# AU InforMed

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***Key Inforbits***

- Diabetes Facts
- Type 1 vs. Type 2
- Reminder: Screening and Diagnosis
- What is eAG?
- New Diabetes Treatments
- Cinnamon and Diabetes


**Diabetes Quick Facts:**

Diabetes is a disease characterized by hyperglycemia caused by defects in insulin production, insulin action (sensitivity), or both. Diabetes can lead to serious complications such as cardiovascular disease, retinopathy, neuropathy, and nephropathy.[1,2] Diabetes is:

- A health risk to 57 million Americans. With current trends, 1/3 of children born today will be diagnosed with diabetes[2]
- Found in approximately 24 million children and adults in the United States -7.8% of the population[3]
- The leading cause of blindness in adults aged 20 to 74 years
- The leading cause of kidney failure
- A risk for stroke (2 to 4 times higher risk for stroke as compared to non-diabetic patients)
- A killer. 2/3 of deaths in type 2 diabetic patients due to cardiovascular events[1]
- The cause of mild to severe nervous system damage in 60% to 70% of diabetic patients - approximately 82,000 lower extremity amputations each year[1,4]
- The seventh leading cause of death in 2006 in the United States
- Deadly. The risk for death is about double that of people without diabetes in the same age groups
- Found in African Americans, Native Americans, Latinos, Asian Americans and Pacific Islanders more than other races of people[1]
- Costly-Annual economic cost in 2007 was approximately $174 billion[1,2]

1. National Diabetes Fact Sheet-2007, Centers for Disease Control and Prevention, [Updated periodically. Cited 2009 October 20].. Available from: http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf
2. American Diabetes Month November 2009. American Diabetes Association. [Updated periodically. Cited 2009 October 22]. Available from: http://www.diabetes.org/communityprograms-and-localevents/americandiabetesmonth.jsp#
3. Rodbard HW, Jellinger PS, Davidson JA, Einhorn D, Garber AJ, Grunberger G, et al. Statement by an American Association of Clinical Endocrinologist/ American College of Endocrinology Consensus Panel on Type 2 Diabetes Mellitus: An algorithm of glycemic control. Endocrine Practice. Sept/Oct 2009. 15 (6): p. 540-559. Available from: http://www.aace.com/pub/pdf/GlycemicControlAlgorithm.pdf
4. Triplitt CL, Reasner CA, Isley WL. Diabetes Mellitus. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. Pharmacotherapy: A Pathophysiologic Approach. 7th edition, New York: McGraw Hill Medical; 2008. P. 1205-1207.

## Type I and Type II Diabetes – What is the Difference?

### Type 1 Diabetes:

Also known as insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes.[1] Type 1 diabetes usually occurs abruptly when pancreatic beta cells are destroyed by the immune system which causes the body to stop producing insulin. Therefore, the need for insulin therapy is immediate. Type 1 diabetes usually affects children and young adults less than 30 years of age; however, it can occur at any age. It accounts for 5% to 10% of all cases of diabetes.[1,2] At the onset of type 1, the patient is usually lean and symptomatic. Patients usually present with polyuria, polyphagia, polydipsia, weight loss and blurred vision[3]. At the time of diagnosis, ketones are present and there are no microvascular complications, such as retinopathy, neuropathy, or nephropathy, and there are rarely macrovascular complications, such as cardiovascular disease.[2]

### Type II Diabetes:

Also known as non–insulin-dependent diabetes mellitus (NIDDM) or adult onset diabetes.[1]Type 2 diabetes starts gradually as insulin resistance where the cells in the body do not use insulin properly. When the need for insulin increases, the pancreas slowly loses the ability to produce insulin. Insulin replacement usually is not necessary until years after diagnosis. Type 2 diabetes typically occurs in adults older than 30 and accounts for about 90% to 95% of all cases.[1,2] At the onset of type 2 the patient is usually obese and asymptomatic. At the time of diagnosis, ketones are not present and microvascular and macrovascular complications are common.[2]


1. National Diabetes Fact Sheet-2007, Centers for Disease Control and Prevention, [Updated periodically. Cited 2009 October 20]. Available from: http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf
2. Triplitt CL, Reasner CA, Isley WL. Diabetes Mellitus. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. Pharmacotherapy: A Pathophysiologic Approach. 7th edition, New York: McGraw Hill Medical; 2008. P. 1213
3. Eisenbarth GS, Polonsky KS, Buse JB. Type 1 Diabetes Mellitus. In: Kronenberg HM, Melmed S, Polonsky KS, Larsen PR. Williams Textbook of Endocrinology. 11th edition, Pennsylvania: Saunders Elsevier; 2008. P.1391-1461.


## A Reminder: Screening and Diagnosis

### Screening for Pre-Diabetes and Type 2 Diabetes

- Adults at any age:
  Screen every three years if BMI ≥25 and have one or more risk factors for diabetes
  Risk factors include:
  - Elevated glucose levels
  - Hypertension
  - Dyslipidemia
  - Smoking
  - Family history of diabetes
  - History of gestational diabetes
  - Race of Native American, African American, Latino, Asian American, or Pacific Islander
- Adults ≥ 45 year old:
  Screen every three years if BMI ≥25
- Children 10 years or older:
  Screen every three years if BMI > 85th percentile for age and sex, >85th percentile for height and weight, or >120% of ideal weight for height **PLUS** two additional risk factors for diabetes

### Diagnosis Criteria

One of the following can be used to diagnose diabetes:

1. Fasting Plasma Glucose ≥ 126 mg/dL
2. Symptoms of hyperglycemia PLUS a random plasma glucose ≥ 200 mg/dL
3. Oral Glucose Tolerance Test (OGTT) with a 2-hour plasma glucose ≥ 200 mg/dL

American Diabetes Association. Executive Summary: Standards of medical care in diabetes – 2009. *Diabetes Care* 2009;32(1):S6-S12.

## What is eAG?

The American Diabetes Association is now recommending using a new term in regards to diabetes management: estimated average glucose (eAG).[1] The concept using a patient's $HbA_{1c}$ to estimate their average glucose levels is not unfamiliar, but this standardized estimate can be used to report $A_{1c}$ results to patients in the same units used for self monitoring blood glucose (SMBG, mg/dL or mmol/L). The results from a 2008 study were the first to clearly define the relationship between $HbA_{1c}$ and eAG.[2] This study allows the eAG to be used as a validated measurement of a patient's average glucose over a two to three month period. An online calculator is available at http://professional.diabetes.org/GlucoseCalculator.aspx, or you can you a simple equation: $eAG=(28.7 \times A_{1c}) - 46.7$.

| A1C | eAG | |
|---|---|---|
| % | mg/dl | mmol/l |
| 6 | 126 | 7.0 |
| 6.5 | 140 | 7.8 |
| 7 | 154 | 8.6 |
| 7.5 | 169 | 9.4 |
| 8 | 183 | 10.1 |
| 8.5 | 197 | 10.9 |
| 9 | 212 | 11.8 |
| 9.5 | 226 | 12.6 |
| 10 | 240 | 13.4 |

Formula: 28.7 X A1C – 46.7 = eAG

Image available from: http://professional.diabetes.org/content/PDF/vnzqcAverage%20Glucose%20flyer.pdf


1. Estimated Average Glucose, eAG, American Diabetes Association, [Updated periodically. Cited 2009 October 20]. Available from: http://professional.diabetes.org/GlucoseCalculator.aspx
2. Nathan DM, Kuenen J, Borg R, et al. Translating the A1c assay into estimated average glucose values. *Diabetes Care* 2008;31:1473-1478.


## New Diabetes Treatments


**Saxagliptin (Onglyza)™)** is a new treatment option for type 2 diabetes mellitus.[1] It is similar to Januvia™ (sitagliptin) because they both inhibit the dipeptidyl peptidase IV (DPP-IV) enzyme which prolongs the action of endogenous incretin hormones. This leads to an increase in insulin secretion, suppression of glucagon secretion, and a slowing of gastric emptying.[2] Onglyza™ can be used as monotherapy or in combination with metformin, a thiazolidinedione, or a sulfonylurea when adequate glycemic control is not achieved.[3] Monotherapy lowers $HbA_{1C}$ approximately 0.6% to 0.8%; therefore, it is recommended for patients who have nearly met their A1c goals but who have high postprandial glucose levels. The recommended dose for adults is 2.5 to 5mg one time each day without regard to meals. A lower dose is recommended for patients with renal impairment or for those on a strong CYP 3A4/5 inhibitor. Onglyza™ is well tolerated and has a favorable adverse event profile. It is associated with a low risk of hypoglycemia with minimal differences in body weight.[1]

**Bromocriptine (Cycloset®)** is now FDA approved for the treatment of type 2 diabetes; however, it is not yet on the market. This drug is unlike any other medications presently used to treat diabetes.[4] It is a dopamine receptor agonist used in higher doses to treat Parkinson's disease.[5] This medication is useful in for treating type 2 diabetes because patients with metabolic diseases have low levels of dopamine which can contribute to insulin resistance.[4] Common adverse effects include hypotension, syncope, and nausea; however, these are usually experienced with drug initiation or dose increase. One dose in the morning helps prevent an increase in blood glucose levels after meals throughout the day.[5] Cycloset® can be used as monotherapy or in combination with other diabetes medications to manage blood glucose levels.[4]


After completing Phase III trials, **liraglutide (Victoza®)** is currently under review by the FDA for the treatment of type 2 diabetes.[6] It is similar to exenatide (Byetta®) because they are both a glucagon-like peptide-1 (GLP-1) receptor agonist. Liraglutide is administered subcutaneously once a day. In phase III trials it was associated with weight lose and a low incidence of hypoglycemia. Common adverse drug effects are nausea and headache. Trials have also shown that it lowers HbA1c by 1.0% to 1.5%.[7]


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3. Saxagliptin (BMS-477118). FDA's Endocrinologic and Metabolic Drugs Advisory Committee Briefing Document for April 2009 Meeting. 2009 Mar 2. Accessed 2009 Oct 21. Available from: http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/Drugs/EndocrinologicandMetabolicDrugsAdvisoryCommittee/UCM148109.pdf

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5. New Indications Bromcriptine (Cycloset) for type-2 diabetes. Pharm Therap. 2009;34 (6):286.
6. Neithercott T. Diabetes Meds on the Horizon. American Diabetes Association. [Updated 2009 May 20. Cited 2009 Oct 23]. Available from: http://forecast.diabetes.org/magazine/only-online/diabetes-meds-horizon.
7. Liraglutide (injection) for the Treatment of Patients with Type 2 Diabetes. Endocrine and Metabolic Drug Advisory Committee. 2009 April 2. Accessed 2009 Oct 21. Available from: http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/Drugs/EndocrinologicandMetabolicDrugsAdvisoryCommittee/UCM148659.pdf

## Pass the Cinnamon Toast Crunch®!

Image available from: http://2.bp.blogspot.com/_I10ImWKhqnQ/SWY61mfTbqI/AAAAAAAABj4/_I0z69CTGL8/s1600-h/cinnamon_2j.jpg

Well, sugary cereal is not a good choice for diabetic patients, but many patients with diabetes turn to cinnamon supplements to help control their glucose levels. In 2003, a promising study about cinnamon's effectiveness in controlling glucose levels and lipids was published.[1] Since then, there has been conflicting data about its true benefit.[2]

Cinnamon activates the insulin receptor kinase, increasing insulin sensitivity and glucose uptake. After multiple human studies, a meta-analysis of randomized placebo-controlled trials using *cinnamomum cassia* (cassia cinnamon) showed no statistically significant improvement in A1c, fasting glucose levels, or lipids.[2]

Cinnamon has been shown to be safe up to four months, but as with most substances, inappropriate doses are not completely benign. When used with other antidiabetic medications, there is some risk of hypoglycemia.[3] Preparations of cassia cinnamon also contain a hepatotoxic substance, coumarin. It can be harmful in very high doses[4] and theoretically could interact with anticoagulants in therory[3], but in most cases cassia cinnamon won't contain enough coumarin to produce toxic effects.[4]

At this time, there is not enough evidence to support cinnamon as a sole treatment for diabetes, but it is potentially beneficial as an add-on therapy. *Cinnamomum cassia* is the only type of cinnamon studied. It is commonly found in the United States, but be aware that some preparations may contain several types.[4] If a patient wishes to add cinnamon to their diabetes regimen, make sure they are taking an appropriate dose (1-6 grams of cassia cinnamon daily[3, 4]) and emphasize the importance of lifestyle changes and adherence to diabetes medications.

1. Khan A, Safdar M, Ali Khan MM, et al. Cinnamon improved glucose and lipids of people with type 2 diabetes. *Diabetes Care* 2003;26:3215-8.
2. Baker WL, Gutierrez-Williams G, White CM, et al. Effect of cinnamon on glucose control and lipid parameters. *Diabetes Care* 2008;31:41-3.
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## The last "dose" …

**Question: What key has legs and can't open doors?**
**Answer: A Turkey**

## Happy Thanksgiving!!!

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