DIABETES 101

Diabetes Mellitis (DM) is a disorder of blood sugar (BS or glucose) regulation and can affect every organ in the body. The two major types are type 1 and type 2, but it can also occur during pregnancy, which is called gestational diabetes. Lastly, if the BS is higher than normal but not abnormal this is borderline or pre-diabetes; this designation is important because at this stage the BS can be monitored and the disease possibly prevented.

Previous thought was that type 1 only occurred in children, representing an autoimmune condition where the body destroys the cells that make insulin, and that Type 2 was only in adults; more recently type 2 diabetes (=T2D) is being found in children as well. "Pre-diabetes" is when diabetes may be eminent but preventable.

WHATS THE PROBLEM—BS is regulated by insulin, which is a hormone made and released by the pancreas, a soft organ in the mid-back portion of the abdomen. Insulin binds to BS and carries it to end organs to supply this energy molecule to cells. In the case of type 1 there is a lack of insulin production (or in some cases destruction of the cells that make the insulin); whereas in T2D there is a shortage of insulin as well as "resistance" to the insulin that is made and released by the pancreas; the muscle, fat and liver cells do not pull off the BS effectively. All types of DM result in an excess of BS floating around and eventually doing harm.

The dangers of DM are multiple and are intensified if the diagnosis is delayed. In the short-term, sustained high BS can become a medical emergency leading to coma and death; this is called diabetic ketoacidosis (DKA). Long-

term complications are also scary and involve many organ systems: CV including heart attack and stroke, visual problems, gastroparesis/reflux, gum disease, impaired kidney function, and compromised peripheral nerve/vascular function (ie, diabetic foot ulcers). The immune system can be compromised (meaning increased risk of infections) and men can experience impotence.

HOW IS IT MEASURED—BS can be measured with a blood test, usually after fasting overnight (8 to 12 hours.) Normal fasting BS is 70 to 99 mg/dl (although 50 to 70 can be ok for some people.) Values of 100 to 125 represent prediabetes. BS can be measured directly, after a glucose load (called a glucose tolerance test for pregnant patients), and with a HgbA1C blood test. The A1C test is a handy tool for diagnosing prediabetes and T2D; it is reported as a percentage and represents the average BS over 3 months. And you don't have to fast for A1C! Normal A1C is below 5.7, prediabetes is 5.7 to 6.4, and above 6.4 represents diabetes. BS can be checked with blood from a fingerstick as well, although this is not as accurate as blood from a vein. Glucose in the urine is abnormal and represents a problem. Less often used is the oral glucose tolerance test, or OGTT, where a sugar load is given orally after an overnight fast, and BS is measured 2 or 3 times afterwards. This is the usual test for diabetes of pregnancy.

WHO IS AT RISK AND SYMPTOMS—People who are obese with BMI>30kg/m2, of older age, low physical activity, who have an unhealthy diet, family history of T2DM, and people of color (Black, Latino, Native American, and Asian) have a higher rate of diagnosis of T2D. Symptoms include extreme thirst and frequent urination, fatigue, extreme hunger, blurry vision, unexplained weight loss and a flowery smell on the breath. In advanced cases, severe sweating, shaking/chills, dizziness, racing heart, intense hunger and anxiety can be signs of significant low blood sugar and DKA, which is a medical emergency. Because the early symptoms are broad and non-specific, screening of high-risk people by health professionals is typically how the diagnosis is made. If

you are pregnant you should be screened as well. Getting a BS test is easy and cheap, so if your doctor orders it you should get it, or ask for one.

PREVENTION—Keeping active and watching what you eat are the basics of prevention, especially if you are in a risk category. Limit or eliminate alcohol and don't smoke. And most importantly, get screened and stay monitored yearly. Prediabetes is present in about 30% of the population, with a progression rate to diabetes of 10% per year. Can prediabetes ever be normalized? Yes! with proper and intentional intervention in lifestyle: targeted caloric restriction, a consistent exercise regimen, both with monitoring and journaling. Losing 7% body weight and exercising at least 150 mins/week may prevent moving into T2DM. Often psychological and emotional support are a tremendous help in the process, and there are also life-style intervention programs available.

TREATMENT—Depending on what type of DM you have, oral medication, insulin injections and blood sugar monitoring may be part of your treatment plan, along with a healthy diet and regular exercise. Figuring out what and how much to eat may require a dietitian at first; they will help you with food groups, counting carbs and portions. Food intake will naturally need to be balanced with whatever medication you may be on.

T1DM almost always requires insulin, and now there are implantable pumps that can administer insulin continuously. Blood sugars need to be checked throughout the day when on insulin, and they can fluctuate greatly depending on what is eaten and exercise level. With T2DM, oral medication may be the first drug prescribed; typically, it's Metformin which acts by decreasing liver production and release of glucose, lowering the amount of glucose your body absorbs from foods, and helping the body's insulin work better. Of course, there are many other medications out there, and your doctor will decide what is best for your own situation. For diabetic patients with BMI>35, bariatric surgery (and now GLP-1 agonists* which decrease appetite, slow stomach emptying and stimulate insulin release from the pancreas) may be an option. The imperative is to reduce the risks of life-threatening end-organ diseases that stem from diabetes.

*Glucagon-like Peptide-1 agonists, eg, Ozempic, Wegovy, Victoza, Trulicity and others

REFERENCES AND FURTHER READING

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Betterhealth-vic.gov.au/health/conditionsandtreatments/diabetes

Webmd.com

NIH

Mayoclinic.org/diseases-conditions/diabetes/diagnosis-treatment