Israel was a third-year college Biology major when he noticed one day that both of his feet were tingling and painful. He figured it was probably from sitting cross-legged while studying for hours.The next morning, he woke up and was in pain throughout his body. He was in so much pain he felt he couldn’t get out of bed, and he tried to use his phone to call his roommate but found that his hands and fingers weren’t working properly. Finally, he managed to yell out to his roommate, who helped him get out of bed and to the hospital.Doctors in the emergency room told him that they were going to perform a lumbar puncture. They inserted a needle into his spine and extracted cerebrospinal fluid for testing. They told him that an infection of his central nervous system could be detected by the presence of proteins or elevated white blood cells in his cerebrospinal fluid.Shortly after the lumbar puncture, another doctor came in to test his reflexes. He used a hammer to tap Israel’s arms, wrists, legs, and ankles in several spots on both his right and left sides. The doctor was being observed by two medical students, and as he performed the test, he said to the students “you see how he has absolutely no deep tendon reflexes?”Thirty minutes later, the doctor came back by himself. “The good news is that we think we know what’s wrong with you. The bad news is that we think you have a rare and serious condition called Guillain-Barré syndrome. Have you been sick lately?” Israel told him that he’d had a bad cold a couple of weeks ago. “What happens in Guillain-Barré syndrome,” the doctor told him “is that typically, your immune system gets activated by some sort of illness, but then after the illness has been vanquished by the immune system, the immune system stays active and starts to attack myelin on peripheral nerves.”Israel knew from having taken Physiology that myelin was essential for rapid transmission of nerve impulses, and also that myelin plays an important role in protecting neurons. “What is going to happen to me?” he asked.

 “We don’t know,” said the doctor. “In most people, the disease leads to paralysis that gradually spreads over the body. In many cases, patients start to get better after a few weeks, but we don’t have any way of knowing how severe your case will be or whether or how quickly you will get better, unfortunately. We are going to admit you to the hospital so we can monitor the progression of your symptoms. In some cases, patients experience paralysis of the muscles that control breathing and they have to be placed on a ventilator.”Israel was terrified, and called his parents to come stay with him at the hospital. After he was admitted, doctors performed nerve conduction velocity tests that confirmed the diagnosis of Guillain-Barré syndrome. Over the course of the next two weeks, Israel’s arms and legs became completely paralyzed. However, he was fortunate that the disease did not affect his breathing muscles. Eventually, he started to feel better, and after 6 weeks he was discharged from the hospital. After a year, he still experienced some tingling and pain in his hands and feet, but knowing what he now knew about Guillain-Barré syndrome, he felt lucky to be alive and able to carry out his normal activities.

 **Questions**

1. Based on what you know about the function of myelin, why do you think a nerve conduction velocity test is important for diagnosis of Guillain-Barré syndrome

2. Why do you think reflex testing suggested the presence of Guillain-Barré syndrome?

 3. What do you think would have to happen to Israel’s peripheral nerves to allow him to recover from his paralysis?