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PROJECT TITLE (200 Characters max):
Using optical prisms to improve visuospatial function after right brain stroke: effects on motor function and memory

HYPOTHESIS:
Spatial neglect is a failure to orient, respond to, or report stimuli in the side of space opposite a brain lesion, when this deficit is not caused by primary sensory or motor dysfunction and when it is accompanied by functional disability (Heilman et al., 1979; Barrett and Burkholder, 2006). People with post-stroke spatial neglect have longer hospital stays, poorer rehabilitation outcomes, and their caregivers incur greater personal and financial burden of acute care (Buxbaum et al., 2004; Maul et al., 2012).

Classically, rehabilitation professionals have thought of this problem as visual, but we and others (Barrett et al., 2012) demonstrated that spatial neglect may be a profound disorder of spatial motor function. “Aiming” motor-exploratory symptoms in spatial neglect may be uniquely disabling, but therapists are not taught how to assess for spatial motor deficits. We developed (Chen et al., 2012) procedures that any clinical professional can be trained to administer, which may distinguish spatial perceptual from spatial motor errors (Goedert et al., 2012), and we demonstrated that a treatment for spatial neglect, repetitive movement training while wearing optical prisms (prism adaptation therapy; Redding and Wallace, 2006), may improve Aiming function. This is interesting, because rather than a “visual” therapy, prism adaptation has been thought of in the past as a way of training “motor learning.”

If motor learning as well as Aiming exploration is affected by spatial neglect, this means that survivors with spatial neglect may be uniquely challenged in one of the fundamental learning areas necessary for many kinds of independent function in modern life (driving, operating a computer or mobile phone, playing sports).

In this study, we will evaluate whether memory and motor learning are improved by prism adaptation. We are one of the only clinical environments in the world using this treatment for spatial neglect in a large number of right brain stroke survivors; students will have a rare opportunity to participate in evaluating and training these patients. We will examine: verbal memory, trajectory of change in spatial performance during training sessions (motor learning), and we will evaluate whether a video task to identify Aiming bias, or a score on motor-exploratory items on the Catherine Bergego Scale (Azouvi et al., 2003), predicts memory and motor learning scores or improvement.

PROJECT DESCRIPTION (Include design, methodology, data collection, techniques, data analysis to be employed and evaluation and interpretation methodology)

- The student will learn about basic neuropsychological evaluation of people with brain injury, and will read about the syndrome of spatial neglect and other cognitive deficits.
Summer Student Research Program
Project Description

- The student will design a datasheet and review results for stroke survivors with spatial neglect on memory, motor learning, aiming spatial bias, and motor-exploratory items on the Catherine Bergego Scale.
- After appropriate training in confidentiality of protected health information in research, and techniques of interview and testing, the student will collect medical history and perform a neurological examination on each subject tested.

SPONSOR'S MOST RECENT PUBLICATIONS RELEVANT TO THIS RESEARCH:

IS THIS PROJECT SUPPORTED BY EXTRAMURAL FUNDS?
Yes ☐ or No ☐
(IF YES, PLEASE SUPPLY THE GRANTING AGENCY'S NAME)
National Institutes of Health

THIS PROJECT IS: ☑ Clinical ☐ Laboratory ☑ Behavioral ☐ Other

THIS PROJECT IS CANCER-RELATED ☐
Please explain Cancer relevance

THIS PROJECT IS HEART, LUNG & BLOOD-RELATED ☐
Please explain Heart, Lung, Blood relevance

THIS PROJECT EMPLOYS RADIOISOTOPES ☐

THIS PROJECT INVOLVES THE USE OF ANIMALS ☐
PENDING ☐ APPROVED ☐ IACUC PROTOCOL #

THIS PROJECT INVOLVES THE USE OF HUMAN SUBJECTS ☑
PENDING ☐ APPROVED ☐ IRB PROTOCOL #: M# 0120050194
However, no testing will take place at UMDNJ. All testing will take place at the Kessler Foundation, and the project is approved by the Kessler Foundation/KIR IRB.

THIS PROJECT IS SUITABLE FOR:
UNDERGRADUATE STUDENTS ☐ ENTERING FRESHMAN ☐
SOPHMORES ☐ ALL STUDENTS ☑
Summer Student Research Program
Project Description

THIS PROJECT IS WORK-STUDY:  Yes ☐ or  No ☐

THIS PROJECT WILL BE POSTED DURING ACADEMIC YEAR FOR INTERESTED VOLUNTEERS?:  Yes ☒ or  No ☐

WHAT WILL THE STUDENT LEARN FROM THIS EXPERIENCE?
We hope the student will
  a) learn about stroke-related disability. Related readings will be assigned to facilitate general learning about stroke, hemiparesis, and visual-spatial problems.
  b) become familiar with fundamentals of basic behavioral neuroscience test design such as randomization, consideration of confounding influences in construction of simple apparatus and design of a behavioral protocol, as well as understanding a basic data analysis plan.
  c) learn about the process of research, from the formulation of hypotheses and decisions about paradigm to the conclusion about a priori questions to be reached from the data. Related readings on clinical research (e.g. from An Introduction to Scientific Research, Wilson) will be assigned to facilitate discussion of these issues during regular supervision meetings.