cells, causing unutilized sugar to build up in the blood—leading to diabetes—as well as unutilized fats to be deposited in arteries.

And we have a good idea of precisely where the defect is located. People with this disease have reduced activity of a porphyrin-containing enzyme called cytochrome oxidase, which resides within the mitochondria, and delivers electrons from the food we eat to the oxygen we breathe. Its activity is impaired in all the incarnations of this disease. Mitochondrial dysfunction has been reported in chronic fatigue syndrome[60] and in anxiety disorder.[61] Muscle biopsies in these patients show reduced cytochrome oxidase activity. Impaired glucose metabolism is well known in radio wave sickness, as is an impairment of cytochrome oxidase activity in animals exposed to even extremely low levels of radio waves.[62] And the neurological and cardiac symptoms of porphyria are widely blamed on a deficiency of cytochrome oxidase and cytochrome *c*, the heme-containing enzymes of respiration.[63]

Recently zoologist Neelima Kumar at Panjab University in India proved elegantly that cellular respiration can be brought to a standstill in honey bees merely by exposing them to a cell phone for ten minutes. The concentration of total carbohydrates in their hemolymph, which is what bees' blood is called, rose from 1.29 to 1.5 milligrams per milliliter. After twenty minutes it rose to 1.73 milligrams per millileter. The glucose content rose from 0.218 to 0.231 to 0.277 milligrams per millileter. Total lipids rose from 2.06 to 3.03 to 4.50 milligrams per milliliter. Cholesterol rose from 0.230 to 1.381 to 2.565 milligrams per milliliter. Total protein rose from 0.475 to 0.525 to 0.825 milligrams per milliliter. In other words, after just ten minutes of exposure to a cell phone, the bees practically could not metabolize sugars, proteins, or fats. Mitochondria are essentially the same in bees and in humans, but since their metabolism is so much faster, electric fields affect bees much more quickly.

In the twentieth century, particularly after World War II, a barrage of toxic chemicals and electromagnetic fields (EMFs) began to significantly interfere with the breathing of our cells. We know from work at Columbia University that even tiny electric fields alter the speed

of electron transport from cytochrome oxidase. Researchers Martin Blank and Reba Goodman thought that the explanation lay in the most basic of physical principles. "EMF," they wrote in 2009, "acts as a force that competes with the chemical forces in a reaction." Scientists at the Environmental Protection Agency—John Allis and William Joines—finding a similar effect from radio waves, developed a variant theory along the same lines. They speculated that the iron atoms in the porphyrin-containing enzymes were set into motion by the oscillating electric fields, interfering with their ability to transport electrons.[64]

It was the English physiologist John Scott Haldane who first suggested, in his classic book, *Respiration*, that "soldier's heart" was caused not by anxiety but by a chronic lack of oxygen.[65] Mandel Cohen later proved that the defect was not in the lungs, but in the cells. These patients continually gulped air not because they were neurotic, but because they really could not get enough of it. You might as well have put them in an atmosphere that contained only 15 percent oxygen instead of 21 percent, or transported them to an altitude of 15,000 feet. Their chests hurt, and their hearts beat fast, not because of panic, but because they craved air. And their hearts craved oxygen, not because their coronary arteries were blocked, but because their cells could not fully utilize the air they were breathing.

These patients were not psychiatric cases; they were warnings for the world. For the same thing was also happening to the civilian population: they too were being slowly asphyxiated, and the pandemic of heart disease that was well underway in the 1950s was one result. Even in people who did not have a porphyrin enzyme deficiency, the mitochondria in their cells were still struggling, to some smaller degree, to metabolize carbohydrates, fats, and proteins. Unburned fats, together with the cholesterol that transported those fats in the blood, were being deposited on the walls of arteries. Humans and animals were not able to push their hearts quite as far as before without showing signs of stress and disease. This takes its clearest toll on the body when it is pushed to its limits, for example in athletes, and in soldiers during war.