Submitted on Friday, 3/13/2015 11:22 AM

Name of Organizer: Cameron S Mang

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I am a current member of the ASNR (Symposium organizers must be ASNR members):
Yes

Title of Symposium: Aerobic exercise effects on neuroplasticity: from neurobiology to behaviour

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Description of Submitted Symposium (please limit to 2000 characters): Neurorehabilitation is designed to promote the reacquisition of behaviours that were lost due to the injury or condition. This re-learning process is supported by neuroplasticity, the intrinsic capacity of the central nervous system to change in response to experience. Such neuroplastic change involves multiple neurochemicals, including neurotrophic growth factors and catecholamines that drive alterations in the strength and organization of neural pathways supporting the desired behavioural change. Increasing research has focused on developing strategies that optimize neurochemical levels in the brain to foster the development of a neural environment that is supportive of plasticity and hence receptive to rehabilitation training [1]. Past research has demonstrated robust effects of aerobic exercise on brain function. Previously, these effects were attributed to indirect consequences of aerobic exercise, such as reduced inflammation and improved cerebral blood flow. However, converging evidence indicates that aerobic exercise also has direct effects on the brain, primarily through modulation of neurochemicals [1,2]. Both animal and human research has now demonstrated benefits of aerobic exercise for neuroplasticity [3], as well as learning and memory processes [2-4]. As a result, there is considerable interest in the potential use of aerobic exercise to optimize neuroplasticity for promotion of functional recovery in individuals with neurological conditions [1]. Within this presentation, we will describe evidence linking aerobic exercise, neurochemical production, neuroplasticity, and learning processes in humans. Further we will discuss optimal parameters of exercise to evoke the beneficial effects, as well as consider how aerobic exercise may be effectively combined with learning-based interventions to improve neurorehabilitation outcomes. [1] Ploughman et al. 2015 [2] Skriver, Lundbye-Jensen et al. 2014 [3] Mang et al. 2014 [4] Roig, Lundbye-Jensen et al. 2012

Length of time required for symposium?: 2 hours, ~35 min plus 5 min questions each

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Additional Presenters (Limited to 4 additional presenters, list full name and email address) Please Note: Any Non-member speakers must receive prior approval from the Program Chair.: Dr. Michelle Ploughman (ASNR member) Assistant Professor Physical Medicine and Rehabilitation Memorial University, Newfoundland, Canada michelle.ploughman@med.mun.ca

Dr. Jesper Lundbye-Jensen (non-member) Associate Professor Department of Nutrition, Exercise and Sports University of Copenhagen, Copenhagen, Denmark jlundbyej@gmail.com

What is the role of each presenter?: Dr. Michelle Ploughman, a Neuroscientist and practicing Physical Therapist, is a recognized expert in neuroplasticity and neurorehabilitation in stroke and multiple sclerosis. She is also the Canada Research Chair in Rehabilitation, Neuroplasticity and Brain Recovery (Tier 2) and will provide important perspectives on the effects of aerobic exercise on neuroplasticity evaluated by translational research spanning from basic animal work to human clinical trials. Dr. Jesper Lundbye-Jensen is a Neuroscientist and leader of the 'Neuroplasticity and Motor Learning' section of the 'Copenhagen Neural Control of Movement Research Group.' He will provide important expertise in human motor control, motor learning, neuroplasticity and the causal relationship between physical activity and cognition. Cameron Mang is a Kinesiologist and PhD Candidate (defence scheduled for August 2015) at the University of British Columbia. He will impart expertise in clinical exercise physiology and techniques used in human neurophysiology research to document the neuroplastic effects of aerobic exercise.

Objective 1: Describe the roles of various neurochemicals (e.g. brain-derived neurotrophic factor, insulin-like growth factor-I, nerve growth factor, norepinephrine) in neuroplasticity underlying learning processes and neurorehabilitation.

Objective 2: Discuss evidence for the role of aerobic exercise in promoting neuroplasticity and learning processes through alteration in the production of neurochemicals.

Objective 3: Consider how exercise effects on neuroplasticity might be optimized to promote neurorehabilitation.

Target Audience: Researchers Rehabilitation Therapists

Type of Educational Activity: Symposia

Lecture - oral didactic presentation: Yes

Forum - open dialogue and discussion among all participants: No

Panel Discussion - 3 to 6 faculty engaged in dialogue: No

Please explain: Given the expected knowledge gap between the presenters and audience on this topic, and the depth with which we intend to cover it, we believe that a lecture format will be the most effective means of accomplishing the symposium objectives.

Please explain: Currently exercise is not prescribed as an intervention that may prepare or prime the brain for learning. The use of priming bouts of exercise on rehabilitation may enhance the outcomes associated with physical rehabilitation. In this session we will emphasize both how this gap in practice might be addressed as well as in which populations it may be feasible and have the largest effects.

How do you know the practice gap exists? (You must answer this question for your symposium to be considered): Peer Review

Please describe: The idea of using exercise to prime neurorehabilitation is relatively new within the literature and has yet to be adopted to clinical practice. The symposium organizer, Cameron Mang, recently published a perspective article in Physical Therapy Journal discussing the potential use of aerobic exercise to prime neurorehabilitation training (Mang et al. 2013; 93(12) 1707-16). The article was peer-reviewed and discusses the practice gap described above. Likewise, Dr. Ploughman recently published systematic reviews on the same topic, which indicate a need for further clinical trials in humans (Austin et al. 2014; 87:8-15 & Ploughman et al. 2015; 6(1): 13-28).

What Desirable Physician Attribute(s) will your symposium address? (Select all that apply): Patient care, Works in interdisciplinary teams, Employ evidence-based practice, Commitment to lifelong learning, Cognitive expertise, Performance in practice

At the end of the educational session, what will your learners have gained? (check all that apply - you must answer this question for your symposium to be considered): Knowledge (information)

Please indicate any other needs for the symposium.: In the above question it indicates 'check all that apply'; however, I was only able to check a single option ('Knowledge'). I also intended to check 'Competence'. Thank you.

By clicking "submit form" below, I agree to adhere to all deadlines and requirements as set forth by the ASNR Executive Office and understand if I do not adhere to these deadlines and requirements I may be disqualified from presenting at the meeting.:

Line:

Response ID: 1550