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**Regenerative Medicine Minnesota
Progress Report
Due: August 30, 2016**

Grant Title: Graduate Scholar in Regenerative Medicine

Grant Number: MRM 2015 GSCH 004

Requester: Peter Grahn

Project Timeline: August 1, 2015 to July 31, 2016

Brief description:

The majority of my time during this award was dedicated to staying up-to-date with current scientific and clinical advances, developing and testing new hypotheses, designing and carrying out experiments, collecting, analyzing and interpreting data, writing manuscripts. Additionally, I worked with team members to prepare and submit documents to the Mayo Clinic Institutional Review Board and Food and Drug Agency Investigational Device Exemption to initiate a clinical trial, which is now underway. Furthermore, I published a first-author manuscript describing a novel image-guided stereotactic system for delivering electrodes, pharmacotherapies, and regenerative cells into target locations within the spinal cord. Moreover, I prepared numerous presentations and posters for Mayo Graduate School works-in-progress seminars, graduate school poster sessions, and the North American Neuromodulation Society and Neural Interfaces Joint Conference. I also focused a significant amount of my energy during this award on completing my remaining coursework required by the Mayo Graduate School Neurobiology of Disease track, followed by successfully defending my dissertation before transitioning to a postdoctoral position.

Outcome:

During the funding period of this award I drafted and successfully defended my PhD dissertation (November 2015). Additionally, in December 2015, I published a first-author, peer-reviewed original research article in *Spine*. Following completion of my PhD, I have remained within the Neural Engineering Laboratory at Mayo Clinic as a postdoctoral research fellow and engineer.

This fellowship has supported the costs of my graduate education as well as my position as a postdoctoral fellow. Also, this support provided an opportunity for myself and several other lab members to attend the North American Neuromodulation Society and Neural Interfaces Joint Conference in Baltimore, MD from June 26-29 by freeing internal laboratory funds that were previously allocated to support my postdoctoral position within the lab.

Please list any publications that have resulted from your Regenerative Medicine Minnesota Grant funding:

Abstracts published:

Grahn, P.J., Mendez, A.A., Knudsen, B., McConico, A., Calvert, J.S., Islam, R., Bennet, K.E., Lee, K.H., Lavrov, I.S. Motor-evoked responses via epidural spinal

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cord stimulation evaluated at inter- and intra-segmental resolution. North American Neuromodulation Society and Neural Interface Joint Conference. Baltimore, MD. June 2016.

Calvert, J.S., Grahn, P.J., Mendez, A.A., Bennet, K.E., Lavrov, I.A., Lujan, J.L., Lee, K.H. Establishing a three-dimensional atlas of intraspinal microstimulation-evoked muscle activity in a swine model. North American Neuromodulation Society and Neural Interface Joint Conference. Baltimore, MD. June 2016.

Mendez, A.A., Nicolai, E., Grahn, P.J., Trevathan, J.K., Bennet, K.E., Chang, S.Y., Lujan, J.L., Lee, K.H. In vivo intraspinal neurochemical monitoring for characterization of underlying mechanisms of stimulation-evoked motor responses following spinal cord injury. Society for Neuroscience. Chicago, IL. October 2015.

Calvert, J.S., Grahn, P.J., Mendez, A.A., Knudsen, B.A., McConico, A.L., Bennet, K.E., Lujan, J.L., Lee, K.H. Establishing a high resolution functional atlas of the lumbar spinal cord in a porcine model. BRAIN Symposium. Rochester, MN. October 2015.

Grahn, P.J., Goers, S.J., Lujan, J.L., Mallory, G.W., Kall, B.A., Mendez, A.A., Trevathan, J.K., Felmlee, J.P., Bennet, K.E., Lee, K.H. MRI-guided stereotactic system for delivery of intraspinal instrumentation. BRAIN Symposium. Rochester, MN. October 2015.

Manuscript publication forthcoming:

Grahn, P.J., Mendez, A.A., Knudsen, B., McConico, A., Calvert, J.S., Islam, R., Bennet, K.E., Lee, K.H., Lavrov, I.S. Motor-evoked responses via epidural spinal cord stimulation evaluated at inter- and intra-segmental resolution.

Responsible Spending:

From August 1 to December 15, 2015 funds were used to support my graduate school education and stipend expenses. Following approval from MN Regenerative Medicine, remaining funds were used to support my postdoctoral position within the Mayo Clinic Neural Engineering Laboratory from December 16, 2015 to July 31, 2016. There are no funds remaining.