

*"Is There a Safer Way to Start Insulin if
I don't Have Access to a Diabetes
Educator"*

*AKA: A Practical Approach to the
Management of Type 2 Diabetes*

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Objectives

To gain an understanding of:

- the various insulins currently available and the concept of basal and bolus insulins
- combining insulin and anti-diabetic agents
- starting insulin, which, when and how to titrate

Disclosures: None

Targets: Glucose levels

	A1C (%)	FPG Pre-prandial (mmol/L)	2hr post prandial (mmol/L)
Target	≤ 7.0	4.0-7.0	5.0-8.0
Normal range	≤ 6.0	4.0-6.0	5.0-8.0

At diagnosis of type 2 diabetes
 Start lifestyle intervention (nutrition therapy and physical activity) +/- Metformin



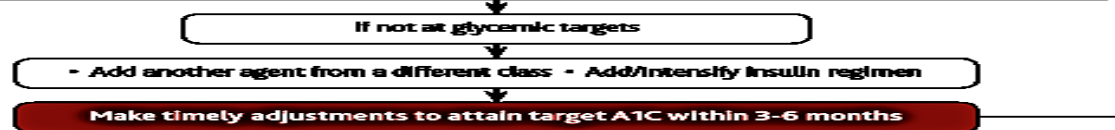
Add another agent best suited to the individual by prioritizing patient characteristics:

PATIENT CHARACTERISTIC	CHOICE OF AGENT
Priority: Clinical cardiovascular disease - Degree of hyperglycemia - Risk of hypoglycemia - Overweight or obesity - Cardiovascular disease or multiple risk factors - Comorbidities (renal, CHF, hepatic) - Preferences & access to treatment	Antihyperglycemic agent with demonstrated CV outcome benefit (empagliflozin, liraglutide) - Consider relative A1C lowering - Rare hypoglycemia - Weight loss or weight neutral - Effect on cardiovascular outcome - See therapeutic considerations, consider eGFR - See cost column; consider access

Add another class of agent best suited to the individual (classes listed in alphabetical order):

Class	Relative A1C Lowering	Hypo-glycemia	Weight	Effect in Cardiovascular Outcome Trial	Other therapeutic considerations	Cost
Alpha-glucosidase Inhibitor (acarbose)	↓	Rare	Neutral to ↓		Improved postprandial control, GI side-effects	\$\$
DPP-4 Inhibitors	↓↓	Rare	Neutral to ↓	alo, saxa, sita: Neutral	Caution with saxagliptin in heart failure	\$\$\$
GLP-1R agonists	↓↓ to ↓↓↓	Rare	↓↓	lira: Superiority in T2DM patients with clinical CVD lbd: Neutral	GI side effects	\$\$\$\$
Insulin	↓↓↓	Yes	↑↑	glar: Neutral	No dose ceiling, flexible regimens	\$-\$\$\$\$
Insulin secretagogues: Meglitinide	↓↓	Yes	↑		Less hypoglycemia in context of missed meals but usually requires TID to QID dosing	\$\$
Sulfonylurea	↓↓	Yes	↑		Gliclazide and glimepiride associated with less hypoglycemia than glyburide	\$
SGLT2 Inhibitors	↓↓ to ↓↓↓	Rare	↓↓	empa: Superiority in T2DM patients with clinical CVD	Genital Infections, UTI, hypotension, dose-related changes in LDL-C, caution with renal dysfunction and loop diuretics, empagliflozin not to be used if bladder cancer, rare diabetic ketoacidosis (may occur with no hyperglycemia)	\$\$\$
Thiazolidinediones	↓↓	Rare	↑↑	Neutral	CHF, edema, fractures, rare bladder cancer (pioglitazone), cardiovascular controversy (rosiglitazone), 6-12 weeks required for maximal effect	\$\$
Weight loss agent (orlistat)	↓	None	↓		GI side effects	\$\$\$

alo=alogliptin; empa=empagliflozin; glar=glargine; lira=liraglutide
 lbd=lbdsenatide; saxa=saxagliptin; sita=sitagliptin



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- What to Do:
- Clinical Ass't
 - A1C
 - Targets
 - Oral meds
 - + insulin

New Agents

GLP-1 agonists/DDP IV inhibitors:

- Mechanism of action:
 - Stimulate insulin secretion
 - Suppress glucagon secretion
 - Inhibit gastric emptying
 - Inhibit food intake/weight gain (central effect)
 - GLP-1: New evidence re: renal/CVD benefit

Sodium Glucose Co-transporter Inhibitors, SGLT-2s:

- Mechanism of action:
 - Inhibit renal tubular reabsorption of glucose
 - New evidence re: CVD benefit
- Concerns:
 - ↓renal function, eGFR <60
 - Elderly- dehydration
 - Euglycemic DKA

Insulin: Classification

Bolus Insulins:

- "Rapid rapid": Fiasp®

Rapid:

- Lispro = Humalog®
- Aspart = Novo-rapid®
- Glulisine = Apidra®

Short-acting: Regular

• Basal Insulins

Intermediate-acting: NPH

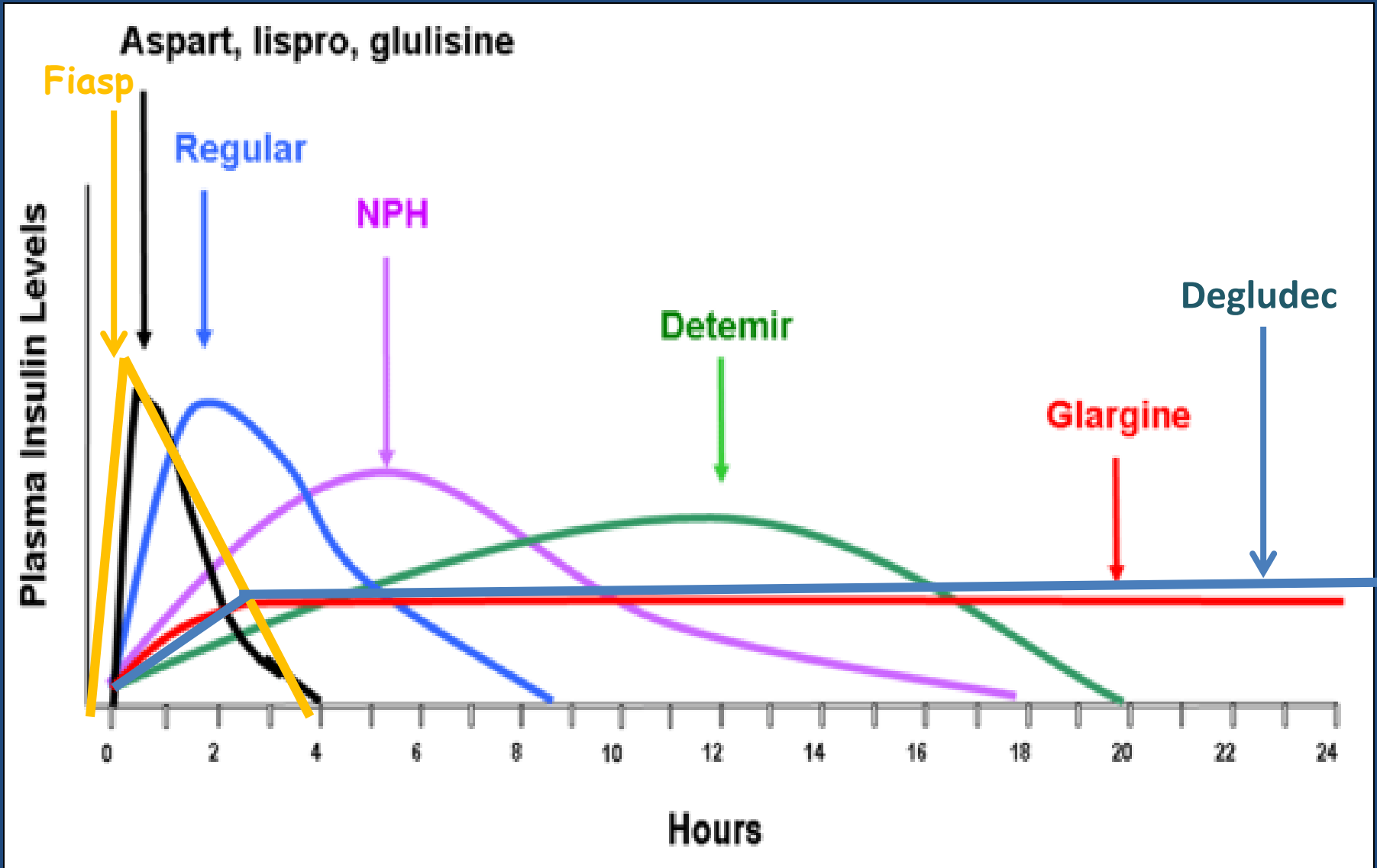
Long-acting:

- Glargine = Lantus®, Tuojeo® (u300 glargine), Basaglar®
- Detemir = Levemir®
- Degludec = Tresiba®

Pre-mix:

- Mix 25
- NovoMix 30
- 30/70

Insulin Action Curves



Insulin / Anti-diabetic agents Combinations:

Basal insulin (HS or BID) with day-time meds

- Any day-time meds, including DPPiVs, GLP-1s, SGLT 2s

Bolus insulin (pre-meal) with day-time meds:

- Can be used with:
 - metformin
 - DPPiVs, GLP-1s, SGLT 2 inhibitors
- Not sulfonylureas, TZD's

Basal/Bolus Insulin

Basal Insulin: 50% TDD

- OD:
 - Long-acting or NPH:
 - HS
 - Alternative times for long-acting:
 - breakfast or supper
- BID:
 - NPH (occasionally long-acting analogue)
 - 12 hours apart
- Little need for dosage adjustment once titrated

Bolus Insulin: 50% TDD

- Given at mealtimes: Flat dose or CHO counting
- Necessary dosage adjustment:
 - with meals
 - exercise
 - major snacks

Basal/Bolus Insulin: Dosage

Basal:

- Starting Dosage: **By Size:**
 - **Lean- 5u hs**
 - **Insulin-resistant- 10u hs**
- Dosage adjustment: Titration method
 - **Increase by 1-2 units every 3 days until FPG is in target**
 - **Little need for adjustment after titration**

Basal/Bolus Insulin: Dosage

- Bolus:
 - CHO Counting :
Start 1 unit / 15 gm CHO (insulin /CHO ratio)
 - Meal-time only BG correction:
 - 1+ unit rapid q3 mmol/L > 7
 - Added to calculated meal time dose
 - Alternative to CHO counting:
 - “Flat” dose rapid insulin at each meal by estimation of CHO content
- Dosage adjustment:
 - Check 2 hr post meal BG to see how bolus worked
 - Assess how often/how much correction insulin is required
 - Increase insulin/CHO ratio if not in target

Community Resources

There is always a diabetes educator available

- **Diabetes and Chronic Disease Self-Management Programs:**
 - Diabetes/Chronic Disease Education teams
 - By region
- **WRHA:**
 - MyHealth teams
 - CDE's
 - By community areas
 - Access Centres- homebase
 - Working in clinics
 - Community Clinics
- **Pharmacists**

Francine

- 54 yr old woman referred after MI
 - T2 DM for 25 years
 - 30/70 insulin
 - BMI = 30
 - Poor glycemic control with erratic blood sugars
 - Hgb A1c- 12%
- 1. What would you do?

Francine

- 54 yr old woman referred after MI
 - T2 DM for 25 years
 - 30/70 insulin
 - BMI = 30
 - Poor glycemic control with erratic blood sugars
 - Hgb A1c- 12%

1. What would you do?

1. Metformin
2. +/- Newer agents esp. SGLT 2 i/GLP-1
3. +/- Basal insulin
4. +/- Basal/bolus insulin

Henry

- 55 yr old man with 10 yr history of type 2 diabetes:
 - Currently:
 - metformin 850 mg TID
 - gliclazide MR 120 mg OD
 - FBS = 10-14 mmol/L
- 1. What would you do?

Henry

- 55 yr old man with 10 yr history of type 2 diabetes:
 - Currently:
 - metformin 850 mg TID
 - gliclazide MR 120 mg OD
 - FBS = 10-14 mmol/L
- 1. What would you do?
 1. Basal insulin
 2. Consider newer agents
 3. Basal/bolus insulin

PRACTICAL DIABETES CARE

For Canadian Health Care Professionals



By Sora Ludwig, MD, FRCPC
Professor, University of Manitoba

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