Emerging Medications and Technology for Improved Diabetes Management

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Disclosures

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- *Has no relevant financial relationships with ineligible companies to disclose.*
- *There are no conflicts of interest related to this educational content.*

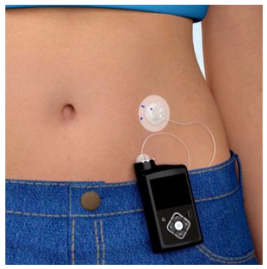
Objectives

1. Assess the impact of emerging diabetes technologies on disease management and interprofessional collaboration.

2. Evaluate the latest advancements in diabetes pharmacotherapy and their role in optimizing patient outcomes through an individualized, patient-centered approach.

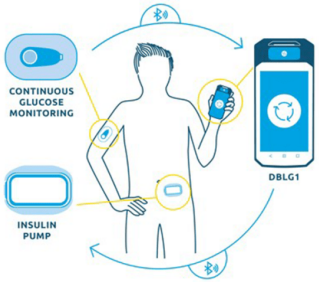
3. Define perioperative risks associated with SGLT2 inhibitors & GLP-1 receptor agonists.

EMERGING DIABETES TECHNOLOGY



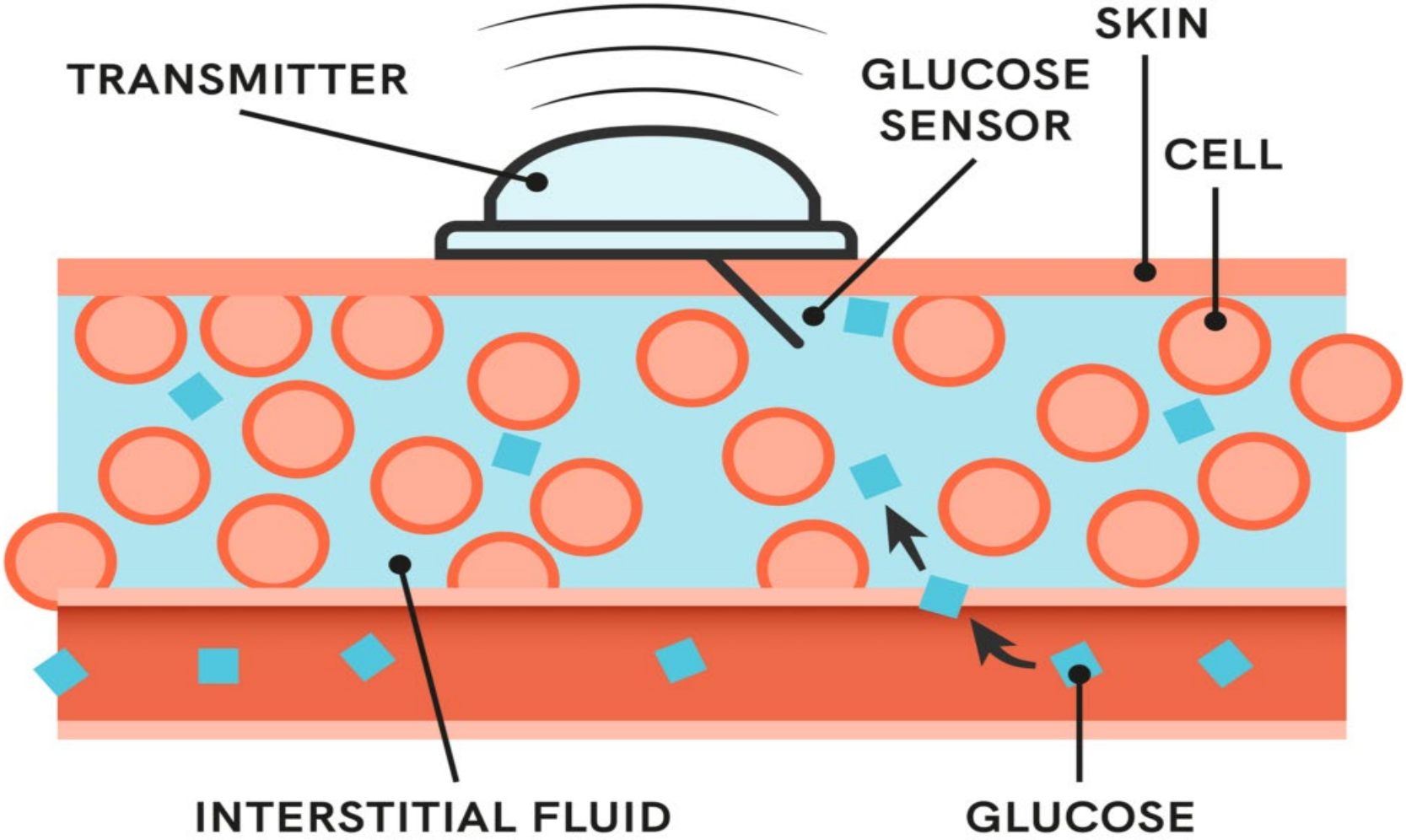
Insulin Pumps

Continuous Glucose Monitors (CGMs)



Automated Insulin Delivery (AID) Systems

Smart Insulin Pens



https://glucare.health/diabetes/

CGMs Benefits & Considerations

Benefits

- Real time cause & effect
- A1c improvements
- Alerts
- Patterns
- Flexibility
- Approved for insulin dosing

Considerations

- Cost
- Alarm fatigue
- Technology readiness level
- Compatibility
- Benefits increase with education

Shaw et al, 2024

Types of CGMs

Personal

Professional

OTC Options

Application Options

Continuous Glucose Monitors (CGMs)

10 or 15 days

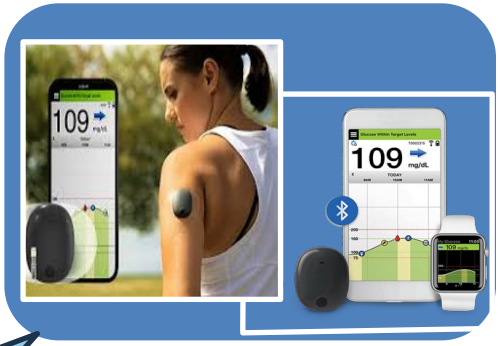
Dexcom

https://www.dexcom.com/

14 days

Freestyle

https://www.freestyle.abbott/us-en/home.html



6 or 12 MONTHS

Eversense

https://www.eversensecgm.com/

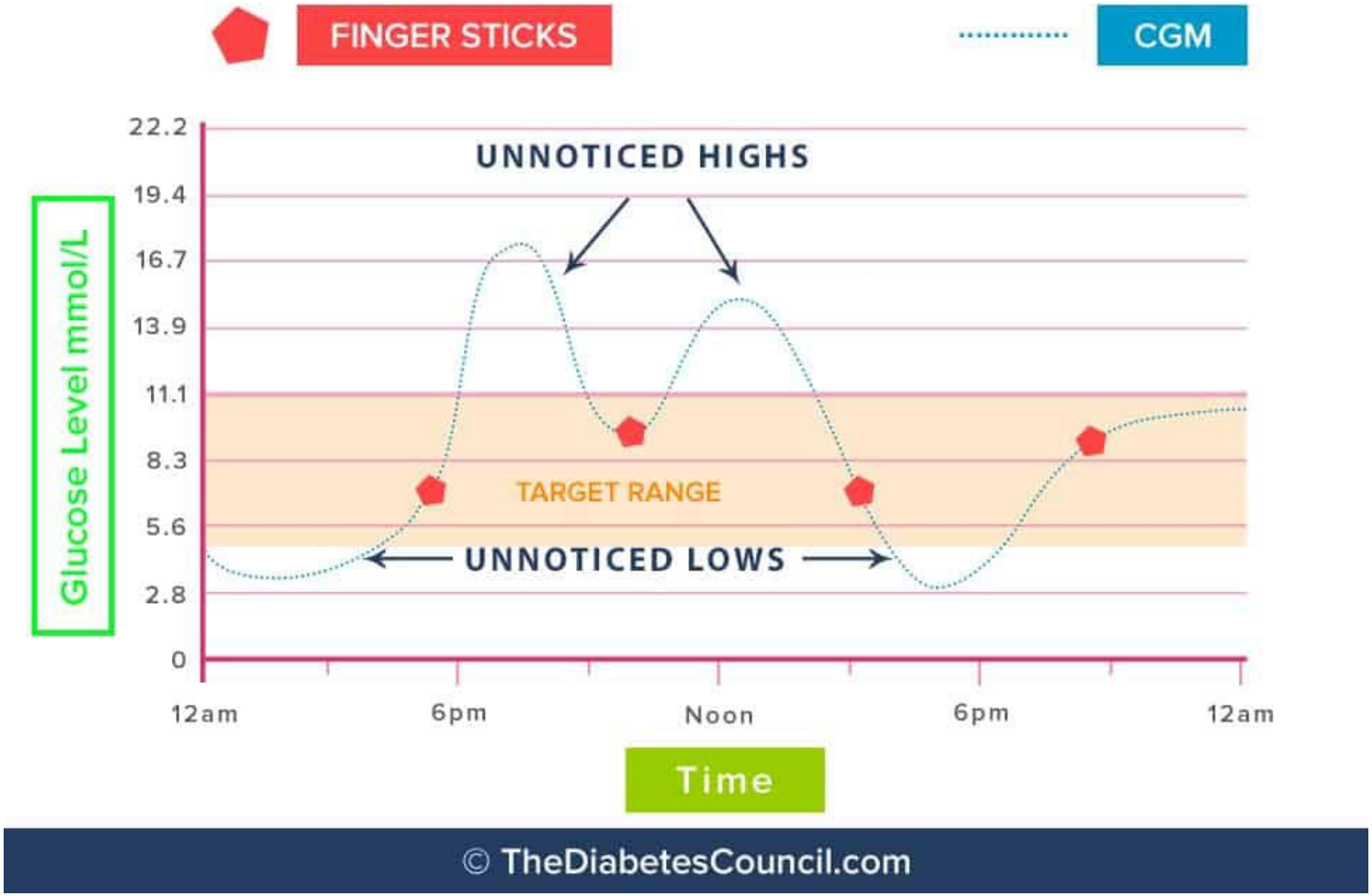
7 days

AID

Medtronic

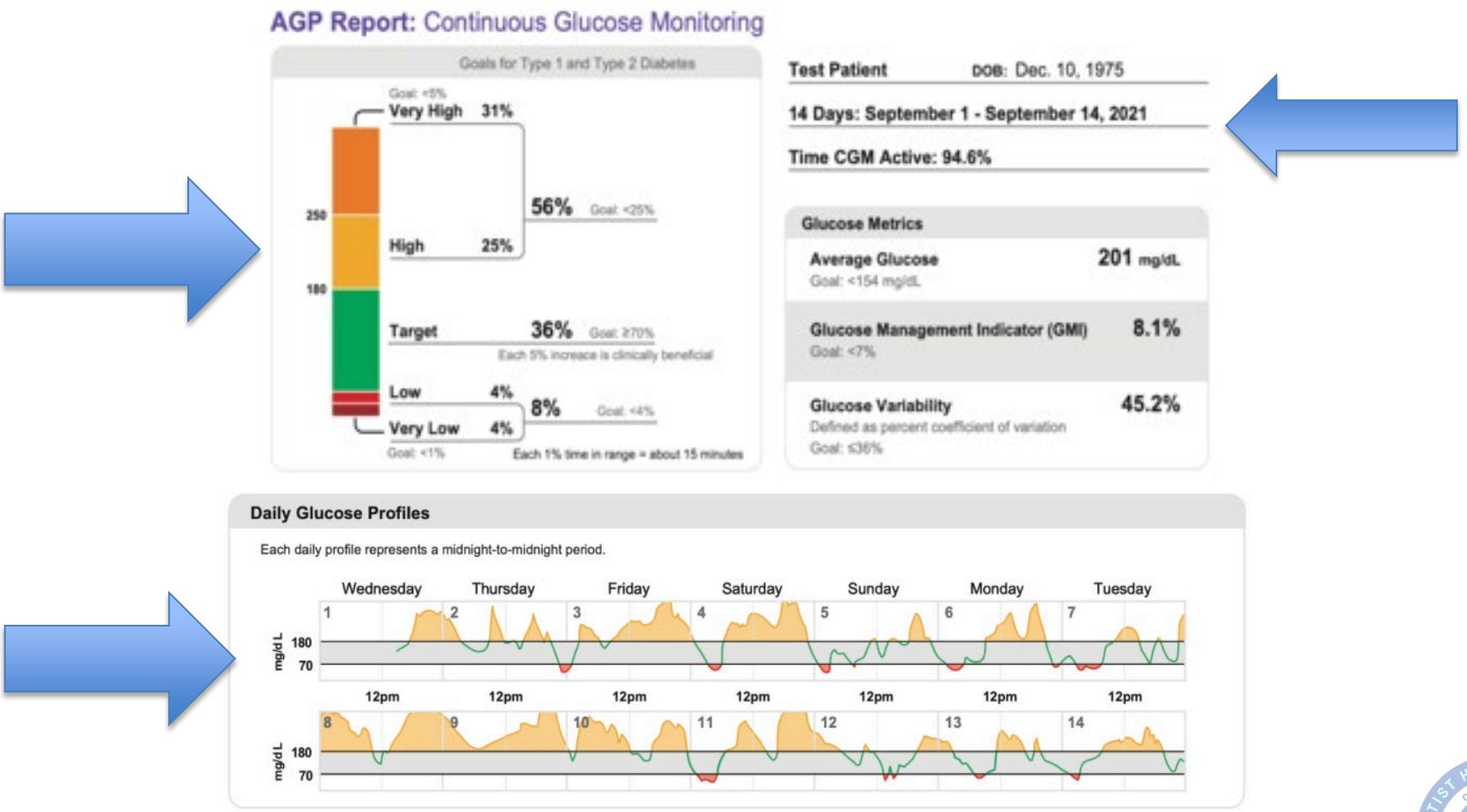
https://www.medtronicdiabetes.com/

https://www.sibionicscgm.com/a/blog/are-continuous-glucose-monitors-accurate-1



https://www.thediabetescouncil.com/continuous-glucose-monitoring-everything-you-need-to-know/

CGMs – Ambulatory Glucose Report



Martens TW, et al. 2025

Time in Range Goals

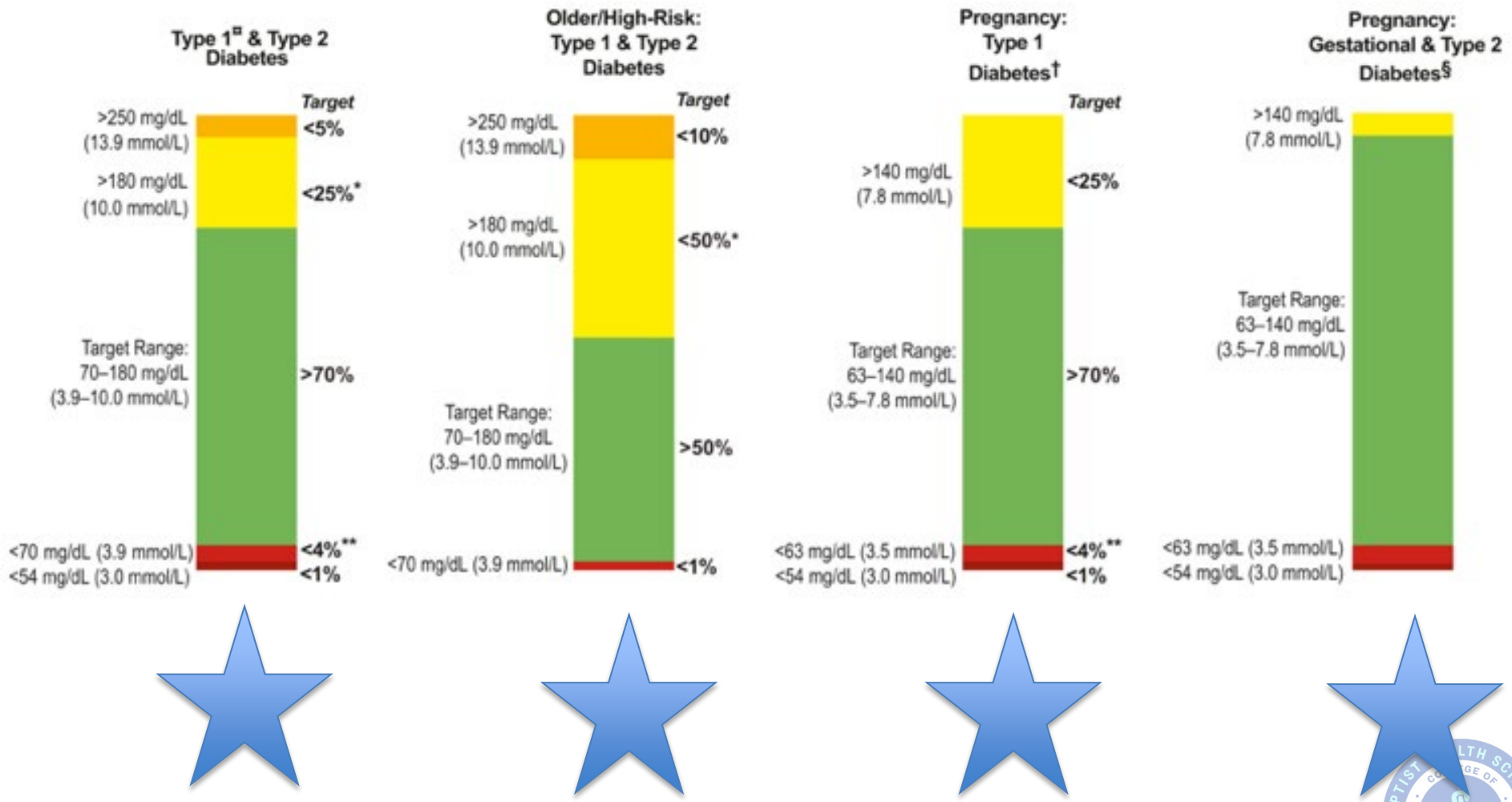
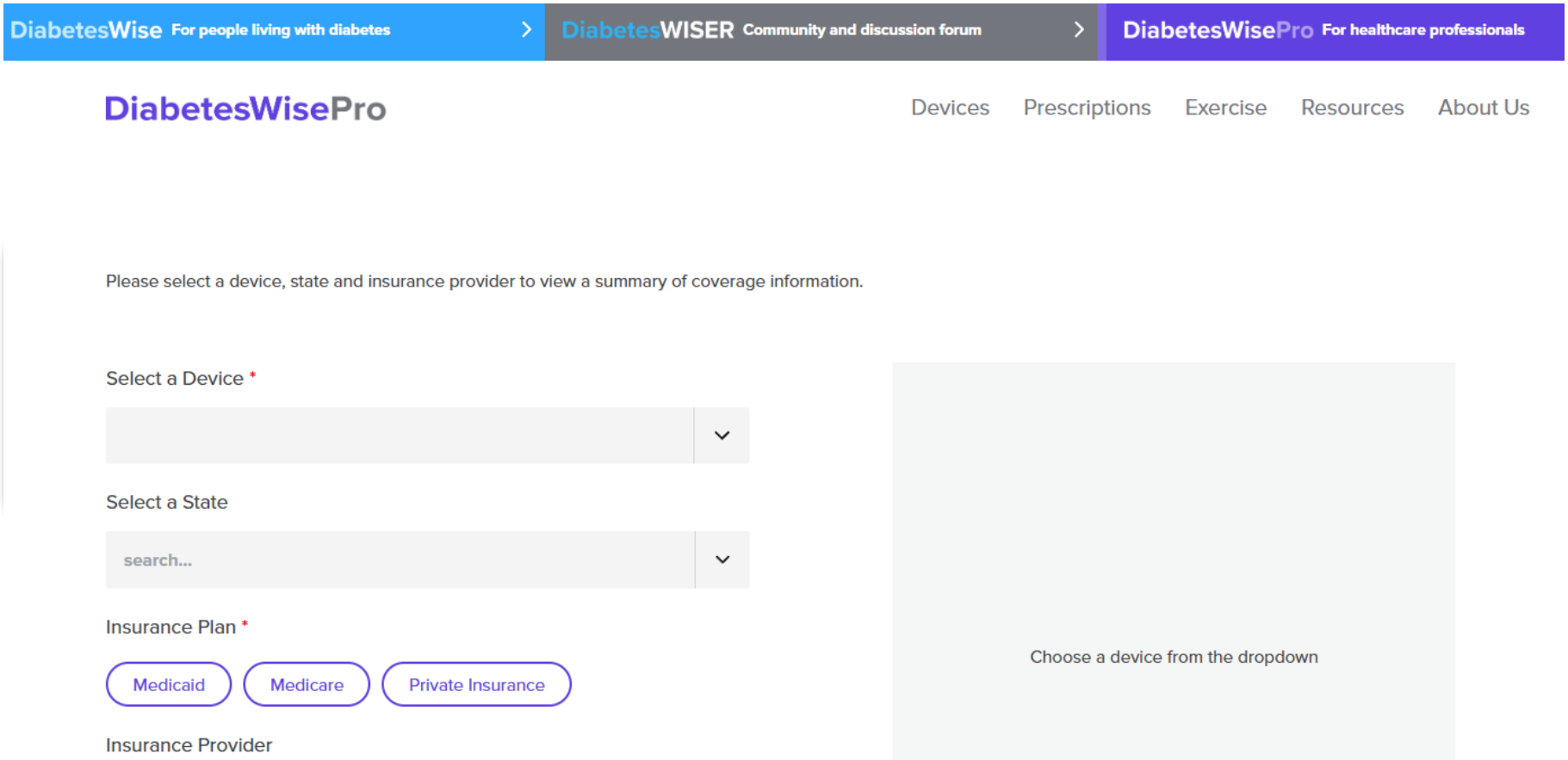


Figure 1: ADA goals using CGM in different types of patients

Manov A, et al. 2023

Prescribing CGMs



Pro.diabeteswise.org

Smart Insulin Pens

Types of Pens

- Connected Insulin Pens
- Insulin Pen Caps

Benefits

- Record doses
- Calculate doses
- Sync with CGMs & provide AGP Reports
- Alerts
- Avoid insulin stacking
- Expiration notification

Shaw et al, 2024

Smart Insulin Pen Candidates

MDI insulin users:

- Miss doses
- Exercise
- Difficulty with dose calculations
- Persistent hyperglycemia
- Random hypoglycemia
- Less comfortable with technology
- Dexterity & vision issues

Smart Insulin Pen Examples

Smart Pens

- [ ] InPen by Medtronic

Smart Pen Caps

- [ ] Unity Pen by Abbott

- [ ] Tempo Smart Button™ by Lilly

https://www.medtronicdiabetes.com/products/inpen-smart-insulin-pen-system
https://www.bigfootbiomedical.com/bigfoot-unity.html
https://www.lillytempo.com/getting-started

Insulin Pumps

Manual System (Open Loop)

- Deliver basal insulin on **preset** settings
- **User-entered** boluses required
- CGM & pump function **independently**

AID Systems (Hybrid Closed-Loop)

- 1. Insulin pump
  2. CGM
  3. Algorithm
- Communication between pump & CGM for **automatic** insulin adjustments
- **Manual** input for carb intake, activity

AID (Hybrid Closed-Loop) Systems

Omnipod 5

Medtronic MiniMed

iLet Bionic Pancreas

Tandem t:slim X2 & Mobi

https://www.tandemdiabetes.com/products/insulin-pumps/tandem-mobi
https://www.omnipod.com/what-is-omnipod/omnipod-5
https://www.betabionics.com/hcp/

AID Considerations

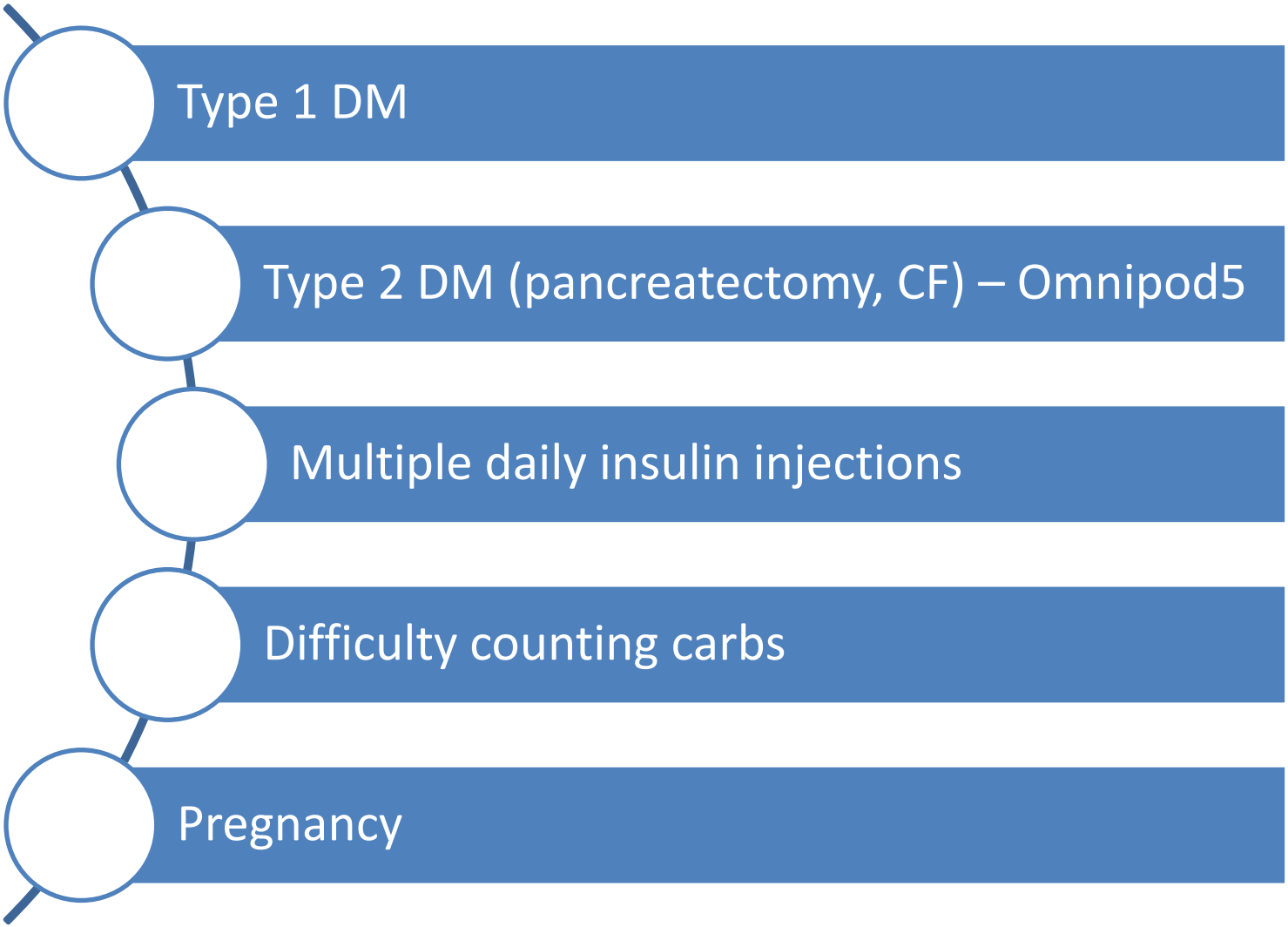
Benefits

- Improved TIR
- A1c improvements
- Lower rates of hypo/hyperglycemia
- Better match physiologic needs
- Less patient anxiety & stress
- More accurate glucose management

- Requires 2 devices
- Alarm fatigue
- Imaging & scans
- Still requires some manual entry

Considerations

Preferred Candidates for AID

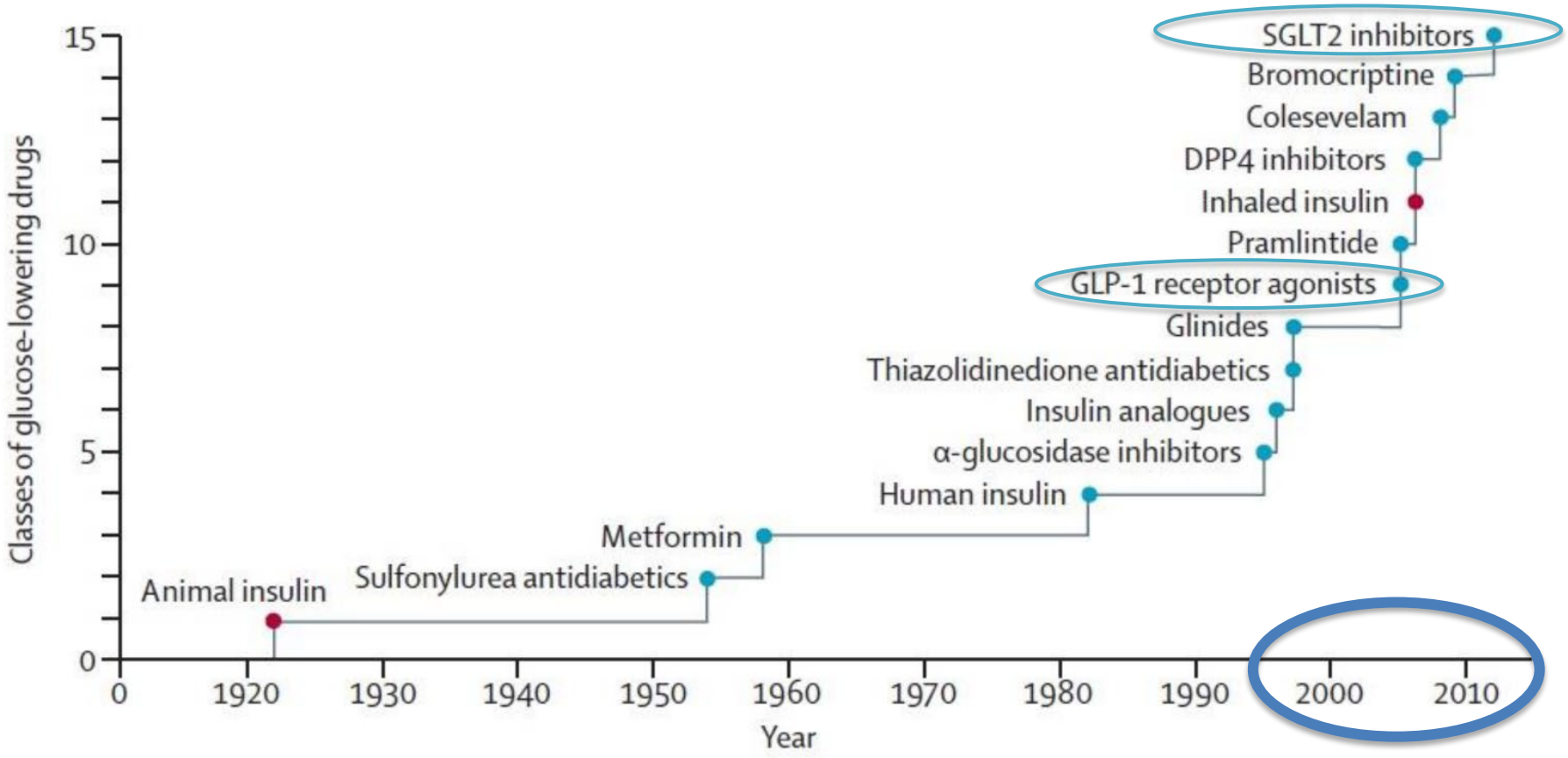


Our Role as Healthcare Providers

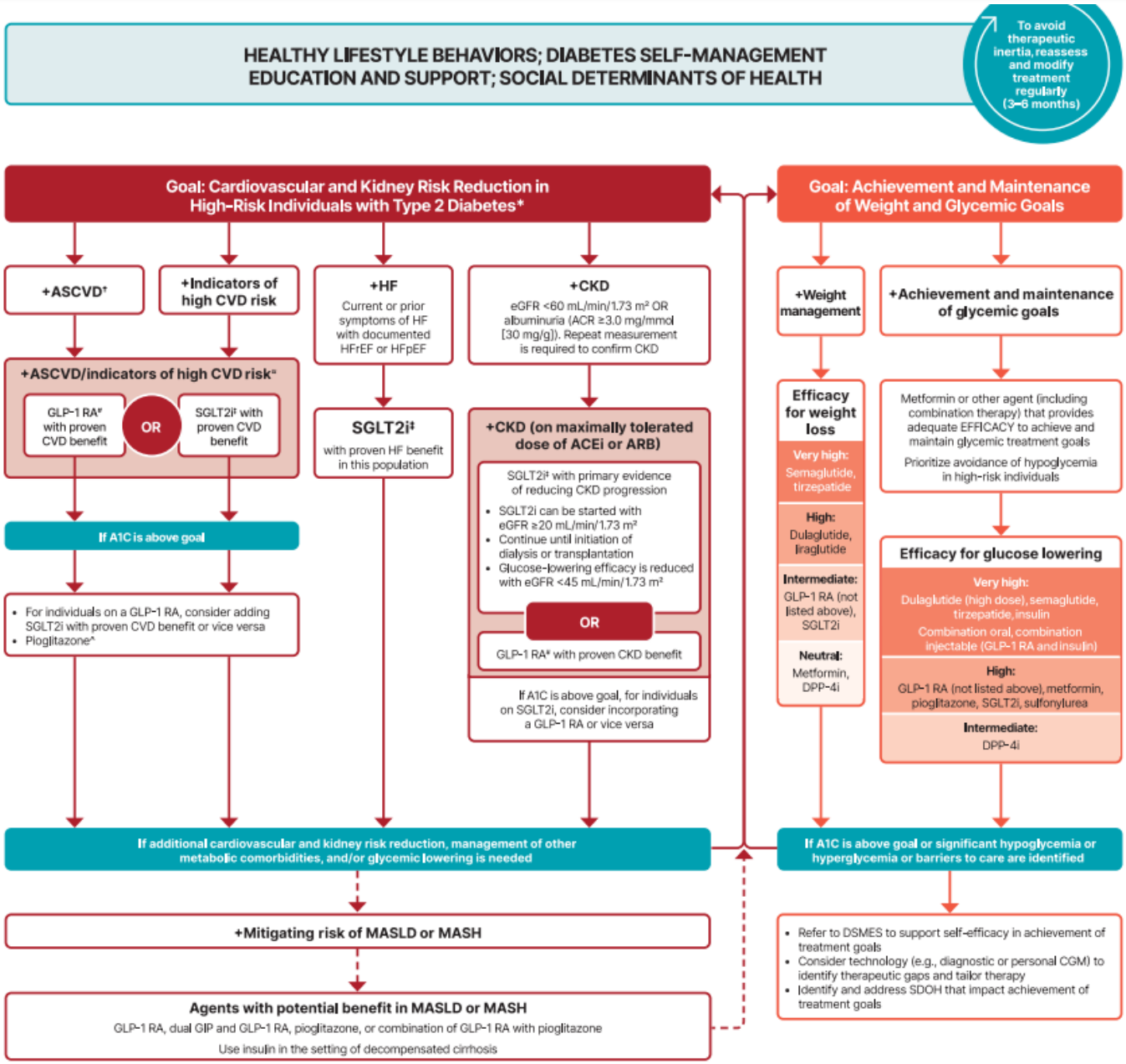
- Identify device candidates
- Provide training & education
- Prescribe BGM, CGM, & smart pens
- Refer for AID systems
- Refer patients to DSMES programs & resources, diabetes tech education & training
- Use AGP report data to make interventions
- Familiarize with billing & coding

DIABETES PHARMACOTHERAPY UPDATES

History of Diabetes Therapeutic Advances

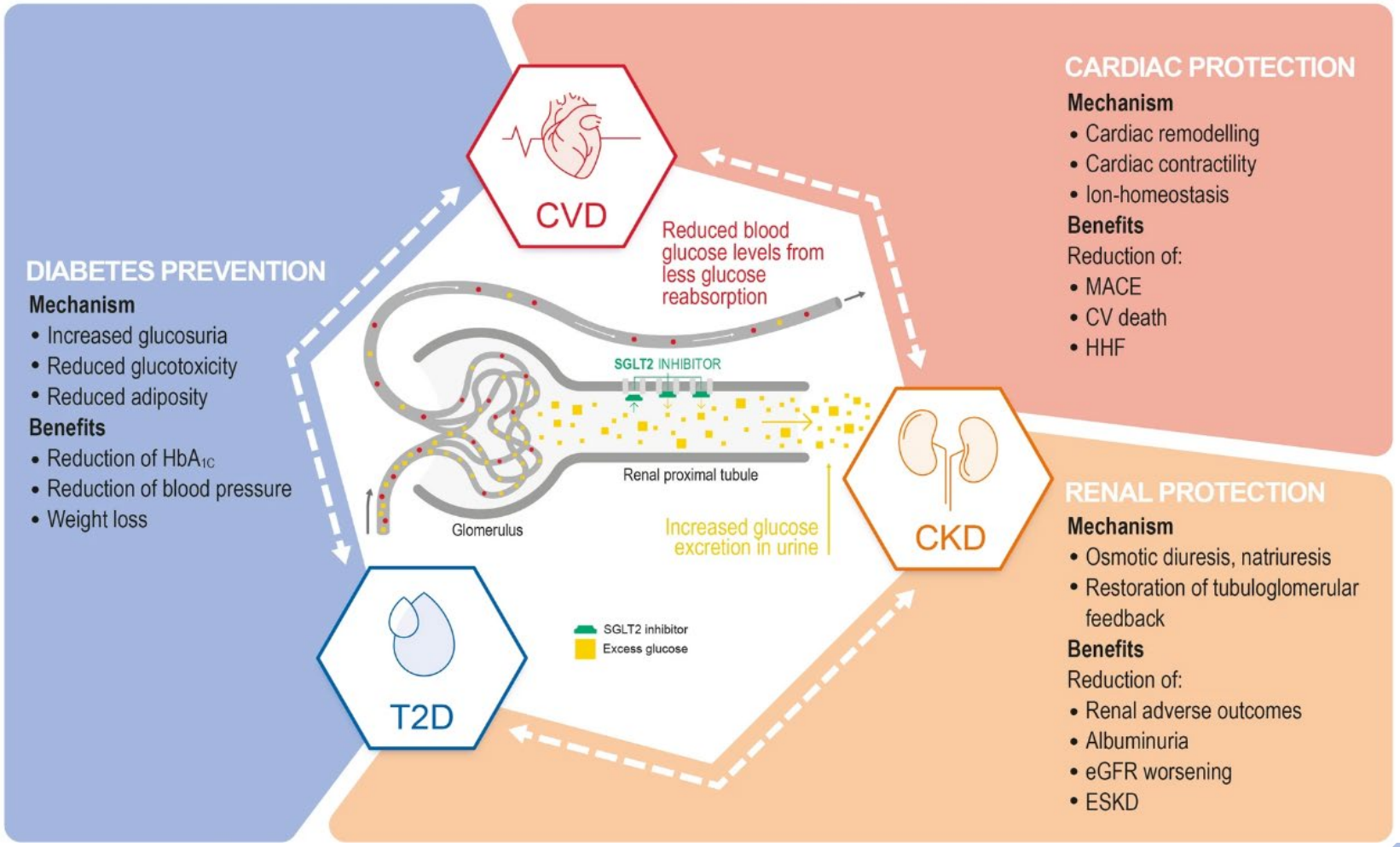


Kahn SE, et al. 2014


HEALTHY LIFESTYLE BEHAVIORS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT; SOCIAL DETERMINANTS OF HEALTH
To avoid therapeutic inertia, reassess and modify treatment regularly (3–6 months)
Goal: Cardiovascular and Kidney Risk Reduction in High-Risk Individuals with Type 2 Diabetes*
Goal: Achievement and Maintenance of Weight and Glycemic Goals
+ASCVD†
+Indicators of high CVD risk
+HF
Current or prior symptoms of HF with documented HFrEF or HFpEF
+CKD
eGFR <60 mL/min/1.73 m² OR albuminuria (ACR ≥3.0 mg/mmol [30 mg/g]). Repeat measurement is required to confirm CKD
+ASCVD/indicators of high CVD risk‡
GLP-1 RA# with proven CVD benefit
OR
SGLT2i§ with proven CVD benefit
SGLT2i¶
with proven HF benefit in this population
+CKD (on maximally tolerated dose of ACEi or ARB)
SGLT2i§ with primary evidence of reducing CKD progression
SGLT2i can be started with eGFR ≥20 mL/min/1.73 m²
Continue until initiation of dialysis or transplantation
Glucose-lowering efficacy is reduced with eGFR <45 mL/min/1.73 m²
OR
GLP-1 RA# with proven CKD benefit
If A1C is above goal, for individuals on SGLT2i, consider incorporating a GLP-1 RA or vice versa
If A1C is above goal
For individuals on a GLP-1 RA, consider adding SGLT2i with proven CVD benefit or vice versa
Pioglitazone^
+Weight management
+Achievement and maintenance of glycemic goals
Efficacy for weight loss
Very high: Semaglutide, tirzepatide
High: Dulaglutide, liraglutide
Intermediate: GLP-1 RA (not listed above), SGLT2i
Neutral: Metformin, DPP-4i
Metformin or other agent (including combination therapy) that provides adequate EFFICACY to achieve and maintain glycemic treatment goals
Prioritize avoidance of hypoglycemia in high-risk individuals
Efficacy for glucose lowering
Very high: Dulaglutide (high dose), semaglutide, tirzepatide, insulin
Combination oral, combination injectable (GLP-1 RA and insulin)
High: GLP-1 RA (not listed above), metformin, pioglitazone, SGLT2i, sulfonylurea
Intermediate: DPP-4i
If additional cardiovascular and kidney risk reduction, management of other metabolic comorbidities, and/or glycemic lowering is needed
If A1C is above goal or significant hypoglycemia or hyperglycemia or barriers to care are identified
+Mitigating risk of MASLD or MASH
Agents with potential benefit in MASLD or MASH
GLP-1 RA, dual GIP and GLP-1 RA, pioglitazone, or combination of GLP-1 RA with pioglitazone
Use insulin in the setting of decompensated cirrhosis
Refer to DSMES to support self-efficacy in achievement of treatment goals
Consider technology (e.g., diagnostic or personal CGM) to identify therapeutic gaps and tailor therapy
Identify and address SDOH that impact achievement of treatment goals

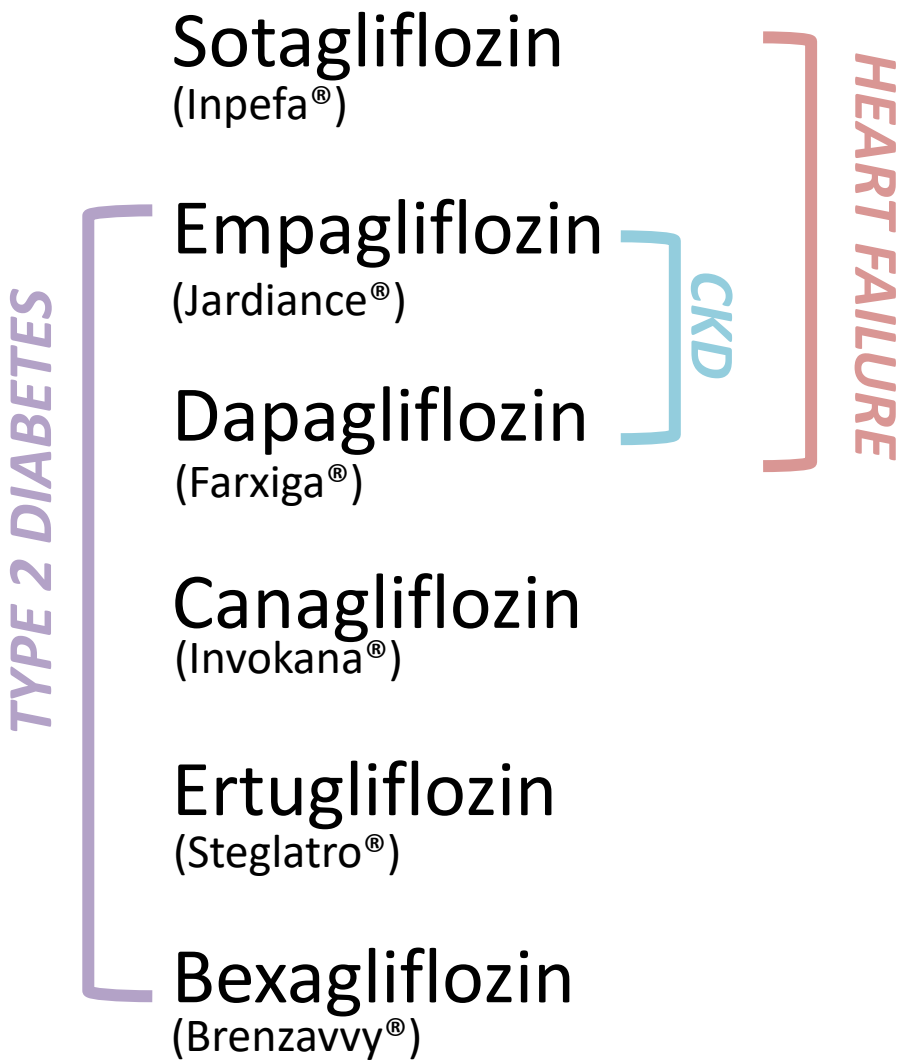
ADA. 2025

SGLT-2 Inhibitor Mechanism of Action



Evans, M. 2022

SGLT-2 Inhibitors Indications



Lexi-Drugs

SGLT2 Adverse Events

Genitourinary fungal infections

AKI

UTIs

Lower limb amputation

Dehydration, volume depletion

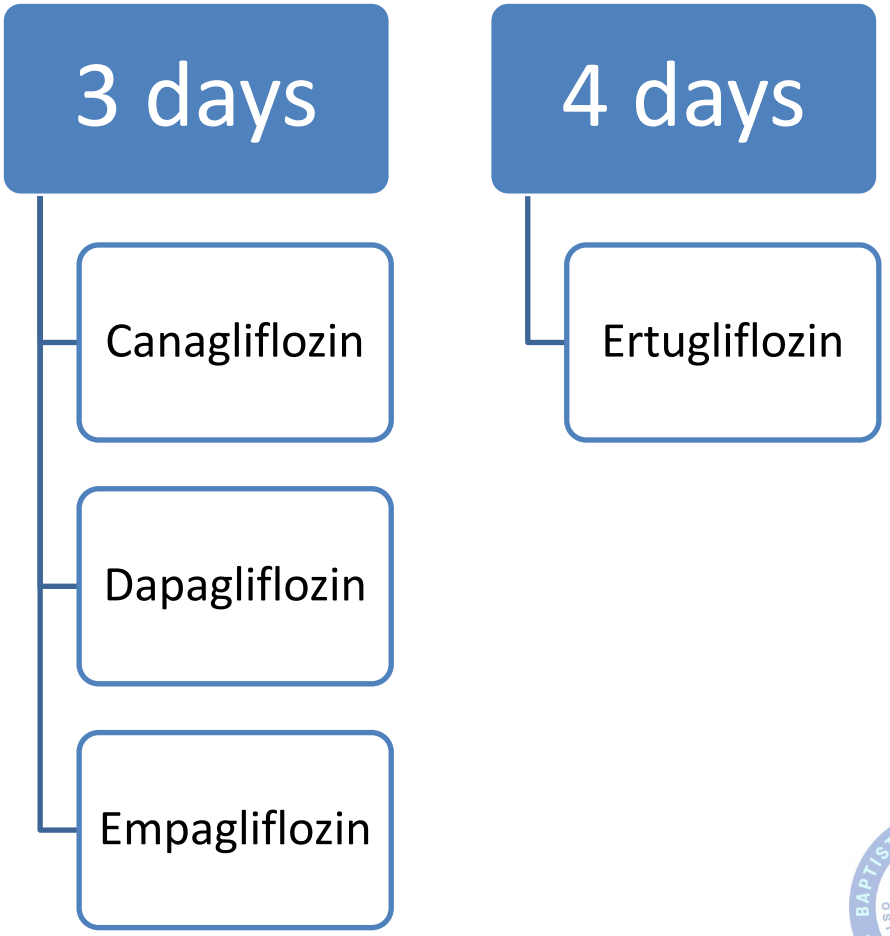
Euglycemic DKA

Lexi-Drugs

SGLT2 Inhibitors – Peri-operative Risk

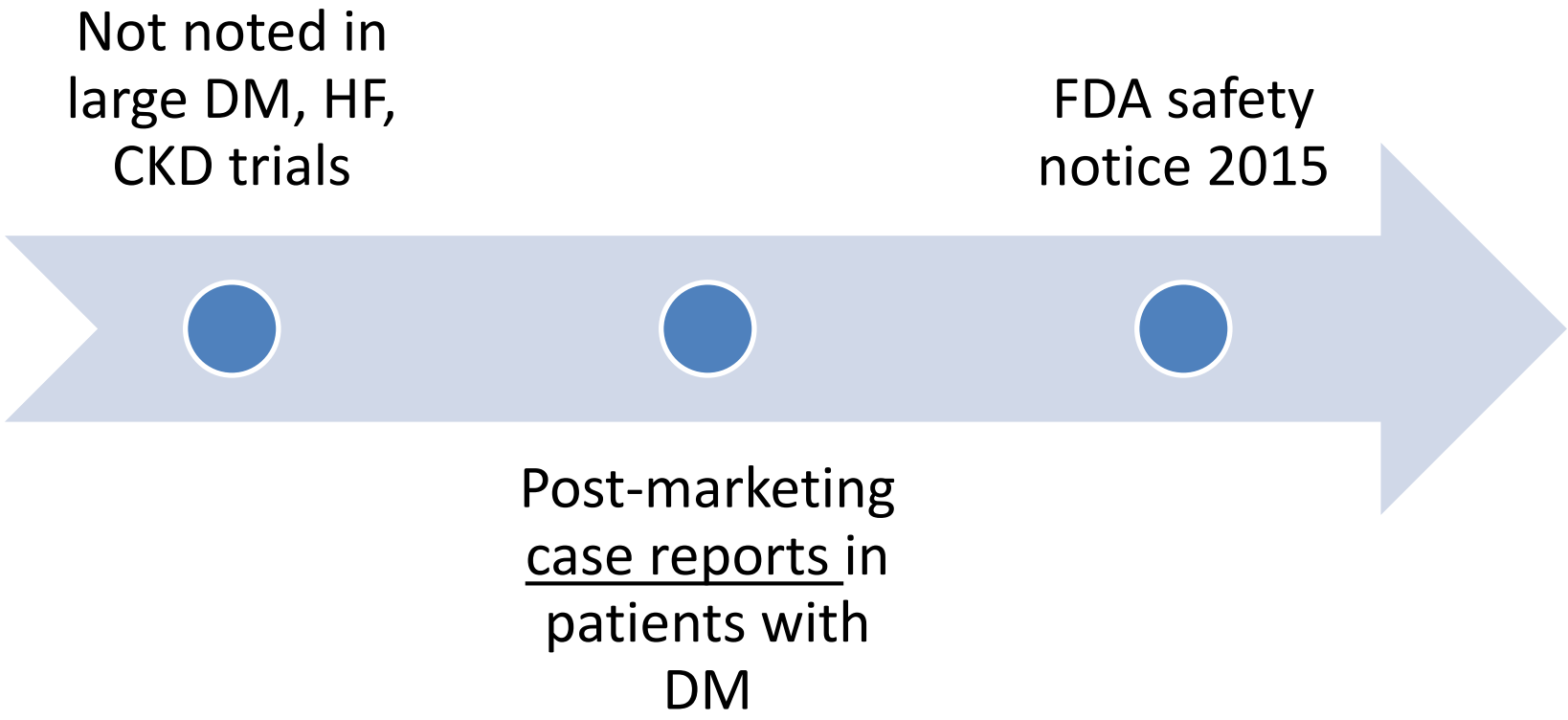
Increased risk of euglycemic DKA

Discontinue before elective or scheduled surgery:



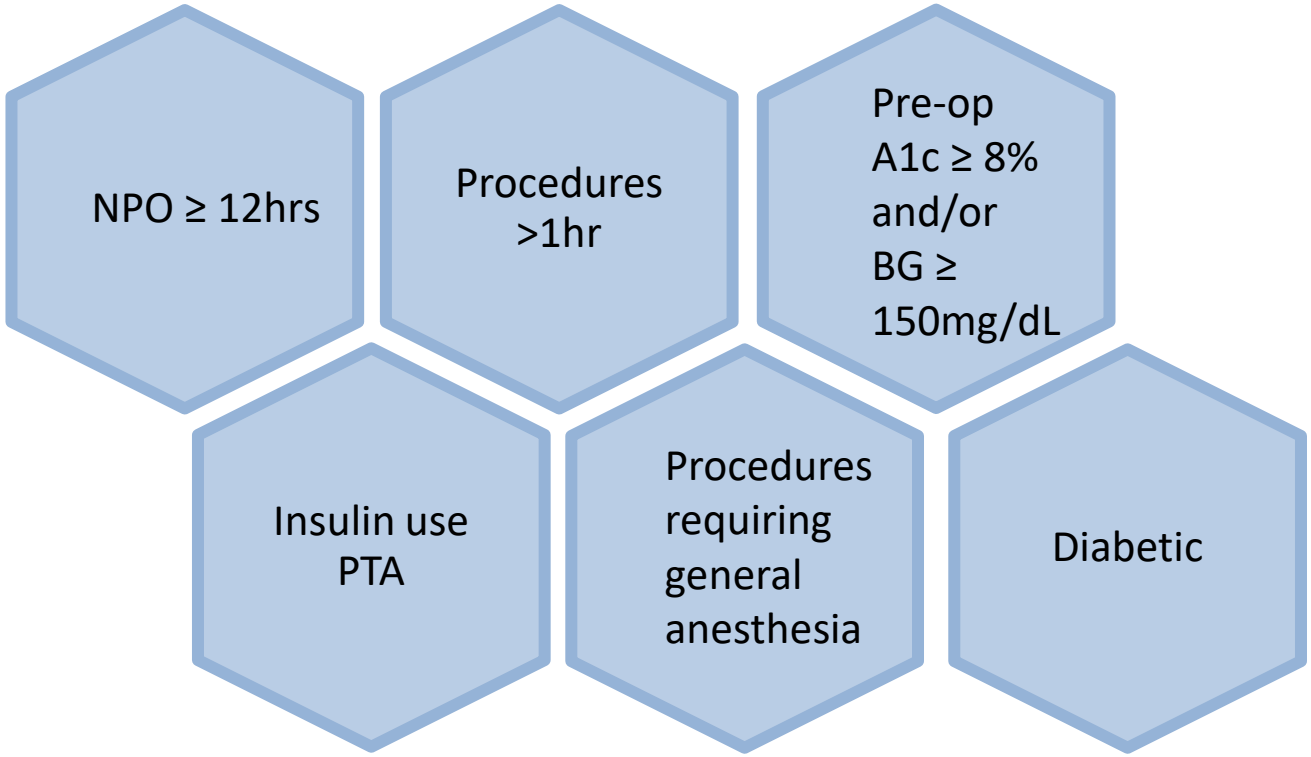
Raiten JM, et al. 2024.

Euglycemic DKA Incidence



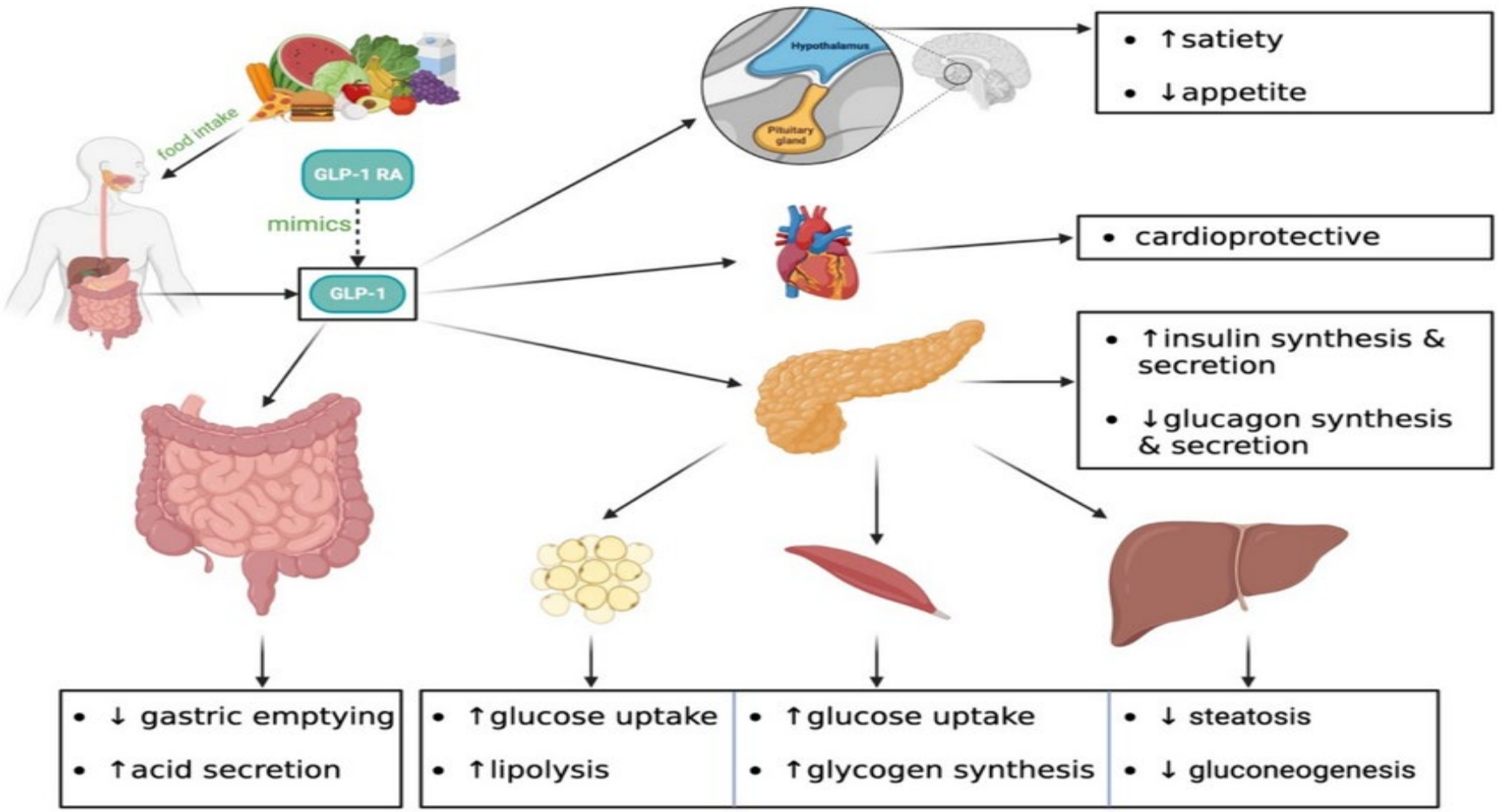
https://www.fda.gov/media/94822/download

SGLT2 Inhibitors – Peri-operative Risk Assessment



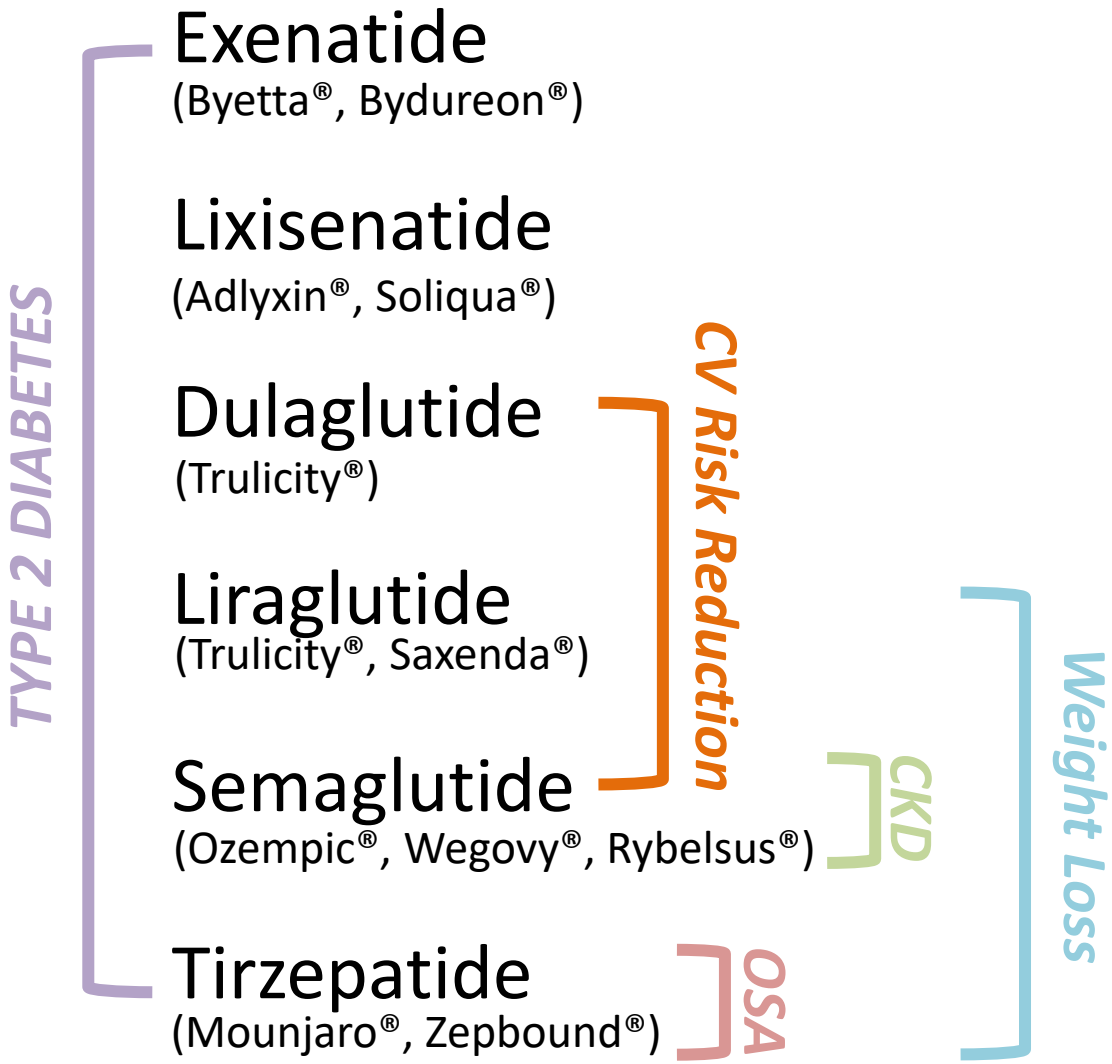
Rosenstock J, et al. 2015.

GLP-1 Agonist Mechanism of Action



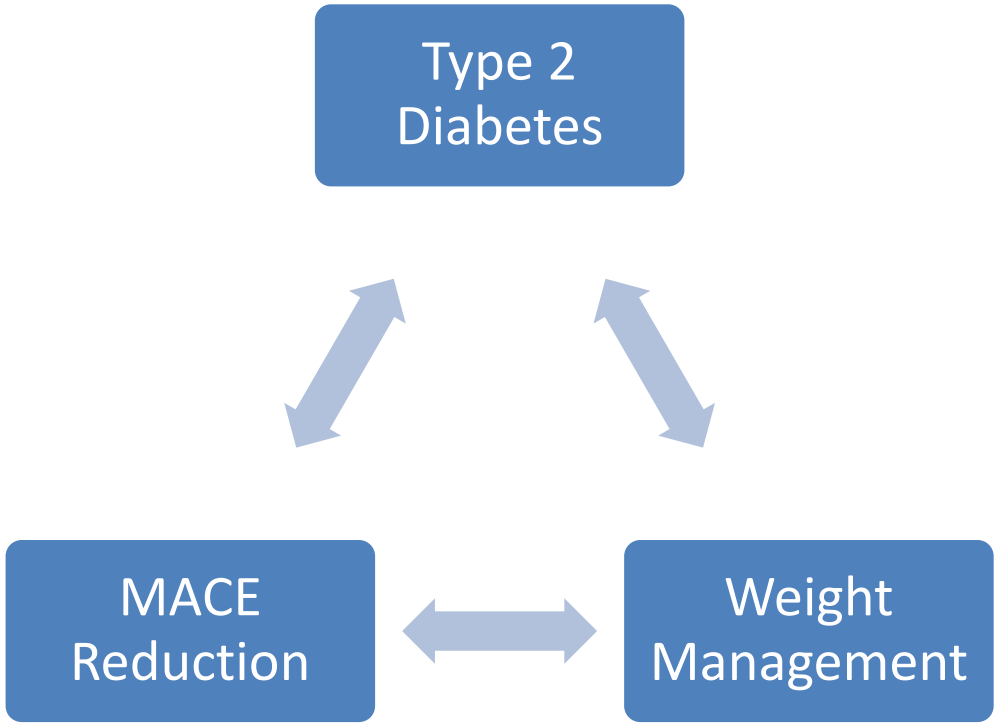
Salazar, et al. 2024

GLP-1 Agonists Indications



Lexi-Drugs

GLP-1 Agonists - Benefits



		Liraglutide (s.c. 3 mg)[68] – (s.c. 0.5 and 1.0 mg)[53]	Semaglutide (s.c. 2.4 mg)[71] – (s.c. 0.5 and 1.0 mg)[54]	Tirzepatide (s.c. 5, 10 and 15 mg)[78]	Dulaglutide (s.c. 1.5 mg)[59]
Weight loss *(mean % change in body weight)* Data from people with obesity/overweight without T2D	GLP-1 RA / Placebo	–8.0% / –2.6%	–14.9% / –2.4%	–15.0% –19.5% / –3.1% –20.9%	-- / --
MACE *(% of patients with primary composite outcome of time to first occurrence of MACE)* Data from people with T2D	GLP-1 RA / Placebo	13.0% / 14.9%	6.6% / 8.9%	-- / --	12.0% / 13.4%

Michos ED, et al. 2023

GLP-1 Agonists Adverse Events

Nausea, vomiting, abdominal pain

Thyroid C-cell tumors

Pancreatitis

Delayed gastric emptying

Gallbladder disease

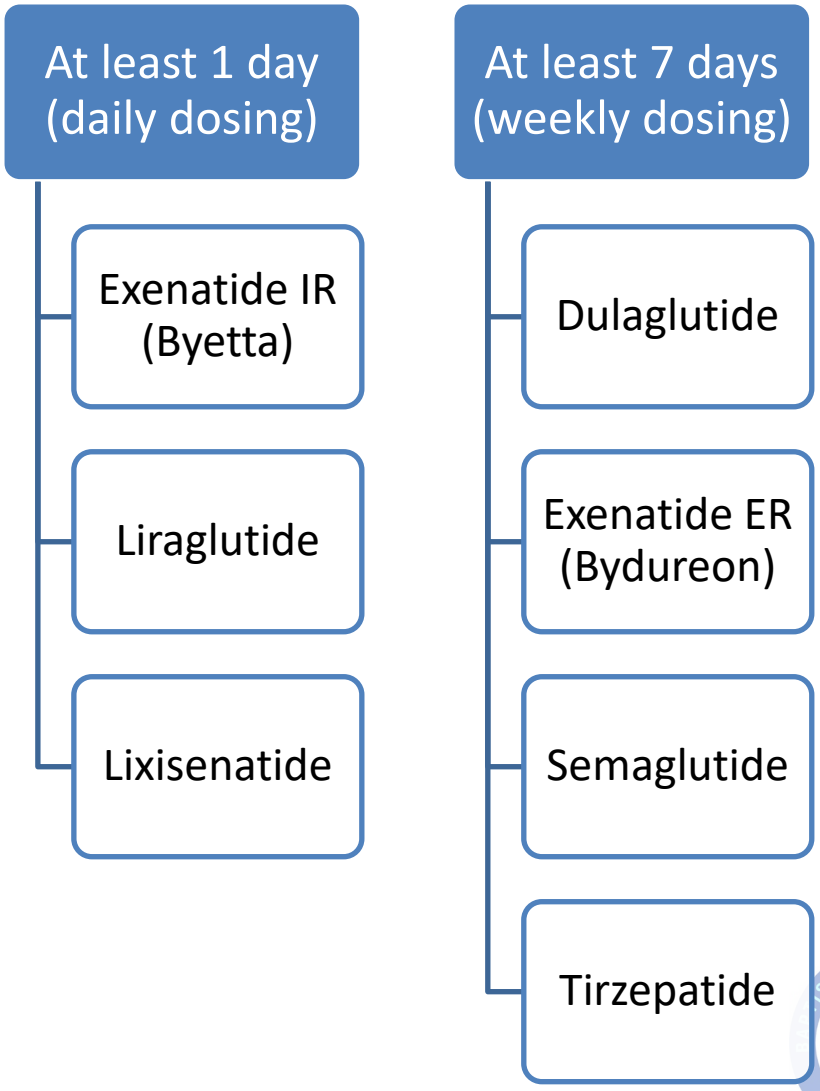
Pulmonary Aspiration

Lexi-Drugs

GLP-1 Agonists– Peri-operative Risk

Risk of pulmonary aspiration

Discontinue before elective or scheduled surgery:



Kindel T, et al. 2024.

Ongoing Research & Recent Literature Updates – GLP-1 Agonists

Trial	Study & Results	Follow-up
ACHIEVE-1[18] orforglipron	• Phase III, oral once daily GLP-1 agonist • A1c 1.3-1.6% decrease • ~8% weight loss	Data presented at ADA 2025 Submissions expected 2025-2026
ESSENCE[19] semaglutide (Wegovy®)	• Ongoing, phase III RCT of MASH & liver fibrosis patients to semaglutide vs placebo • Improvements in liver histologic findings	FDA decision expected later 2025
FLOW[20] semaglutide (Ozempic®)	• 24% reduction in kidney outcomes & death from CV causes in patients with T2DM & CKD.	Jan 2025 semaglutide (Ozempic®) approved to slow CKD in T2DM
EVOKE[21] EVOKE-PLUS semaglutide	• Ongoing phase III RCTs evaluating semaglutide vs placebo in early stage Alzheimer's	Completion of main phase expected 9/2025

Conclusions

- Diabetic technology & treatments rapidly changing
- Diligence to provide guideline-based therapies in the most cost-effective manner
- Impactful morbidity & mortality outcomes

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