

## Virtual reality and computer technology improve stroke rehabilitation

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Israeli hospitals have recently started to use virtual reality therapy for stroke patients. One commonly used program has the patient watch his virtual image on a screen. For example, tennis balls are virtually thrown at the patient from all directions and the patients' actual hand motions are recorded on screen.

In the first stage of development of this new program, computer scientists Dr. Larry Manevitz of the University of Haifa, together with Dr. Uri Feintuch, a neuroscientist from Hebrew University and a research fellow at the Haifa's Caesarea Rothschild Institute for Interdisciplinary Applications of Computer Science, and Eugene Mednikov, a computer science graduate student, fed video sessions of this virtual reality therapy into their newly developed program. With the new program, the computer "learned" to differentiate between different types of brain injuries: cerebrovascular accident (CVA) and traumatic brain injury (TBI). During further testing, the computer was able to accurately diagnose, between 90%-98% of the time, whether the patient was healthy, or had suffered a traumatic brain injury or a stroke.

Diagnosis, says Dr. Manevitz, is the most basic part of treatment – any doctor and many healthcare workers can correctly diagnose severe brain injuries. While this study is an important advance in the field of computer science, it will not directly help society. What is important, however, is the next phase of development, in which the computer is able to do things that doctors cannot.



"As soon as the computer identified the injury, we have a model that we can use for further testing and analysis – something that cannot be done on live patients. Using a computer model, we can experiment with different treatment options and decide which will be the most effective. The computer can also define how much the patient will be able to rehabilitate. These are things that would take a long time for medicine to accomplish, and some of them cannot be done at all," explained Dr. Manevitz.

For example, the computer can simulate how the patient will respond if the virtual reality therapy throws more balls to the patient's left side than to the right or if any other change would be beneficial for rehabilitation. The computer can quickly examine tens of different possibilities in a very short time. Using the computer will help avoid spending time on treatments that will not benefit the patient, or worse, cause harm.

"Our next step is to find similarities in the behavior of people in subgroups of brain injuries. The human eye may not be able to see such similarities, but a computer would easily be able to pick them up. As soon as we are able to identify similarities in different sub-groups, new avenues of effective treatment will open up for doctors," summarized Dr. Manevitz.

Source: University of Haifa

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