

Diabetes Update 2005

This clinician tool reviews the diagnosis/classification and pharmaceutical treatments for diabetes.

Type 1 diabetes is characterized by beta-cell destruction and usually results in absolute insulin deficiency.

Type 2 diabetics have insulin resistance and relative insulin deficiency. Many health care providers screen for type 2 diabetes in adults with high blood pressure or hyperlipidemia. Routine screening for glucose intolerance in pregnancy is the rule in some parts of the world. HIV-positive pregnant women are at increased risk for **Gestational Diabetes Mellitus (GDM)** particularly if they are on highly active antiretroviral treatment (HAART). Low-risk women are:

- Less than 25 years of age
- At normal body weight
- Have no family history of diabetes
- Are not members of an ethnic/racial group with a high prevalence of diabetes (Hispanic, African American, Native American, Asian)

Diagnostic Criteria

- ◆ A fasting plasma glucose (FPG) of 110 mg/dl is the upper limit of “normal”.
- ◆ A FPG of more than 126 mg/dl (confirmed by repeat testing) is diagnostic for diabetes.
- ◆ Glycosylated hemoglobin (HbA_{1c}) is **not** recommended for diagnosis.

Pharmacological Treatment

Type 1- Therapeutic Timing of Actions Following Subcutaneous Administration

Note: These values are approximate: substantial inter- and intra-individual variation can occur.

| Insulin | Onset | Peak | Duration |
|---|--|-----------|----------|
| Lispro (Humalog), Aspart (Novolog)- rapid-acting | 0.25-0.5 h | 0.5-1.5 h | 3-5 h |
| Humulin R, Novolin R (Regular)- short-acting | 30 min–1 h | 1-2 h | 5-8 h |
| Humulin N/L, Novolin N/L- intermediate-acting | 1-3 h | 8-15 h | 18-24 h |
| Premixed (Humulin 50/50 or 70/30, Humalog Mix 75/25 or 50/50, Novolin 70/30, Novolog Mix 70/30)- intermediate/short-acting mixtures | Onset, peak and duration reflects a composite of the intermediate and short-or rapid-acting components, with one peak of action. | | |
| Ultralente- long-acting | 4-6 h | 8-20 h | 24-28 h |
| Glargine (Lantus)- long-acting | 1 h | no peak | 24 h |

Type 2- Patients start pharmacological treatment if FPG is more than 200 mg/dl at diagnosis.

If FPG is less than 200 mg/dl, recommended measures include:

- Medical Nutrition Therapy including weight management and diet modification with a focus on food sources of unsaturated fat instead of saturated (hydrogenated) and trans fat
- Self-management training including blood glucose monitoring (SMBG)
- Increased physical activity level

Note: This information is current as of March 2005. The information is not an endorsement to use any products. Use of this information is done on your own risk. Copyright © 2000 Original author: Wendy Wittenbrook, MA, RD, LD
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Pharmaceuticals for Diabetes Mellitus

| Class | Generic Name | Trade Name | Mechanism of Action | Side Effects/Education |
|---|----------------------------|-----------------------------|---|---|
| Sulfonylureas <i>2nd generation</i> | Glyburide | Micronase | <i>Insulin secretagogue</i> ↑ Insulin secretion ↓ Postprandial plasma glucose | <ul style="list-style-type: none"> ▪ Hypoglycemia, GI effects (nausea, dyspepsia, diarrhea, constipation), ↑ or ↓ appetite, ↑ Weight, Dermatologic effects (rash), Hepatic effects ▪ If taken once a day, take with first meal. ▪ Take glipizide 30 minutes before meals. ▪ ↑ Risk of hypoglycemia (Glimepiride). ▪ Do not skip meals. |
| | | Glynase | | |
| | | Diabeta | | |
| | Glipizide | Glucotrol | | |
| | Glipizide extended release | Glucotrol XL | | |
| | Glimepiride | Amaryl | | |
| | Acetohexamide | Dymelor | | |
| | Chlorpropamide | Diabinese | | |
| <i>1st generation</i> | Tolazamide | Tolinase | | |
| | Tolbutamide | Orinase | | |
| For all classes: Caution patients to acknowledge use of herbs as some herbs affect blood glucose control. | | | | |
| Biguanide | Metformin | Glucophage Glucophage XR | ↓ <i>Liver glucose</i> ↑ Muscle glucose uptake, hepatic glucose production and gluconeogenesis ↓ Insulin resistance at liver and muscle ↓ Fasting plasma glucose ↓ Intestine glucose absorption | <ul style="list-style-type: none"> ▪ ↓ Weight, ↓ Waist circumference, Metallic taste, GI effects (diarrhea). Works well in people who are obese. ▪ Avoid use in people with alcoholism, CHF, liver or renal disease, COPD, or age >80 to avoid risk of lactic acidosis. ▪ Take with food to minimize side effects. ▪ ↓ Triglycerides (TG), ↓ Cholesterol, ↓ Low-density lipoprotein (LDL) cholesterol ▪ ↓ Absorption of folate and vitamin B12. ▪ ↑ Monitoring for people taking steroids, nucleoside analogs, chromium or garlic. ▪ May ↑ lipoatrophy and worsen mitochondrial toxicities. |
| α-glucosidase Inhibitor | Acarbose | Precose | ↓ <i>Postprandial glucose</i> Delays glucose absorption after ingestion of complex carbohydrate. ↓ Glucose absorption at brush border | <ul style="list-style-type: none"> ▪ GI effects (gas, abdominal cramping, diarrhea) ▪ Take with first bite of each main meal. ▪ ↓ absorption of Iron. |
| | Miglitol | Glyset | | |
| Thiazolidinedione | Pioglitazone | Actos | <i>Insulin sensitizer</i> ↑ Insulin sensitivity in fat and muscle. Activates a receptor for transcription of insulin responsive genes. | <ul style="list-style-type: none"> ▪ ↓ LDL, High-density lipoprotein (HDL) cholesterol, TG ▪ Take once a day without regard to food. ▪ Monitor liver function tests. ▪ Some birth control pills may not work. |
| | Rosiglitazone | Avandia | <i>Insulin sensitizer</i> ↑ Insulin sensitivity in fat and muscle. ↓ Hepatic gluconeogenesis and glucose production. ↑ Glucose transporters | <ul style="list-style-type: none"> ▪ ↑ Weight ▪ ↑ LDL and HDL, ↓ TG ▪ Take without regard to food. ▪ Monitor liver function tests. ▪ Synergistic effect with Metformin ▪ Some birth control pills may not work. |
| Meglitinide (Benzoic Acid Derivative) | Repaglinide | Prandin | ↓ <i>Postprandial glucose</i> ↑ Insulin release from pancreas during/after a meal | <ul style="list-style-type: none"> ▪ ↑ Weight, GI effects (nausea, vomiting, diarrhea, and constipation) ▪ Take 15-30 minutes before meals. ▪ May be good for people with erratic eating patterns. ▪ Patients, who add/skip meals, should add/skip dosages. |
| Amino acid D-phenylalanine Derivative | Nateglinide | Starlix | <i>Insulin sensitizer</i> Restores early phase insulin secretion without prolonging late-phase secretion. | <ul style="list-style-type: none"> ▪ Take before meals. ▪ ↑ Appetite, Palpitations, Nausea, Fatigue, Weakness, Sweating, Trembling, Dizziness |
| Combination Oral Medicine | Glyburide + Metformin | Glucovance | Refer to Glyburide and Metformin above. | Refer to Glyburide and Metformin above. |

Reliable information on Insulin Resistance, Pre-Diabetes, and Diabetes for clinicians and patients (counseling/education materials)

- Diabetes Monitor URL: www.diabetesmonitor.com.
- U.S. Food and Drug Administration URL: www.fda.gov.
- American Diabetes Association URL: www.diabetes.org.
- National Diabetes Education Initiative URL: www.ndei.org.
- National Diabetes Information Clearinghouse URL: www.diabetes.niddk.nih.gov.
- Agency for Healthcare Research and Quality URL: www.preventiveservices.ahrq.gov.
- Pronsky ZM. Food Medication Interactions 13th Edition. Food Medication Interactions: Birchrunville, PA; 2004.
- Gillen LJ, Tapsell LC. Advice that includes food sources of unsaturated fat supports future risk management of gestational diabetes mellitus. J Am Diet Assoc. 2004; 104(12): 1863-1867.