

# BRAIN PORT OFFERS NEW “VISION”

By  
Mark Pappas

About two years ago, there was an article in the Sunday edition of the Youngstown Vindicator about a soldier who was blinded by an explosion while fighting in Iraq. The article focused on a new device called the Brain Port, which was helping this serviceman to “see” again. The Brain Port is a pair of sunglasses with a digital camera mounted on the bridge of the glasses. There is a cable that is attached to the glasses at one end, while the other end has a flat, rectangular sensor that rests on your tongue. The digital camera views what is in front of you, processes the information and transmits it to the sensor on your tongue in the form of tiny pinpoint electrical pulses that let the person wearing the device know that there is something in front of them. The Brain Port works best with contrasts of white on black or black on white. There is a remote control attached to the device that allows you to adjust the intensity of the electrical surges, zoom in and out and vary your contrast settings.

In July of 2009 while home on vacation, I told my sister about the article. She did some research and found out that the University of Pittsburgh Medical Center was conducting the studies on the Brain Port. She e-mailed U.P.M.C., explained my situation and signed me up for the study. Finally, around the first week in April, 2011, I received a call from UPMC asking me if I was available to participate in the Brain Port study during the weeks of April 25 and May 2. Below is a detailed description of what I encountered during each day over the two weeks that I participated in the BrainPort study.

## Brain Port Study

**Day 1:** The first day of the study I was asked to report to the Eye and Ear Institute at UPMC in Pittsburgh, PA. I was asked to answer a 150 question true/false survey, as well as numerous questions where I had to rank things as strongly disagree, disagree, impartial, agree, or strongly agree. Then, I met with the head of the Brain Port study, Dr. Amy Nau. She explained how the Brain Port works and asked me for a brief medical history.

**Day 2:** The first thing I was asked to do was to sit down at a computer while a series of different light impulses flashed on the screen. I was supposed to press numbers on the number pad based on what direction these light impulses were moving. As a completely blind person, I found this exercise to be extremely difficult. However, they explained that they needed to get a baseline to compare to because I would be asked to do this test again at the end of the study while wearing the Brain Port. Then, they did a Visual Evoked Protocol test. For this test, I was asked to put the sensor of the Brain Port on my tongue, while the camera and glasses were placed inside a light dome, which sent light impulses to the Brain Port. I had to count the number of times the sensor vibrated during a 13 to 14 minute time period. This test was done twice.

**Day 3:** Today, we went to the obstacle course at Blind and Visual Services in Homestead, PA. The obstacle course is a hallway which is 7 feet wide by 40 feet long. They set up three different obstacle course designs. The obstacles consisted of various foam shapes, some of which were hanging from the ceiling, while others were at ankle height, waist height and head height. There were also some different textures placed on the floor, such as plastic and bunched up material. I had to walk from one end to the other and back without the Brain Port, and they recorded how long it took me to do this. I did this three times with three different obstacle course designs.

**Day 4:** Training with the Brain Port started today. I was seated at a table that was covered in black cloth. A white line was placed on a black wall, and I had to say whether that line was horizontal, vertical, or slanting to the right or left. Then, they placed an arrow on the one end of the line, and I had to say which direction the arrow was pointing. Then, felt shapes were introduced. The triangle was easy to detect, but the circle and the square were more difficult to distinguish because they were the same size and the edges of the felt were not very crisp. During the afternoon session, we dealt with objects in space. One test involved a coffee cup, packets of sugar and some coffee stirrers. I had to locate the cup, then find the sugar packets and stirrers and place them in the cup. Another test involved the cup, a sphere and a cube. I had to identify each shape, as well as locate the sphere, place it in the cup, and place the cup on top of the cube. Finally, we touched briefly on letters and numbers, and talked about some helpful tips to make this task easier, such as breaking up letters into three groups. Letters are circular, triangular or square. By breaking them up into three groups, you only have to choose between 8 or 9 different letters instead of 26 letters.

**Day 5:** I continued my training with the Brain Port. First, we tried looking at white shapes without the black background. The table that the object was sitting on was beige in color. This was much more difficult because the table registered like static on a television screen, while the white cube registered with stronger intensity. Then, we worked with black letters on the beige background. We changed the setting on the remote to inverse mode so that the black letters would be what I felt vibrating on the sensor. Then, they used the letters A, C, and E, and I had to determine which of those three letters was on the wall. Then, they placed a three letter word in front of me, and I could “see” that the word was CATTING. In the afternoon, we walked out into the waiting room, and I had to stand in front of three chairs and determine which chair had a white paper on it, and then I had to determine in which chair a person was sitting. Finally, I walked around a hallway. The walls were white, so the Brain Port picked it up at a vibration on the left and on the right side of the tongue, while the middle of the sensor had no vibration. Just by keeping the area with no vibration centered on your tongue, I was able to walk about the hallway without bumping into any walls.

**Day 6:** We went back to Blind and Visual Services and the obstacle course. In the morning, we walked around another hallway, testing the Brain Port out in a slightly different environment. Then, in the afternoon, we went down to the obstacle course and walked around with the Brain Port, trying to navigate around a few obstacles.

**Day 7:** I went back to the Eye and Ear Institute to follow up and retake some of the tests that they did in the beginning of the study. First, I answered the questions from the psychiatric evaluation questionnaire that asked if I strongly disagreed, disagreed, was impartial, agreed or strongly agreed with different things. Then, I took the Visual Evoked Protocol test again. They ran this test twice. The first time, I counted 238 light pulses. The second time, I counted 251 impulses. I was informed after the second test that there was 250 total pulses in each test, so I was pretty close. The first time I took these tests, I think I counted 208 and 219 pulses, so I did improve slightly. Finally, I was placed back in front of the computer, this time with the Brain Port, to retake the tests with the light beams bouncing around the computer screen. I improved greatly on a couple of the tests when using the Brain Port, while making decent improvements on the rest of the tests.

**Day 8:** I went back to the Blind and Visual Services in Homestead, PA for my “final exam” on the obstacle course. They set up six different obstacle course designs, and I had to walk down the hallway and back with the Brain Port on, while being timed. I was definitely able to spot many of the obstacles, and became more comfortable with the device each time. Then, they removed all of the obstacles and I had to walk from one end of the hallway and back while being timed. Finally, they conducted a Visual Field Test. With the Brain Port on, they faced me against a black wall. They introduced a little white dot in from each direction. Each time the dot entered my “field of view” and the sensor started vibrating, I had to signal that I felt something. The lab technicians then measured how far in from the edge that the white dot was detected.

That concluded my two weeks participating in the Brain Port study. This was truly a fascinating and amazing experience. I guess you could say it was a real “eye-opener”. I would like to thank everyone at UPMC who was involved in the Brain Port study. Special thanks to the head of the study, Dr. Amy Nau, as well as Gail Engelka, the Clinical Research Coordinator. Special thanks also to Chrissy, Jackie and Chris, the research technicians that I worked with on the Brain Port. Thanks to everyone at U.P.M.C. for a wonderful and very memorable experience.