UNDERSTANDING THE DIFFERENT TYPES OF DIABETES MEDICATIONS CAN HELP IMPROVE YOUR HEALTH

PART 2 OF 2: INSULINS AND INJECTABLES

Kim Ladd, RN, BS, CPHQ, CDCES

AMERICAN PRINTING HOUSE

This webinar will help you gain an understanding of the different types and actions of diabetes injectable medications and how they help regulate blood sugar levels.

Objectives:

1. Increase knowledge base of the different types of insulins and how they help to lower blood glucose levels.
2. Gain an understanding of the non-insulin injectable medications that can be used to manage type 2 diabetes.
3. Apply knowledge gained to be a part of choosing which diabetes medications will work best for you.

Why Diabetes Medications?

The cornerstone of diabetes management is keeping blood sugar levels under control (80 -130 mg/dcl) to help prevent complications of diabetes.

Taking diabetes medications is one way to help manage blood sugar levels.

Insulin

How Insulin Works (9:42) video from Sugar High (PA diabetes specialist) stop at 8:49

https://youtu.be/3h1R-1mCJ8c

Insulin is a hormone made by the pancreas and it's main function is to regulate glucose metabolism (ie. insulin helps to move glucose out of the bloodstream and into cells where it can be used for energy).

Insulin directly lowers glucose levels by increasing uptake into muscle and fatty tissue, and reducing release of glucose from the liver.

Insulin

If your body cannot produce enough insulin (diabetes) and other medications cannot regulate your blood sugar levels properly, then it may be time for insulin. If you have type 1 diabetes you will be taking insulin.

Insulin doses are drawn up from a vial using a syringe, a pen or via an insulin pump, depending on the type of insulin.

Insulin is injected into subcutaneous tissue (subq, aka fatty tissue); abdomen, legs, back of arms, or buttocks.

Insulin can’t be taken in pill-form because your digestive system would break it down in the same way that you digest food. That means the insulin wouldn’t make it to your bloodstream where it’s needed.

Insulins for Type 1 and Type 2 Diabetes- HISTORY

1921: Dr. Fredrik Banting and Charles Best produce an extract that they could inject into diabetic dogs. They then begin to produce extracts from the pancreas in cows and they call it extracted insulin.

1922: 14-year-old Leonard Thompson, who had type 1 diabetes, was the first patient to receive insulin. He survived 13 years. Before that, diabetics died within a few months of being diagnosed with type 1 diabetes.

1950: Novo Nordisk, a Danish pharmaceutical company, launches NPH, which is insulin with an intermediate action effect. This improves the ability to control blood sugar.

1963: Insulin became the first protein that man learned to manufacture artificially.

1982: Insulin made artificially begins to be called human insulin. It turns out that human insulin is better than insulin extracted from the pancreas of animals. In particular, the risk of infections and allergic reactions is lower when using human insulin. The company Eli Lilly launches Humulin.

Insulins for Type 1 and Type 2 Diabetes- HISTORY

1985: Novo Nordisk launches the insulin pen.

1992: Medtronic launches the insulin pump.

1996: Eli Lilly launches analog insulin lispro under the trade name Humalog. Analog insulin is a modification of human insulin and the modification gives insulin other properties. For example, the rate at which insulin is absorbed, distributed and translated into the body is modified.

2000: Approximately 500 patients received transplantation with beta cells (which make insulin). The aim is to be able to transplant beta cells to such an extent that people with type 1 diabetes no longer need to supply insulin with syringes.

2013: The University of Cambridge developed an artificial pancreas, which means that you have a glucose meter (which measures blood sugar continuously) and it is connected to an insulin pump that can automatically dose insulin.

Insulins for Type 1 and Type 2 Diabetes

1) Rapid Acting
2) Short Acting
3) Intermediate Acting
4) Long Acting
5) Intermediate + Short
6) Intermediate + Rapid
7) Concentrated
8) Inhaled

Insulins for Type 1 and Type 2 Diabetes

Bolus versus basal insulin

Bolus (one-time dose) insulin lowers after-meal glucose. Post meal blood glucose levels reflects efficacy.

Basal (continuous dose) insulin controls blood glucose levels between meals and nighttime. Fasting blood glucose levels reflects efficacy.

Insulin side effects: hypoglycemia, weight gain, lipodystrophy (skin lesions at injection sites; rotate injection sites to decrease).

Typical dosing range: 0.5-1.0 units/ kg body wt/day.

Discard open vials after 28 days. For pen storage guidelines, see package insert.

Insulins for Type 1 and Type 2 Diabetes

Rapid Acting	Onset:	Peak:	Duration:
aspart (Fiasp)	2 ½ mins	60 mins	3-5 hours
Lispro-aabc (Lyumjev)	1 min	60 mins	4-5 hours
aspart (Novolog)	5-15 mins	30-90 mins	<5 hours
lispro (Humalog, Admelog)	5-15 mins	30-90 mins	<5 hours
glulisine (Apidra)	5-15 mins	30-90 mins	<5 hours

BOLUS insulins; used to lower blood sugar levels after eating.
Dosed as: fixed dose, sliding scale or carb counting ratio. Insulin pumps use rapid-acting insulins.

Insulins for Type 1 and Type 2 Diabetes

Short Acting	Onset:	Peak:	Duration:
regular	30-60 mins	2-3 hours	5-8 hours

(Humulin R, Novolin R, ReliOn R, Iletin R)

BOLUS insulin; used to lower blood sugar levels after eating.
Dosed as: fixed dose, sliding scale or carb counting.
1st insulin developed; 1921, 1st given to patients in 1922

ReliOn R insulin available at Walmart pharmacy for $25/vial without a prescription.

Insulins for Type 1 and Type 2 Diabetes

Intermediate Acting	Onset:	Peak:	Duration:
NPH	2-4 hours	4-10 hours	10-16 hours

(Humulin N, Novolin N, ReliOn N, Iletin N)

BASAL insulin; controls BG between meals and nighttime. Fasting BG reflects efficacy
Dosed as: fixed dose
2nd insulin developed; 1946

ReliOn N insulin available at Walmart pharmacy for $25/vial without a prescription.

Insulins for Type 1 and Type 2 Diabetes

Long Acting	Onset:	Peak:	Duration:
detemir (Levemir)	3-8 hours	none	6-24 hours
glargine (Lantus, Basaglar)	2-4 hours	none	20-24 hours
degludec (Tresiba)	~ 1 hour	none	<42 hours

BASAL insulins; controls BG between meals and nighttime. Fasting BG reflects efficacy

Dosed as: fixed dose 1 x/day at same time everyday

Insulins for Type 1 and Type 2 Diabetes

Combo Intermediate + Short Acting

	Onset:	**Peak:**	**Duration:**
NPH + Reg	30-60 mins	dual peaks	10-16 hours

70/30 = 70% NPH + 30% Reg
50/50 = 50% NPH + 50% Reg

BOLUS + BASAL

Draw up regular insulin (clear) into syringe first, then NPH (cloudy) into same syringe

Dosed as: fixed dose 1 or 2 x/day

Insulins for Type 1 and Type 2 Diabetes

Combo Intermediate + Rapid

	Onset:	Peak:	Duration:
Novolog Mix - 70/30	5-15 mins	dual peaks	24 hours
(70 % insulin aspart protamine/ 30% insulin aspart)			
Humalog Mix - 75/25 or 50/50 (%insulin lispro protamine/ %insulin lispro)	5-15 mins	dual peaks	24 hours

BOLUS + BASAL

Dosed as: fixed dose 1 or 2 x/day

Insulins for Type 1 and Type 2 Diabetes

Concentrated Insulin

	Onset:	Peak:	Duration:
Rapid Acting High Dose U-200 insulin lispro (Humalog U200)	10-15 mins	1-3 hrs	3-5 hrs

2 xs concentration of u-100 insulin (200 units insulin/mL)

3 mL Kwik Pen. Once opened, good for 28 days; store at room temperature

BOLUS insulin

Dosed as: fixed dose, sliding scale or carb counting ratio prior to each meal.

Insulins for Type 1 and Type 2 Diabetes

Concentrated Insulin

	Onset:	**Peak:**	**Duration:**
Ultra Long Lasting (Basal)	1 hr	no peak	up to 42 hrs

insulin degludec U-200 (Tresiba U200)

insulin degludec (IDEG U200)

2 xs concentration of u-100 insulin (200 units insulin/mL)
Tresiba FlexTouch 3 mL pen; once opened, good for 8 weeks
Dosed as: fixed dose once a day

Insulins for Type 1 and Type 2 Diabetes

Concentrated Insulin

	Onset:	**Peak:**	**Duration:**
Ultra Basal insulin	6 hrs	none	up to 36 hrs
insulin glargine (Lantus) U-300 (Toujeo Solostar)			

3 xs concentration of u-100 insulin (300 units insulin/mL)

1.5 mL or 3 mL (Max Solostar) Pen.

Dosed as: fixed dose once a day

Insulins for Type 1 and Type 2 Diabetes

Concentrated Insulin

	Onset:	**Peak:**	**Duration:**
Humulin Regular U-500 Short Acting High Dose	15- 30 min	4-8 hrs	13-24 hrs

5 xs concentration of u-100 insulin (500 units insulin/mL). Indicated for pts taking 200+ units insulin daily. Although U500 is a regular insulin, it possesses both prandial and based glucose-lowering activity and may work in a manner similar to premix insulin.

KwikPen 3 mL Pen – Once opened, good for 28 days.

20 mL Vial – Once opened, good for 40 days.

Use designated U-500 insulin syringe (has a green cap).

A bolus insulin used as a BASAL insulin

Dosed as: fixed dose 2 to 3 x/day, 30 minutes before a meal

Insulins for Type 1 and Type 2 Diabetes

Inhaled Insulin

	Onset:	Peak:	Duration:
Afrezza Inhaled	~12 mins	35-45 mins	1.5- 3 hours

- regular human
- insulin2 xs concentration of u-100 insulin

Dose range: 4, 8, and 12 unit cartridges before meals

How to administer Afrezza inhaled insulin: https://afrezza.com/wp-content/uploads/2020/01/Afrezza-How-to-Use-Guide.pdf

After you inhale Afrezza (insulin), the insulin passes quickly through your lungs and into your bloodstream, where it begins lowering your blood sugar level.

Assess lung function. Avoid in lung disease — bronchospasm risk.

Side effects: hypo, cough, throat irritation.

Injectable Medications for Type 2 Diabetes

GLP-1 Receptor Agonist (GLP-1 RA)

"Incretin Mimetic": Increase insulin release with food, slow gastric emptying, promote satiety (feeling of fullness), suppresses glucagon

• exenatide (Byetta)	Inject 2 x a day
• exenatide XR (Bydureon)	Inject 1 x a week (approved for 10+ yo)
• liraglutide (Victoza)	Inject 1 x a day (approved for 10+ yo)
• dulaglutide (Trulicity)	Inject 1 x a week
• lixisenatide (Adlyxin)	Inject 1 x a day
• semaglutide (Ozempic)	Inject 1 x a week

Side effects for all: Nausea, vomiting, weight loss, injection site reaction. Report signs of acute pancreatitis (severe abdominal pain, vomiting), stop med. Renally excreted. Black box warning: Thyroid C-cell tumor warning for exenatide XR, liraglutide, dulaglutide, and semaglutide (avoid if family history of medullary thyroid tumor).

Victoza and Ozempic significantly reduce risk of CV death, heart attack, and stroke.

Lowers A1c 0.5 – 1.6%

Weight loss of 1.6 to 6.0kg (3.5 to 13 pounds)

Insulin/Injectable Combo Medications for Type 2 Diabetes

iDegLira (Xultophy 100/3.6)

Combines: insulin degludec (IDeg or Tresiba): ultra long insulin

+

liraglutide (Victoza): GLP-1 Receptor Agonist

Xultophy 100/3.6 pre-filled pen = 100 units IDeg / 3.6 mg liraglutide per mL

Once daily injection

Recommended starting dose:

- 16 IDegLira (= 16 units IDeg + 0.58 mg liraglutide)

Titrate dose up or down by 2 units every 3-4 days to reach target.

Supplied in package of five single-use 3mL pens.

Once opened, good for 21 days.

Insulin/Injectable Combo Medications for Type 2 Diabetes

iGlarLixi (Soliqua 100/33)

Combines: insulin glargine (Lantus): basal Insulin

+

lixisenatide (Adlyxin): GLP-1 ReceptorAgonist

Soliqua 100/33 Solostar Pen = 100 units glargine / 33 µg lixisenatide per mL

Once daily injection an hour prior to first meal of day.

Recommended starting dose:

- 15 units for pts not controlled on 30 units basal insulin or GLP-1 RA
- 30 units for pts not controlled on 30 -60 units basal insulin or GLP-1 RA

Titrate dose up or down by 2-4 units every week to reach target.

Supplied in package of five single-use 3mL pens.

Once opened, good for 14 days.

Amylin Mimetic

slows gastric emptying, suppresses glucagon

- pramlintide (Symlin)

Dosage: Type 1: 15 - 60 mcg sq; Type 2: 60 - 120 mcg sq; take immediately before major meals

For diabetes Type 1 or 2 on insulin.
Severe hypoglycemic risk, decrease insulin dose when starting.
Side effects: nausea, weight loss.
Lowers A1c 0.5 – 1%

Diabetes Medications & Low/ No Vision

Empower yourself to be responsible for your medications (do not let blindness be an excuse):

- Research your medications (online, apps, Alexa, doctor, nurse, diabetes educator, pharmacist)
- Have a safe way to identify your medications (ScripTalk, Spoken RX, braille, large print, etc.)
- Develop a medication management regimen that works for you
- Educate, Advocate, Activate!

Visit the **Diabetes Medications** webpage on VisionAware for more information