



# CALIFORNIA STATE SCIENCE FAIR 2003 PROJECT SUMMARY

Name(s) <b>Leslie L. Sheu</b>	Project Number <b>S1011</b>
<b>Project Title</b> <b>A New Measurement for Locomotor Behavior: Recovery from Spinal Cord Injury in Human Stem Cell Transplanted Mice</b>	
<b>Objectives/Goals</b> My objectives are to suggest the importance of and come up with an appropriate scoring method for quantitative ladder beam testing (rather than the widely used qualitative BBB locomotor test) as researchers get closer to finding a cure for spinal cord injury (SCI), and the possibility of using stem cell transplants to help SCI patients (stem cells are undifferentiated cells that may replace the injured cells). I also hope to show a relationship between successful proliferation of human stem cells and locomotor behavior through histology.	<b>Abstract</b>  
<b>Methods/Materials</b> I began by recording normal C57BL6 mice (mice most often used in research) and normal Nod-Scid (immunodeficient) mice run across a ladder beam apparatus (17 animals per strain, 3 trials each). Afterwards, 18 injured Nod-Scid mice, half of which had human embryonic stem cell grafts, were recorded. I analyzed the locomotion of each mouse by downloading the clips onto a computer program and then compared this ladder beam data to BBB test data (the higher the ladder beam or BBB score, the better the locomotion). I compared ladder beam scores of control injured mice with those that received stem cells, and further compared the proliferation of stem cells in transplanted mice to ladder beam scores with a light microscope.	
<b>Results</b> All SCI mice have worse behavior than normal mice, but mice that received stem cells functioned more like normal mice than those that did not receive stem cells. There is a positive correlation of BBB and ladder beam scores in injured mice, but ladder beam scores have a much higher range around BBB scores of 8-10. The ladder beam data is much more detailed and reproducible. Histology showed a very strong positive correlation between stem cell count and ladder beam score among stem cell transplanted mice.	
<b>Conclusions/Discussion</b> Stem cells can be a potential treatment for SCI patients if injected properly and accepted by the host organism. The new quantitative ladder beam test is more sensitive to small changes in locomotion than the currently used qualitative BBB test; thus, it can differentiate recovery of small animals in more detail than the BBB and should be used in locomotor recovery studies.	
<b>Summary Statement</b> Assessing the affect of stem cells on locomotion of immunodeficient mice by comparing results from two different behavioral tests (new ladder beam and current BBB) and histological evidence.	
<b>Help Received</b> Used lab facilities and specimen at the University of California, Irvine, under the advisement of Dr. Brian Cummings.	