



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sarkis Karibyan; Alexander Sanchez</b>	<b>Project Number</b> <b>S0815</b>
<b>Project Title</b> <b>Development of Symmetry Evaluation Methods for Determining the Degree of Ventricle Symmetry in Ischemic Stroke</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of the project was to identify and develop effective methods of symmetry evaluation in images and apply these techniques to an imaging-based stroke rehabilitation phase I clinical trial named Dose Optimization for Stroke Evaluation (DOSE), Also detecting changes using the shape of the lateral ventricles to understand adjustments in the rest of the brain. The symmetry of the left and right lateral ventricles is an effective indicator of spatially altered regions of the brain.</p> <p><b>Methods/Materials</b> Open patients MRI image of the brain on MRIcron software, Segment the lateral ventricle, 3D fill the ventricle, Overlay pre and post images of the ventricle, save file as volume format (v.o.i.), Use Bayes' rule to incorporate into Matlab for contrast from CSF and image background, Provide image to Matlab to generate ventricle volume.</p> <p><b>Results</b> 84 MR image studies were processed and the symmetry ratios were calculated. The ratios will be utilized to evaluate potential correlation with the enrolled subjects# MAL(Motor activity log) scores and WMFT(wolf motor function test) scores over time. We expect the symmetry ratios to correlate with improved arm and hand function from the two scores over time, Evaluated from the CSF volume in the lateral ventricle.</p> <p><b>Conclusions/Discussion</b> This method of symmetry detection is novel because it provides a quantitative measure of the symmetry between non-uniform regions. The lateral ventricles have a non-uniform shape, which is unique between patients and contributes to the difficulty of applying current symmetry detection methods. This algorithm effectively and accurately provides meaningful quantitative data. The symmetry evaluation method and the projected correlations will be very valuable for diagnostic and therapeutic applications in stroke and other clinical trials.</p>	
<b>Summary Statement</b> To find a new way to treat stroke as accurately as possible, by providing a quantitative measure of the symmetry between non-uniform regions.	
<b>Help Received</b> My mentors Ximing Wang and Kevin Ma provided the patients files assigning us to segment and to calculate the volume of the ventricles.	