# Prediabetes – Gate way to Diabetes: Halt Now

Prediabetes is the state in which some but not all of the diagnostic criteria for diabetes are met. It is often described as the "gray area" between normal blood sugar and diabetic levels. While in this range, patients are at risk for not only developing type 2 diabetes, but also for cardiovascular complications. It has been termed "America's largest healthcare epidemic," affecting more than 57 million Americans. Prediabetes is also referred to as borderline diabetes, impaired glucose tolerance  and/or impaired fasting glucose (IFG).

Impaired fasting glycemia or impaired fasting glucose (IFG) refers to a condition in which the fasting blood glucose is elevated above what is considered normal levels but is not high enough to be classified as diabetes mellitus. It is considered a pre-diabetic state, associated with insulin resistance and increased risk of cardiovascular pathology, although of lesser risk than impaired glucose tolerance (IGT). IFG sometimes progresses to type 2 diabetes mellitus. There is a 50% risk over 10 years of progressing to overt diabetes. A recent study cited the average time for progression as less than three years.[5] IFG is also a risk factor for mortality.

Fasting blood glucose levels are in a continuum within a given population, with higher fasting glucose levels corresponding to a higher risk for complications caused by the high glucose levels. Impaired fasting glucose is defined as a fasting glucose that is higher than the upper limit of normal, but not high enough to be classified as diabetes mellitus. Some patients with impaired fasting glucose can also be diagnosed with impaired glucose tolerance, but many have normal responses to a glucose tolerance test.

## Signs and symptoms

Prediabetes typically has no signs or symptoms. Patients should monitor for signs and symptoms of type 2 diabetes mellitus. These include the following:

- o  Constant hunger
- o  Unexplained weight loss
- o  Weight gain
- o  Flu-like symptoms, including weakness and fatigue
- o  Blurred vision

- Slow healing of cuts or bruises
- Tingling or loss of feeling in hands or feet
- Recurring gum or skin infections
- Recurring vaginal or bladder infections

**Cause**

- Sleep disorders
- Family history of diabetes
- Impaired glucose levels and/or metabolic syndrome
- Cardiovascular disease
- Hypertension (high blood pressure)
- Increased triglycerides levels
- Low levels of good cholesterol (HDL)
- Overweight or obese
- Women who have had gestational diabetes, had high birth weight babies (greater than 9 lbs.), and/or has Polycystic Ovarian Syndrome (PCOS).

These are associated with insulin resistance and are risk factors for the development of type 2 diabetes mellitus. Those in this stratum (IGT or IFG) are at increased risk of cardiovascular disease. Of the two, impaired glucose tolerance better predicts cardiovascular disease and mortality.

In a way, prediabetes is a misnomer since it is an early stage of diabetes. It is now known that the health complications associated with type 2 diabetes often occur before the medical diagnosis of diabetes is made.

Diabetes mellitus (DM) is a group of metabolic diseases that are characterized by hyperglycemia and defects in insulin production in the pancreas and/or impaired tolerance to insulin effects. Normal glucose homeostasis is controlled by three interrelated processes. There is gluconeogenesis (glucose production that occurs in the liver), uptake and utilization of glucose by the peripheral tissues of the body, and insulin secretion by the pancreatic islet cells. What triggers the production and release of insulin from the pancreas is the presence of glucose in the body. The main function of insulin is to increase the rate of transport of glucose into certain cells of the body, such as striated muscles, fibroblasts, and fat cells. It is also

necessary for transport of amino acids, glycogen formation in the liver and skeletal muscles, triglyceride formation from glucose, nucleic acid synthesis, and protein synthesis. Insulin enters cells by first binding to target insulin receptors. DM and some of those with prediabetes have impaired glucose tolerance—in these individuals, blood glucose rises to abnormally high levels. This may be from a lack of pancreatic hormone release or failure of target tissues to respond to the insulin present or both.

**Prevention**

The goals of prevention are to delay the onset of type 2 diabetes, preserving the function of the beta cells, and preventing or delaying the microvascular and cardiovascular complications. Obesity is an extremely important environmental influence, therefore, exercise, weight loss, and drug therapies have been studied. It has been found that lifestyle modification/intervention provides the greatest benefit in preventing the progression into type 2 diabetes.

Key points to prevention of delay the onset of type 2 diabetes-

- Healthy meals (low-fat, low-sugar, low-salt diet)
- Physical exercise (45 minutes of exercise per day, five days a week)
- Reducing weight by as little as 5-10 percent can have a significant impact on overall health.

Low-carbohydrates diet & low glycemic index carbohydrate s is a valuable prevention and treatment tool in diabetes and prediabetes. Previous advice focused on low-fat approach. However the vast majority of the evidence favors a minimum of 130g of carbohydrate per day with carbohydrate foods providing between 45-65% of total calories. Dietary carbohydrate (amount and type) in the prevention and management of diabetes: a statement by the American diabetes association.

**Screening**

Fasting plasma glucose screening should begin at age 30-45 and be repeated at least every three years. Earlier and more frequent screening should be conducted in at-risk individuals. The risk factors for which are listed below:

Family history (parent or sibling)

Dyslipidemia (triglycerides > 200 or HDL < 35)

Overweight or obese (body mass index > 25)

History of gestational diabetes or infant born with birth weight greater than 9 lb (4 kg)

High risk ethnic group

Hypertension (systolic blood pressure >140 mmHg or diastolic blood pressure > 90 mmHg)

Prior fasting blood glucose > 99

Known vascular disease

Markers of insulin resistance (PCOS, acanthosis nigricans).

**Diagnosis**

Prediabetes is usually diagnosed with a blood test:

Fasting blood sugar (glucose) level of:

✓ 110 to 125 mg/dL (6.1 mM to 6.9 mM) - WHO criteria
✓ 100 to 125 mg/dL (5.6 mM to 6.9 mM) - ADA criteria

Two hour glucose tolerance test after ingesting the standardized 75 Gm glucose solution the blood sugar level of 140 to 199 mg/dL (7.8 to 11.0 mM).

✓ Glycated hemoglobin between 5.7 and 6.4 percent.

Levels above these limits would be a diagnosis for diabetes.

**Management**

Persons with prediabetes actually have the same complications as persons with diabetes—only less frequently. They run the risk of developing diabetic eye disease, nerve damage, and early diabetic kidney disease with excess protein in the urine. Patients with prediabetes are also thought to already have an increased risk of heart and blood vessel disease.

Intensive weight loss and lifestyle intervention, if sustained, can substantially improve glucose tolerance and prevent progression from IGT to type 2 diabetes. Reducing weight by 7% through a low-fat diet and performing 150 minutes of exercise a week is the goal. The recommendation is modest weight loss (5-10% body weight), moderate-intensity exercise (30 minutes daily), and smoking cessation.

For patients with severe risk factors, prescription medication may be appropriate. This can be considered in patients for whom lifestyle therapy has failed or is not sustainable and who are at high-risk for developing type 2 diabetes. Insulin sensitizing drugs are of value.

The progression to type 2 diabetes mellitus is not inevitable for those with prediabetes. The progression into diabetes mellitus from prediabetes is approximately 25% over three to five years.