Everything happens for a reason. And sometimes good things happen because of bad experiences. That was the case for Mark Ruefenacht, a diabetic who had an acute low blood sugar episode in 1999. He was a volunteer puppy raiser for Guide Dogs for the Blind, Inc.© (GDB) and was working with a dog when the episode occurred. Although not trained to help, the dog instinctively tried to rouse him from the drowsiness symptomatic of low blood sugar. The dog’s behavior was enough to make him aware he needed to get help.

The episode left Ruefenacht wondering if dogs could be trained to assist diabetics. As a forensic metrologist by profession who works with blood and breath alcohol measurements, he wondered if there was something diabetics emit that dogs could detect. After learning no one was researching this, he launched an investigation.

In 2004 and using his own diabetes, Ruefenacht set out to train a Labrador retriever named Armstrong to Alert to, or indicate, drops in blood sugar. “I needed to answer two questions.” He says. “First, could I train a dog to detect changes in blood sugar? And second, if I could train a dog to detect the change in my blood sugar, would the dog be able to detect the same change in another diabetic’s blood sugar? I found out the answer to both questions was yes.”

In 2006, Ruefenacht founded Dogs4Diabetics® Inc. (D4D), a non-profit organization that primarily places Medical Alert Dogs with Type 1, insulin dependent diabetics.
HIGHS AND LOWS

When a diabetic’s blood sugar drops rapidly, the liver responds by secreting a chemical. That chemical emission is put out in the breath and sweat and is very consistent from one diabetic to another. That’s what the dogs smell.

“Breath and sweat are the same molecularly except breath content is about ten minutes ahead of what’s put out in sweat. The dogs smell the chemical in both. The faster the blood sugar falls the more chemical is emitted and, therefore, the easier it is for the dogs to detect. For example, if blood sugar drops from 200 to 100 in an hour, it’s not an acute reaction. Less chemical is emitted, so it’s more difficult for the dogs to smell. But, if blood sugar drops from 200 to 100 in 15 minutes—it’s an acute reaction and the body emits more chemical. Then, it’s easier for the dogs to detect.”

Diabetics also sometimes have high blood sugar. Typically, that isn’t a critical situation and can be detected by the human nose, i.e., the breath smells like a popular brand of chewing gum. Whereas it takes several days for high blood sugar to cause unconsciousness, low blood sugar causes incapacitation in as little as an hour. Without intervention, a diabetic could die.

“Although we train the dogs to detect low blood sugar, about half of them also Alert to high blood sugar. We don’t train the dogs to do that, they just figure out there’s a window in which they need to keep their diabetic. High blood sugar is easy for the dogs to detect. So much so, it can extinguish their ability to pick up low blood sugar.” Ruefenacht says.

Here’s why. If the dogs have an easier job—detecting high blood sugar—versus a more difficult job—detecting low blood sugar—and the dogs are rewarded for both, the dogs do the easier job. To encourage the dogs to Alert to low blood sugar, they’re given a higher value reward—cheese or premium dog treats—versus a lower value reward—regular dog food kibble—when they Alert to high blood sugar.

Thus far, D4D placed 85 dogs trained to Alert to blood sugar only. With the exception of dogs placed with youngsters that get a parent if the youngster’s blood sugar drops, the dogs aren’t trained to provide other assistance. Ruefenacht wants to cross train dogs, in the future, so they can assist in more ways.

“Interestingly, 40% of the recipients of Guide Dogs from GDB, lost their sight due to complications resulting from diabetes. We’re looking at training dogs that would work as both Guide Dogs and Medical Alert Dogs through our partnership with that organization.”

A SUPPLEMENT ONLY

While the rate of accurately Alerting to low blood sugar varies from dog to dog, D4D Medical Alert Dogs are between 80 and 100 percent accurate. Although the dogs are highly accurate, they only indicate blood sugar is dropping. The diabetic still needs to test with a glucometer and take appropriate action.

“In our experience, after diabetics get a Medical Alert Dog, they have the best blood sugar control they’ve ever had in their lives. That’s because the dogs give them more opportunities to test. Depending upon the severity of the disease, blood sugar testing is recommended three to seven times daily. Most recipients of Medical Alert Dogs test seven to ten times daily which gives them exceptionally good control.” Ruefenacht says.

Better blood sugar control means diabetics are less likely to develop severe symptoms such as neuropathy (numbness in the fingers or feet), blindness or require amputation. Other benefits derived from a Medical Alert Dog are more difficult to measure.

“We believe Medical Alert Dogs relieve the depression experienced by many diabetics because the dogs give them a sense of empowerment—They now have the ability to manage a disease they had difficulty managing in the past. The dogs are conversations starters as well, which benefits diabetics who often feel isolated.”

Diabetics also get much needed exercise when walking their dog.

ALERTING WITH A BRINGSEL

The dogs are trained to Alert to low blood sugar with a bringsel, a device that hangs from the dog’s neck. When the dogs smell the change in blood sugar, they pick up the bringsel and make physical contact with their diabetic. The diabetic then checks his sugar.

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blood sugar and rewards his dog if it Alerted correctly. The reward each dog receives depends upon what motivates it. While Armstrong was driven by toys, most labs are food motivated.

Scent discrimination is taught using sweat samples from actual diabetics, i.e., here’s a normal diabetic scent, here’s a low blood sugar scent and here’s high blood sugar scent. Once scent discrimination training is complete, a client and a dog are matched.

After the client takes the dog home, the dog focuses exclusively on him and his blood sugar level for at least three months. During this period, no one else can play with the dog, feed it, etc. The process, called umbilical coring, develops a strong bond between the dog and client and causes the dog to understand it’s only supposed to Alert to the client’s blood sugar level.

**DOG AND CLIENT MATCHING**

Current clients are matched with dogs in training in terms of their energy level and personality.

“I travel constantly so I needed an active, outgoing dog that always wants to be doing things.” Ruefenacht says. “Another diabetic, who travels infrequently, needs a dog with a lower energy level.”

During a three-month client training program, clients learn how their dog Alerts, how to care for it, etc. At the training program’s conclusion, clients check in daily with D4D initially; then, weekly; and, finally, monthly. Dogs are recertified annually to ensure they continue to Alert to hypoglycemia and meet the requirements of the American’s with Disabilities Act. Client health is monitored with periodic updates from physicians.

D4D is based in the San Francisco Bay area and only places dogs with clients living within a three or four hour drive. Ruefenacht is beginning to work with other accredited assistance dog organizations across the country and around the world to develop partnerships and training programs enabling them to offer Medical Alert Dogs as well.

**LIFE OR DEATH**

To be eligible for the program, a person must be diabetic for one year, physically active and 12-years-of-age.

“We’re looking for clients actively trying to manage their disease but, nonetheless, still having low blood sugar episodes. For example, some diabetics no longer experience the early symptoms of hypoglycemia: sweating, hunger, the shakes and drowsiness. Without symptom recognition, they fail to act and could lapse into a coma and die. The dogs Alert them before they become incapacitated.”

Because low blood sugar can be a life or death matter, D4D does double blind studies with the dogs it trains to assure accurate Alerting behavior. It also follows a rigorous protocol, when training dogs to discriminate the low blood sugar scent.

Within the field of assistance dogs, Medical Alert Dogs detecting blood sugar drops are the most in demand. As a result, a multitude of organizations have arisen which provide Medical Alert Dogs or offer to train pets to Alert to low blood sugar. While some other organizations train pets, D4D does not.

“The early socialization that’s part of the puppy raising programs conducted by organizations like GDB and CCII is critical. The dogs go on trains and buses and inside grocery stores and restaurants. Pets don’t have the same socialization experience. It’s not surprising the majority of problems reported with them arise because of it. For example, pets are likely to forage for food on the floor when taken in a restaurant.” Ruefenacht says.

Those seeking to acquire a Medical Alert Dog should learn which organizations are accredited by Assistance Dog International to train diabetes/Medical Alert Dogs. The D4D website (http://www.Dogs4Diabetics.com/) also provides standards of performance for them as well as consumer awareness information.