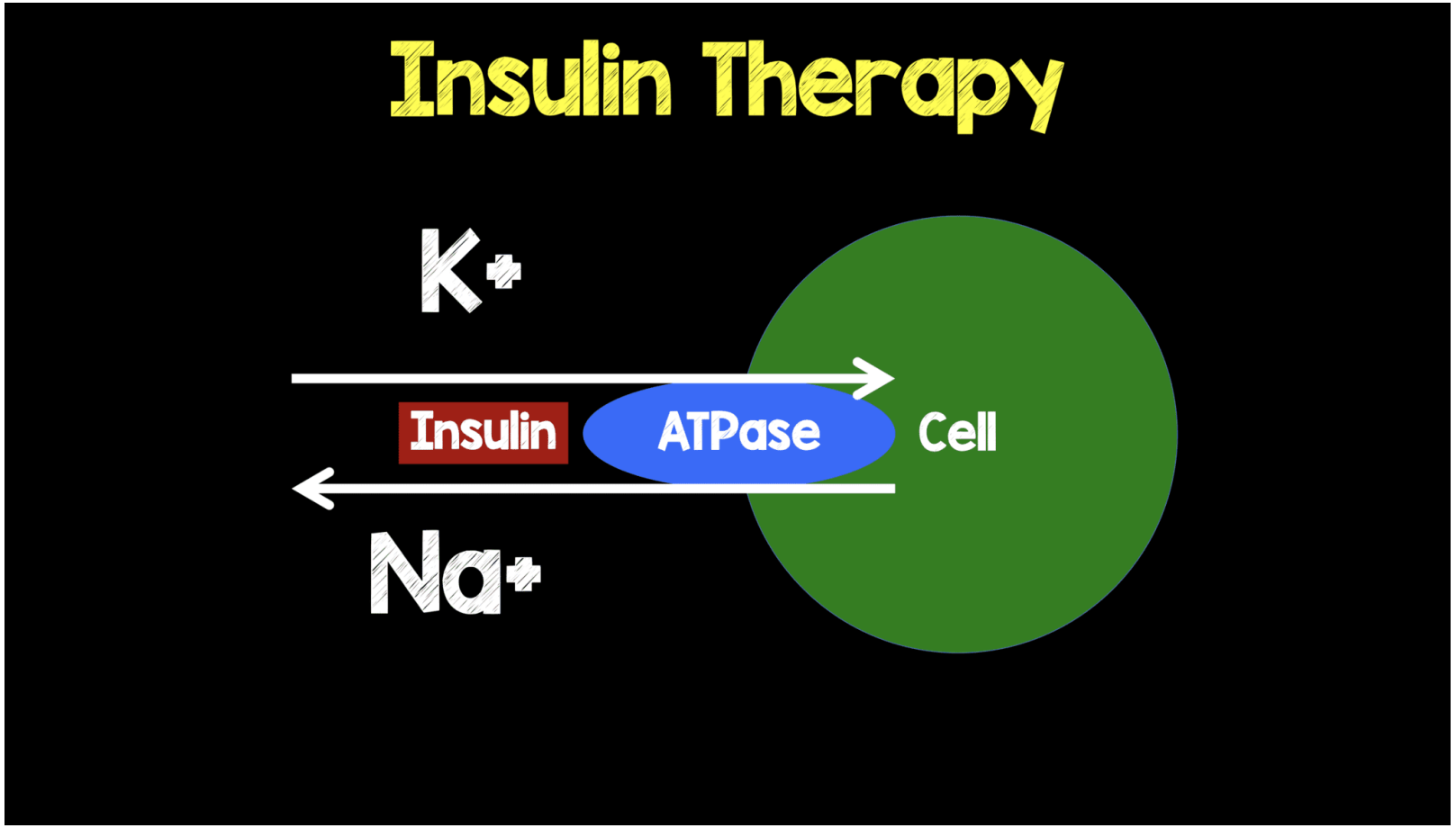
Grants/Research support
NOVONORDISK; SANOFI

Speaker's bureau/
honoraria:DEXCOM; ANIMAS;
MEDTRONIC; ELI LILLY NOVORDISK;
BI ; SANOFI;

Consulting/Advisory Board:SAME
AS ABOVE

Other/Patents

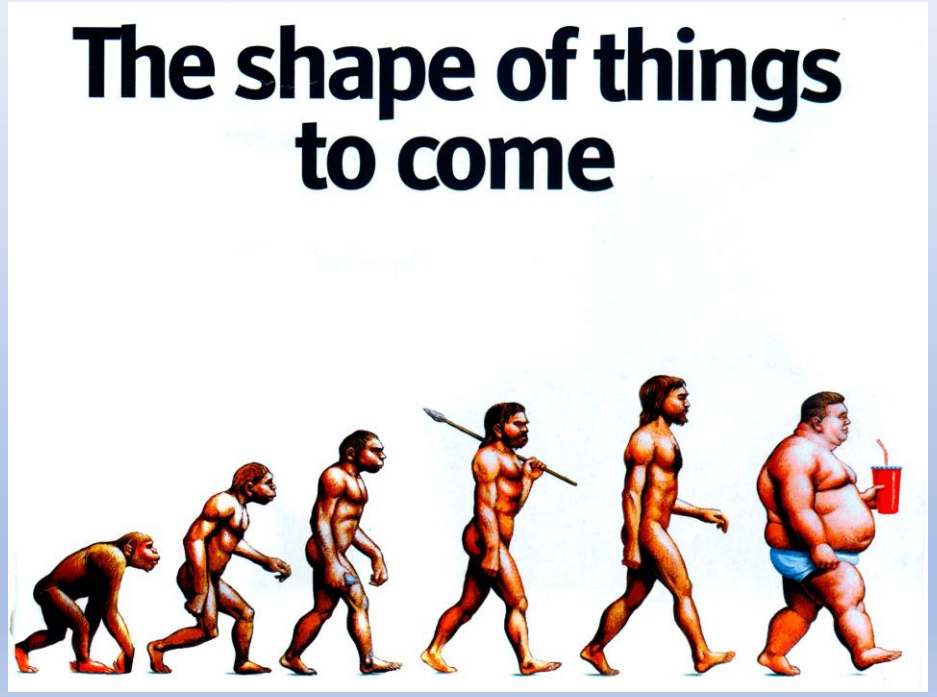
Diabetes new approaches IS IT TIME TO SAY GOODBYE TO MY DEAR FRIEND

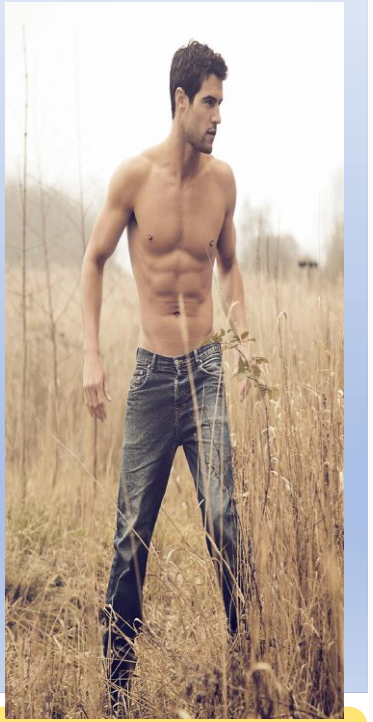


VOTE

- A) YES
- B) NO
- C) NOT SURE

DIABETES IS CHANGING





diabetes

*TIR: 3.9–10 mmol/L.

1. Battelino T et al. *Diabetes Care*. 2019 Aug;42(8); 2. Wright Jr. EE et al. *Clin Diabetes*. 2020 Dec;38(5):439-448.

presentation

Case

- Historical perspective
- Where we are in 2022
- Who needs insulin
- When to start
- New guidelines 2022 sept diabetes care

MRS P

- TYPE 2 DIABETES FOR ? 5 YEARS
- NEW CONSULT
- FEELS WELL
- NOT CHECKING SUGARS
- NO RECENT EYE CHECKUP
- NO KNOWN KIDNEY ISSUES

METFORMIN ; ACE AND STATIN

And Diamicron

EXAMINATION

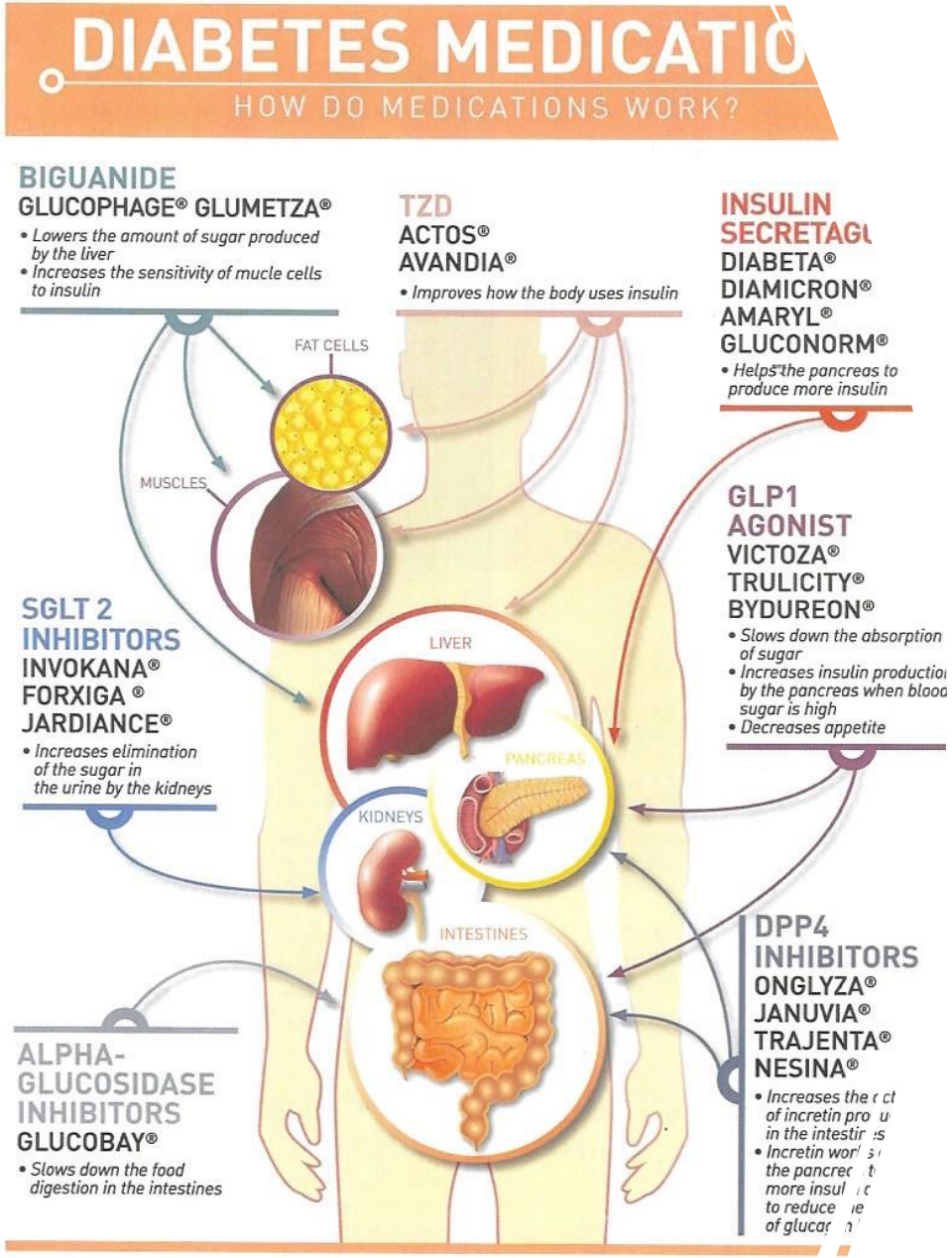
- BP 140/90
- BMI 33
- FEET DECREASE MONOFILAMENT
- CVS NORMAL
- RESP CLEAR

LABS

- GFR 50
- PROTEINURIA 1 GRAM/DAY
- A1C 0.095
- LDL 1.8
- TSH NORMAL

DISCUSSION

- DISCUSSED PROS AND CONS WITH PATIENT
- GIVEN LOW GFR AND NO CAD; SGLT2 WOULD HAVE BEEN A GOOD OPTION
- PATIENT HAS RECURRENT YEAST AND UTI
- DIDN’T WANT INJECTIONS
- WENT WITH RYBELSUS



RYBELSUS; OZEMPIC

COURSE

- PATIENT WAS STARTED ON 3 MG A DAY
- FOR ONE MONTH
- WAS GOING AWAY MARCH 5
- DUE TO COVID TRIP CANCELLED
- INCREASED TO 7 MG
- NO SIDE EFFECTS; TOLERATING WELL
- A1c over 7 sglt2 added
- 3 years later a1c at 8 percent on 4 agents ;what is next step

Antihyperglycemic Agents and Kidney Function

eGFR (mL/min/1.73m²)	DRUG CLASS						
	Metformin (max daily dose)	**SGLT2i** (Recommended daily dose*)	**GLP1-RA**	**DPP4i** (max daily dose)	**All Insulins**	**Secretagogues**	
						Glyburide	**Others**
45 – 59	2 g	No dose change	No dose change	No dose change	No dose change	Avoid Glyburide	No dose change
30 – 44	1 g	Canagliflozin 100 mg Dapagliflozin 10 mg Empagliflozin 10 or 25 mg		Linagliptin 5 mg Sitagliptin 50 mg (Saxagliptin 2.5 mg**)			Gliclazide or Repaglinide preferred Dose reduction may be needed
15 – 29	500 mg			Linagliptin 5 mg Sitagliptin 25 mg	Dose reduction may be needed		
<15 or on dialysis	Avoid	Stop on dialysis	Limited data available				
Risk related to low GFR	Lactic acidosis	Cardiorenal protection preserved but less reduction in A1C with low GFR		Accumulation***	Accumulation and hypoglycemia	Prolonged and severe hypoglycemia	Hypoglycemia

*listed alphabetically, **increased risk for heart failure, ***except linagliptin

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1-800-BANTING (226-8464) | info@diabetes.ca

DIABETES CANADA

presentation

- Case
- **Historical perspective**
- Where we are in 2022
- Who needs insulin
- When to start
- New guidelines 2022 sept diabetes care

History lane with dr K

- Young resident at JGH
- Started my
- endo training 1990
- We had crazy hair back then
- And Insulin was out!!!!

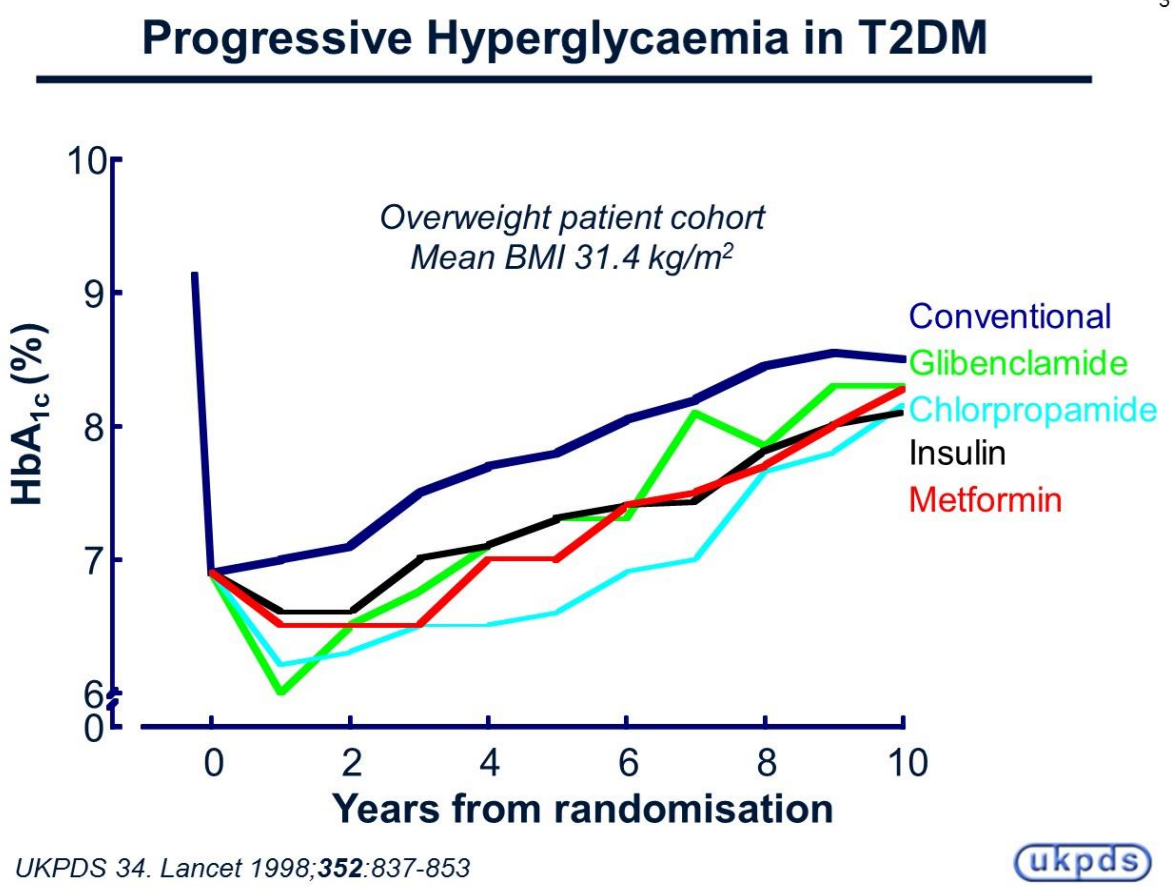
1992

- First clinic at jgh
- Insulin was BAD
- Caused heart disease; made you gain weight
- Made you swell
- Don’t use it even if your sugars are high
- First clinic a1c 10 percent
- Don’t start insulin
- He is insulin resistant he needs to lose weight and exercise

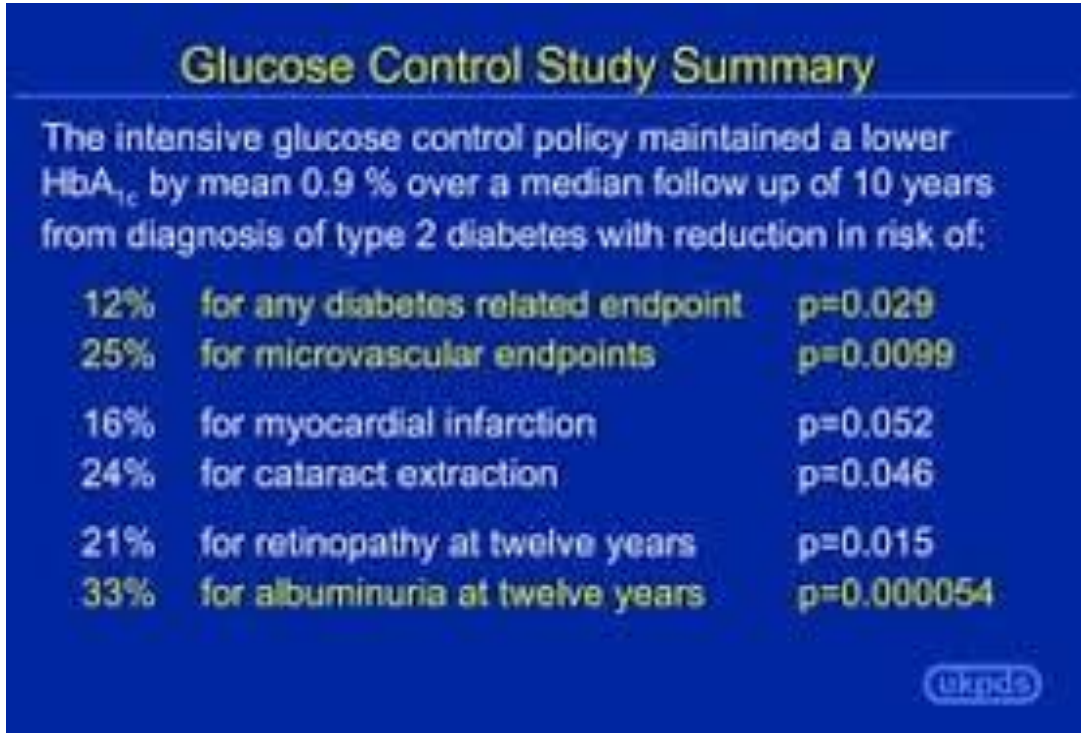
1992 to 2010

- Oral agents available
- Glyberide and its friends
- Metformin
- Dpp4
- Tzd
- Acarbose

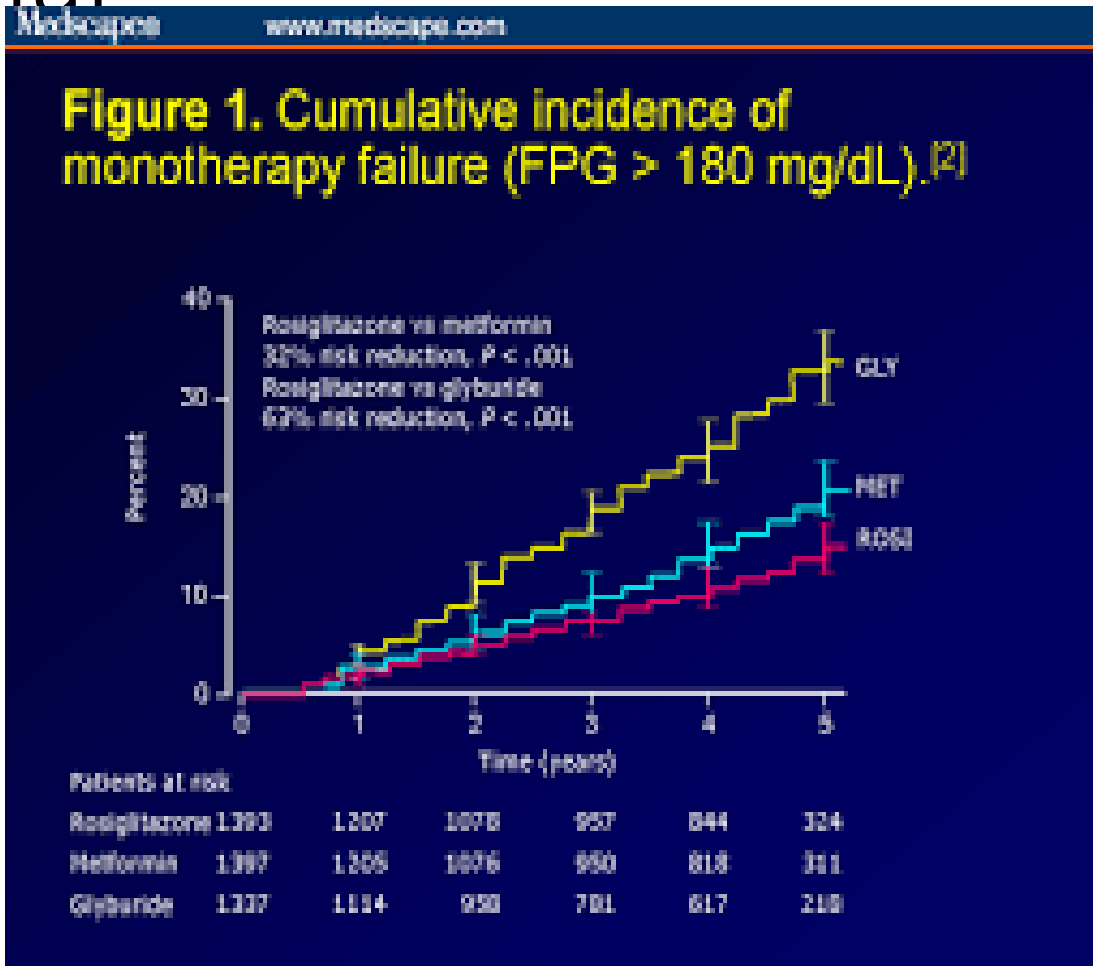
ukpds


Progressive Hyperglycaemia in T2DM
Overweight patient cohort
Mean BMI 31.4 kg/m2
HbA1c (%)
10
9
8
7
6
0
0
2
4
6
8
10
Years from randomisation
Conventional
Glibenclamide
Chlorpropamide
Insulin
Metformin
UKPDS 34. Lancet 1998;352:837-853
ukpds

Conclusion they all work get control better and hence the following 20 years would be about glucose control;insulin was no longer evil



Adopt trial


Medscape
www.medscape.com
Figure 1. Cumulative incidence of monotherapy failure (FPG > 180 mg/dL).[2]
Rosiglitazone vs metformin
32% risk reduction, P < .001
Rosiglitazone vs glyburide
63% risk reduction, P < .001
Percent
40
30
20
10
0
0
1
2
3
4
5
Time (years)
GLY
MET
ROSI
Patients at risk
Rosiglitazone 1393 1207 1078 957 844 324
Metformin 1397 1205 1076 950 818 311
Glyburide 1337 1114 958 781 617 218

World rocked again 2008

- Nissen published
- Linking an metanalysis
- Showing tzd high cardiac complications and death
- Gone were tzd;
- First time an agent was associated with worsening outcomes
- BUT GOING FORWARD ALL TRIALS HAD TO SHOW SAFETY OF AGENTS

Rosiglitazone Meta-Analysis: Risk of Myocardial Infarction and Death from Cardiovascular Causes for Patients Receiving Rosiglitazone vs Several Comparator Drugs

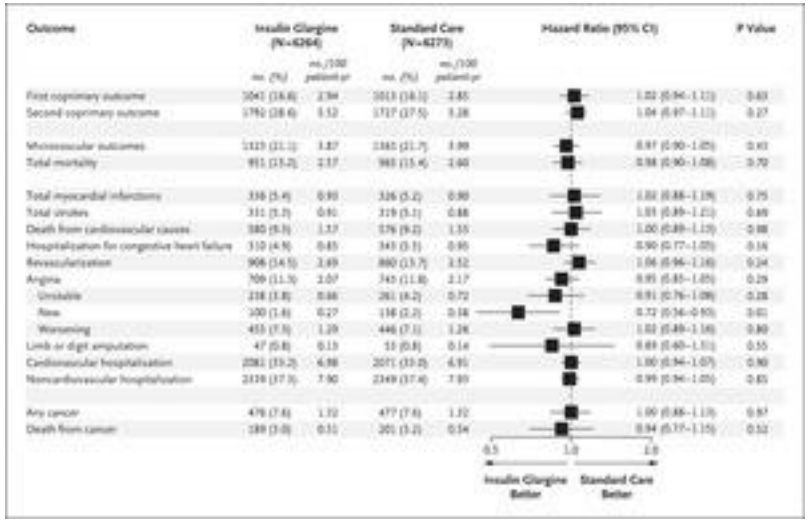
Table 1. Risk of Myocardial Infarction and Death from Cardiovascular Causes for Patients Receiving Rosiglitazone versus Several Comparator Drugs.

Comparator Drug	Odds Ratio (95% CI)	P Value
Myocardial Infarction		
Metformin	1.14 (0.70–1.84)	0.59
Sulfonylurea	1.24 (0.78–1.98)	0.36
Insulin	2.78 (0.58–13.3)	0.20
Placebo	1.86 (0.95–3.70)	0.07
Combined comparator drugs	1.43 (1.03–1.98)	0.03
Death from cardiovascular causes		
Metformin	1.13 (0.34–3.71)	0.84
Sulfonylurea	1.42 (0.60–3.33)	0.43
Insulin	3.57 (0.51–24.52)	0.16
Placebo	1.22 (0.64–2.34)	0.55
Combined comparator drugs	1.64 (0.98–2.74)	0.06

Nissen SE, Wolski K. *N Engl J Med.* 2007;356:2457-2471.

2008 TO 2010

- INSULIN BACK IN
- TZD OUT
- ORIGIN TRIAL
- Insulin was safe but
- But didn’t offer any
- Cardiac protection



2010 TO PRESENT

- DRUGS HAD TO BE TESTED FOR CARDIAC SAFETY
- AND HENCE A NEW ERA OF DIABETES

presentation

- Case
- Historical perspective
- **Where we are in 2022**
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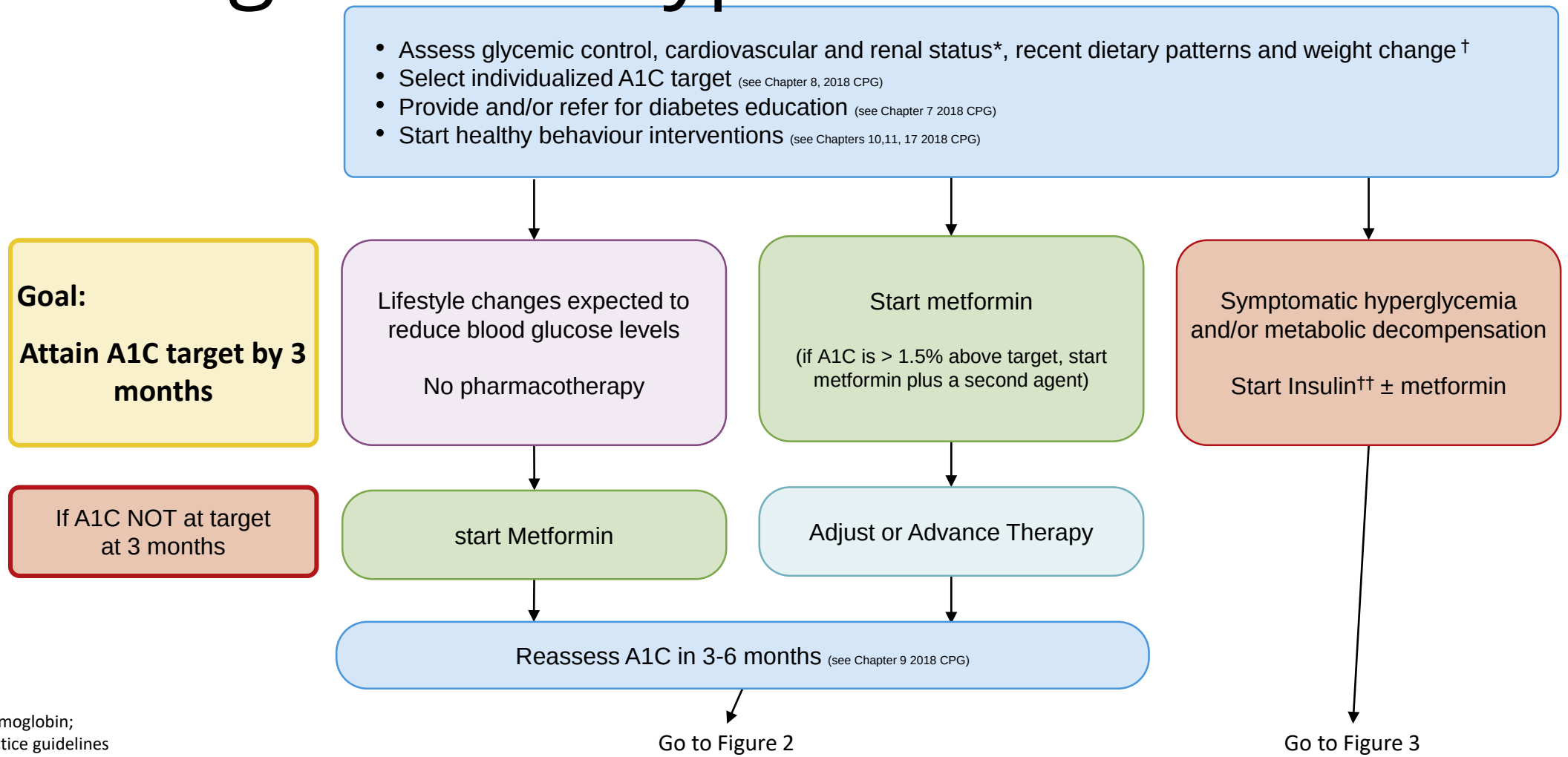
	Efficacy[1]	Hypoglycemia	Weight change[2]	CV effects		Renal effects		Oral/SQ	Cost	Clinical considerations
				Effect on MACE	HF	Progression of DKD	Dosing/use considerations*			
Metformin	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Neutral	• Contraindicated with eGFR <30 mL/min per 1.73 m^2	Oral	Low	• GI side effects common; to mitigate GI side effects, consider slow dose titration, release formulations, and administration with food • Potential for vitamin B_{12} deficiency; monitor at regular intervals
SGLT2 inhibitors	Intermediate to high	No	Loss (intermediate)	Benefit: canagliflozin, empagliflozin	Benefit: canagliflozin, dapagliflozin, empagliflozin, ertugliflozin	Benefit: canagliflozin, dapagliflozin, empagliflozin	• See labels for renal dose considerations of individual agents • Glucose-lowering effect is lower for SGLT2 inhibitors at lower eGFR	Oral	High	• DKA risk, rare in T2DM: discontinue, evaluate, and treat promptly if suspected; b predisposing risk factors and clinical presentation (including euglycemic DKA); before scheduled surgery (e.g., 3–4 days), during critical illness, or during prolo mitigate potential risk • Increased risk of genital mycotic infections • Necrotising fasciitis of the perineum (Fournier's gangrene), rare reports: institut treatment if suspected • Attention to volume status, blood pressure; adjust other volume-contracting ager
GLP-1 RAs	High to very high	No	Loss (intermediate to very high)	Benefit: dulaglutide, liraglutide, semaglutide (SQ) Neutral: exenatide once weekly, lixisenatide	Neutral	Benefit for renal endpoints in CVOTs, driven by albuminuria outcomes: dulaglutide, liraglutide, semaglutide (SQ)	• See labels for renal dose considerations of individual agents • No dose adjustment for dulaglutide, liraglutide, semaglutide • Monitor renal function when initiating or escalating doses in patients with renal impairment reporting severe adverse GI reactions	SQ; oral (semaglutide)	High	• Risk of thyroid C-cell tumors in rodents; human relevance not determined (lirag dulaglutide, exenatide extended release, semaglutide) • Counsel patients on potential for GI side effects and their typically temporary na guidance on dietary modifications to mitigate GI side effects (reduction in meal eating practices [e.g., stop eating once full], decreasing intake of high-fat or spi consider slower dose titration for patients experiencing GI challenges • Pancreatitis has been reported in clinical trials but causality has not been estab Discontinue if pancreatitis is suspected • Evaluate for gallbladder disease if cholelithiasis or cholecystitis is suspected
GIP and GLP-1 RA	Very high	No	Loss (very high)	Under investigation	Under investigation	Under investigation	• See label for renal dose considerations • No dose adjustment • Monitor renal function when initiating or escalating doses in patients with renal impairment reporting severe adverse GI reactions	SQ	High	• Risk of thyroid C-cell tumors in rodents; human relevance not determined • Counsel patients on potential for GI side effects and their typically temporary na guidance on dietary modifications to mitigate GI side effects (reduction in meal eating practices [e.g., stop eating once full], decreasing intake of high-fat or spi consider slower dose titration for patients experiencing GI challenges • Pancreatitis has been reported in clinical trials but causality has not been estab Discontinue if pancreatitis is suspected • Evaluate for gallbladder disease if cholelithiasis or cholecystitis is suspected
DPP-4 inhibitors	Intermediate	No	Neutral	Neutral	Neutral (potential risk, saxagliptin)	Neutral	• Renal dose adjustment required (sitagliptin, saxagliptin, alogliptin); can be used in renal impairment • djustment required for linagliptin	Oral	High	• Pancreatitis has been reported in clinical trials but causality has not been estab Discontinue if pancreatitis is suspected • Joint pain • Bullous pemphigoid (postmarketing): discontinue if suspected

At Diagnosis of Type 2 Diabetes



A1C, glycated hemoglobin;
CPG, clinical practice guidelines

* In individuals **with** atherosclerotic cardiovascular disease, history of heart failure (with reduced ejection fraction) or chronic kidney disease, agents with cardiorenal benefits (Fig 2a and 2b) may be considered (see 2020 Update – The Users Guide)
† Unintentional weight loss should prompt consideration of other diagnoses (e.g. type 1 diabetes or pancreatic disease) †† Reassess need for ongoing insulin therapy once type of diabetes is established and response to health behaviour interventions is assessed

2020

Update: Reviewing, Adjusting or Advancing Therapy

Regular Review

- Assess glycemic control, cardiovascular and renal status
- Screen for complications (eyes, feet, kidneys)
- Review efficacy, side effects, safety and ability to take current medications
- Reinforce & support healthy behaviour interventions

if A1C NOT at Target
and/or
Change in Clinical Status ← NEW

Adjust or Advance Therapy[1]

NEW → ASCVD, CKD or HF, OR Age >60 with 2 CV risk factors[2]

NEW → ADD or SUBSTITUTE AHA with demonstrated cardiorenal benefits (see Fig 2b)

A1C above target and glucose lowering required

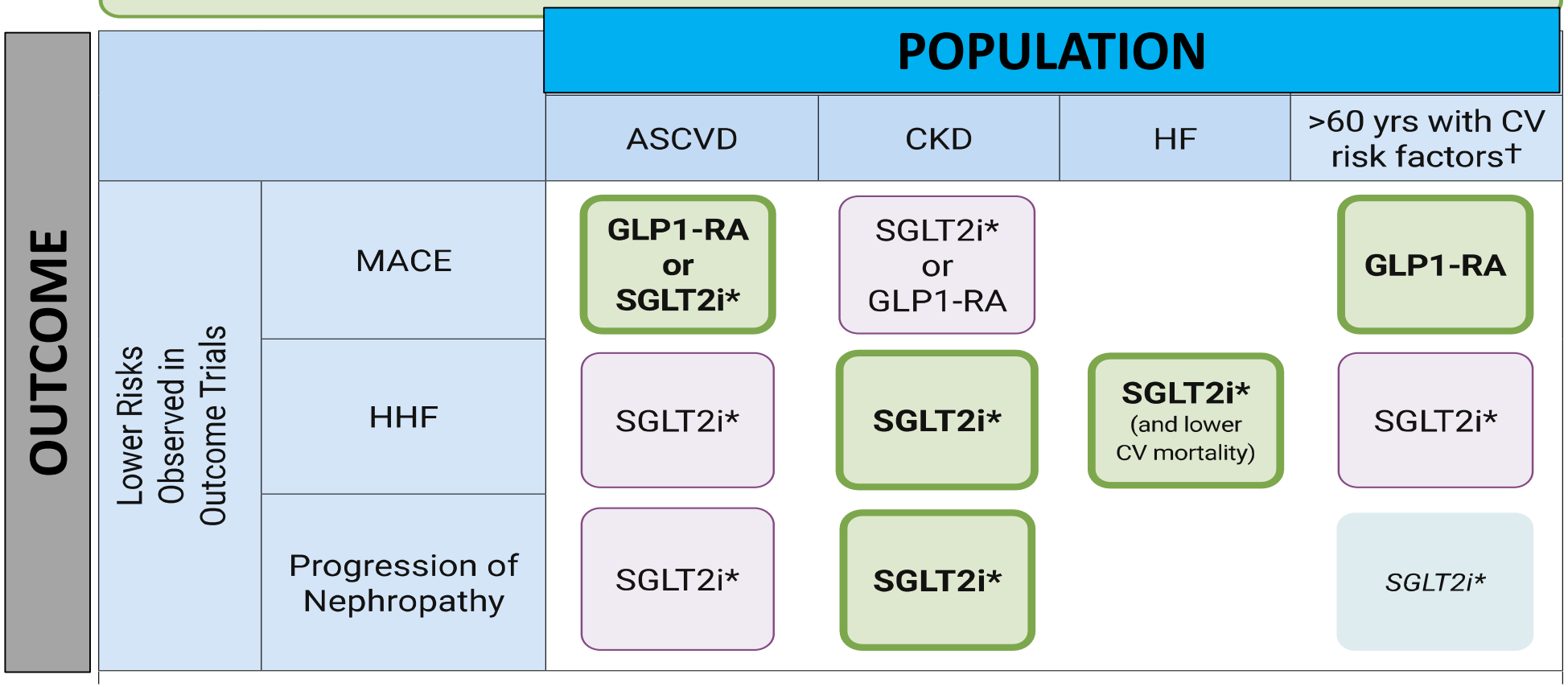
ADD or SUBSTITUTE AHA[3] according to clinical priorities[4]
start insulin for symptomatic hyperglycemia and/or metabolic decompensation (fig 3)

1. Changes in clinical status may necessitate adjustment of glycemic targets and/or deprescribing
2. Tobacco use; dyslipidemia (use of lipid modifying therapy or a documented untreated LDL ≥3.4 mmol/L, or HDL-C <1.0 mmol/L for men and <1.3 mmol/L for women, or triglycerides ≥2.3 mmol/L); or hypertension (use of blood pressure drug or untreated SBP ≥140 mm Hg or DBP ≥95 mmHg)
3. All AHA's have Grade A evidence for effectiveness to reduce blood glucose levels
4. Consider degree of hyperglycemia, costs and coverage, renal function, comorbidity, side effect profile, and potential for pregnancy

2020

Update: For People with ASCVD, CKD or HF, OR >60yrs and 2 CV risk factors

ADD or SUBSTITUTE AHA with demonstrated cardiorenal benefits (see Figure 2B)



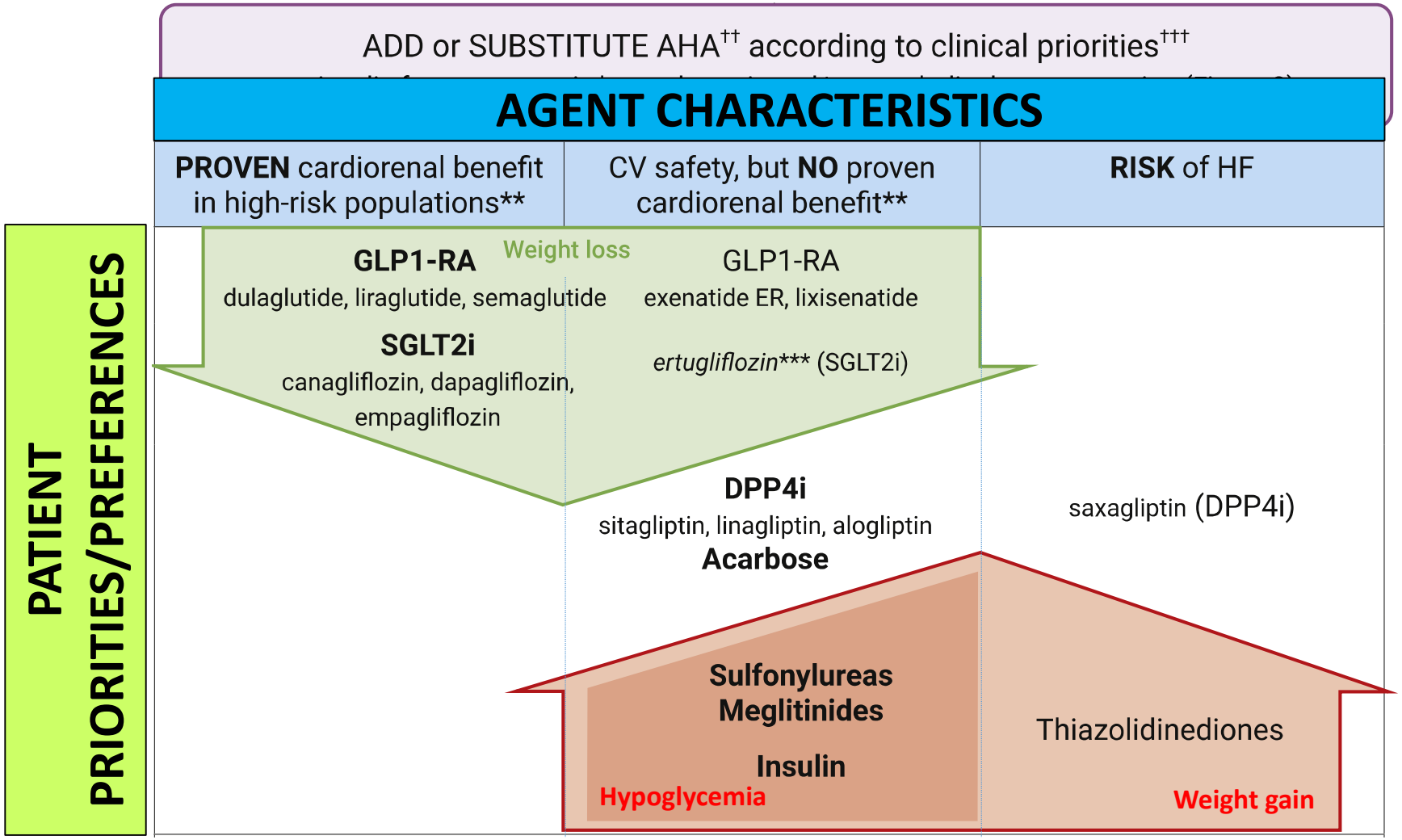
Highest level of evidence: Grade A | Grade B | *Grade C or D*

*Initiate only if eGFR >30 ml/min/1.73m^2

Where additional glucose lowering is required

†† All AHA's have Grade A evidence for effectiveness to reduce blood glucose levels

††† Consider degree of hyperglycemia, costs and coverage, renal function, comorbidity, side effect profile, and potential for pregnancy



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** In CV outcome trials performed in people with ASCVD, CKD, HF or at high CV risk

*** VERTIS (CV outcome trial for ertugliflozin) presented at ADA June 2020 showed non-inferiority for MACE. Manuscript not published at time of writing.

Summary of Outcome Trials Showing Cardiorenal Benefits

2020

Agent (outcome trial)	Population	Clinical outcomes (HR [95% CI] vs placebo)						
		MACE	CV mortality	All-cause mortality	Fatal/ nonfatal MI	Fatal/ nonfatal stroke	Hosp HF	Progression of CKD
GLP1-RA								
Exenatide (EXSCEL)	**CVD (73%) or CV risk factors**	0.91* (0.83-1.00)	0.88 (0.76–1.02)	**0.86 (0.77-0.97)**	0.97 (0.85–1.10)	0.85 (0.70–1.03)	–	–
Liraglutide (LEADER)	**CVD (72%) or CV risk factors**	**0.87* (0.78-0.97)**	**0.78 (0.66–0.93)**	**0.85 (0.74-0.97)**	0.86 (0.73–1.01)	0.86 (0.71–1.04)	–	–
Semaglutide SC (SUSTAIN 6)	**CVD (59%) or CV risk factors**	**0.74* (0.58-0.95)**	0.98 (0.65–1.48)	1.05 (0.74-1.50)	0.74 (0.51-1.08)†	**0.61 (0.38-0.99)†**	–	–
Semaglutide Oral (PIONEER 6)	**CVD (85%) or CV risk factors**	0.79* (0.57-1.11)	**0.49 (0.27–0.92)**	**0.50 (0.31-0.84)**	1.18 (0.73–1.90)	0.74 (0.45–1.22)	–	–
Dulaglutide (REWIND)	**CVD (31.5%) or CV risk factors**	**0.88* (0.79-0.99)**	0.91 (0.78–1.06)	0.90 (0.80-1.01)	0.96 (0.79–1.16)†	**0.76 (0.61–0.95)†**	–	–
Albiglutide (HARMONY) (withdrawn from market)	**CVD or PVD**	**0.78* (0.68-0.90)**	0·93 (0·73–1·19)	0.95 (0.79-1.16)	0.96 (0.79–1.15)	**0.76 (0.62–0.94)**	–	–
SGLT2i								
Empagliflozin (EMPA-REG)	**CVD**	**0.86* (0.74-0.99)**	**0.62 (0.49-0.77)**	**0.68 (0.57-0.82)**	0.87 (0.70–1.09)	1.18 (0.89–1.56)	**0.65 (0.50-0.85)**	**0.61 (0.53-0.70)**
Canagliflozin (CANVAS PROGRAM)	**CVD (66%) or CV risk factors**	**0.86* (0.75-0.97)**	0.87 (0.72-1.06)	0.87 (0.74-1.01)	0.89 (0.73–1.09)	0.87 (0.69–1.09)	**0.67 (0.52-0.87)**	**0.73 (0.67-0.79)**
Canagliflozin (CREDENCE)	CKD (eGFR 30-90 + proteinuria)	0.80 (0.67-0.95)	0.78 (0.61-1.00)	0.83 (0.68-1.02)	–	–	0.61 (0.47-0.80)	0.70*[2] (0.59-0.82)
Dapagliflozin (DECLARE-TIMI)	CVD (41%) or CV risk factors	0.93* (0.84-1.03)	0.98 (0.82-1.17)	0.93 (0.82-1.04)	0.89 (0.77–1.01)	1.01 (0.84–1.21)	0.73 (0.61-0.88)	0.76 (0.67-0.87)
Dapagliflozin (DAPA-HF)	CHF (reduced EF) ± DM (42%)	–[1]	0.82 (0.69-0.98)	0.83 (0.71-0.97)	–	–	0.70 (0.59-0.83)	0.71 (0.44-1.16)

For People with T2D and ASCVD

Both GLP1-RA & SGLT2i reduce risk of MACE

presentation

- Case
- Historical perspective
- Where we are in 2022
- ***Who needs insulin***
- ***When to start***
- New guidelines 2022 sept diabetes care

Unchanged: Initial choice of therapy

Symptomatic Hyperglycemia

and/or

Metabolic Decompensation

- Polyuria
- Polydipsia
- Weight loss
- Volume depletion

Start INSULIN +/- metformin

When to start insulin

1)Metabolic decompensation

2) Preconception

If a1c not at target

3) Evidence of ketoacidosis

4) Poor control despite oral agents and glp1 agonist

5) All of the above

Q10: When should initiation of insulin be considered?

- Symptomatic hyperglycemia and/or metabolic decompensation (e.g. unintentional weight loss)
- Relative insulin deficiency with severely elevated A1C and fasting glucose, even without symptomatic hyperglycemia and/or metabolic decompensation
- Unclear diagnosis (i.e. type 1 diabetes or latent autoimmune diabetes in adults [LADA] are being considered)
- Conception planning or during pregnancy
- When noninsulin AHA are unable to achieve target glycemic control

Continued on next slide

If starting insulin

1) Best to start with mealtime insulin
2) Best to start with basal insulin only
3) Best to start with multiple daily injections
4) Insulin pump is the best way to go

Clinical Practice Guidelines 2020 Updates: Initiating Insulin Treatment in Patients With T2D

What are the recommendations for patients with T2D who need to initiate insulin?

DIABETES CANADA

Therapeutic considerations

- Potentially greatest A1C reduction and (theoretically) no maximum dose
- Dose escalation may be limited by hypoglycemia
- Numerous formulations and delivery systems allow for regimen flexibility

Cautions

- Education required regarding blood glucose monitoring and preventing, detecting and treating hypoglycemia
- Numerous formulations and delivery systems increases complexity and risk for errors

In people not achieving glycemic targets on existing noninsulin antihyperglycemic medication(s), the addition of a basal insulin regimen should be considered over premixed insulin or bolus-only regimens, if lower risk of hypoglycemia and/or preventing weight gain are priorities

Lipscombe L et al. *Can J Diabetes* 44 (2020) 575–591.

Clinical Advantages of Second-Generation Ba

What are the clinically meaningful benefits of second-generation basal insulin analogues compared to first-generation?

Second-generation basal analogues have advantages over previous generations

- **Extended action profiles**
- **Comparable glycemic control**
- **Reduced risk of hypoglycemia**
- **Reduced number of injections**
- **Smaller injection volumes**

Newer second-generation basal insulin analogues Gla-300 and IDeg have demonstrated increased stability, which translates to:

Increased convenience and flexibility in timing of administration

Potential for morning dosing, without adversely impacting efficacy or safety

Reduced risk of severe and nocturnal hypoglycemia

Potentially overcoming key barriers to insulin initiation and titration

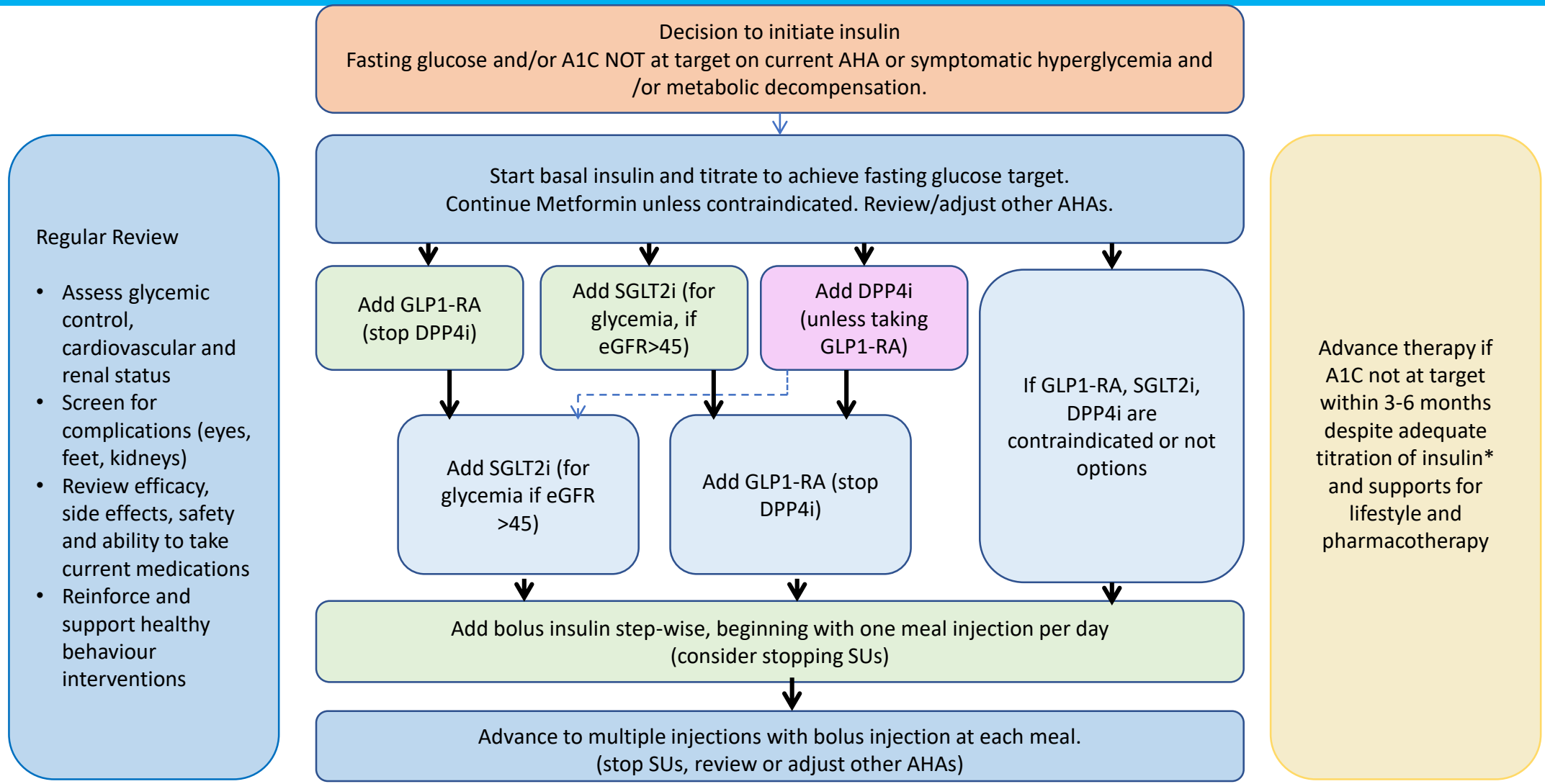
Gla-300: insulin glargine U300; IDeg: insulin degludec.

Kalra S et al. *Diabetes Ther*. 2021 Feb;12(2):465-485; Cheng AYY et al. *Adv Ther* (2019) 36:1018–1030.

Users' Guide

Dose titration and use of combination products

Starting or Advancing Insulin in Type 2 Diabetes



Highest level of evidence: Grade A | Grade B | Grade C or D

* Titration of basal insulin to achieve target FPG without hypoglycemia
† And titrate dose of GLP1-RA as tolerated
†† Or fixed ratio combination
††† If eGFR >30ml/min/1.73m^2, may be used for cardiorenal benefit
** Sulfonylureas or meglitinides

Return to Main Menu

Real-World Burden of Hypoglycemia in

Incidence of hypoglycemia among adults with diabetes taking insulin may be higher than previously thought

InHypo-DMPQ Study
(Canada)

N=552

T1D patients
n=94

T2D patients
n=456

Total hypoglycemia:

65% **experienced ≥1 hypoglycemia event**
95% CI: 61.0 to 69.0

Overall hypoglycemia rate:
35.1 events/person-year
95% CI: 34.6 to 35.6

66%
95% CI: 58.2 to 66.3
Daytime hypoglycemia
(22.7 events/person-year)
95% CI: 22.2 to 23.0

41%
95% CI: 36.9 to 45.1
Nocturnal hypoglycemia
(12.6 events/person-year)
95% CI: 12.3 to 12.9

Severe hypoglycemia:

40% **experienced ≥1 hypoglycemia event**
95% CI: 36.5 to 44.7

Overall hypoglycemia rate:
2.5 events/person-year
95% CI: 2.3 to 2.6

38%
95% CI: 34.0 to 42.1
Daytime hypoglycemia
(1.5 events/person-year)
95% CI: 1.4 to 1.6

27%
95% CI: 23.4 to 30.8
Nocturnal hypoglycemia
(1.0 events/person-year)
95% CI: 0.9 to 1.0

InHypo-DMPQ: InHypo-DMP Person with Diabetes Mellitus Questionnaire. CI: confidence interval.
Ratzki-Leewing A et al. *BMJ Open Diab Res Care* 2018;6:e000503.

presentation

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PLACE OF INSULIN IN TYPE 2 DIABETES

The use of a GLP-1 RA should be considered prior to initiation of insulin.

When initiating insulin, start with a basal insulin and intensify the dose in a timely fashion, titrating to achieve the individualised fasting glycaemia target set for every person.

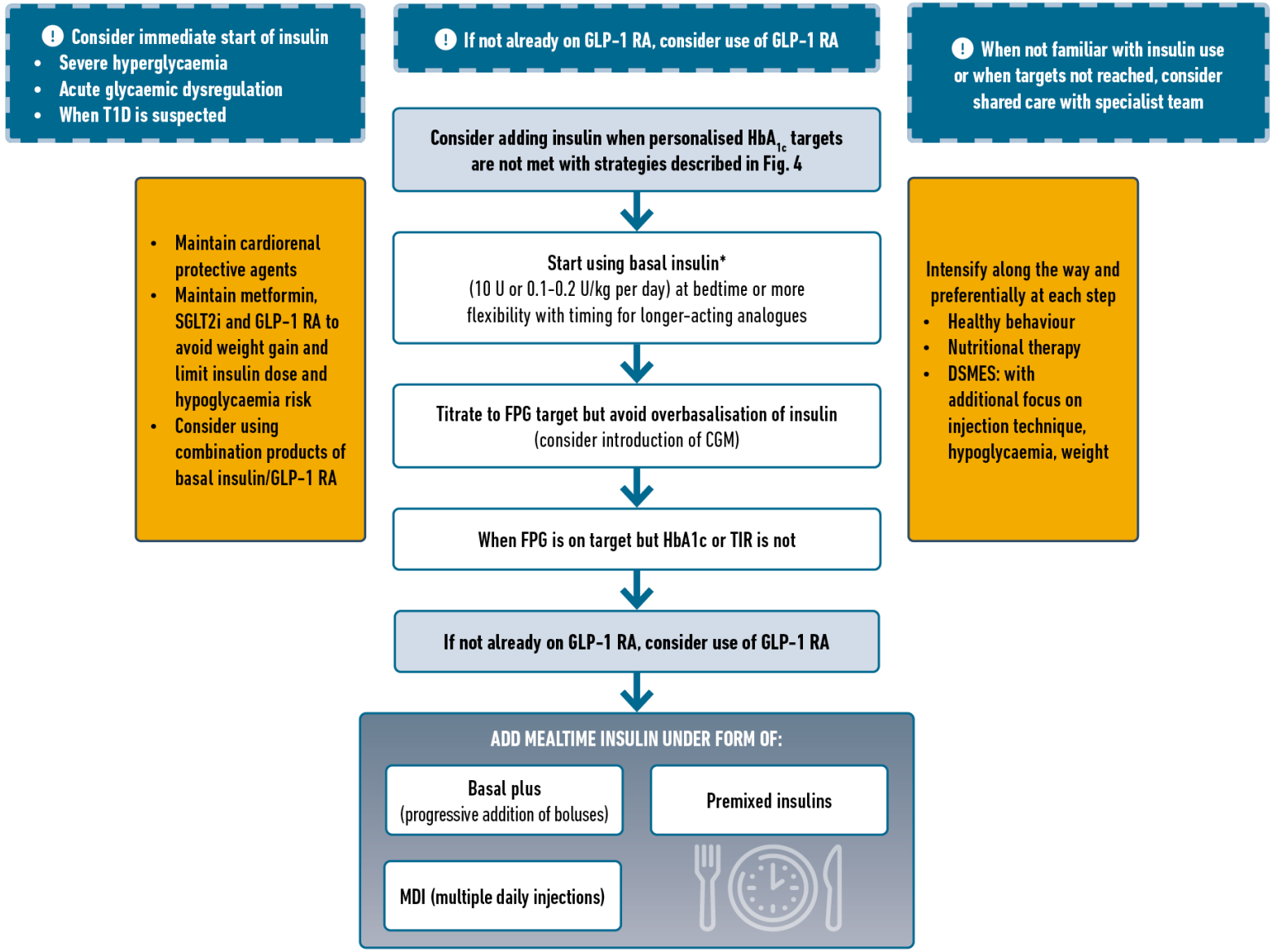
When insulin is initiated, continue organ-protective glucose-lowering medications and metformin.

Refer for DSMES when initiating insulin or advancing to basal-bolus therapy.

Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

Diabetes Care 2022; https://doi.org/10.2337/dci22-0034. *Diabetologia* 2022; https://doi.org/10.1007/s00125-022-05787-2.

FIGURE 5: PLACE OF INSULIN[1]



*NPH Insulin or preferably analogue to reduce nocturnal hypoglycaemia risk

CGM, Continuous Glucose Monitoring; DSMES, Diabetes Self-Management Education and Support; FPG, Fasting Plasma Glucose; GLP-1 RA, Glucagon-Like Peptide-1 Receptor Agonist; SGLT2i, Sodium-Glucose Cotransporter-2 Inhibitor; T1D, Type 1 Diabetes; TIR, Time in Range.

1, More details can be found in Davies M, D'Alessio DA, Fradkin J et al. Management of Hyperglycaemia in Type 2 Diabetes, 2018. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). Diabetologia 2018 61(12):2461–2498, and American Diabetes Association Professional Practice Committee, Draznin B, Aroda VR et al. 9. Pharmacologic Approaches to Glycemic Treatment: Standards of Medical Care in Diabetes-2022. Diabetes Care. 2022 Jan 1;45(Suppl 1):S125–43.

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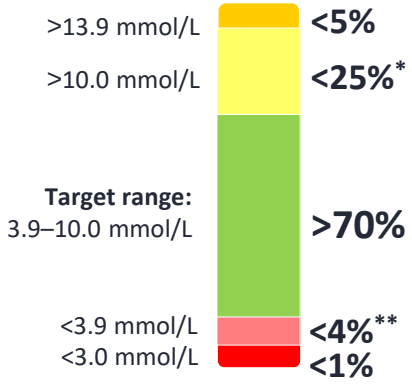
Time in Range Targets for People With Diabetes

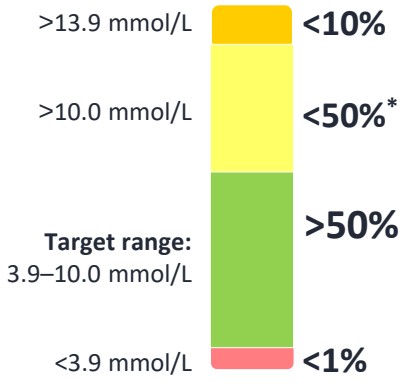
What time in range goals should my patients aim for?

Time in range goals will be different for every person and may depend on medication, diabetes type, diet, age, general health, and hypoglycemia risk. Thus, targets can be personalized to meet individual needs.

Most people with diabetes:



Older/high-risk people with diabetes:

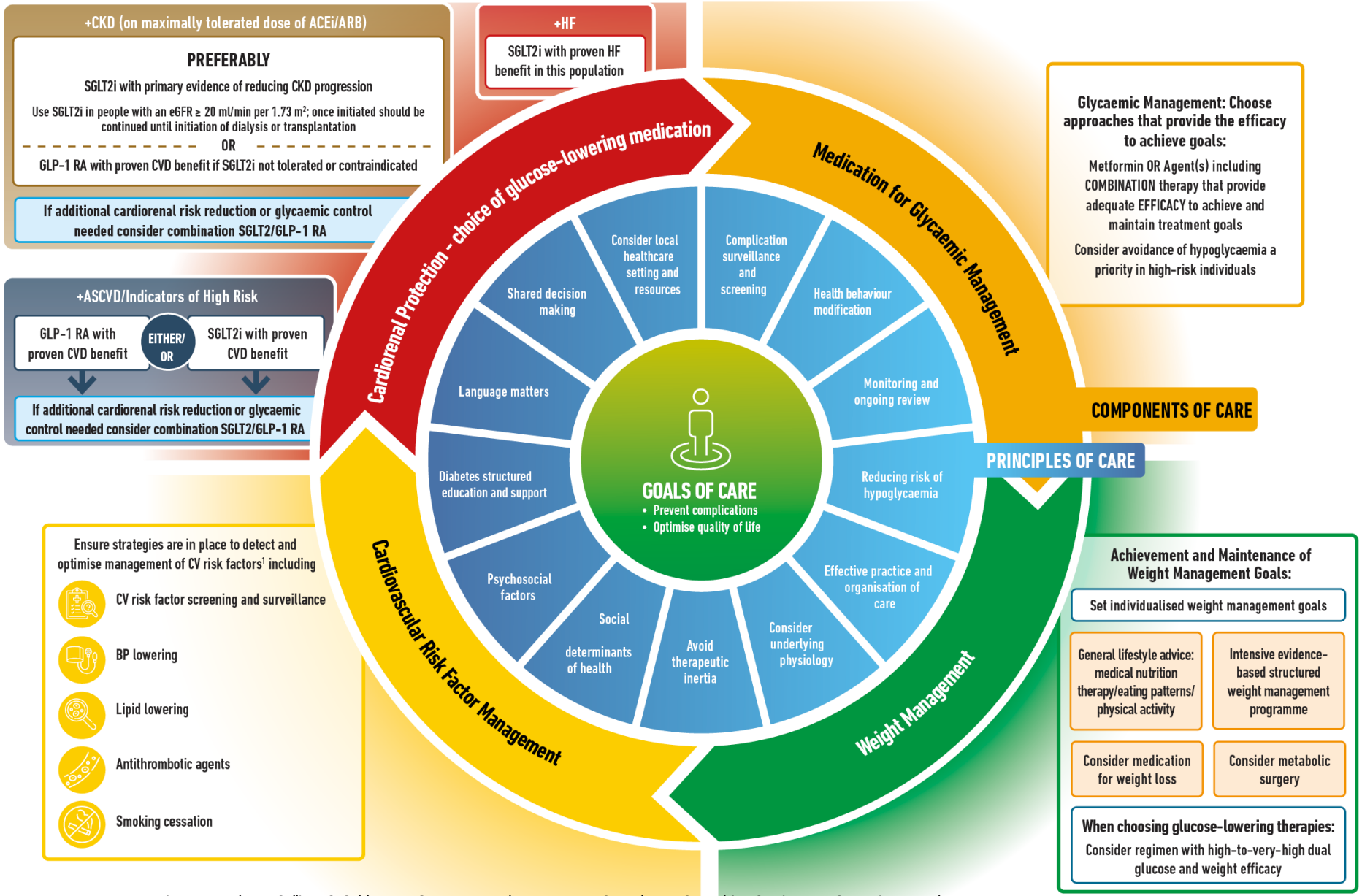


Click for information on factors that impact the daily life of people with type 2 diabetes

Primary goal for effective and safe glucose control is to ↑ time in range and ↓ time below range

*Includes percentage of values >13.9 mmol/L; **includes percentage of values <3.0 mmol/L.
Note: Targets are tighter for pregnancy.
Image adapted from: Battelino T et al. *Diabetes Care*. 2019 Aug;42(8):1593-1603.

FIGURE 4: HOLISTIC PERSON-CENTRED APPROACH TO T2DM MANAGEMENT



1 = American Diabetes Association Professional Practice Committee. 10. Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2022. Diabetes Care. 2022 Jan 1;45(Suppl 1):S144–74.

ACEi, Angiotensin-Converting Enzyme Inhibitor; ARB, Angiotensin Receptor Blockers; ASCVD, Atherosclerotic Cardiovascular Disease; BP, Blood Pressure; CKD, Chronic Kidney Disease; CV, Cardiovascular; eGFR, Estimated Glomerular Filtration Rate; GLP-1 RA, Glucagon-Like Peptide-1 Receptor Agonist; HF, Heart Failure; SGLT2i, Sodium-Glucose Cotransporter-2 Inhibitor; T2D, Type 2 Diabetes.

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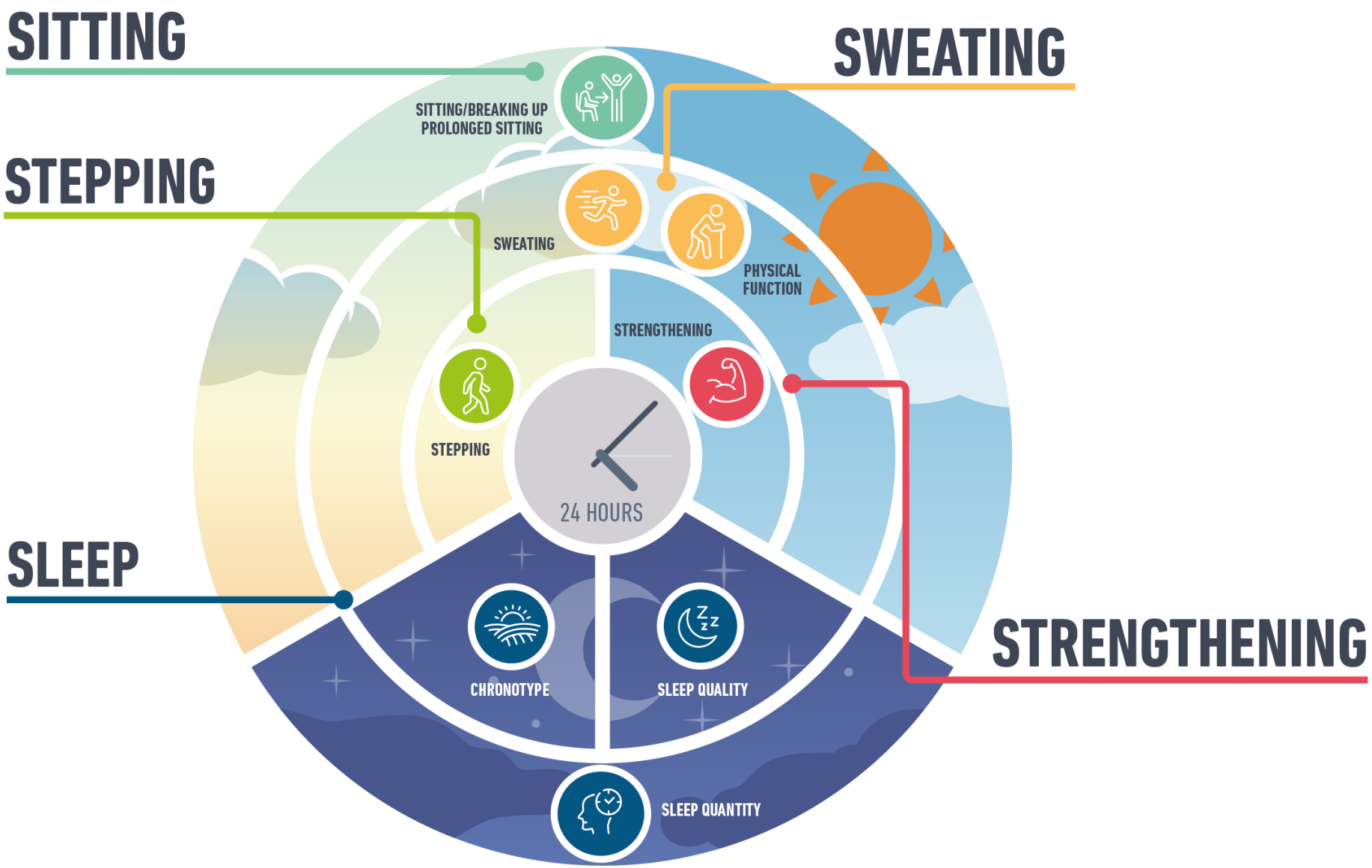
FIGURE 2: IMPORTANCE OF 24-HOUR PHYSICAL BEHAVIOURS FOR TYPE 2 DIABETES



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Diabetes Care.

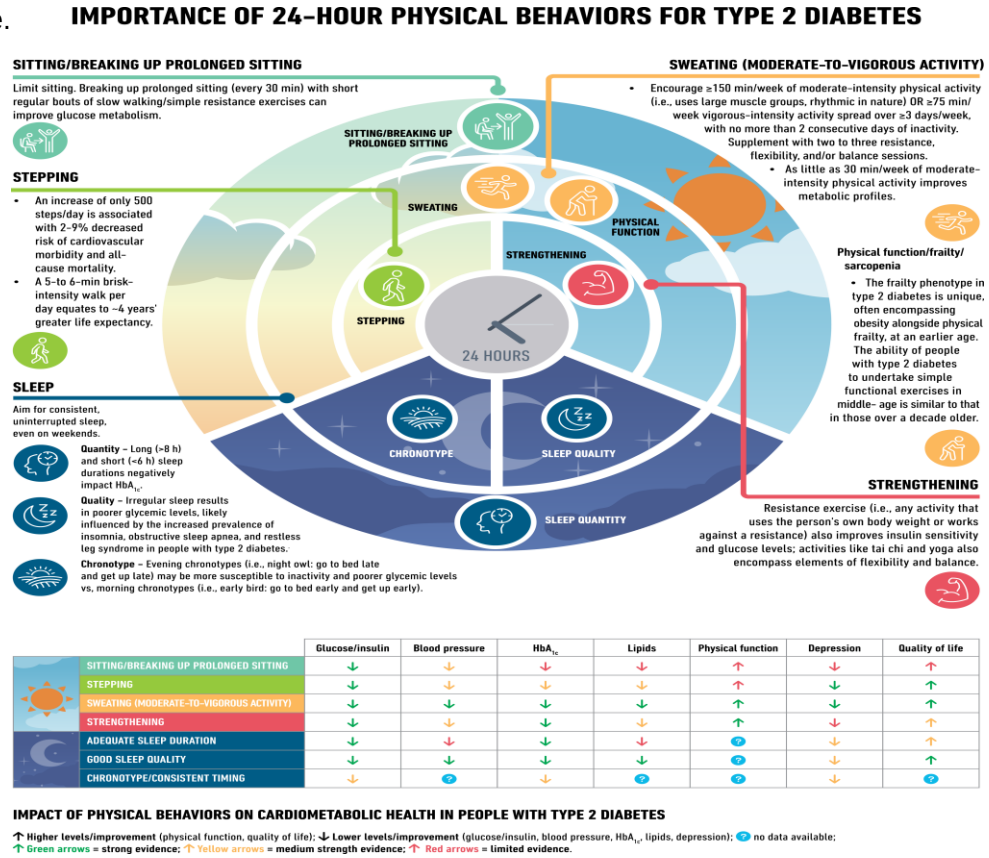
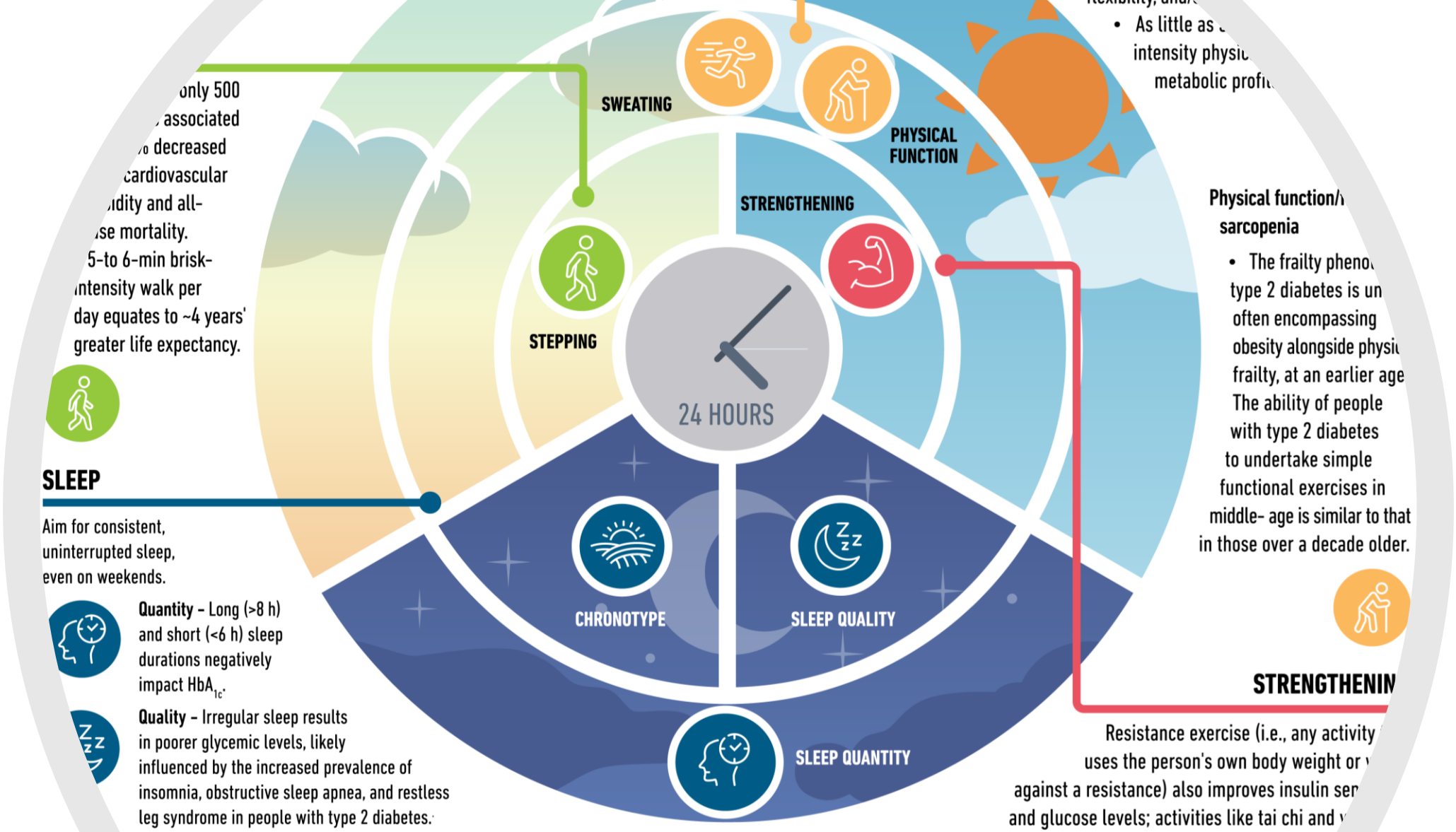


Figure Legend:

Importance of 24-h physical behaviors for type 2 diabetes.



only 500
associated
decreased
cardiovascular
idity and all-
se mortality.
5-to 6-min brisk-
ntensity walk per
day equates to ~4 years'
greater life expectancy.

SLEEP

Aim for consistent, uninterrupted sleep, even on weekends.

Quantity – Long (>8 h) and short (<6 h) sleep durations negatively impact HbA_{1c}.

Quality – Irregular sleep results in poorer glycemic levels, likely influenced by the increased prevalence of insomnia, obstructive sleep apnea, and restless leg syndrome in people with type 2 diabetes.

Chronotype – Evening chronotypes (i.e., night owl: go to bed late nd get up late) may be more susceptible to inactivity and poorer glycemic levels morning chronotypes (i.e., early bird: go to bed early and get up early).

- As little as
intensity physi
metabolic profi

Physical function/
sarcopenia

- The frailty pheno
type 2 diabetes is un
often encompassing
obesity alongside physi
frailty, at an earlier age
The ability of people
with type 2 diabetes
to undertake simple
functional exercises in
middle- age is similar to that
in those over a decade older.

STRENGTHENIN

Resistance exercise (i.e., any activity
uses the person's own body weight or
against a resistance) also improves insulin ser
and glucose levels; activities like tai chi and
encompass elements of flexibility a

AND GUESS WHAT EXERCISE IS IN

r Look

Thank you ;Any Questions