

Little - Known Consequences of Diabetes

Diabetes mellitus is a condition characterized by alterations in the body's metabolism of glucose (sugar) that result in elevated blood glucose levels. Diabetes is usually classified as being type 1 or type 2. In type 1 diabetes, the beta cells of the pancreas cannot make insulin, a hormone that allows your body to use sugar from carbohydrates in the food that you eat for energy or to store glucose for future use. In type 2 diabetes, the pancreas continues to produce insulin, but a cellular impairment causes insensitivity and inability to utilize insulin. The end result is elevated blood glucose levels in both diabetes types.

It is well known that diabetes is the leading cause of new cases of blindness, heart attacks, kidney failure, and leg and foot amputations among adults. However there are many other consequences of diabetes that you may not be aware of. In fact, evaluation of these conditions may also help diagnose underlying diabetes.

Hearing Loss

Did you know that diabetes is associated with hearing loss? U.S. data suggest that among persons with diabetes between the ages of 50 and 69 years, more than 70 percent have high-frequency hearing impairment and one third have low- or mid-frequency hearing impairment. High-frequency loss affects your ability to understand speech. You can hear vowel sounds, but cannot hear the sounds of the letters F, S, T and Z. You would also be unable to hear higher octaves, such as a woman's or a child's voice, or a bird chirping. Low- to mid-frequency hearing loss means having difficulty hearing conversation or picking out parts of conversation when you are in a group or a noisy environment. This affects the ability to hear all sounds, whether speech, phone conversations, or media such as TV.

The data also suggest that people with diabetes may experience hearing loss at earlier ages. This is due to damage to the blood vessels or the complex collection of nerves and specialized cells of the inner ear and may be a consequence of abnormal hardening of the internal auditory artery; damage to the protective covering of the cochlear nerve, which carries auditory sensory information from the cochlea of the inner ear directly to the brain; wasting away of the spiral ganglion, the group of nerve cells that serve the sense of hearing by sending a representation of sound from the cochlea to the brain; and loss of hair cells, the sensory receptors in the inner ear that detect sound and head motion to begin the processes of hearing and balance control. Optimal blood sugar (glucose) control may prevent premature hearing loss in those with diabetes.

Cognitive Decline

Another less-addressed and not as well-recognized complication of diabetes is cognitive (thinking ability) impairment. Cognitive impairment includes changes in memory, mood swings, ability to understand, reaction times, attention and concentration.

Recent studies have shown a link between type 2 diabetes and mild cognitive impairment and Alzheimer's disease. Although the exact mechanism of cognitive dysfunction in diabetic persons is not clear, it is believed to be due to many potential factors. Lack of blood glucose control that results in low and/or high blood sugars is strongly associated with a decline in thinking ability.

Small blood vessel (such as the small arteries in the brain) and large blood vessel changes (such as the carotid arteries that deliver blood from the neck to the brain) have been linked to type 2 diabetes, and these changes are believed to decrease blood flow to the brain as well as within the brain, potentially allowing the development of dementia. Optimal blood glucose control may slow this progression of loss of cognitive function.

Osteoporosis

Osteoporosis is a bone condition defined by low bone mass and decreased bone quality resulting in increased fragility and risk of bone fractures. Various studies have shown that patients with diabetes have lower bone mass and higher risk of fractures. And increasing evidence suggests that those with type 1 diabetes, in particular, may have an associated decrease in new bone formation possibly because of defective function of osteoblasts (bone-forming cells) due to autoimmune or inflammation-related chemical processes.

Some data suggests that poorly controlled diabetes with higher than normal blood sugars and subsequent increased osmolarity (electrolyte imbalance) may decrease the ability of bone-forming cells to function normally. In addition, those individuals that have type 1 diabetes are known to have lower levels of a bone-forming hormone called insulin-like growth factor, a hormone that maintains healthy bone formation. And lifestyle factors such as obesity and inactivity in type 2 diabetes seems to lead to low bone mass and increased risk of bone fractures.

Diabetic Myonecrosis

Diabetic myonecrosis (muscle death) is an uncommon finding associated with long-standing and poorly controlled diabetes mellitus. This muscle death may occur as a result of decreased blood flow to the muscles due to blockage of blood vessels or inflammation accompanied by clot formation in the vessels in muscle. The usual symptom of this condition is sudden onset of pain of the involved muscle, which appears red and swollen. You should contact your doctor promptly if you see a swollen and reddened muscle, as surgical care may be necessary. Some people just experience a deep pain in a muscle without seeing any changes. In this circumstance, an x-ray may be required to fully evaluate what is happening. Again, contact your doctor and/or diabetes care team to undergo testing needed to determine whether diabetes-related muscle injury might be a cause of your symptoms.

Frozen Shoulder

Frozen shoulder, also known as adhesive capsulitis or shoulder bursitis, is common in those with both type 1 and type 2 diabetes. In this condition, the shoulder becomes stiff and movement is limited. An estimated 20 percent of people with type 1 or type 2 diabetes can develop this, as compared to only 5 percent of the general population.

One theory about the condition is that glucose (sugar) molecules can stick to collagen, which is one of the building blocks of your ligaments and tendons and helps to hold your bones together in a joint, and that these molecules make the collagen thicker and less able to function as it should normally. This stickiness can result in more-than-normal deposits of collagen in cartilage and tendons of the shoulder. The resulting buildup then causes the affected shoulder to stiffen

and limits motion. Anti-inflammatory drugs and physical therapy is usually the recommended treatment, but surgery may be necessary if there is no benefit from that course of treatment.

Diabetic Mastopathy

Diabetic mastopathy (inflammation of the breasts) is a condition characterized by the presence of tumor-like hard, irregular, easily movable, distinct and painless breast masses that are not cancerous. The condition has been reported in both women and men with long-standing type 1 or type 2 insulin-dependent diabetes. These tumor-like masses are believed to be caused by abnormal chemical responses to insulin and can be solitary or multiple and present in one or both breasts. The masses can be treated surgically for cosmetic reasons, but tend to regrow in uncontrolled diabetes.

Recurrent Respiratory Infections

Having diabetes is one of the most common contributors to developing frequent respiratory infections, with influenza (flu) and streptococcus (strep) pneumonia being more common. If you have diabetes, you are six times more likely to be hospitalized during flu epidemics than if you don't. The American Diabetes Association (ADA) and the Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices recommend anti-pneumococcal and influenza vaccination for people with diabetes. These vaccines reduce the number of respiratory infections, the number and length of hospitalizations, the deaths caused by respiratory tract infections, and the consequent medical expenses related to the treatment of influenza and pneumonia.

Emphysematous pyelonephritis

It is relatively common knowledge that people with diabetes are at increased risk for developing urinary tract infections. Diabetes is also a major risk factor for a condition called emphysematous pyelonephritis, which results in necrosis (process of dying of a tissue) of kidney tissues accompanied by the formation of gas from bacteria involved in the urinary tract or around the kidneys. This condition can be life-threatening and is characterized by fever, chills, back pain, nausea and vomiting. Treatment requires administration of antibiotics, fluids (usually both intravenously in a hospital) and getting blood sugars under control.

Skin Infections / Eruptive Xanthomatosis / Digital Sclerosis

Several kinds of bacterial infections can occur more frequently in people with diabetes. These include styes (infections of the glands of the eyelid), boils, folliculitis (infections of the hair follicles), carbuncles (deep infections of the skin and the tissue underneath), and infections around the nails.

Those with diabetes are especially prone to fungal infections, which is often caused by *Candida albicans*. This yeast-like fungus causes itchy rashes that occur in warm, moist folds of the skin such as under the breasts, between fingers and toes, and in the armpits and groin area. Other fungal infections include athlete's foot, ringworm (a ring-shaped itchy patch), and vaginal infection that causes itching. If you think you have a yeast or fungal infection, call your doctor.

Eruptive xanthomatosis (zan'thō-mă-tō'sis) is yet another skin condition caused by uncontrolled diabetes. It is associated with high triglycerides (sugar fats) and can be an initial sign of diabetes that has been undiagnosed. It causes firm, yellow, pea-like enlargements that may have a red halo and may itch. The condition occurs most often on the backs of hands, feet, arms, legs and buttocks. Also frequently causing an inflammation of the pancreas, eruptive xanthomatosis often requires insulin use be started promptly.

Digital sclerosis can occur with diabetes. The condition causes development of tight, thick, waxy skin on the backs of hands, toes and the forehead, resulting in joint stiffness and limited movement.

Dental Disease

Diabetes is one of the risk factors for periodontitis, a serious gum disease that damages the soft tissue, destroys the bone that supports your teeth and can cause tooth loss. And it may make the infection worse if your diabetes is uncontrolled. Research has further suggested that the bacteria responsible for periodontitis can enter your bloodstream through your gum tissue and affect your lungs, heart and other parts of your body, triggering a cycle of inflammation that contributes to heart attacks.

Mauriac syndrome

Mauriac syndrome is characterized by small stature, obesity and an enlarged liver in patients with insulin-dependent diabetes. It is typically associated with poorly controlled type 1 diabetes and is manifested by growth failure and delayed pubertal development. These complications are known to be reversed with good glycemic control.

Despite the varied consequences with each of these conditions, the first line of defense to avoid these complications is to maintain tight control over your blood glucose. By doing so, you increase the odds of reducing these less-common complications of diabetes.