Physical Exercise and Brain Health

Symposium Program

March 2, 2017
8AM - 5PM

Arnold and Mabel Beckman Center of the National Academies of Science and Engineering

This scientific symposium is jointly hosted by:

UCI Exercise Medicine & Sport Sciences Initiative
UCI CNLM Center for the Neurobiology of Learning & Memory
Schedule

8:00 AM  Coffee and pastries
8:45 AM  Welcome and Opening Remarks

Michael Yassa, Ph.D.
Director, Center for the Neurobiology of Learning and Memory

James Hicks, Ph.D.
Director, Exercise Medicine and Sport Sciences Initiative

9:00 AM  Kirk Erickson, Ph.D., University of Pittsburgh
Fit body, fit brain: effects of exercise on brain imaging outcomes

9:30 AM  Michelle Carlson, Ph.D., Johns Hopkins University
Linking physical and social activity to neurocognitive health

10:00 AM Henriette van Praag, Ph.D., National Institute on Aging
The regulation of adult hippocampal neurogenesis by exercise

10:30 AM Mark Mattson, Ph.D., National Institute on Aging
Bioenergetic challenges, mitochondrial plasticity, and neuronal resilience

11:00 M  Poster viewing I
12:00 PM Lunch

1:00 PM  Laura Baker, Ph.D., Wake Forest University
Exercise as medicine: How to slow cognitive impairment and reduce Alzheimer’s pathology in adults with mild cognitive impairment

1:30 PM  Carl Cotman, Ph.D., University of California, Irvine
Exercise and neuroscience: Exercise builds brain health

2:00 PM  Wendy Suzuki, Ph.D., New York University
The effects of acute and long-term exercise on cognitive functions in healthy adults

2:30 PM  Panel Discussion
3:00 PM  Poster viewing II

4:00 PM  Keynote Lecture
Arthur Kramer, Ph.D., University of Illinois
Exercising your brain and mind

5:00 PM  Concluding Remarks
Virtually every organism is dependent on movement. Regular physical activity imposes unique stresses on a broad spectrum of cell types, tissues, and organ systems. In so doing, exercise plays a key role in shaping fundamental biological processes necessary for maintaining health and preventing disease. In contrast, inactivity and a sedentary lifestyle are widely recognized as a significant factor in the development of a wide array of diseases and disabilities including brain disease. The effective role of exercise to improve brain health and to alter brain disease trajectories is gaining acceptance among health care professionals. However, a complete mechanistic understanding of how regular physical activity works to alter brain function and health remains a mystery.

The **Physical Exercise and Brain Health** symposium brings together renowned scholars to share discoveries on the impact of exercise on brain health and disease and discuss the state of the field and path forward. The symposium results from a partnership between the UCI Exercise Medicine and Sport Sciences Initiative (EMSSI) and the UCI Center for the Neurobiology of Learning and Memory (CNLM). We would like to thank our community supporters and advocates as well as our hard-working staff and students who make these educational activities possible. Welcome to the symposium!

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**James Hicks, Ph.D.**
Director
Exercise Medicine and Sport Sciences Initiative

**Michael A. Yassa, Ph.D.**
Director
Center for the Neurobiology of Learning and Memory
Dr. Kramer served as director of the Beckman Institute for Advanced Science & Technology (2010-2016) and was Swanlund Chair and Professor of Psychology and Neuroscience at the University of Illinois. He is now Beckman director and professor emeritus. Kramer also serves as senior vice provost for research and graduate education at Northeastern University in Boston. He received his Ph.D. in cognitive/experimental psychology from the University of Illinois in 1984. He holds appointments in the Department of Psychology, Neuroscience program, and the Beckman Institute. Professor Kramer’s research projects include topics in cognitive psychology, cognitive neuroscience, aging, and human factors. A major focus of his labs recent research is the understanding and enhancement of cognitive and neural plasticity across the lifespan. He is a former associate editor of Perception and Psychophysics and is currently a member of six editorial boards. Professor Kramer is also a fellow of the American Psychological Association, American Psychological Society, a former member of the executive committee of the International Society of Attention and Performance, and a recent recipient of a NIH Ten Year MERIT Award. Professor Kramer’s research has been featured in a long list of print, radio and electronic media including the New York Times, Wall Street Journal, Washington Post, Chicago Tribune, CBS Evening News, Today Show, NPR, and Saturday Night Live.
Speaker Profiles

Kirk Erickson, Ph.D.
Associate Professor, Department of Psychology
Center for the Neural Basis of Cognition
University of Pittsburgh

Dr. Erickson received his Bachelor’s degree in Psychology and Philosophy at Marquette University in 1999. He received his Ph.D. from the University of Illinois at Urbana-Champaign in 2005 and did post-doctoral work at the Beckman Institute for Advanced Science and Technology at the University of Illinois until 2008. Dr. Erickson’s research interests range from cognitive neuroscience, aging, neuroplasticity, genetics, and molecular mechanisms of cognitive function. He is currently the Principal Investigator of the BACH lab at the University of Pittsburgh and is continuing his research on how the brain changes in late adulthood and the factors that promote successful aging. In 2016, Professor Erickson received a $21.8 million grant from the National Institute on Aging to study the link between exercise and brain health in older adults in a collaborative project with the University of Illinois, Northeastern University and the University of Kansas.

Michelle Carlson, Ph.D.
Associate Professor, Mental Health, Epidemiology
Johns Hopkins School of Public Health

Dr. Carlson’s lab seeks to develop and apply the public health tools of the 21st century, integrating functional neuroimaging and mobile technologies, to identify risk and health profiles of activity - cognitive, physical, and social. She leads investigations to identify biomarkers of early dementia and evaluates both environmental and pharmacologic interventions of dementia risk. Dr. Carlson served as the Principal Investigator (PI) of the Women’s Health and Aging Study Cognitive Pathways study, and the Johns Hopkins site PI of the national Ginkgo Evaluation of Memory (GEMS) trial to prevent and delay dementia and cognitive aging. Dr. Carlson currently serves as the Johns Hopkins site PI of the national Cardiovascular Health Study (CHS), and as Project leader of the P01-funded Baltimore Experience Corps Trial (BECT) to evaluate the impact of high-intensity service in elementary schools on older adults’ cognitive, brain, and functional health. Within this trial, Dr. Carlson obtained funds to recruit a nested Brain Health Study (BHS) to evaluate the Experience Corps program’s impact on brain health through changes in life style activity as measured by accelerometry and assisted GPS.
Henriette van Praag, Ph.D.
Investigator, Neuroplasticity and Behavior Unit
Laboratory of Neurosciences, National Institute on Aging

Dr. van Praag received her Ph.D. from Tel-Aviv University in 1992. She then conducted postdoctoral research on the role of nerve growth factors in brain injury at Robert Wood Johnson Medical School from 1992-1997. She continued her research in brain regeneration as a staff scientist at the Salk Institute for Biological Studies, where she discovered that exercise plays an important role in the production of new neurons in the adult rodent brain. She joined NIA in 2007 where her lab is focused on understanding the mechanisms underlying synaptic and structural plasticity important for learning and memory, particularly the functional role and neural circuitry of new neurons in the adult hippocampus. Her lab uses behavioral assays, viral vector based neuroanatomical tracing and electrophysiology. She studies the regulation of neurogenesis by voluntary wheel running in rodents and has identified molecular, synaptic and circuit markers that are altered by exercise. This work has significant translational application for studies of brain disease and the utility of aerobic exercise for prevention and/or treatment of age-associated cognitive disorders such as Alzheimer’s disease.

Mark P. Mattson, Ph.D.
Sr. Investigator and Chief, Laboratory of Neurosciences
National Institute on Aging
Professor of Neuroscience, Johns Hopkins University

Dr. Mattson is currently Chief of the Laboratory of Neurosciences at the National Institute on Aging, and Professor of Neuroscience at Johns Hopkins University. He is Editor-in-Chief of Ageing Research Reviews and NeuroMolecular Medicine, a Section Editor for Neurobiology of Aging, and an Associate Editor for Trends in Neurosciences. In addition, he has edited 10 volumes in the areas of mechanisms of brain function, stress responses, aging and age-related neurodegenerative disorders. Dr. Mattson is a Fellow of the American Association for the Advancement of Science, and has received numerous awards including the Metropolitan Life Foundation Medical Research Award and the Alzheimer’s Association Zenith Award. He is considered a leader in the area of cellular and molecular mechanisms underlying neuronal plasticity and neurodegenerative disorders, and has made major contributions to understanding of the pathogenesis of Alzheimer’s disease, and to its prevention and treatment. Dr. Mattson has published more than 400 original research articles and more than 200 review articles and commentaries.
Laura D. Baker, Ph.D.
Associate Professor, Gerontology and Geriatric Medicine
Wake Forest School of Medicine

Dr. Baker received her Ph.D. from Washington University in 1995, and completed neuropsychology internship at San Antonio State Hospital, clinical neuropsychology residency at St. John’s Mercy Medical Center, and fellowship in psychiatry at the University of Washington. She currently serves on the faculty at Wake Forest School of Medicine where she is associate professor in the Department of Internal Medicine, Section on Gerontology and Geriatric Medicine, and of Public Health Sciences in the Department of Epidemiology and Prevention. Dr. Baker is a cognitive neuroscientist who is a nationally recognized leader in the areas of aerobic exercise and hormone supplementation as treatments for memory decline associated with preclinical and early stage Alzheimer’s disease. In collaboration with Dr. Carl Cotman at the University of California, Irvine, she is currently leading a large-scale clinical trial investigating the efficacy of 2 different doses of exercise on memory and thinking and other measures of brain health. The study, which is named the Exert Trial, is currently enrolling participants in thirteen cities across the country.

Carl Cotman, Ph.D.
Professor, Neurobiology and Behavior, Neurology
University of California, Irvine

Dr. Cotman is a distinguished scholar, internationally known for his pioneering work on successful brain aging and Alzheimer’s disease and is the Founding Director of the Institute for Brain Aging and Dementia, known today as the Institute for Memory Impairments and Neurological Disorders. Dr. Cotman’s contributions to neuroscience have provided in-depth knowledge of how the human brain functions, how it ages, and how it is changed by Alzheimer’s disease. In particular, Dr. Cotman’s seminal discoveries of the impact of exercise on the production of brain-derived neurotropic factor have significantly influenced the field. Dr. Cotman’s career at UCI began in 1968, and since that time, he has published over 750 peer-reviewed articles. He initiated the UCI Alzheimer’s Disease Research Center in 1985, and it has been continuously funded since then. In 2008 Dr. Cotman received a lifetime achievement award for his research on Alzheimer’s disease at the 11th International Conference on Alzheimer’s Disease in Chicago. In 2015, he was awarded the Clinical Translational Scientist Career Achievement Award by the UCI Institute for Clinical and Translational Science at UC Irvine.
Wendy Suzuki, Ph.D.
Professor, Neural Science and Psychology
Center for Neural Science, New York University

Dr. Suzuki earned her Ph.D. in Neuroscience from U.C. San Diego in 1993 and completed a post-doctoral fellowship at the National Institutes of Health before accepting a faculty position at New York University in 1998. Her major research interest continues to be brain plasticity. She is best known for her extensive work studying areas in the brain critical for our ability to form and retain new long-term memories. More recently her work has focused on understanding how aerobic exercise may improve long-term memory functions dependent on the hippocampus, executive functions dependent on the prefrontal cortex, mood and imagination/creativity. She has examined the effects of increased levels of aerobic exercise on cognitive functions in patient population groups including in participants recovering from addiction as well as patients with traumatic brain injury. Current studies in her lab are examining the effects of long-term increases in aerobic activity on a wide range of mood and cognitive functions in healthy young adults. A major goal is to understand how much, how long and what kind of exercise optimally improves brain functions in both healthy and patient population groups.

What is The Anti-Cancer Challenge?

The Anti-Cancer Challenge Cycle & Run For Cures is where the end of cancer begins. The Challenge is an exciting new event being held June 10-11, 2017 at Angel Stadium in Anaheim that features a cycling ride that ranges from 10 to 100 miles and a 5K fun run/walk to benefit the UC Irvine Health Chao Family Comprehensive Cancer Center, Orange County’s only National Cancer Institute-designated comprehensive cancer center. All proceeds go directly to fund lifesaving cancer research.

Anti-Cancer Challenge Festival in June

The weekend will begin June 10 with a free Anti-Cancer Challenge Festival that will include live entertainment, a children’s ride, stationary bike event, food from local vendors, craft beer and exhibits. June 11 will feature a cycling ride that ranges from 10 to 100 miles and a 5K run/walk with a finish line festival.

For more info visit Anti-CancerChallenge.org or contact us at Anti-CancerChallenge@uci.edu.
1. Acute and Chronic Effects of High-intensity Resistance Exercise on the Executive Functions of Female College Students
Kyungae Kim¹, and Hyukki Chang¹,²
¹Exercise Physiology Laboratory, Department of Human Movement Science, Seoul Women’s University, Seoul, Korea; ²Translational Neurobiology Laboratory, Department of Neurobiology and Behavior, Center for the Neurobiology of Learning and Memory, University of California, Irvine, CA.

2. Acute exercise modulates feature-selective responses in human visual cortex
Tom Bullock¹,², James C. Elliott¹,², John T. Serences³, Barry Giesbrecht¹,²
¹Department of Psychological and Brain Sciences, University of California, Santa Barbara, CA; ²Institute for Collaborative Biotechnologies, University of California, Santa Barbara, CA; ³Department of Psychology, University of California, San Diego, La Jolla, CA

3. Behavioral and Neural Correlates of Health and Lifestyle Factors in Older African-Americans
Ashlee Shaw, Neha Sinha, Mark A. Gluck
Rutgers University-Newark, Newark, NJ

4. Associations between aerobic fitness and hippocampal subfield structure and function over a 12-week exercise intervention
Rachel K. Nauer¹,²,³, Matthew F. Dunne³, Thomas W. Storer⁴, Karin Schon¹,²,³
¹Department of Psychological and Brain Sciences, Boston University, Boston, MA; ²Center for Memory and Brain, Boston University, Boston, MA; ³Department of Anatomy and Neurobiology, Boston University School of Medicine, Boston, MA; ⁴Brigham and Women’s Hospital, Harvard Medical School, Boston, MA

5. Post-Stress Glucose Consumption Facilitates Hormetic Preconditioning and Resilience to Trauma
Michael A. Conoscenti¹,², Traci N. Plumb³, Kayla A. Piiwaa¹,², Thomas R. Minor¹,²,³,⁵,⁶
¹Department of Psychology, University of California, Los Angeles, CA; ²UCLA Behavioral Testing Core, Brain Research Institute, Los Angeles, CA; ³Legacy Research Institute, Portland, OR; ⁴Department of Psychiatry and Biobehavioral Sciences, Integrative Center for Learning and Memory, University of California, Los Angeles, CA; ⁵Stress and Motivated Behavior Institute, New Jersey Medical School, Newark, NJ; ⁶Veterans Affairs, Newark, NJ

6. The Epidemiology of Sports-Related Head Injury and Concussion in Water Polo
Robert S. Blumenfeld¹,², Jessica C. Winsell², James W. Hicks³, Steven L. Small⁴
¹Department of Psychology and Sociology, California State Polytechnic University, Pomona, CA; ²Department of Neurology, University of California Irvine, Irvine, CA; ³Department of Ecology and Evolutionary Biology, University of California Irvine, Irvine, CA; ⁴Brain Circuits Laboratory, Biological Sciences III, University of California Irvine, Irvine, CA
7. Misremembering Past Affect Predicts Adolescents’ Future Affective Experience during Exercise
Melissa M. Karnaze, Linda J. Levine, Margaret Schneider
Department of Psychology and Social Behavior, University of California Irvine, CA

8. Aerobic fitness is associated with mnemonic discrimination as a mediator of physical activity effects: evidence for memory flexibility in young adults
Kazuya Suwabe¹⁻², Kazuki Hyodo¹⁻³, Kyeongho Byun¹⁻²⁻⁴, Genta Ochi¹⁻², Takemune Fukue¹⁻², Michael A. Yassa²⁻³ and Hideaki Soya¹⁻²
¹Laboratory of Exercise Biochemistry and Neuroendocrinology; University of Tsukuba, Ibaraki, Japan; ²Department of Sports Neuroscience, Advanced Research Initiative for Human High Performance (ARIHHP), Faculty of Health and Sport Sciences, University of Tsukuba, Ibaraki, Japan; ³Physical Fitness Research Institute, Meiji Yasuda Life Foundation of Health and Welfare, Tokyo, Japan; ⁴Department of Neurobiology and Behavior, Center for the Neurobiology of Learning and Memory, University of California, Irvine, CA

9. Mild exercise improves discrimination memory by boosting pattern separation-related DG/CA3 connectivity in young adults
Kazuya Suwabe¹, Kyeongho Byun¹⁻³, Zachariah M. Reagh¹, Jared M. Roberts³, Akira Matsushita⁴, Kousaku Saotome⁴, Michael A. Yassa²⁻³, and Hideaki Soya¹⁻²
¹Laboratory of Exercise Biochemistry and Neuroendocrinology; University of Tsukuba, Ibaraki, Japan; ²Department of Sports Neuroscience, Advanced Research Initiative for Human High Performance (ARIHHP), Faculty of Health and Sport Sciences, University of Tsukuba, Ibaraki, Japan; ³Department of Neurobiology and Behavior, Center for the Neurobiology of Learning and Memory, University of California, Irvine, CA; ⁴Center for Cybernics Research, University of Tsukuba, Ibaraki, Japan

10. Relationship of physical exercise and aerobic fitness with episodic associative learning and hippocampal volume in healthy older adults
Rachel Clark¹, Tim Weng², Conner Wharff², Lauren Reist³, Lyndsey DuBose³, Warren Darling³, Phillip Schmid⁴, Gardar Sigurdsson⁴, Vincent A Magnotta¹⁻⁴, Gary Pierce³, Michelle Voss¹⁻²
¹Interdisciplinary Graduate Program in Neuroscience; ²Department of Psychological and Brain Sciences; ³Department of Health and Human Physiology; ⁴Carver College of Medicine, University of Iowa, Iowa City, IA

11. Positive Expectations Regarding Aging Are Associated with Higher Levels of Physical Activity over Two Years
Ryan Andrews, Michelle Carlson
Departments of Mental Health and Epidemiology, Johns Hopkins School of Public Health, Baltimore, MD

12. Changes in working memory filtering efficiency during acute bouts of exercise
Lindsey Purpura, Barry Giesbrecht
Psychological and Brain Sciences, University of California, Santa Barbara, CA
The Persistence of Memory
The 30th Annual Conference on the Neurobiology of Learning and Memory
April 13-14, 2017
Herklotz Conference Center | UC Irvine
Register online
http://cnlm.uci.edu/springmeeting

Speakers
Christie Fowler  University of California, Irvine
Julie Lauterborn  University of California, Irvine
Gary Lynch  University of California, Irvine
Stephen Mahler  University of California, Irvine
Stephen Maren  Texas A&M University
Courtney Miller  Scripps Research Institute, Florida
Helen Scharfman  New York University
Michael A. Yassa  University of California, Irvine

Sessions moderated by Tallie Z. Baram, James L. McGaugh and Marcelo Wood

Neuroscience of Dance
Integrating science and art
Coming Fall 2017. Stay tuned!
To receive advance notice of open registration, please subscribe online: http://cnlm.uci.edu/neurodance

This event will be open to the community and jointly hosted by the Center for the Neurobiology of Learning and Memory, the Exercise Medicine and Sport Sciences Initiative, and the Claire Trevor School of Arts.
The Exercise Medicine and Sport Sciences Initiative (EMSSI) is a unique multidisciplinary program established in 2015 that promotes scholarly activities and innovative discoveries in all fields associated with movement, including exercise and sport sciences, exercise medicine, and rehabilitation. The EMSSI's mission is to enhance human health and wellness through undergraduate and graduate teaching, basic and translational research, development of innovative technologies, service to the community, and clinical activities.

To find out more about how you can support exercise science at UCI or to join our re:action newsletter mailing list, please contact us.

Director: James Hicks, Ph.D.

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The Center for the Neurobiology of Learning and Memory (CNLM) was established by the UC Regents in 1983 as the world’s first research institute dedicated exclusively to the multidisciplinary study of the brain mechanisms underlying learning and memory. CNLM faculty use state-of-the-art approaches integrating cellular/molecular, systems, cognitive, and behavioral neuroscience to examine the brain at all levels. The CNLM has been a worldwide leader in learning and memory and has played a critical role in advancing global discovery in the neurosciences.

To find out more about how you can support brain science at the CNLM or to join our NeuroTimes mailing list, please contact us.

Director: Michael Yassa, Ph.D.

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