Medications for Type 2 Diabetes CDE Exam Preparation

The webinar will begin soon

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Medications for Type 2 Diabetes CDE Exam Preparation

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Agenda

Medication for Prediabetes

Oral Medication for Glycemic control

Combination medications

Injectable medication for type 2 diabetes

Medications for hypertension

Medications for cholesterol

Sample questions

Prediabetes- Lifestyle

- 58% reduction in progression at 4 years (DPP)
  - Lifestyle- diet, 5% weight reduction, exercise
- 67% reduction in progression Japanese Study
  - Lifestyle for IGT
- 43% reduction Chinese Da Qing Prevention
  - Lifestyle

Medications used for Prediabetes

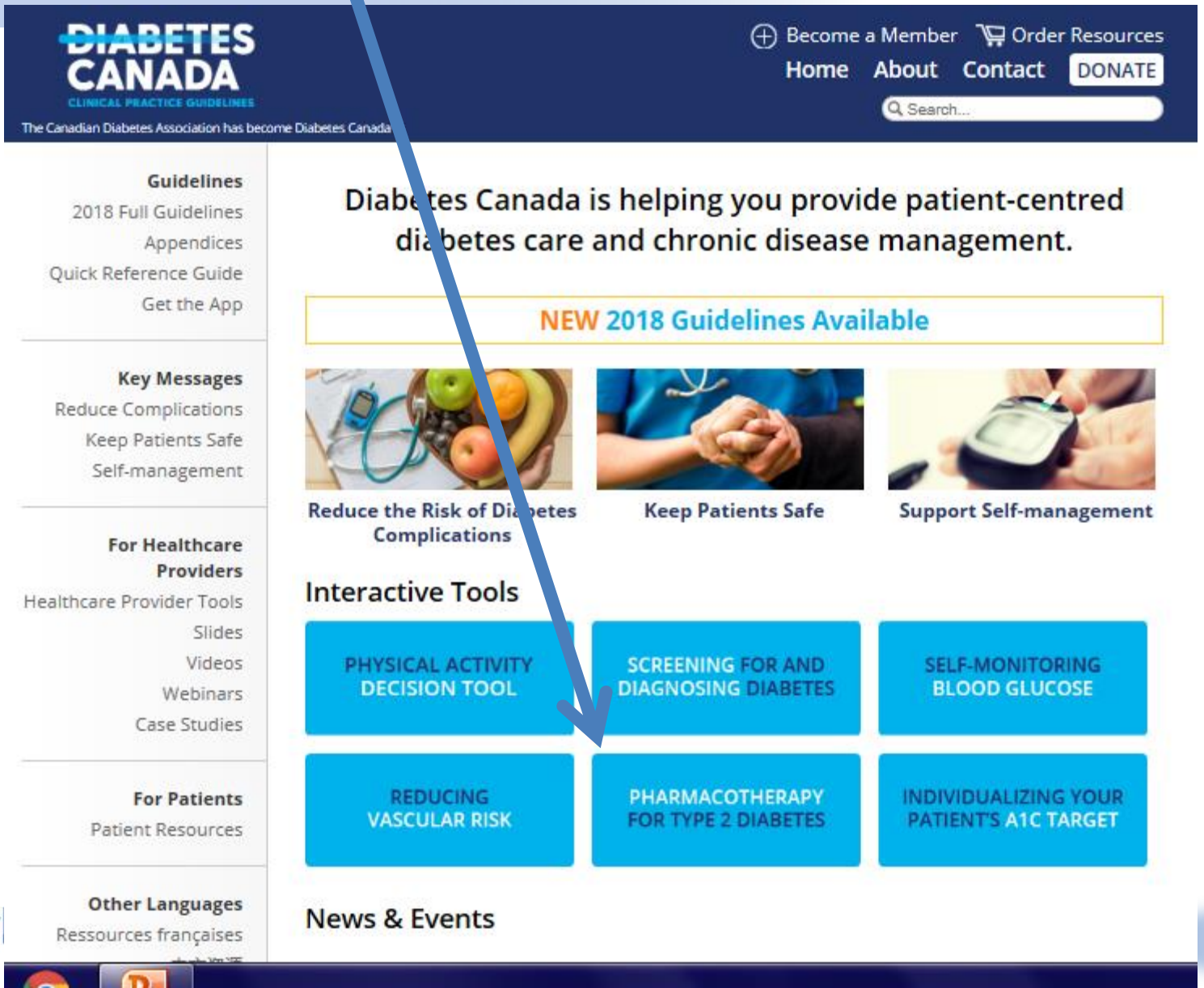
- Metformin 850 mg bid (DPP) 31% decrease in progression to diabetes
- Acarbose 100 mg tid (STOPNIDDM) 36% reduction
- GLP1 Liraglitide prevalence of prediabetes decreased 84-96% depending on dose
- TZD (ACTNOW)- pioglitazone decreased conversion to diabetes by 72%
- Metformin + rosiglitazone 66% reduction
- Glargine ORIGIN 31% reduction in diabetes

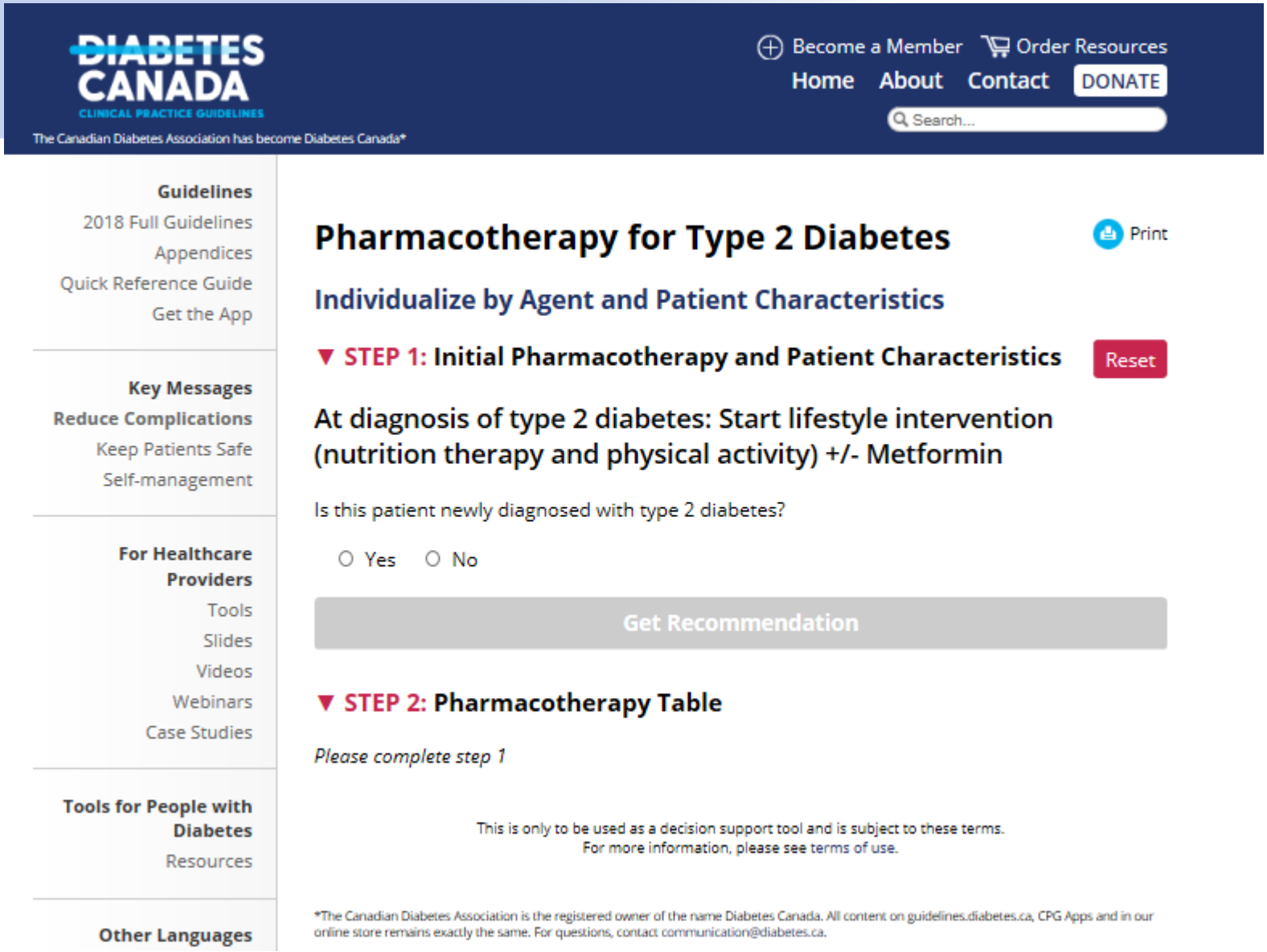
Competency for CDE Exam 3A

Oral Medications for Type 2 Diabetes

- Action
- Indications for Use
- Side Effects
- A1C lowering
- Weight
- Hypoglycemia
- Precautions
- Comments

Pharmacotherapy




DIABETES CANADA
CLINICAL PRACTICE GUIDELINES
The Canadian Diabetes Association has become Diabetes Canada*
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Key Messages
Reduce Complications
Keep Patients Safe
Self-management
For Healthcare Providers
Tools
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Tools for People with Diabetes
Resources
Other Languages
Pharmacotherapy for Type 2 Diabetes
Print
Individualize by Agent and Patient Characteristics
▼ STEP 1: Initial Pharmacotherapy and Patient Characteristics
Reset
At diagnosis of type 2 diabetes: Start lifestyle intervention (nutrition therapy and physical activity) +/- Metformin
Is this patient newly diagnosed with type 2 diabetes?
Yes
No
Get Recommendation
▼ STEP 2: Pharmacotherapy Table
Please complete step 1
This is only to be used as a decision support tool and is subject to these terms.
For more information, please see terms of use.
*The Canadian Diabetes Association is the registered owner of the name Diabetes Canada. All content on guidelines.diabetes.ca, CPG Apps and in our online store remains exactly the same. For questions, contact communication@diabetes.ca.

Self-Management Education
Team & Organizing Care
Special Populations

For Healthcare Providers
Healthcare Provider Tools
Slides and Videos

For Patients
Patient Resources

Other Languages
Ressources françaises
中文資源

Links
orders.diabetes.ca
diabetes.ca
diabetes365.ca

Which of the following applies to your patient?

- ○ A1C <8.5%
- ◉ A1C ≥8.5%
- ○ Symptomatic hyperglycemia with metabolic decompensation

Get Recommendation

Recommendations:

Start metformin immediately. Consider initial combination with another antihyperglycemic agent.

If the glycemic target is still not reached, add an agent best suited to the individual. See the following table.

▼ STEP 2: Individualize and Sort Results

Individualize the table based on patient characteristics:

Priority: Does your patient have clinical cardiovascular disease? ○ Yes ○ No

Individualize

Sort the table by column:

Click a column title to sort results by that column.

Know this chart!

Class▲	Effect on CV outcomes (people with diabetes and CVD)	Likelihood of hypoglycemia	Effect on weight	Relative A1C lowering when added to metformin	Cost	Interactions	Renal considerations	Other therapeutic considerations
Alpha-glucosidase inhibitor (acarbose)		Rare	Neutral	↓	$$			GI side effects; requires TID dosing
DPP-4 Inhibitors	Neutral: alogliptin, saxagliptin, sitagliptin	Rare	Neutral	↓↓	$$$			Caution with saxagliptin and heart failure; Rare joint pain
GLP1 receptor agonists	Liraglutide: Superior Exenatide LAR and lixisenatide: Neutral	Rare	↓↓	↓↓ to ↓↓↓	$$$$			GI side-effects Gallstone disease **Contraindicated: Personal or family history of MTC or MEN2** Requires SC injection
Insulin	Neutral: glargine Non-inferior to glargine: degludec	High	↑↑	↓↓↓↓	$-$$$$			No dose ceiling, flexible regimens Requires SC injection
Insulin secretagogue: Meglitinide		Some	↑	↓↓	$$			Reduced post-prandial glycemia; requires TID-QID dosing
Insulin secretagogue: Sulfonylurea		Some	↑	↓↓	$			Gliclazide and glimepiride associated with less hypoglycemia than glyburide Poor durability
SGLT2 inhibitors	Canagliflozin and empagliflozin: superior	Rare	↓↓	↓↓ to ↓↓↓	$$$			Genital infections, UTI, hypotension Caution with renal dysfunction and loop diuretics, elderly **Contraindications: Dapagliflozin and bladder cancer, canagliflozin and prior lower extremity amputation** Rare DKA (may occur without hyperglycemia)
Thiazolidinediones	Neutral	Rare	↑↑	↓↓	$$			CHF, edema, fractures, cardiovascular controversy (rosiglitazone) **Contraindications: pioglitazone and bladder cancer**

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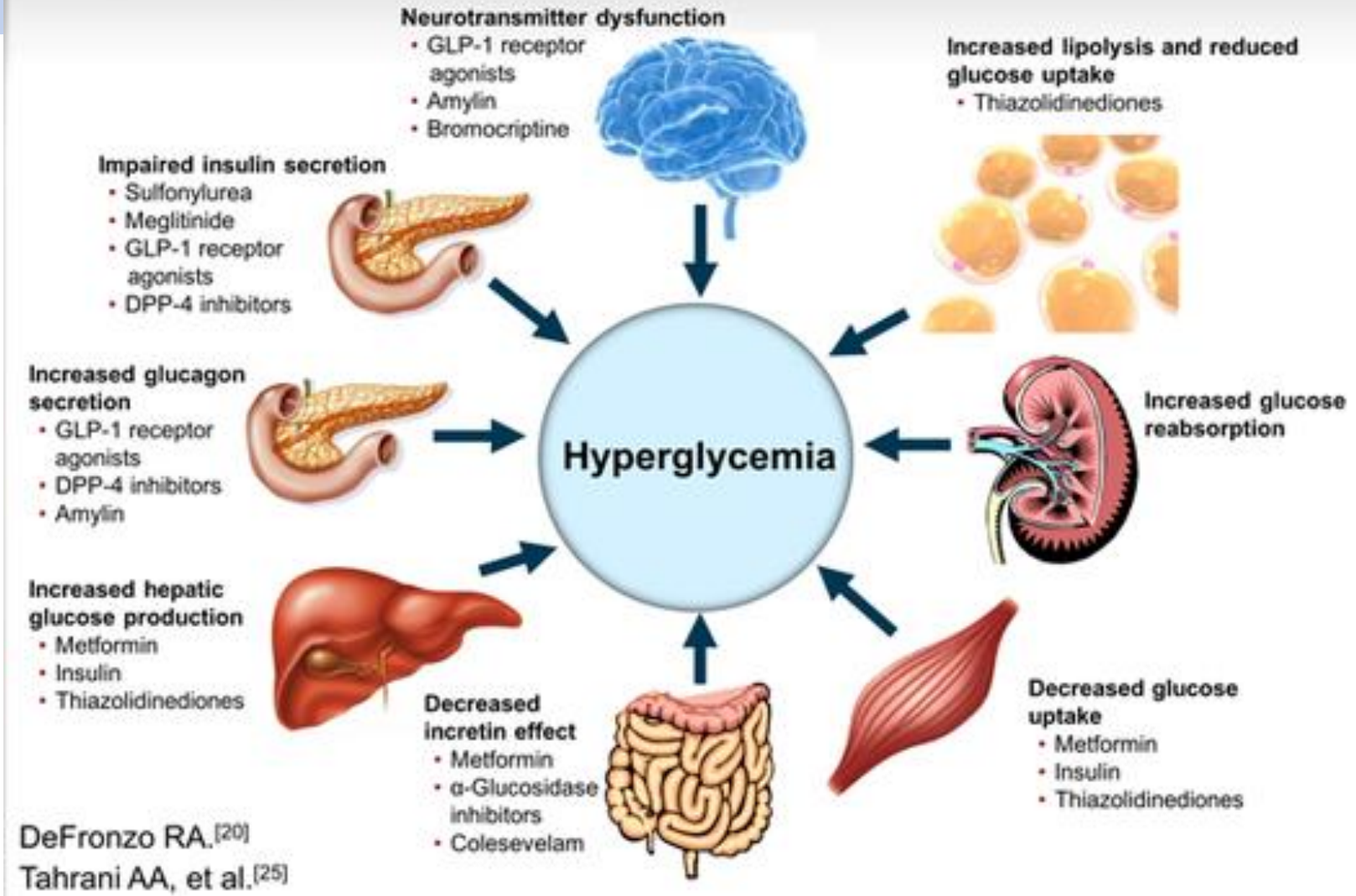
Hyperglycemia in Type 2 Diabetes



DeFronzo RA.[20]
Tahrani AA, et al.[25]

Biguanides

Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation	Risk of hypoglycemia
Biguanides	Metformin	Glucophage	 500 mg  850 mg	No
Biguanides	Extended release metformin	Glumetza	 500 mg  1000 mg	No

Monitor Vitamin B12 levels

Secretagogues

Meglitinide

- faster acting

Sulfonylurea

- longer duration of action

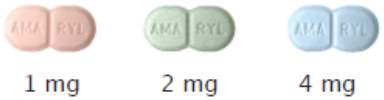
Must be taken with food

Secretagogues

Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation
Amino acid derivate (insulin secretagogues)	Nateglinide	Starlix	 60 mg 120 mg
Meglitinides (insulin secretagogues)	Repaglinide	GlucoNorm	 0.5 mg 1 mg 2 mg

Hypoglycemia Risk

Secretagogues

Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation
Sulfonylureas (insulin secretagogues))	Glimepiride	Amaryl	 1 mg 2 mg 4 mg
Sulfonylureas (insulin secretagogues)	Glyburide	Diaßeta	 2.5 mg 5 mg
Sulfonylureas (insulin secretagogues)	Gliclazide	Diamicron	 80 mg
Sulfonylureas (insulin secretagogues)	Gliclazide modified release	Diamicron MR	 30 mg 60 mg

Hypoglycemia Risk

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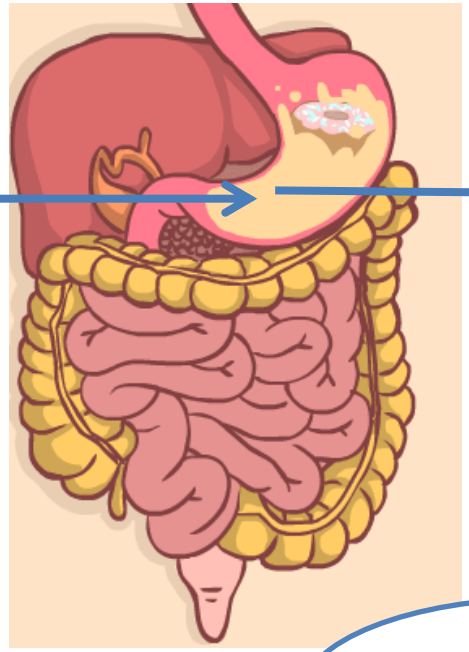
Incretins

Incretins

Meal Ingestion



Secretion of active GLP-1 and GIP (hormone)

DPP-4 (enzyme)

DPP-4 Inhibitor

Inactive GLP-1 and GIP

DPP-4 Inhibitors

Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation
Dipeptidyl peptidase-4 inhibitors (incretin pathway)	Alogliptin	Nesina	 6.25 mg 12.5 mg 25 mg
Dipeptidyl peptidase-4 inhibitors and biguanides	Alogliptin and metformin	Kazano	 12.5/500 mg 12.5/850 mg 12.5/1000 mg
Dipeptidyl peptidase-4 inhibitors (incretin pathway)	Linagliptin	Trajenta	 5 mg
Dipeptidyl peptidase-4 inhibitors and biguanides	Linagliptin and metformin	Jentadueto	 2.5/500 mg 2.5/850 mg 2.5/1000 mg
Dipeptidyl peptidase-4 inhibitors (incretin pathway)	Saxagliptin	Onglyza	 2.5 mg 5 mg
Dipeptidyl peptidase-4 inhibitors and biguanides	Saxagliptin and metformin	Komboglyze	 2.5/500 mg 2.5/850 mg 2.5/1000 mg
Dipeptidyl peptidase-4 inhibitors (incretin pathway)	Sitagliptin	Januvia	 25 mg 50 mg 100 mg
Dipeptidyl peptidase-4 inhibitors and biguanides	Sitagliptin and metformin	Janumet	 50/500 mg 50/850 mg 50/1000 mg
Dipeptidyl peptidase-4 inhibitors and biguanides	Extended release sitagliptin and metformin	Janumet XR	 50/1000 mg

$100/ month

Not covered by ODB

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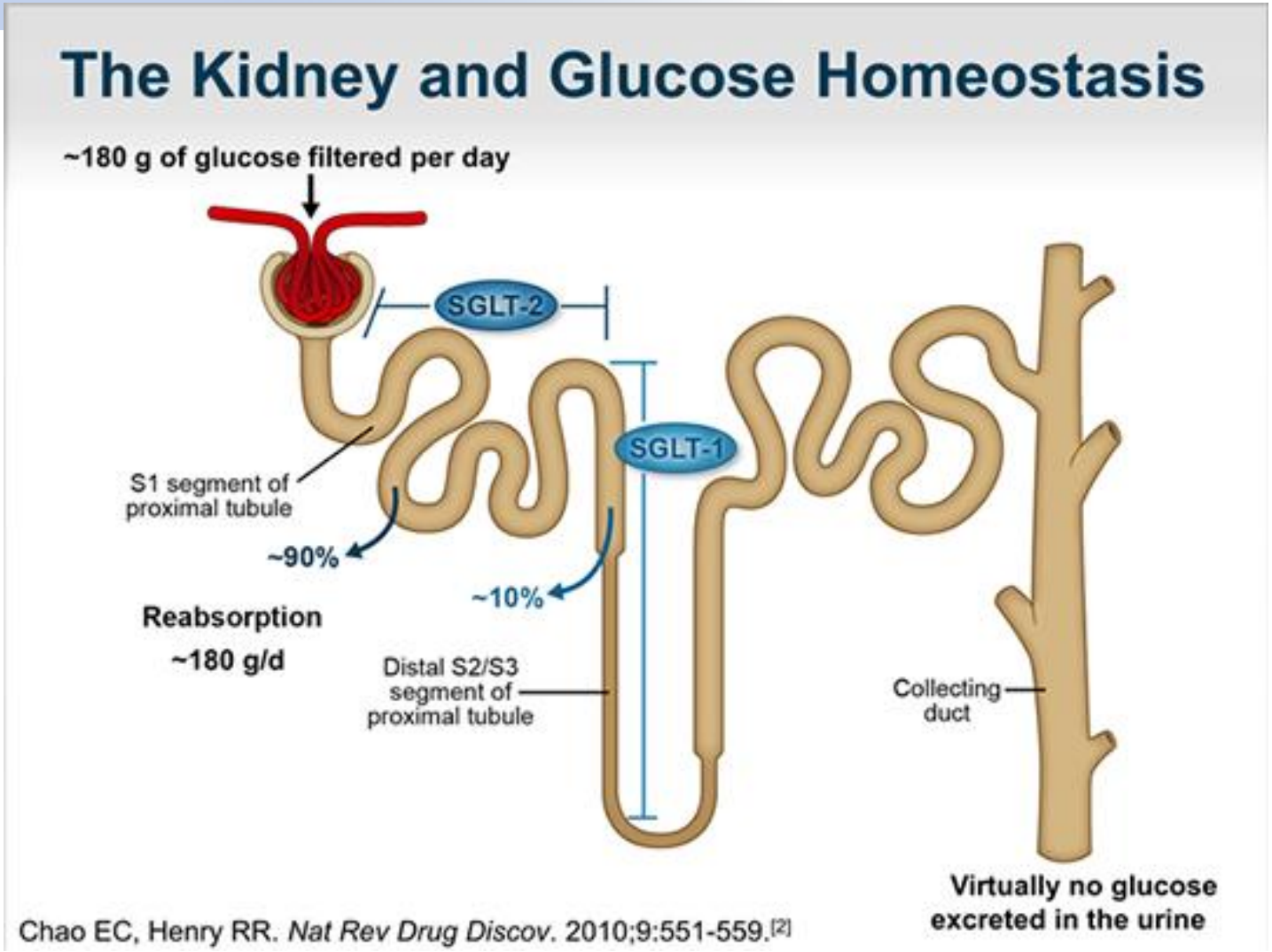
Combinations with DPP4

Alogliptin + Metformin	Kazano	12.5/500,mg 12.5/850 mg, 12.5/1000 mg
Linagliptin + Metformin	Jentadueto	2.5/500 mg, 2.5/850 mg, 2.5/1000 mg
Saxagliptin + Metformin	Komboglyze	2.5/500mg, 2.5/850 mg, 2.5/1000 mg
Sitagliptin + metformin	Janumet	50/500 mg, 50/850 mg, 50/1000 mg
Extended release sitagliptin + metformin	Janumet XR	50/500 mg, 50/1000mg, 100/1000mg

SGLT2


The Kidney and Glucose Homeostasis
~180 g of glucose filtered per day
SGLT-2
SGLT-1
S1 segment of proximal tubule
~90%
~10%
Reabsorption
~180 g/d
Distal S2/S3 segment of proximal tubule
Collecting duct
Virtually no glucose excreted in the urine
Chao EC, Henry RR. Nat Rev Drug Discov. 2010;9:551-559.[2]

SGLT2

Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation
Inhibitor of sodium glucose co-transporter 2 (SGLT2)	Canagliflozin	Invokana	 100 mg 300 mg
Inhibitor of sodium glucose co-transporter 2 (SGLT2)	Dapagliflozin	Forxiga	 5 mg  10 mg
Inhibitor of sodium glucose co-transporter 2 (SGLT2)	Empagliflozin	Jardiance	 10 mg  25 mg

$100/ month

Increase fluid intake

Combinations with SGLT2

Canagliflozin + Metformin	Invokamet	50/500 mg, 50/850mg, 50/1000mg 150/500mg, 150/850 mg, 150/1000mg
Dapagliflozin + Metformin	Xigduo	5/850 mg, 5/1000mg
Empagliflozin + metformin	Synjardy	5/500 mg, 5/850 mg, 5/1000 mg 12.5/500 mg, 12.5/850 mg, 12.5/ 1000mg
Empagliflozin + Linagliptin	Glyxambi	10/5 mg, 25/5 mg

TZD

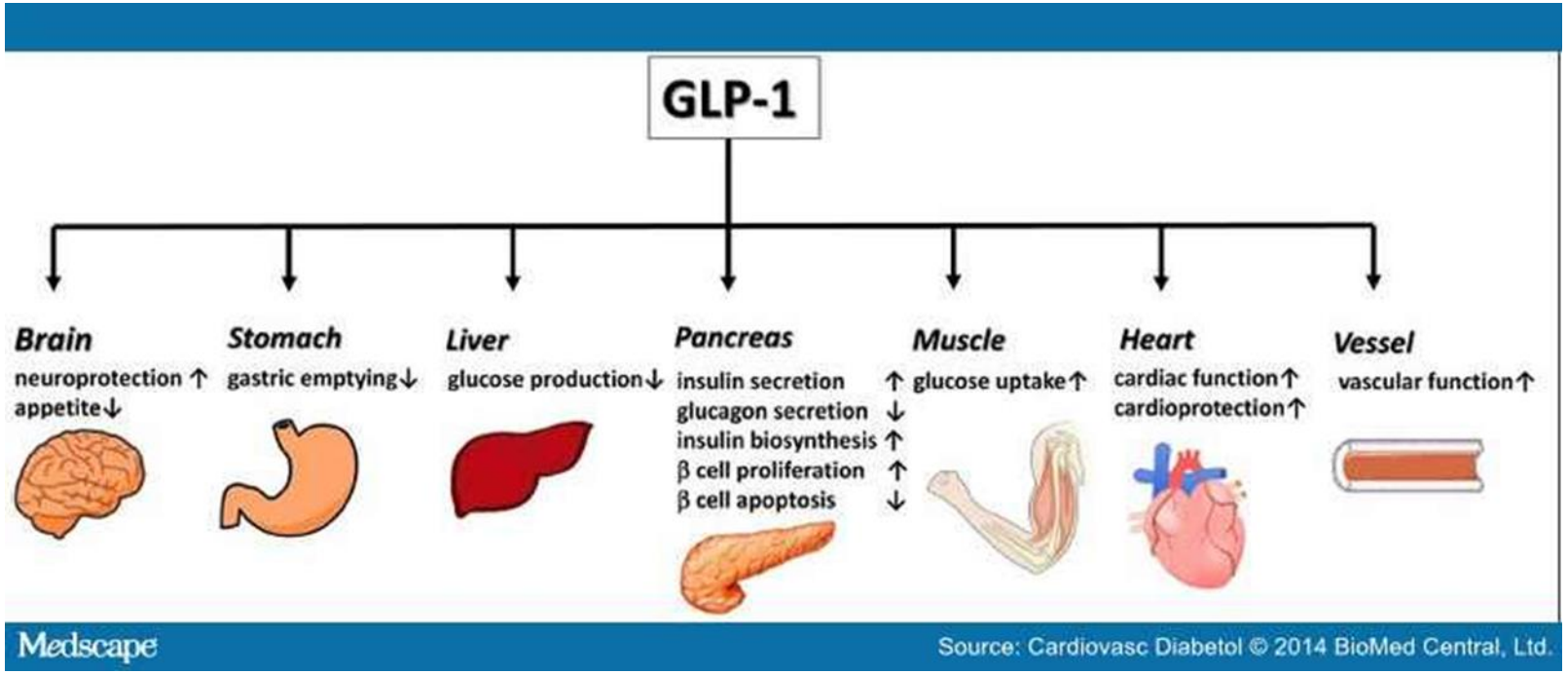
Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation
Thiazolidinediones	Pioglitazone	Actos	 15 mg 30 mg 45 mg
Thiazolidinediones	Rosiglitazone	Avandia	 2 mg 4 mg 8 mg
Thiazolidinediones and biguanides	Rosiglitazone and metformin	Avandamet	 2/500 mg 2/1000 mg  4/500 mg 4/1000 mg

Alpha-glucosidase Inhibitors

Class	Drugs	Brand name (non-exhaustive list)	Commercial presentation	
Alpha-glucosidase inhibitors	Acarbose	Glucobay	 50 mg	 100 mg

Hypoglycemia Treatment:
Glucose Tablets
Milk

GLP-1


GLP-1
Brain
neuroprotection ↑
appetite↓
Stomach
gastric emptying↓
Liver
glucose production↓
Pancreas
insulin secretion ↑
glucagon secretion ↓
insulin biosynthesis ↑
β cell proliferation ↑
β cell apoptosis ↓
Muscle
glucose uptake↑
Heart
cardiac function↑
cardioprotection↑
Vessel
vascular function↑
Medscape
Source: Cardiovasc Diabetol © 2014 BioMed Central, Ltd.

GLP-1

Exenatide	Byetta
Liraglutide	Victoza
Lixisenatide	Adlyxine

Not covered by ODB
$168-303/month

GLP-1 Weight Loss

Saxenda- liraglutide

Not covered by ODB
Up to $413/ month

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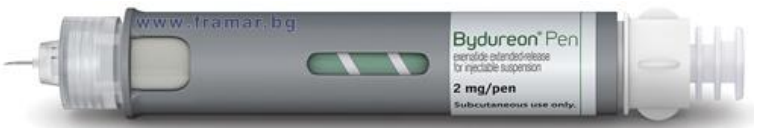
GLP-1

Once per week injectable

Bydureon (exenatide extended release)



Trulicity (dulaglutide)

Competency for CDE Exam 3H, 5F

Medications for Hypertension

Medications for Cholesterol

Medications for Hypertension

Target 130/80 mmHg

Medications for Hypertension

Who do you treat?

- Over 55, use an ACE or ARB
- Under 55, with PAD, CVD, microvascular or macrovascular complications, use an ACE or ARB
- Anyone whose Blood pressure is above the target, use an ACE or ARB

Medications for Hypertension

Combination of 2 first line drugs may be considered as **initial therapy if the blood pressure is above target:**

≥ 20 mmHg systolic

or

≥ 10 mmHg diastolic

Three drugs may be required to reach target.

Medications for Hypertension- Monitoring

Monitor serum potassium and creatinine in patients with CKD prescribed an ACEI or ARB.

Combinations of ACEI and ARB are generally not recommended in the absence of proteinuria.

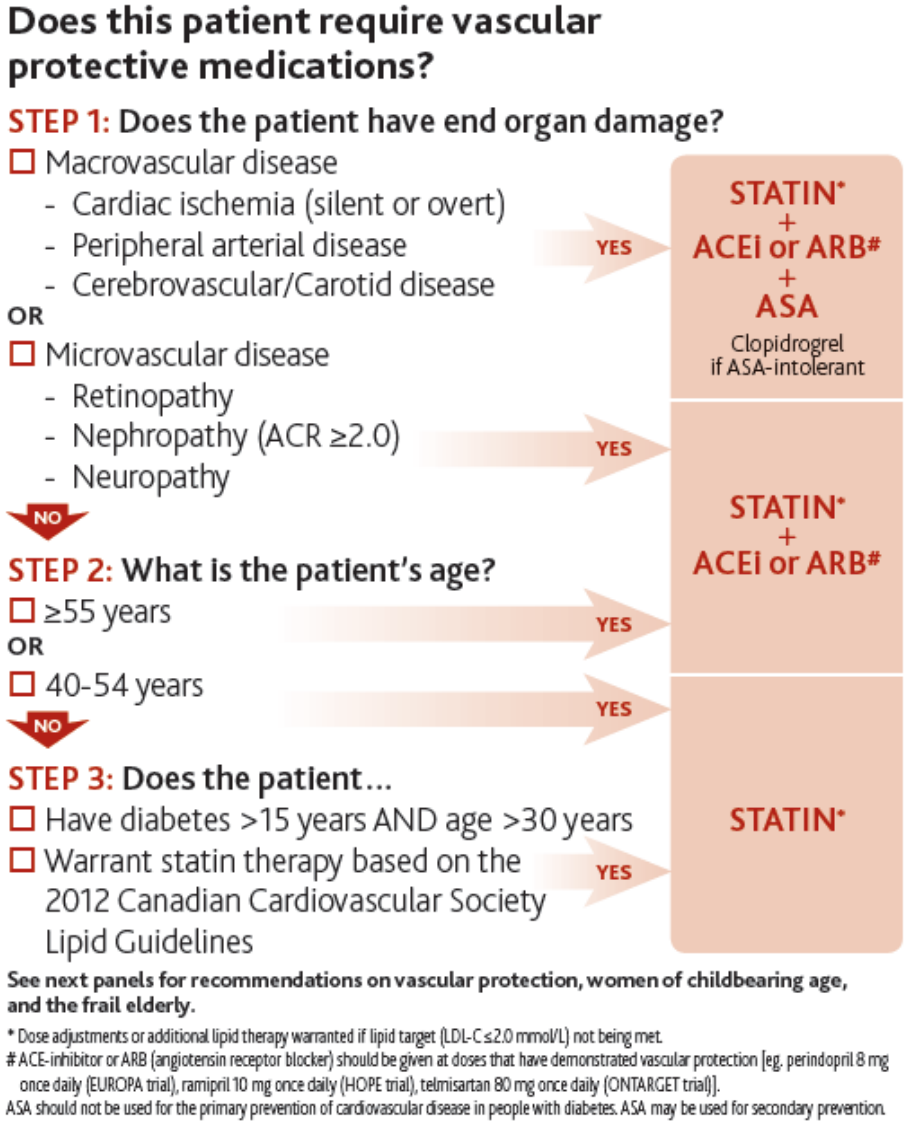
Medications for Hypertension- ACE (Angiotensin Converting enzymes)

Generic Name	Brand Name
Quinapril	Accupril, generic
Ramipril	Altace, generic
Captopril	Capoten, generic
Perindopril	Coversyl
Benazepril	Lotensin, generic
Cilazapril	Inhibace, generic
Lisinopril	Prinivil, Zestril, generic
Fosinopril	Monopril, generic
Enalapril	Vasotec, generic
Trandolapril	Mavik

Medications for Hypertension ARB (Angiotensin II Receptor Blockers)

Generic Name	Brand Name
Candesartan	Atacand
Eprosartan	Teveten
Irbesartan	Avapro
Losartan	Cozaar
Telmisartan	Micardis
Valsartan	Diovan
Olmersartan medoxomil	Benicar
Azilsartan	Edarbi

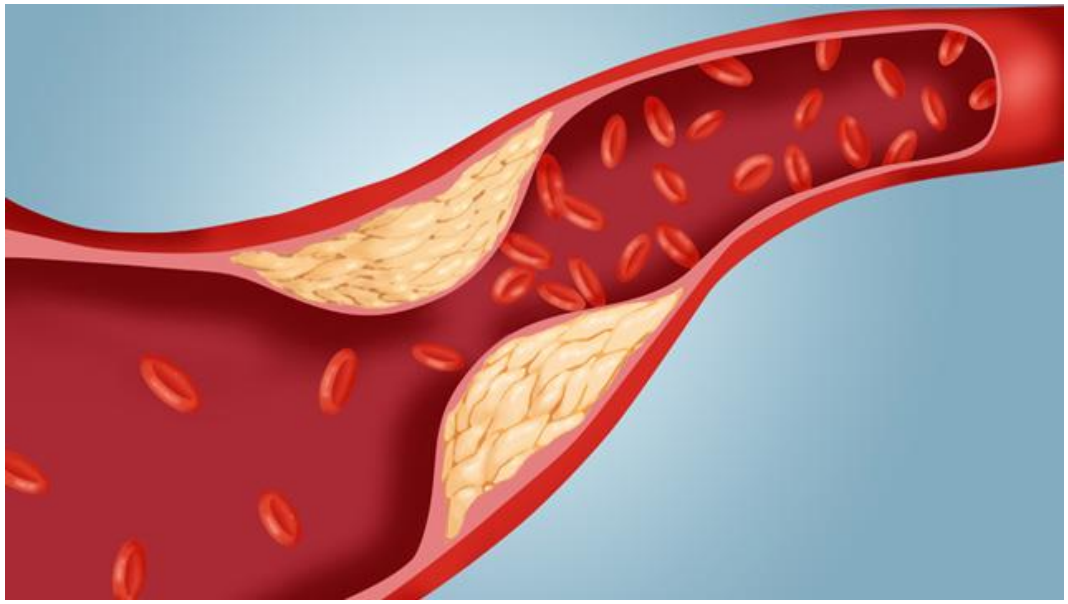
Reducing Vascular Risk



Guidelines.diabetes.ca

Medications for Hyperlipidemia

Target LDL-C ≤ 2.0mmol/l



Medications for Hyperlipidemia

Statins

Generic Name	Trade Name
Atorvastatin	Lipitor
Fluvastatin	Lescol
Lovastatin	Mevacor, generic
Pravastatin	Pravachol, generic
Rosuvastatin	Crestor, generic
Simvastatin	Zocor, generic

Medications for Hyperlipidemia

Other Medications

- Bile acid seqestrants
- Cholesterol absorption inhibitors
- Fibrates
- ~~Nicotinic acid~~

Medication Changes during Illness

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

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

Sample Question 1

Seema is presently on glimipride and metformin. Acarbose has been added as the A1C is still elevated.

What would be the most important information to tell her about this change in medication?

a) Acarbose does not cause hypoglycemia

b) Fruit juice is the best way to treat hypoglycemia

c) Hypoglycemia must be treated with glucose tablets or milk

d) Hypoglycemia is best treated with food e.g. crackers

e) If hypoglycemia occurs the metformin should be reduced.

Sample Question 2

Alfred is 75 and has recently returned home after an MI. His eGFR is 60. His present medications include glucophage 1 gm bid, lisinopril 40 mg od, atorvastatin 20 mg. He develops flu-like symptoms and is vomiting. What would you tell him about his medications?

a) Stop all medications as illness will decrease blood glucose
b) Stop lisinopril and atorvastatin
c) Stop glucophage and lisinopril
d) Continue with all medications

Sample Question 3

Paula calls her diabetes educator as she has had 2 genital mycotic infections in the last two months. She reports that her blood sugars are in good control with FBS 5.6-7.1mmol/l and postprandial sugars all under 10 mmol/l. Her medications include glucophage 1 gm bid, repaglinide 1 mg tid and canagliflozin 100 mg, candesartan 16 mg. What is the most likely explanation?

a) Glucophage can cause dehydration
b) There is an increased risk of genital infections with canagliflozin
c) Repaglinide and glucophage should not be taken together
d) Repaglinide can cause dehydration and risk of genital infections

Sample Question 4

Nasar (age 39) has had type 2 diabetes for 2 years. He has recently immigrated to Canada. His A1c is 8.4% and eGFR 110. He is on glucophage 1g bid. What class of medication would you recommend adding given his limited finances and no drug coverage.

a) DPP4
b) SGLT2
c) GLP-1
d) Sulfonylureas

Sample Question 5

Nikki questions whether her blood glucose meter is working correctly. You send her for a lab to meter comparison. According to the 2013 guidelines what should the correlation be?

a) 5 %

b) 10%

c) 15%

d) 20%

Sample Question 6

Nikki comes to the clinic reporting her period is overdue by 4 weeks. Which medications should be stopped?

a) Vitamin D + omega 3

b) Lovastatin + olmestartan

c) Metformin

d) Folic acid

Sample Question 7

What statement is true about alternate site testing?

a) It can be done at any time

b) The forearm is the best place to test right after a meal

c) The base of the thumb is most comparable with fingertip testing

d) It should only be used by children

Sample Question 8

What would be a realistic expectation for reducing the progression to diabetes with Metformin?

a) 20 %

b) 31%

c) 58%

d) 10%

Questions

Contact me at: wendyg@langs.org