

January 24h, 2022



STROKE SPECIAL INTEREST GROUP

Academy of Neurologic Physical Therapy

In this newsletter...

- Stroke Corner Article Review: Virtual Reality & Neural Plasticity after Stroke
- **REGISTER for Stroke SIG Trivia TOMORROW!**
- ANPT Annual Meeting & Myelin Melter Invite
- Elections information now available: Sign up to run for ANPT or SIG Office!

STROKE CORNER

Article Review: Virtual Reality & Neural Plasticity after Stroke

Thanks to Marissa Moran, DPT, CSRS for reviewing this week's article

Effects of Virtual Reality Intervention on Neural Plasticity in Stroke Rehabilitation: A Systematic Review

Article reference:

Jie Hao, Haoyu Xie, Kimberly Harp, Zhen Chen, Ka-Chun Siu, *Effects of Virtual Reality Intervention on Neural Plasticity in Stroke Rehabilitation: A Systematic Review.*

Archives of Physical Medicine and Rehabilitation.2021. ISSN 0003-9993.

<https://doi.org/10.1016/j.apmr.2021.06.024>

Link to full article

<https://www.sciencedirect.com/science/article/pii/S0003999321013058>

Definition(s):

- Virtual Reality: computer-generated stimulation technology used to create an enriched environment. In the rehabilitation world, it is used to facilitate task specific training and provide multimodal feedback to augment functional recovery.
- Augmented VR: Enhancing the user's physical world with computer-generated technology.
- Non immersive VR: the desktop or laptop screen is used to present virtual environment to the user. User's field of view is not fully occluded; low sense of immersion and interaction.
 - Example: Nintendo Wii Fit, Kinect-based VR, VR enhanced Treadmill
- Semi-immersive VR: a partially virtual environment is provided for the user to interact with.
 - Example: panoramic TV, Lokomat with VR, IREX VR games, NJIT-RAVR
- Fully immersive VR: VR encompasses the overall sense of the user. The real world is totally displaced by the virtual environment.
 - Example: head mounted display (oculus), EMG based VR feedback system, REAL eyes

Purpose of article: To examine the current literature regarding the effects of VR-based

rehabilitation on neural plasticity changes with functional recovery in survivors of stroke.

- This systematic review investigated articles that look at actual changes occurring in the central nervous system, NOT at changes of impairment and functional measures (ie balance, gait, quality of life).

Methods of interest

This systematic review looked for articles that:

- measured outcomes of neural plasticity in persons who suffered a stroke via neuroimaging and electrophysiological technique
 - Functional MRI, electroencephalography (EEG), transcranial magnetic stimulation (TMS)
- outcomes were taken at least twice.
- Clinical trial and peer reviewed.
- Exclusion: clinical trials that used noninvasive brain stimulation or brain-computer interface.

27 studies met criteria

- 18 of the studies had no control group.
- Variability in VR systems with the most common being the NJIT-RAVR system for upper extremity (VR + robotic training)

Results of interest

- Studies that used fMRI
 - Most studies consistently showed a Shift of activation from the contralesional to the ipsilateral hemisphere specific to sensorimotor activation.
- Studies that used EEG
 - Higher cortical activation was seen within the frontoparietal region
- Studies that used TMS
 - During intervention period, a significant expansion of ipsilateral TMS mapping of the affected area of intervention was seen (ie hand muscles with UE tasks).
-

Discussion, take home message.

- There is a clear neuroplastic change during the intervention time period. This is seen by Improved neural plasticity measures that correlated to enhanced behavior outcomes.
- Increased frontal lobe and activation of the ipsilesional motor and bilateral sensory regions were seen as well as interhemispheric balance.
- Some VR systems are able to imitate the mirror neuron system
 - Components such as seeing yourself as an avatar and imitating motor, can possibly act as surrogates to the damaged circuits (primary and secondary motor areas).
- Amount of intervention time was variable between the studies. Dosing was 20-60 minutes, 3-5 days/week, and varied between 2-6 weeks. Most studies investigated chronic stroke participants.

Clinical Implication

There can be large overhead cost to invest in semi-immersive and full-immersive VR. How do you present to your clinic manager the justification for investing in VR?

Having a discussion with your team on what would best benefit your patient population is important (ie robotic arm with VR, VR enhanced treadmill, head set for balance and possibly some UE tasks.)

Below you will find a chart with some of the options out there, interventions that can be performed, and general cost.

THIS IS NOT AN EXTENSIVE LIST OF WHAT VR OPTIONS ARE AVAILABLE.

Note: non-robotic UE games would most likely require more active control of the impaired arm, especially grip.

	Intervention	Price range
Non immersive		
Kinect-based (xbox)	UE games, balance, cardiovascular	\$300 (plus purchase of TV)
Nintendo Wii Fijt + balance board	UE games, balance, Cardiovascular	\$240 (plus purchase of TV)
VR enhanced treadmill (ie GaitBetter)	Gait, balance, cardiovascular	>\$2,000, unsure of price
Semi immersive		
Hocoma C-mill treadmill	Gait, balance, cardiovascular	>100k
IREX VR gaming system	UE, LE, balance,	\$14,000
NJIT-RVR	Adaptive robotics that can interface with VR. UE, LE	Unable to find price
Fully immersive		
Real Eyes	Balance, UE tasks available with no grip, dynamic balance in seated	> \$20,000
Samsung Oculus Quest	UE task (need grip), balance, cardiovascular	\$300, games cost as well.
Immersive VR mirror therapy	UE tasks, phantom pain	\$300-using headset such as Samsung oculus

Tomorrow night! Register Now for a Virtual Stroke SIG Meeting & Trivia Night!



You're Invited!

To a Pre-CSM Virtual Stroke SIG Business Meeting. Learn about Stroke SIG initiatives, volunteer needs, upcoming elections, and play Stroke Trivia to win prizes!

You must be registered in advance to attend.

When: Jan 25, 2022 07:30 PM Central Time (US and Canada)

Where: Zoom

Register in advance for this meeting:

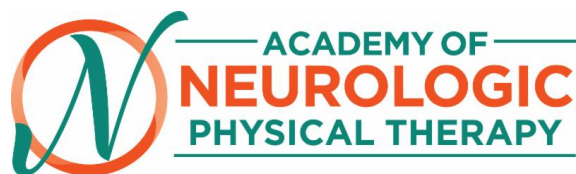
<https://us06web.zoom.us/join/register/tZcpduiorzMsE9VXCAEmc36YcD0EgoagV6wR>

After registering, you will receive a confirmation email containing information about joining the meeting.

Trivia prizes include a brain model for patient/student teaching, a wrist-worn pulse oximeter for easy High Intensity Gait Training, and a portable peddle exerciser!



Academy of Neurologic Physical Therapy Annual Business Meeting, Awards Ceremony, and Myelin Melter



Join the Academy of Neurologic Physical Therapy for its Annual Business Meeting for all members. Additionally, the Academy will host the 2022 Awards Ceremony recognizing the successes of the Academy over the past year.

**Friday, February 4, 2022
at CSM in San Antonio, Texas!**

**Grand Hyatt
Lone Star Salon DE**

**6:30-6:45 pm Business Meeting
6:45-7:15 pm Awards Ceremony
7:15-9:00 pm Myelin Melter Social**

As a member of the ANPT, you are encouraged to vote at the upcoming meeting.

[Click here](#) to view the business meeting packet that includes the items below:

*Meeting Agenda
Prior Year Minutes
ANPT Updates
Membership Updates
Call for Nominations
ANPT Awards*

ANPT will be following the APTA Covid-19 guidelines for this event.

Run for Office! ANPT and Special Interest Group Elections

NOMINATE NOW!

Plan ahead and consider running for a position on the Stroke SIG board!

The following Stroke Special Interest Group are open:

- Chair Elect
- Vice Chair
- Nominating Committee

Nominations are due March 21, 2022 and you are encouraged to self-nominate. The nomination link is now live on the [ANPT Elections Webpage](#).

Elections will be held April 4 - May 4, 2022. Three year terms begin July 1, 2022.

All Stroke SIG board positions involve attendance at monthly meetings and leadership of one of our Stroke SIG initiatives, such as our podcast, Student Corner, Social media, or weekly newsletter. Nominees must be Academy of Neurologic PT Members in good standing.

For more information on Stroke SIG initiatives, visit our page [here](#).

Don't hesitate to reach out to our Nominating Committee for more information at strokesig@gmail.com

Nominating Committee Members:

- Rachel Prusynski (Chair)
- Ginny Little
- Mackenzie Wilson

ELECTIONS WEBSITE

VISIT THE STROKE SIG ONLINE!



Academy of Neurologic Physical Therapy

ANPT Social Media

