

Diabetes Mellitus Management



Chronic Care Didactic Session

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Agenda

- 1. Making the diagnosis**
2. Approach to the patient with a new diagnosis
3. When and how to initiate and titrate insulin
4. Monitoring patients for complications
5. Emergency situations
6. Break out sessions

Diagnosing Type 2 Diabetes Mellitus

Who should we be testing?

Symptoms to look out for:

- Polyuria, polydipsia, polyphagia
- Fatigue
- Blurred vision
- Weight loss
- Dermatologic: acanthosis nigricans, candidal vaginitis

Screening per USPSTF

- Asymptomatic adults with sustained BP (treated/untreated) **>135/80 mmHg**
- Insufficient evidence to screen for asymptomatic adults with BP <135/80

Screening per ADA

- All **adults over 45** years of age
- Earlier in patients with 1 or more **risk factors:**
 - Family history (1st degree relative)
 - High risk ethnicity (African American, Latino, Native American, Asian American, Pacific Islander)
 - Obesity
 - HTN \geq 140/90
 - CVD
 - History of gestational diabetes

How do we diagnose people?

Diagnosis made by...

- **confirmation with two tests** (repeat of same or another type)
- **random glucose >200 with symptoms**

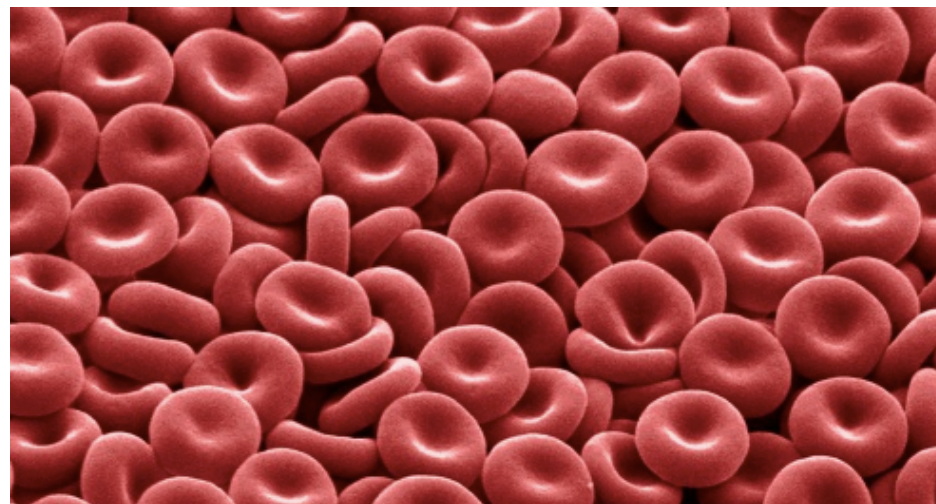
Test	Pre-DM	DM

*Fasting defined as no caloric intake for at least 8 hours

Sources: Diabetes Care **January 2014** vol. 37 no. Supplement 1 S14-S80

How often should we screen?

Diabetes status	A1C level	Next A1C check
Non-diabetic	< 5.7	3 years
Pre-diabetic	5.7 – 6.4	1 year
Diabetic	> 6.5	3 months



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Basic intervention algorithm



- **All Diabetics**
- **Moderate Hyperglycemia**
(fasting glucose **140-240**)
- **Severe Hyperglycemia**
(fasting glucose **>240**)

→ Diet and exercise

→ Start with an **oral hypoglycemic**

→ Start with **insulin** (+/- oral hypoglycemics)

Oral medications on formulary:

Metformin

- **Reduction in a1c: 1-2**
- **Advantages:**
 - Hypoglycemia rare
 - Weight loss
- **Disadvantages:**
 - GI issues (diarrhea)
 - Lactic acidosis
 - Metallic taste
- **Contraindications:**
 - Cr >1.4 (females)
 - Cr >1.5 (males)
 - Excessive EtOH intake



Metformin Dosing

Start with **500mg BID**

Titration options

**Increase by 500mg
increments each week**

**Increase by 850mg
increments every 2 weeks**

Maximum Daily Dosage = 2550mg

*Divide total daily dosage into 2 to 3 doses
(i.e. 1000mg in AM, 1000mg in PM)*

Basic intervention algorithm

Diet and exercise



**First agent:
Metformin**

A1c still not at goal
after 3 months



**Second agent:
Glimepiride or
Insulin**

Oral medications on formulary: Glimepiride & Glipizide XL



Glimepiride

- **Reduction in a1c: 1-1.5**
- **Advantages:**
 - Rapidly effective
- **Disadvantages:**
 - Hypoglycemia
 - Weight gain
 - Disulfiram-like effects

Sulfonylurea Dosing

Glimepiride

- Initiation: **1-2mg/day**
- Maintenance: increase by **1-2mg** every 1 to 2 weeks based on glycemic response
- Max dosage: **8mg/day**

Glipizide XL (ER)

- Initiation: **5mg/day**
- Maintenance: **5 to 10 mg/day**
- Max dosage: **20mg/day**

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When to use insulin

As a **complement to oral agents**: in patients with persistent hyperglycemia

As a **monotherapy**: in patients with persistent hyperglycemia (who have “failed” oral agents)

As an **initial monotherapy**: in newly diagnosed Type II diabetics to achieve rapid control

Two ways to give insulin

Basal dose

- **Basal supplement**
(intermediate to long-acting insulin)
- Goal: suppress hepatic glucose production and **maintain normoglycemia in the fasting state**



NPH, Glargine, Detemir

Prandial dose

- **Pre-meal bolus**
(short-acting or rapid acting insulin)
- Goal: **decrease postprandial spikes** in blood glucose levels



**Lispro, Aspart, Glulisine,
Regular**

Approach to starting insulin at EHHOP

Patient education

- Educate on how to administer insulin (sterile technique, rotate injection site, etc.)
- Describe symptoms of hypoglycemia and what to do if patient becomes hypoglycemic
- Ensure patient understanding with “teach-back” method

Start PM NPH

- Prescribe insulin NPH before bedtime
- Initiate with 10 units or 0.2 units per kg (whichever is lower)
- Initial goal is to optimize your bedtime NPH dose to achieve an AM FBG within the target range of 70 to 130

Check FBGs

- Instruct patient to check FBG daily and record in a written log
- Strongly encourage patient to take additional readings

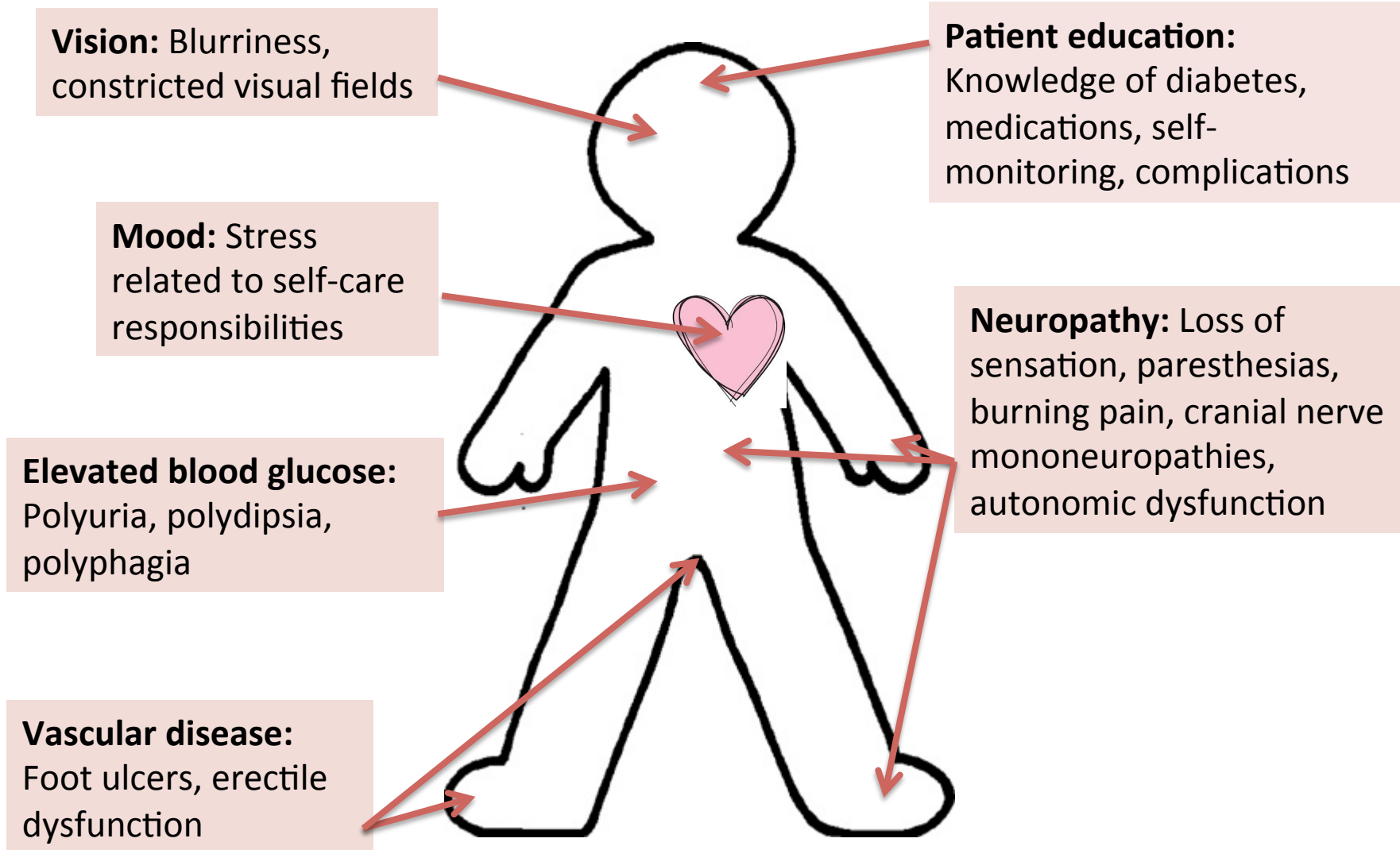
Adjust as necessary

- Increase dose (~2 units every 3 days) until FBG are in target range
- If patient has sx of hypoglycemia or FBG <70, reduce NPH dose by 4 units or 10 percent (whichever is greater)
- If a1c still too high after three months, and pre-dinner FBG is high, consider 2nd NPH dose at breakfast

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What to ask about



What to measure

Eyes

BP: Check a
(target <14

Cholesterol:
Lipid panel 1x

Renal Function
- Screen for
albuminur
- Check BUN
1x/year

SUMMARY

Each Visit:

- BP
- Review written log/glucometer
- Examine feet

Every 3 months

- Check A1C

Every year:

- Ophtho Exam
- Lipid Panel
- Microalbuminuria
- BUN/Cr
- Comprehensive vascular, neuro, MSK and soft tissue eval

glucose: Review
log/glucometer
each visit

every 3 months
meds are
d, then 1-2x per
stable

@ each visit:
ounds, perfusion,
on/proprioception
y consult for high
ents

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(Usually blood glucose < 70)

Hypoglycemic emergency: What do I do?

Symptoms

- Shaking
- Sweating
- Change in mood
- Rapid heartbeat
- Lightheadedness
- Headache
- Seizure

Treatment

- **15-20 grams** of glucose/ simple carbohydrates
- Recheck blood glucose after 15 minutes
- If still hypoglycemic, repeat
- Eat a small snack if the next planned meal is more than an hour or two away

15 grams of carbs...



Glucose tabs



Glucose gel



4oz juice



8oz milk



Honey packets



Hard candies

Hyperglycemic Emergency

Common precipitatio

of or inadequate insulin

Common features: p

, lethargy

Diabetic Ketoacidosis (DM1)

Symptoms/signs: e
(over 24h), N/V, abn
hyperventilation, f

Hyperosmolar Hyperglycemic State (DM2)

Symptoms/signs: evolve insidiously
(days), altered mental
status → coma



Step 2: Bring patient to ED for admission

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**Many
thanks!**



**Dr. Jasti, Ina Flores, IMA, Drs. Meah &
Thomas, all of the beautiful and talented
chronic care seniors**

I'm so pumped! What now?

Session 1: Nutrition counseling

Session 2: Insulin injection

Session 3: Glucometer use and diabetic foot exam



One of the beagles
treated for diabetes

Count off

1's → stay here in 12-06

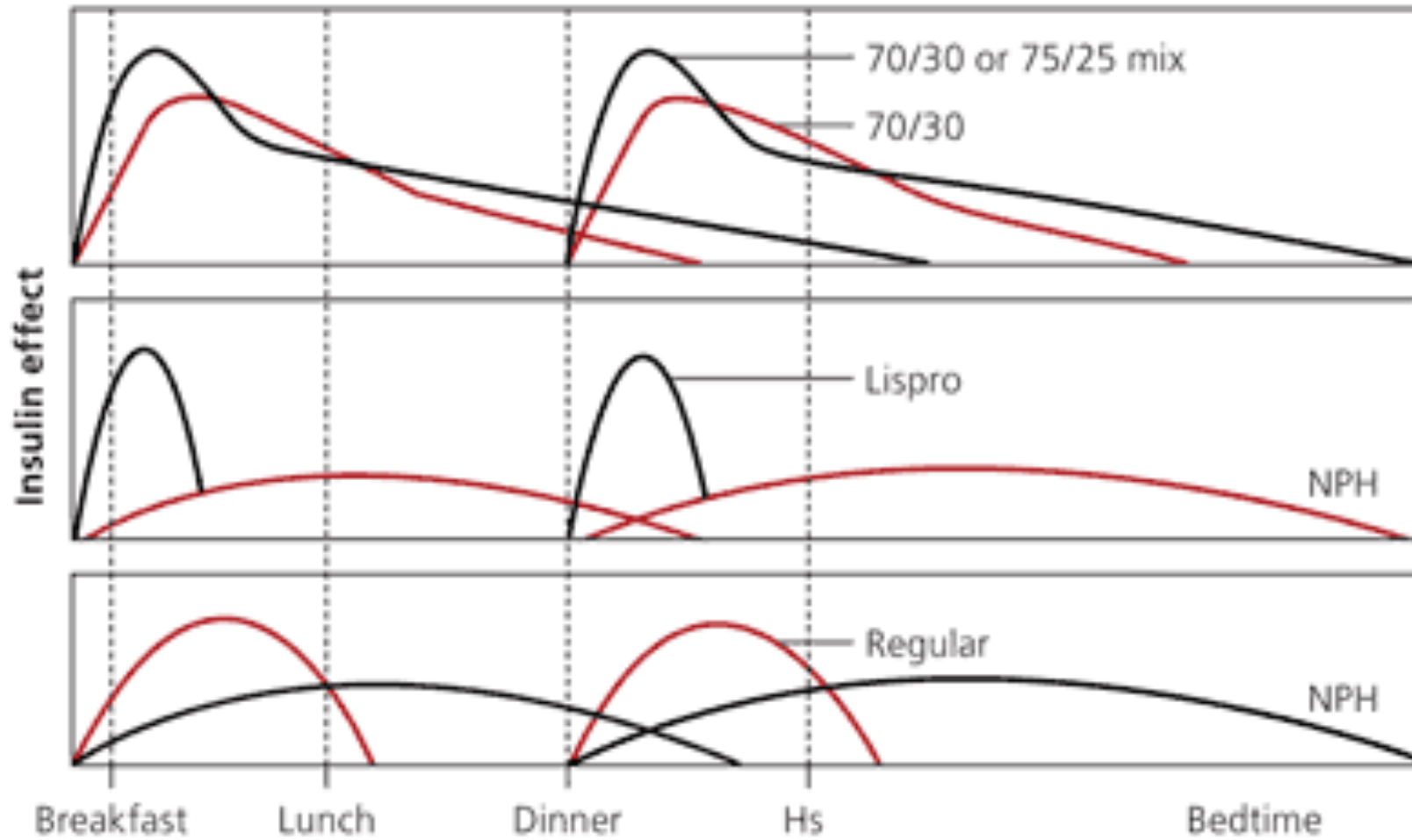
2's → go to 12-07

3's → go to 12-08

Break!

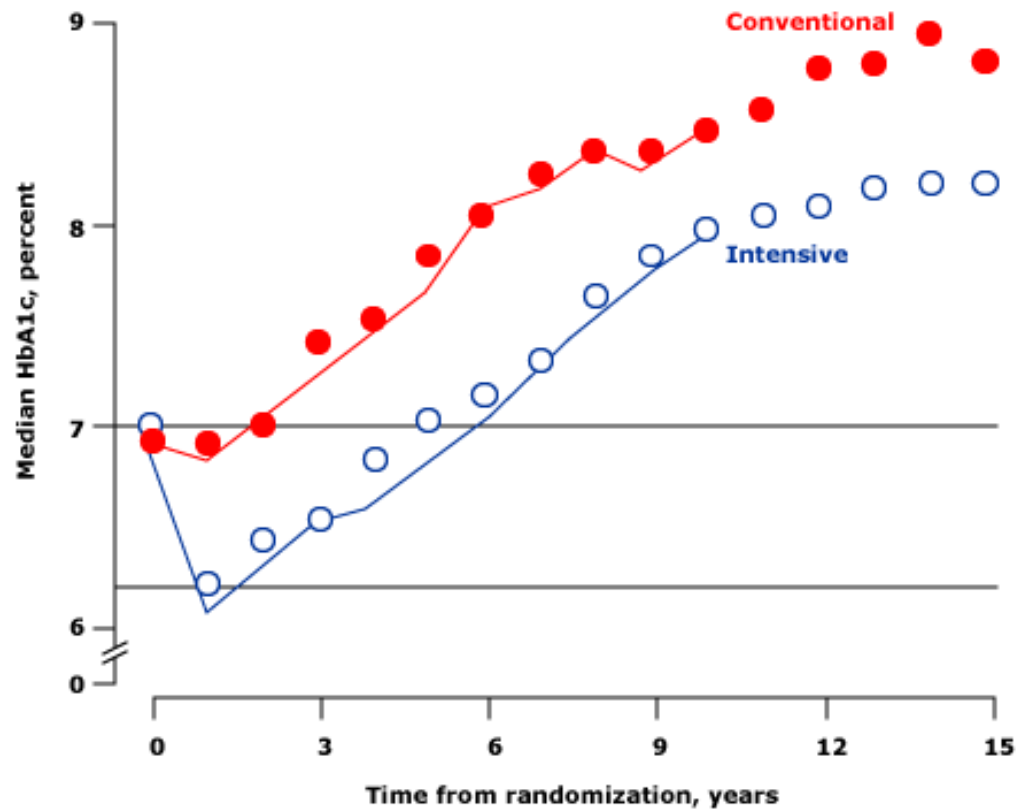
BACKUP SLIDES

Example regimens



Benefit of early intensive glycemic control

Glycemic control in type 2 diabetes



Acute complications of DM2

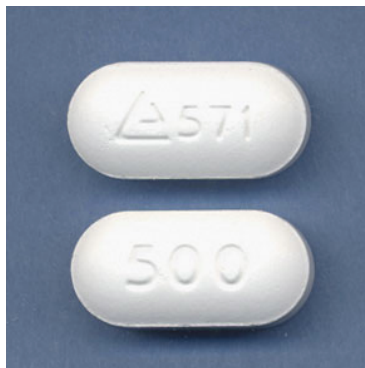
- Hyperosmolar Hyperglycemic Nonketotic Syndrome
- Hypoglycemia
- Diabetic Ketoacidosis (rare in DM2)
 - Hyperglycemia
 - Elevated serum or urine ketones
 - Metabolic acidosis

Chronic complications of DM2

- Macrovascular Complications:
 - Accelerated atherosclerosis
 - CAD (most common cause of death in diabetics)
 - Peripheral vascular disease
 - Cerebrovascular disease
- Microvesicular Complications:
 - Diabetic Nephropathy
 - Subtypes: Kimmestiel-Wilson Syndrome and Diffuse Glomerular Sclerosis
 - Diabetic Retinopathy
 - Diabetic Neuropathy
 - Diabetic Foot
 - Increased susceptibility to infection

Oral medications on formulary

Class	Agent(s)	Cost <small>Prices taken from EHHAPP.org</small>
Biguanide	Metformin	500mg: \$0.10 850mg: \$0.03
Sulfonylurea	Glimepiride	1mg: \$0.02; 2mg: \$0.04; 4mg: \$0.26
	Glipizide XL	2.5mg: \$0.22; 5mg: \$0.14; 10mg: \$0.27



Metformin



Glimepiride



Glipizide XL

Oral Medications - names to recognize

Class	Agent(s)
Sulfonylurea	Glyburide
Meglitinide	Nateglinide, repaglinide
Thiazolidine-dione	Rosiglitazone, pioglitazone
DPP-IV inhibitor	Saxagliptin, linagliptin, sitagliptin
Alpha-glucosidase inhibitors	Miglitol, acarbose
GLP-1 receptor agonist (injectible)	Exenatide, liraglutide

Medications in greater depth

Class	Agent(s)	Reduction in A1C	Advantages	Disadvantages	Cost
Meglitinide	Nateglinide, repaglinide	0.5-1.0	Short duration of action (take before meals)	Not very effective, hypoglycemia	High
Thiazolidinedione	Rosiglitazone, pioglitazone	0.5-1.4	More “durable” effect than metformin	Edema, heart failure, weight gain, potential risk of bladder cancer	High
DPP-IV inhibitor	Saxagliptin, linagliptin, sitagliptin	0.5-0.8	Few side effects, hypoglycemia rare	Low efficacy, angioedema, unknown safety profile	High
Alpha-glucosidase inhibitors	Miglitol, acarbose	0.5-0.9	Decreased post-prandial glucose, hypoglycemia rare	Flatulence and diarrhea	Moderate
GLP-1 receptor agonist (injectible)	Exenatide, liraglutide	0.5-1.5	Weight loss, cardioprotective, hypoglycemia rare	N&V, pancreatitis risk, thyroid C-cell hyperplasia, tumors	High

Insulin time-action profiles

