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The Diabetic Swimmer

by Dr. Jim Miller

Diabetes mellitus (DM) is an abnormality of metabolism that results in a higher than normal blood glucose (sugar). There are two major types of DM.

Type I DM was formally known as juvenile diabetes. It accounts for less than 10% (approximately one million) of all diabetics and tends to occur in younger age groups, hence the name "juvenile." Insulin-producing cells in the pancreas are mistakenly attacked by the body's own immune system, resulting in their destruction. This destruction is usually complete, making the type I diabetic totally dependent upon exogenous insulin injections. This control is frequently a difficult balancing act leading to the term "brittle diabetic." Early in the development of type I DM, the athlete may go through a period of time when little or no insulin is needed. This is known as the "honeymoon phase" and is confusing to the athlete, who mistakenly thinks that they are cured of the disease. The relapse into total insulin dependence is guaranteed, though the length of the honeymoon phase cannot be predicted. Parents and coaches must be ready for the relapse with a return of symptoms and, frequently, depression as reality sets in.

Type II DM, formally known as adult diabetes, affects far more people. The current statistics show that 5% of all adults over the age of twenty are affected. This represents 14.9 million people. Estimates also indicate that there are at least an additional 2.7% of adults who are not yet diagnosed. The prevalence of type II DM is rising in those who are 40 – 74 years old. This correlates to the average rise in body weight in adults as well as a decline in overall fitness.

The organ that is involved is the pancreas. One of the jobs of the pancreas is the production of insulin by a cell called the islet or beta cell. It was noted that there is a complete destruction of beta cells in type I DM. In type II there is a development of insulin resistance, wherein the body becomes less sensitive to the insulin that it makes. The pancreas also loses its ability to compensate for the increased demand for insulin production.

The result of these deficiencies is a rise in blood sugar. There are many symptoms that the athlete may show as the blood sugar rises. These include increased thirst, increased appetite, increased urination, increased fatigue with a decline in performance, weight loss in type I diabetics, weight gain in type II diabetics. DM, regardless of type, results in a profound effect on the immune system as well as increased risk for heart disease and strokes, blindness, kidney disease, and difficulty with sensation later in life.

The terms "adult" and "juvenile" DM have gone out of use, since adults can develop type I DM and children can exhibit type II, though more rarely. Treatment goals for both are a strict control of blood sugars. While type I DM requires insulin injections, oral medications may be used to enhance the effectiveness of the insulin. Usually type II diabetics are initially treated with oral agents. However, times are changing, and insulin is being increasingly used in type II diabetics as well.

Insulin is an injected medication. As of this writing, there are no other ways to get it into the human body. There are many types of insulin. Some insulins last a brief time

i.e. less than 2 hours. Others may last 24 hours. Still others are produced in fixed combinations of short-acting and intermediate-acting insulins. Most diabetics using insulin are on a schedule of several shots a day, based upon how their blood sugar readings are running. Diabetics typically need to measure their blood sugar several times a day at least.

Besides medication, a strict regimen of weight control, diet, and exercise help a diabetic maintain control. The exercise needs to be a daily routine for it to have a major consistent impact upon the blood sugar control. Swimming is an excellent choice for the diabetic. Practices that are fairly routine in their intensity make the control easier, since aerobic activity increases the body's sensitivity to insulin regardless of whether the insulin is natural or injected. The diabetic swimmer will typically measure his/her blood sugar prior to practice or to a competition in order to determine how much insulin is needed as well as whether food is required.

The major danger to the diabetic swimmer is the development of too low a blood sugar. This is called hypoglycemia. It can be seen symptomatically as a decline in performance that may range from subtle all the way up to loss of consciousness and seizures. The diabetic swimmer may be given an injection of Glucagon, which reverses the reaction. In the absence of a Glucagon injection, liquids containing sugar (such as orange juice with added sugar or whatever else may be handy) should be given immediately upon suspicion of low blood sugar. Any loss of consciousness or seizure activity should result in a call to 911.

Each athlete must be responsible for a balanced diabetic diet and for monitoring their blood sugars throughout the day. From this data, it will become evident how each individual swimmer responds to exercise, allowing an elaborate plan based upon this data. Practices will vary based upon the season and the distances covered. Meets offer another challenge, requiring frequent blood sugar readings. **Gary Hall, Jr.**, has proven that insulin-dependent diabetics can compete quite successfully at the elite level. Open water competitions present yet another topic for discussion and management, including the use of small packets of gel containing glucose that the swimmer carries on him. Indeed, in 1996, **Scott Coleman** became the first insulin-dependent diabetic to cross the English Channel at the age of 42.

Scott has worked out percentages of his routine insulin dose, which he takes based upon the type of training that he anticipates. Though these numbers vary from athlete to athlete, Scott has found that he needs to reduce his short-acting insulin by 18% and his intermediate insulin by 25% on training days. This is contrasted by a decrease of 82% for his short-acting and 92% for the intermediate on days when he is competing in a marathon open water event. While these specific reductions are unique to Scott, they do demonstrate clearly the impact of training on the insulin doses administered.

Jim Miller is a current and active member of USA Swimming's Sports Medicine and Science Network.

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