



## Diabetes Mellitus

Diabetes is a disorder of sugar metabolism. It is characterized by high blood glucose levels. Diabetes is classified as Type 1 or Type 2 Diabetes.

**Type 1 diabetes** formerly called juvenile-onset or insulin dependent (*IDDM*) has a peak age at onset of 12 years old. It is unusual to begin after age 40. Symptoms include excessive thirst, excessive urination, and weight loss.

**Type 2 diabetes** was formerly called adult-onset or noninsulin dependent (*NIDDM*). Eighty percent of NIDDM patients are obese. Many have excessive thirst or urination, but some have no symptoms. Risk factors for the development of NIDDM are older age, obesity, positive family history and history of gestational diabetes.

**Secondary** diabetes can result from pancreatic disease, hormonal syndromes (*Cushing's syndrome*), drug-induced disease (*thiazide diuretics, steroids, phenytoin*) or those associated with genetic syndromes.

**Impaired glucose tolerance (IGT)** and **Impaired fasting glucose (IFG)** are also termed subclinical or borderline diabetes. Patients generally have no symptoms. Many go on to develop diabetes. There is an increased risk of cardiovascular disease.

**Gestational diabetes** is a diagnosis for women who are first found to have glucose intolerance during a pregnancy. It is associated with increased perinatal complications. Risk factors for the development of gestational diabetes are older age, overweight, previous large or stillborn babies, or positive family history of diabetes. Women with a history of gestational diabetes have an increased risk of developing NIDDM (*as high as 50% within 10 years and 70% within 20 years*).

### Diagnostic Criteria for Diabetes

- 1) Fasting blood glucose: 2 readings greater than or equal to 126 mg/dl
- 2) 75 gram oral glucose tolerance test:  
Diabetes: 2-hour sample greater than 200 mg/dl  
Impaired glucose tolerance: 2-hour sample between 140–200 mg/dl
- 3) 100 gram glucose tolerance test for pregnant women to screen for gestational diabetes:  
2 readings that equal or exceed the following:
  - fasting greater than or equal to 105 mg/dl
  - 1 hour greater than or equal to 190 mg/dl
  - 2 hour greater than or equal to 165 mg/dl
  - 3 hour greater than or equal to 145 mg/dl

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## Diabetes Mellitus Classification

Diabetes Mellitus (*DM*) is a group of disorders characterized by hyperglycemia (*that is, high blood sugar*). Factors that contribute to hyperglycemia include reduced insulin secretion, decreased blood sugar (*glucose*) usage by the body, or increased glucose production. Chronic hyperglycemia adversely affects the body. In the vascular system, there can be cardiovascular disease such as strokes and heart attacks. There can also be renal disease, peripheral neuropathy, and blindness. In the United States, *DM* is a leading cause of end stage kidney disease, leg amputations, and blindness.

The two broad categories of *DM* are type 1 and type 2. Blood sugar enters cells via the action of insulin, which is a hormone produced by the beta cells of the pancreas. Type 1 *DM* is due to beta cell destruction so that no insulin is produced and must be replaced by insulin injections. Type 2 *DM* is a group of disorders characterized by 1) variable degrees of resistance to the action of insulin, 2) impaired insulin secretion by the beta cells, or 3) impaired glucose production.

Older terminology for diabetes is obsolete: insulin dependent diabetes mellitus (*IDDM*) and noninsulin dependent diabetes mellitus (*NIDDM*). While type 1 (*IDDM*) must be treated with insulin, type 2 may also require insulin in the later stages. Also, age is no longer used as a distinction. While most type 1 *DM* develops before age 30, it occasionally occurs at later ages. Conversely, type 2 *DM* usually develops over the age of 30, but its incidence is increasing in children and adolescents, especially those who are obese.

The classification of the diabetes mellitus guides treatment and affects long term prognosis. Type 1 is treated with insulin. Type 2 is initially treated with diet and exercise. If decreased calorie intake and increased exercise does not result in blood glucose control, oral medication is added. Some oral medications include: sulfonylureas (*Diabinese, Tolinase, Diabeta*), alpha-glucosidase inhibitors (*Precoase, Glyset*), thiazolidinedione (*Avandia, Actos*), metformin (*Glucofage*), and repaglinide (*Prandin*).

Diabetes is a progressive disease which can be slowed by meticulous control of blood sugar. Diabetes control is monitored by testing glycohemoglobin in the blood. The American Diabetes Association considers normal glycohemoglobin as a value of  $\leq 6$ . Values of 7 to 9 are acceptable control and  $> 9$  is poor control.

Rating for diabetes mellitus depends on 1) years since diagnosis, 2) control of the diabetes, and 3) presence of complications. Ratings increase with years present, poor control, or complications.

See prior *Rx* for Success issue on Diabetes Mellitus (*Rx #12*), Diabetes Mellitus Complications (*Rx #13*), Older Age Diabetes (*Rx #65*).

To get an idea of how a client with a history of diabetes would be viewed in the underwriting process, please feel free to use the attached *Ask "Rx" pert underwriter* for an informal quote.

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## Diabetes Mellitus Controlled

Diabetes Mellitus (*DM*) is a disorder of sugar metabolites, which is characterized by high blood sugar levels. *DM* damages the large and small vessels causing many complications, including coronary artery disease, renal failure, and blindness. Atherosclerosis (*hardening of the arteries*) is a major factor in diabetic mortality. See *Diabetes Mellitus (Rx#12)* and *Diabetes Mellitus Complications (Rx13)*.

Good control of blood sugar in Type 2 *DM* can delay the progression of small vessel disease thereby improving life prognosis. Hypertension and elevated lipids are additive risk factors for mortality. Control of blood pressure and lipids are especially important in *DM* to prevent renal failure and heart disease or to slow their progression.

Let's use an analogy of twins A and B with diabetes mellitus diagnosed at age 50 when they are overweight (*i.e. Table A for Build*) and now applying for life insurance at age 55. Neither has yet been diagnosed with coronary artery disease.

Twin A follows his doctor's advice to lose weight. His blood sugar is normal as is the glycohemoglobin A1c, a blood test marker for blood sugar control. He had mild elevation in blood pressure before he lost the weight. Now it is normal. He applied for life insurance and is rated Preferred Nonsmoker.

Twin B does not follow the doctor's advice to lose weight and applies for life insurance. His blood pressure is 140/85 and glycohemoglobin is 7.7. He is rated Table D for the combination of diabetes mellitus plus build.

Adjustments for Best Case Scenarios		
<b>Type 2 diabetes or type unknown, no known diabetic complications, no debit for build, BP ≤135/85, and HDL &gt;45</b>		
Evidence of <b>excellent</b> control: <ul style="list-style-type: none"> <li>random glucose ≤170 mg/dl or fasting glucose ≤126 mg/dl, and</li> <li>glycohemoglobin ≤7.0 or fructosamine ≤ 1.7</li> </ul>	Onset age 30-49 and diet control or Onset age 50+ and diet control or oral medication	No debits, may qualify for PNS
Evidence of <b>good</b> control: <ul style="list-style-type: none"> <li>random glucose ≤220 mg/dl or fasting ≤140 mg/dl, and</li> <li>glycohemoglobin ≤8.0 or fructosamine ≤1.9</li> </ul>	Onset age 50-69 and diet control or oral medication <hr/> Onset age 70+ and diet control or oral medication	No debits, may qualify for NS <hr/> No debits, may qualify for PNS

To get an idea of how a client with older age Diabetes would be viewed in the underwriting process, feel free to use the attached Ask "Rx" *pert underwriter* for an informal quote.

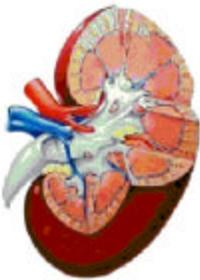
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## Diabetes Mellitus Complications

Diabetes Mellitus Part I (*Rx for Success #12*) discussed the types of diabetes, diagnostic criteria and general underwriting approach. This issue will look at the long-term complications of diabetes mellitus. All types of diabetes of sufficient duration can develop long-term complications of **nephropathy** (*kidney disease*), increased **atherosclerosis** (*cardiovascular disease*), **neuropathy** (*nervous system disease*), and **retinopathy** (*eye disease*). Poorly controlled diabetics will have a greater number and more rapid development of complications. Thus, the degree of complications gives some indication of long-term diabetic control.



Kidney Diagram

**Nephropathy:** This is the diabetic complication associated with the highest mortality. Diabetic kidney disease develops only in 35-45% of patients with Type 1 (*insulin-dependent diabetes mellitus*) (*IDDM*) and less than 20% of patients with Type 2 (*non-insulin-dependent diabetes mellitus*). In the U.S., diabetes is the leading cause of end stage renal disease requiring dialysis or transplant. Nephropathy starts with the development of microalbuminuria which is a small amount of albumin (*type of protein*) in the urine detected by the microalbumin test (*normal range 0-3 mg/dL*). This may occur as early as 5 years from the onset of diabetes. It usually takes another 5-10 years for overt proteinuria to develop (*noted by a positive random routine urinalysis or greater than 300 mg of albumin on a 24-hour urine collection*). The average time from overt proteinuria to needing dialysis is only 5-6 years. The risk of cardiovascular

disease is much greater in a diabetic with renal disease vs. no renal disease. Hypertension accelerates the kidney disease. The presence of persistent protein in the urine of a known diabetic would have additional rating and may call for a decline on an individual basis. Survivorship policies would be highly rated.



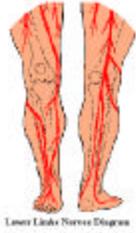
Heart Failure Diagram

**Cardiovascular:** Atherosclerosis is implicated in 80% of all diabetic mortality. Coronary artery disease develops at a younger age in diabetics (*especially if they also have renal disease*). Also, the usual protective effect of female gender is lost. Diabetics more often have atypical angina and the mortality rate is higher following myocardial infarction than in non-diabetics. The total rating for coronary artery disease in a diabetic will range from high substandard to a decline on an individual basis.

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**Neuropathy:** The most common form of neuropathy in diabetes is a peripheral neuropathy (*stocking-glove distribution: loss of sensation in hands and feet*). Electromyography (*EMG*) studies show some degree of abnormality in most patients within 5-10 years from the onset of diabetes. Loss of sensation in the feet can lead to foot trauma and diabetic ulcers. Diabetes is the leading cause of lower extremity amputation in the U.S. The presence of neuropathy will lead to a mildly increased diabetic rating.

**Retinopathy:** Changes include microaneurysms, hemorrhages, and exudates (*fluid collection*). Neovascularization and proliferative retinopathy refers to the development of new blood vessels in an ischemic area which can grow out into the vitreous cavity. These new vessels are fragile and often bleed. Late changes also include scarring and retinal detachment. After 7 years, half of all patients with insulin-dependent diabetes mellitus have some degree of retinopathy—by 15 years it reaches 95%. Diabetic retinopathy will lead to a mildly increased diabetic rating.

The presence of any diabetic complication will lead to an increased rating above the basic diabetic rate (see *previous Rx for Success #12*). The most serious complications are the kidney disease and presence of atherosclerosis.

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Other laboratory studies used to monitor diabetes include glycosylated hemoglobin (*HbA1c*) and fructosamine. HbA1c gives an indication of glucose control over the preceding 60 days, and fructosamine (*glycosylated protein*) measures glucose control over a 20-day time span.

Treatment of diabetes includes diet, exercise, oral hypoglycemic agents, and insulin.

<b>Table for Diabetes Mellitus (based on age and duration)</b>				
<b>Age at Issue</b>	<b>0-7 years</b>	<b>8.0-14 years</b>	<b>15- 20 years</b>	<b>Over 20 years</b>
0-17	R	R	R	-
18-34	175	200	225	275
35-49	125	150	175	225
50-65	100	125	150	200
66+	75	100	125	150

The rating for diabetes mellitus depends upon the age at onset and the duration of the disease. Diabetics are not considered until age 18. The degree of diabetic control and any diabetic complications heavily influence the rating. Prudential has a number of best case scenarios available. Please see *Rx 131* on Diabetes for more details on diabetes control and best case scenarios.

To get an idea of how a client with a history of diabetes would be viewed in the underwriting process, please feel free to use the attached *Ask "Rx" pert underwriter* for an informal quote.

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## Older Age Diabetes

Diabetes is a disorder of carbohydrate (*glucose*) metabolism due to a deficiency of insulin or due to impaired response to insulin. Previous issues of the Rx for Success have discussed the types of diabetes (*Rx #12*) and complications of diabetes (*Rx #13*). The focus of this issue is the older age diabetic.

Most often the type of diabetes mellitus that occurs in older ages is non-insulin dependent diabetes (*NIDDM*), also called adult-onset diabetes or type II diabetes. It is increasingly common in the older age population groups, affecting 18% of people age 64-75 years and 40% of people age 80 years or older. It is estimated that nearly half of elderly diabetics are currently undiagnosed. Complications from diabetes do not appear to be any less in the elderly. Many older age diabetics already show signs of complications (*example, retinopathy-eye changes*) at the time of diagnosis because they had the disease for a number of years prior to the actual diagnosis.

Treatment for diabetes in the elderly includes diet, exercise, oral medication, and insulin. As many as 40% of older age diabetics are obese and are instructed to follow a diet and an exercise weight loss program. For those who fail diet therapy, oral medication is started. Insulin is reserved only for those diabetics whose blood sugars can not be controlled by oral medication and diet.

From an underwriting standpoint, the rating for diabetes mellitus depends upon the age at onset and the duration of disease. Most favorable ratings are available for those with onset at an older age and duration of less than 8 years. The degree of diabetic control and any diabetic complications will heavily influence the rating.

To get an idea of how a client with older age Diabetes would be viewed in the underwriting process, see *Rx 131 Diabetes Mellitus Controlled*.

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