

## **Diabetes and The Lower Extremity: Why is Blood Sugar Control Important?**

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Diabetes Mellitus is a metabolic disease in which the body cannot process sugar correctly. There are two forms of Diabetes widely known which are Type I (insulin dependant) and Type II (non-insulin dependant). The most common form is the Type II in which the body's sugar receptors in distal organs and tissue do not take up sugar because of a defect in receptors for sugar thus allowing the sugar content in the blood to rise. Overtime however, without good blood sugar control with oral medication balanced with diet and exercise, the insulin production from the pancreas decreased and Type II Diabetic become insulin dependant. Type I Diabetics are insulin dependent and usually at a young age, although can be diagnosed at a later age (see Jay Cutler, NFL pro quarterback for the Chicago Bears). Type I diabetics can end up with worse long term because they are insulin dependent for a longer period of time. They are insulin dependent because the pancreas genetically stops producing the protein. Diabetes affects 25.8 million Americans (8.3% of the population) with 18.8 million people being diagnosed and 7 million people going undiagnosed. Diabetes is the leading cause of kidney failure, nontraumatic lower-limb amputations, and new cases of blindness among adults in the United States. Diabetes is a major cause of heart disease and stroke, and diabetes is the seventh leading cause of death in the United States. (Statistics from the Center of Disease Control)

There are several conditions directly related to uncontrolled blood sugar in the diabetic patient such as neuropathy. Neuropathy is the end result of the body's inability to process sugar within the nerves themselves therefore allowing a buildup of sugar specifically in the form of sorbitol which then doesn't allow adequate depolarization of nerve cells to transmit signals. This eventually leads to a variety of symptoms suffered by the patient. Symptoms include neuropathic pain which consists of both negative symptoms (sensory loss and numbness) and positive symptoms (paresthesias, spontaneous pain, increased sensation of pain).

Arteriosclerotic Peripheral Vascular Disease is a process in which there is continual plaque build up within the arterial walls leading to decreased blood flow to the lower extremities. Peripheral arterial disease in diabetic individuals is more diffuse and often involves the popliteal and below-knee arteries. A combination of neuropathy and poor circulation to the feet leads to development of ulcerations from pressure or injury in which the diabetic will have difficulty in healing these wounds without advanced woundcare in most cases. In some cases as mentioned above, wounds progress to infection or fail to receive adequate blood flow leading to gangrene and surgical intervention is necessary involving, in many cases, amputation of toes, foot, or leg depending on the level of circulatory disease.

Another end result of Diabetes and an individual's inadequate blood sugar control involving poor circulation as well as the lack of sensations and nerve signal regulation is a condition called Charcot Neuroarthropathy. Named after a French physician Jean Martin-Charcot for first describing the symptoms in 1868 seen in cases of syphilis. Charcot neuroarthropathy is a combination of processes in which the tendons and ligaments of the foot and ankle are unable to regulate proprioception (sensation of orientation in space) due to decrease in nerve signal conduction causing microstress fracturing of bones in the foot and/or ankle in combination with inability to regulate blood flow because of peripheral arterial disease causing washing out of the bone leading to a breakdown in the foot structure with collapse of midfoot joints in most cases leading to permanent deformity, disability and potential amputation.

There are many major conditions that can occur in the lower extremities due to Diabetes Mellitus that can cause decrease function and disability or in some cases risk of life or limb. It is because of this that it is important for patients, in addition to maintaining visits with the primary care physicians, to also be evaluated by a Podiatrist as well as maintain continual visits to ensure that any complications can be prevented or caught early in their disease process.