**JOHN ESSIGMANN:** One of the physiological scenarios that we teach, and is probably very common in biochemistry courses, has to do with diabetes. I'm diabetic, and my great grandfather was diabetic. His daughter, my grandmother was diabetic. Five of her six sons were diabetic, one of whom was my father. So you see a very genetic disease here. OK? That's, in my case, type 2 diabetic, so adult onset.

So my cells are insulin-resistant. So if I eat a meal that has carbohydrate or fat in it, my pancreas is probably responding. My beta cells in my pancreas are probably OK, but the insulin just isn't able-- but producing insulin-- but the insulin just isn't able to signal my cells to be able to take up the glucose. As a consequence, I'm somewhat in a technical state of starvation. My glycogen reserves are therefore smaller than yours, and I can tell this in times.

For example, when I first became diabetic, I loved mountain climbing and hiking and so on, and I noticed that I would go out. And I'd be totally exhausted for the first 10 minutes or so, and that's because I have very small glycogen reserves. What I had to do is this metabolic switch over to booting up oxidative metabolism of fats. That all had to be turned on, and it's hard. It's a hard transition, but once it got going, as long as I stay aerobic, in other words, I don't go so fast that I go anaerobic, I can climb forever. Because if I stay aerobic, I've got plenty of fat reserves. In fact, it's probably a good thing that I'm burning them. So I'm just a little bit different.

I like to teach this stuff in 5.07, in part because well there's probably not that many kids in the class, of 100, 130, or so, students would be diabetic, but it's about 6% to 8% of the population in the United States right now. So everybody knows someone who is diabetic, or maybe your parents are, and what are the risk factors? So we teach that.