

DIABETES

*Diabetes can affect people of all genders. In this material, the terms “male” and “man” are used to refer to people assigned male at birth. The terms “female” and “woman” are used to refer to people assigned female at birth.

Diabetes is a chronic disease in which your blood sugar, also known as glucose, is too high. Glucose is essential to your health as it is the body’s main source of energy. There are a number of types of diabetes, the most common ones are the following:

PREDIABETES

Prediabetes occurs when your blood sugar is high, but it is not high enough to become diabetes or warrant medical therapy. This type of diabetes can lead to type 2 diabetes and may be corrected with diet and exercise.

TYPE 1 DIABETES

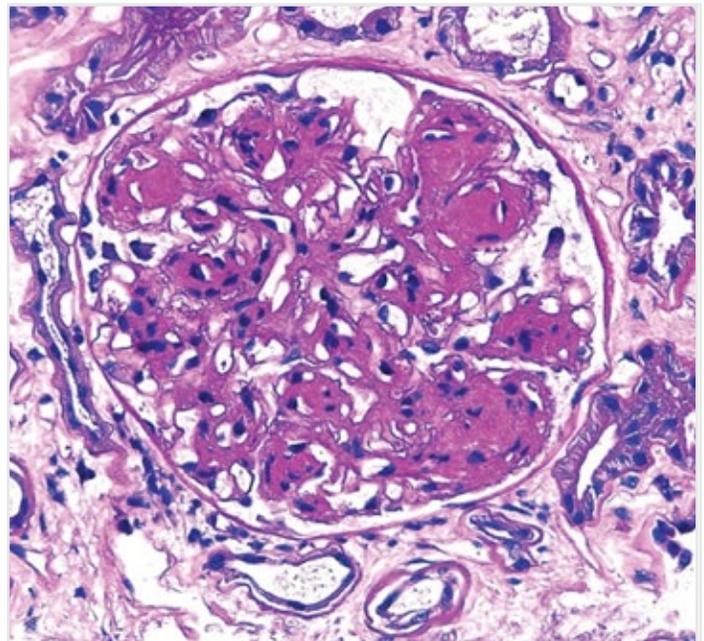
Type 1 diabetes is a chronic condition that occurs when the pancreas does not produce enough insulin or no insulin at all. This can occur when the immune system destroys beta cells that make insulin in your pancreas. Insulin is an important hormone needed to allow sugar (glucose) to enter our cells and produce energy (insulin is like the key that unlocks the door to your cells for glucose). Type 1 diabetes is commonly diagnosed in children and young adults and can be caused by different factors such as genetics and some viruses.

TYPE 2 DIABETES

Type 2 diabetes is similar to Type 1 except the insulin-producing beta cells may be intact or damaged while the body’s tissue sensors for insulin become resistant to the action of insulin. Type 2 diabetes occurs usually in the setting of excess carbohydrate intake and most commonly in the setting of obesity. Reduction in sugar intake and weight loss, for example, can reduce risk for Type 2 diabetes. However, some healthy weight patients with balanced diets can develop Type 2 diabetes, pointing to genetic factors.

GESTATIONAL DIABETES

Gestational diabetes occurs in pregnant women when a woman’s body cannot make enough insulin needed for pregnancy or when certain hormones in the placenta block the actions of the mother’s insulin. This type of diabetes can occur without being diagnosed with diabetes before pregnancy and it does not mean you will have diabetes after delivery. This condition may be very dangerous for the baby and should be screened for and, if detected, carefully monitored during pregnancy.



UNDER THE MICROSCOPE

A glomerulus (the structure that filters blood to produce urine, which typically looks like a thin lattice of different cells) of a diabetic kidney shows large pink areas that represent damage to the filtering cells, indicating diabetes.

For more information and to get involved:
www.ascp.org/patients

 @ASCPPatientChampions

 /ASCPPatientChampions

 @ASCPChampions

 ASCPPatientChampions

 Champions@ascp.org

LABORATORY TESTS RELATED TO DIABETES*

**Please note that reference ranges are set by individual laboratories for their specific populations and vary accordingly. Therefore, a discussion of your specific testing results with your healthcare provider is recommended.*

DIAGNOSING DIABETES

FASTING PLASMA GLUCOSE (FPG): This test measures your fasting blood sugar (glucose) levels, meaning what your blood sugar levels are after you have not eaten or drank anything (except water) in the last eight hours. This test is important because it can indicate if you have diabetes or prediabetes. Typical reference ranges* for individuals without diabetes are less than 100 mg/dl. Levels* between 100 mg/dl to 125 mg/dl may indicate prediabetes, and greater than 126 mg/dl may indicate diabetes.

HEMOGLOBIN A1C (HBA1C): This test measures your Hemoglobin A1c level, the average level of glucose (blood sugar) in your blood, by determining how much glucose is bound to your red blood cells. This test is important because it shows how well diabetes is being managed. Typical reference ranges* for both children and adults it is less than 6%. If A1c levels are higher than 7%, it may indicate diabetes; levels between 5.7-6.4% are considered to potentially be prediabetes.

ORAL GLUCOSE TOLERANCE (OGTT): This test analyzes how your body processes sugar and is conducted before and two hours after you drink a specific sweet drink. This test is important because it can indicate if you have Type 2 or gestational diabetes. Typical levels* for non-diabetic individuals are less than 140 mg/dl; levels that may indicate that you have prediabetes are between 140 mg/dl to 199mg/dl; and levels that indicate that you may have diabetes are 200 mg/dl or higher.

RANDOM/CASUAL PLASMA GLUCOSE: This test is used to check blood glucose levels throughout the day and before meals, usually in relation to taking medications for diabetes. Random glucose should not be interpreted without the advice and care of a doctor or nurse.

GLYCATED SERUM PROTEIN (GSP): This test measures the amount of glucose that is attached to the total serum proteins. This test is important because it indicates the average amount of blood sugar (glucose) in the last 2-3 weeks. GSP is also known as fructosamine. Typical reference range* is between 175-280 mmol/L for non-diabetic individuals, between 210-421 mmol/L for controlled diabetes, and between 268-870 mmol/L for uncontrolled diabetes.

ASK YOUR DOCTOR

- How often are A1Cs drawn?
- What is an A1C range you recommend I to try to achieve?
- What other body systems will be monitored via lab testing?
- How frequently will kidney function, thyroid function, and/or cholesterol be monitored?
- Should I fast before my test? If so, how long should I fast before to the test?
- Do I need a c-peptide or autoantibody test to help understand my diabetes?

MONITORING CHOLESTEROL AND OTHER LIPIDS (FATS)

LIPID PANEL (LP): This test measures the fats and fatty substances used by your body as a source of energy called lipids. Lipids include cholesterol, high-and low-density lipoprotein, and triglycerides. This test is important because it indicates your chances of developing cardiovascular disease.

Lipid Test	Role in Health	Recommended Reference Ranges*
High-Density Lipoprotein (HDL) Cholesterol	The "good" cholesterol that removes fatty deposits	60 mg/dL and above
Low-Density Lipoprotein (LDL) Cholesterol	The "bad" cholesterol that reduced blood flow associated with depositing "plaques"	Below 70-100 mg/dL
Total Cholesterol	Sum of your cholesterol	Below 200 mg/dL
Triglycerides	Type of fat in the blood related to recent meals	Below 150 mg/dL

MONITORING KIDNEY FUNCTION

BLOOD UREA NITROGEN (BUN): This test measures the amount of nitrogen in your blood. This test is important because higher levels can indicate kidney issues. A typical reference range* for adults is between 7-20 mg/dL, through the ranges can vary based on your age.

CREATININE: This test measures the level of creatine in your blood. Normally, kidneys filter our creatine, which is a waste product created through the metabolism of both the muscle and of certain foods. This test is important because higher levels of creatine can indicate an issue with your kidneys. A typical reference range* for adults is between 0.84 and 1.21 mg/dL.

CREATININE CLEARANCE: This test measures how much creatinine your kidneys filter. Through this test, creatine levels from your blood and your urine are compared. This test is important because it indicates how well the kidneys are functioning. *Please note that the reference range for creatinine depends on a person's age, sex, body and muscle mass, etc.

COMPREHENSIVE METABOLIC PANEL (CMP): This test includes the components of a Basic Metabolic Panel (BMP) plus the below additional measures related to liver activity and function.

Additional Tests	Role in Health	Recommended Reference Ranges*
Alanine Transaminase (ALT)	Convert protein into energy	7-55 U/L
Albumin	Protein made by the liver	3.4 to 5.4 g/dL
Alkaline Phosphatase (ALP)	Breaking down proteins	40-129 U/L
Aspartate Transaminase (AST)	Metabolize amino acids	7-48 U/L
Bilirubin	Substance produced by liver to aid in digestion	0.1-1.2 mg/dL
Total Protein	Proteins including those that help fight infections	6.3-7.9 g/dL

CYSTATIN C: This test measures how well your kidneys are working by measuring the amount of cystatin C that is retained in your blood. Because it is a small molecule, it is normally passed in urine. High levels of cystatin C in your blood indicates that your kidneys are not working well. Typical reference ranges* are between 0.6-1.3 mg/dl.

GLOMERULAR FILTRATION RATE (GFR): This test detects how well kidneys are working by measuring the flow of filtered blood through the kidneys. A typical reference range* for adults is between 90-120 mL/min/1.73m².

MICROALBUMIN: This test measures the presence of small amounts (hence, "micro") of albumin in the urine, which is a protein found in blood serum. Albumin is the main protein of blood plasma and it helps bind other minerals and hormones. When kidneys start to fail, a small amount of albumin begins to leak through which this test can detect. A typical reference range* for adults is less than 30 mg. The ratio of this protein to creatinine in urine is used by your doctor to understand your kidney function.

MEET CHRISTIE



“The lab results play a huge role in treatment plans and give you a great understanding of how your disease process and treatment plan are working.”

Christie was diagnosed with Type 1 Diabetes when she was 15 years old. Her diagnosis came around Easter time at a routine checkup where her blood glucose test result was 450 mg/dL and normal levels are usually less than 100 mg/dL. When she was diagnosed, she felt scared but did not truly understand the full impact that diabetes would have on the rest of her life. Her family and friends were and continue to be a great support system in her journey.

She is now married to her high school sweetheart, Juan, who has been by her side since before her diagnosis. Throughout managing her diagnosis and in becoming a pediatric nurse, she learned about the crucial role the laboratory plays in patient care. For Christie, life after diagnosis has remained pretty much the same, just with some modifications. She has also become a strong advocate for herself through doing her own research about diabetes through podcasts and social media and applies it to her life when appropriate. She encourages patients to be a part of their own care and to find a strong support system, whether it be friends and family or an online community that can help you in what they are going through.

To learn more and to watch a video about Christie, go to www.ascp.org/patients

ADDITIONAL RESOURCES



Scan the QR code to view and download our educational resources.



Scan the QR code to watch videos of our Champions sharing their stories.

 @ASCPPatientChampions

 /ASCPPatientChampions

 @ASCPChampions

 ASCPPatientChampions

 Champions@ascp.org

For more information and to get involved:
www.ascp.org/patients