Timothy R. Macaulay, PhD, CSCS
Curriculum Vitae

Neuroscience Laboratory Lead
KBR, Human Health and Performance Contract
NASA – Johnson Space Center, B21, Houston, TX
Email: timothy.r.macaulay@nasa.gov
Phone: (408)-332-3900

Education

Graduate Education 2016 – 2020
Division of Biokinesiology and Physical Therapy, University of Southern California
Doctor of Philosophy in Biokinesiology
Mentor: E. Todd Schroeder, PhD, FACSM, CSCS

Undergraduate Education 2012 –2015
University of California San Diego
Bachelor of Science degree in Physiology and Neuroscience
Mentors: Alan R. Hargens, PhD and Brandon R. Macias, PhD

Positions and Professional Experience

KBR Lab Lead at NASA Johnson Space Center Neuroscience Laboratory 2021-Present
KBR Government Solutions Science & Space
Adjunct Assistant Professor of Clinical Physical Therapy 2024-Present
USC Division of Biokinesiology and Physical Therapy
KBR Senior Scientist at NASA Johnson Space Center Neuroscience Laboratory 2020-2021
KBR Government Solutions Science & Space
Graduate Teaching Assistant 2016-2020
USC Doctor of Physical Therapy Program
Independent Contractor for Laboratory-based Device Validation and Athlete Testing 2016-2020
K2 Sciences – www.k2sciences.com
Biokinesiology Student Council President 2019
USC Division of Biokinesiology and Physical Therapy
Flight Lab Performance Analyst and Injury Prevention Specialist 2018-2019
Jumpman Los Angeles, Air Jordan
Biokinesiology Student Council Representative 2017
USC Division of Biokinesiology and Physical Therapy
Staff Research Associate; Clinical Physiology Laboratory, Orthopaedic Surgery Department, 2016
University of California San Diego, PI: Alan R. Hargens, PhD
Student Research Intern; Clinical Physiology Laboratory, Orthopaedic Surgery Department, 2014-2016
University of California San Diego, PI: Alan R. Hargens, PhD
UC San Diego - FitLife Personal Trainer and Fitness Instructor 2013-2016
Scripps Hospital Rehab Services Intern 2014
Physiotherapy Associates Intern 2014
LA Fitness Personal Trainer 2013
Fitness Quest 10 Intern 2013

Current Support

Head Down Bed Rest Sensorimotor Countermeasures
NASA HRP Directed, Master Task List ID: 1429. Role: PI, 2021-2028.

The goal of this study is to determine the effects of proprioceptive training and electrical muscle stimulation on functional task performance and sensorimotor function following 60 days of 6° head down bed rest.

Neuro-Vestibular Examination During and After Spaceflight (CIPHER – Vestibular Health)
NASA NRA 80JSC017N0001-BPBA, Role: Co-I (PI: Clément), 2020-2033.
The purpose of this study is to investigate temporal changes in neuro-vestibular health and performance in orbit and immediately after landing in crewmembers participating in short-duration, six-month, and one-year missions on the International Space Station.

Functional Task Tests in Partial Gravity during Parabolic Flight
NASA NRA 80JSC019N0001, Role: Co-I (PI: Clément), 2021-2024.
The purpose of this study is to examine how critical mission tasks are performed during the partial gravity phases of parabolic flight.

Sensorimotor Predictors of Postlanding Functional Task Performance
NASA HRP Directed, Role: Co-I (PI: Wood), 2019-2024.
The goal of this study is to examine the relationships of behavioral, neuroimaging and genetic biomarkers with post-flight functional task performance.

Assessments for Lunar Landing and Egress During Early Artemis Missions
NASA HRP Directed, Role: Co-I (PI: Wood), 2025-2030.
This purpose of this directed study is to strategically capture data during the early Artemis test flights to better characterize how sensorimotor, cardiovascular, and other individual and mission design factors may impact human performance during critical mission tasks.

Peer-Reviewed Publications

Bellisle RF, Peters BT, Oddsson L, Wood SJ, **Macaulay TR**. A Pilot Study to Evaluate the Relationships Between Supine Proprioception Assessments and Upright Functional Mobility. Brain Sciences. *In Press*

Magnard J, **Macaulay TR**, Schroeder ET, Laine C, Gordon J, Schweighofer N. Initial development of skill with a reversed bicycle and a case series of experienced riders. Sci Rep 14, 4334 (2024). https://doi.org/10.1038/s41598-024-54595-8

Clément G, **Macaulay TR**, Moudy SC, Kuldavletova O, Wood SJ. Back to the future—revisiting Skylab data on ocular counter-rolling and motion sickness. Frontiers in Physiology. 2023;14. https://doi.org/10.3389/fphys.2023.1303938

Clément G, Kuldavletova O, **Macaulay TR**, Wood SJ, Navarro Morales DC, Toupet M, Hautefort C, Van Nechel C, Quarck G and Denise P. Cognitive and balance functions of astronauts after spaceflight are comparable to those of individuals with bilateral vestibulopathy. Front. Neurol. 2023; 14:1284029. doi: 10.3389/fneur.2023.1284029

Macaulay TR, Wood SJ, Bollinger A, Schubert MC, Shelhamer M, Bishop MO, Reschke MF, Clément G. Comparison of Asymmetry between Perceptual, Ocular, and Postural Vestibular Screening Tests. Brain Sciences. 2023; 13(2):189. https://doi.org/10.3390/brainsci13020189

Clément G, Moudy SC, **Macaulay TR**, Bishop MO, Wood SJ. Mission-critical tasks for assessing risks from vestibular and sensorimotor adaptation during space exploration. Frontiers in Physiology. 2022 Nov 25;13:2437.

Krittanawong C, Singh NK, Scheuring RA, Urquieta E, Bershad EM, **Macaulay TR**, Kaplin S, Dunn C, Kry SF, Russomano T, Shepanek M. Human Health during Space Travel: State-of-the-Art Review. Cells. 2023 Jan;12(1):40.

Macaulay TR, Hegarty A, Yan L, Duncan D, Pa J, Kutch JJ, La Rocca M, Lane CJ, Schroeder ET. Effects of a 12-Week Periodized Resistance Training Program on Resting Brain Activity and Cerebrovascular Function: A Nonrandomized Pilot Trial. Neuroscience Insights. 2022 Aug;17:26331055221119441.

Macaulay TR, Pa J, Kutch JJ, Lane CJ, Duncan D, Yan L, Schroeder ET. 12 weeks of strength training improves fluid cognition in older adults: A nonrandomized pilot trial. PloS one. 2021;16(7):e0255018.

Macaulay TR, Peters BT, Wood SJ, Clément GR, Oddsson L, Bloomberg JJ. Developing Proprioceptive Countermeasures to Mitigate Postural and Locomotor Control Deficits After Long-Duration Spaceflight. Frontiers in Systems Neuroscience. 2021; 15:658985. doi: 10.3389/fnsys.2021.658985.

Macaulay TR, Fisher BE, Schroeder ET. Potential indirect mechanisms of cognitive enhancement after long-term resistance training in older adults. Physical Therapy. 2020; 100,6:907–916.

Macaulay TR, Erceg DN, McMillan B, Ramirez JE, Dominguez JF, Vallejo AF, Schroeder ET. Validation of an Automated and Adjustable Blood Pressure System for Use with a Public Health Station. Vascular Health and Risk Management. 2020;16:133.

Siamwala JH, Moossazadeh DG, **Macaulay TR**, Becker RL, Hargens RH, Hargens AR. Aging decreases hand volume expansion with water immersion. Frontiers in Physiology. 2018;9:72.

Macaulay TR, Siamwala JH, Hargens AR, Macias BR. Thirty days of spaceflight does not alter murine calvariae structure despite increased Sost expression. Bone reports. 2017 Dec 1;7:57-62.

Macaulay TR, Macias BR, Lee SM, Boda WL, Watenpaugh DE, Hargens AR. Treadmill exercise within lower-body negative pressure attenuates simulated spaceflight-induced reductions of balance abilities in men but not women. npj Microgravity. 2016 Jun 30;2:16022. doi.org/10.1038/npjmgrav.2016.22

Private Industry White Papers

Macaulay TR, Lee HJ, Schroeder ET. Total Energy Expenditure and Step Count Estimated by the Stayhealthy Activity App Software. K2 Sciences for Stayhealthy Inc. July 2019.

Macaulay TR, Schwery N, Schroeder ET. Under Armour Rush Evaluation – Oxygen Consumption and Heat Production. K2 Sciences for Under Armour Inc. January 2019.

Macaulay TR, Schroeder ET. Heat-Stress Increases Energy Expenditure during Exercise. K2 Sciences for Zaggora. September 2018.

Macaulay TR, Ramirez JE, Schroeder ET. Theragun G2PRO Evaluation – Blood Flow Response and Changes in Fluid Distributions. K2 Sciences for Theragun LLC. July 2018.

Macaulay TR, Schroeder ET. Airmetrix Whole-Body Self-Service Analyzer Evaluation – Comparison to Dual-Energy X-ray Absorptiometry. K2 Sciences for Airmetrix. October 2017.

Licenses/Certifications/Training

Front Line Leader (FLL) Program KBR Human Exploration Division Leadership Development Program	2024
Project Management Workshop by Kepner-Tregoe, Inc. Human Health and Performance Contract Program Management Office	2021
Breaking Frames Training Course Human Health and Performance Contract Program Management Office	2021
Certified Strength and Conditioning Specialist (CSCS) National Strength and Conditioning Association	2016-Present
Functional Movement Systems Certified Functional Movement Systems	2013

Licensed Dual-Energy X-Ray Absorptiometry (DEXA) Technician (exp) 2019-2021
California Department of Public Health – Radiologic Health Branch
Licensed Phlebotomy Technician (CPT-I) (exp) 2017-2021
National Healthcareer Association and California Department of Public Health
MR Operator – Level 1 Training (exp) 2017-2020
American College of Radiology
Certified Personal Trainer (exp) 2013-2019
National Strength and Conditioning Association

Book Chapters

Macaulay TR. Summary and Future Directions. Michael AP, Otto C, Reschke MF, Hargens AR (eds.), Spaceflight and the Central Nervous System. 2023. https://doi.org/10.1007/978-3-031-18440-6_10

Macaulay TR, Thao S, Calegari J, Macias BR, Hargens AR, Vitale KC. NEW DEVELOPMENTS IN LOWER LIMB PROSTHESIS DESIGN: Effects on residual limb volume, pistoning, skin tolerance, skin contact pressures, and hemodynamics. XI World Congress of the International Society for Adaptive Medicine. 2016.

Teaching Services

As an Adjunct Assistant Professor of Clinical Physical Therapy:
Clinical Exercise Physiology (PT-549L), USC Doctor of Physical Therapy Program, 2024
Course Director: E. Todd Schroeder, PhD, FACSM, CSCS

As a Teaching Assistant:
Clinical Exercise Physiology (PT-549L), USC Doctor of Physical Therapy Program, 2016-2019
Course Director: E. Todd Schroeder, PhD, FACSM, CSCS
Therapeutic Exercise (PT-530a), USC Doctor of Physical Therapy Program, 2017-2019
Course Director: Liz Poppert, PT, DPT, MS, OCS
Differential Diagnosis in Physical Therapy (PT-650), USC Doctor of Physical Therapy Program, 2017
Course Director: Didi Matthews, PT, DPT, NCS
Human Physiology (BIPN-100), UCSD Undergraduate Physiology and Neuroscience 2015

As a Guest Lecturer:
Kinesiology: Moving Minds and Bodies though Sports, Medicine, and Health (CORE-195), 2018-2019
USC Summer Program; Course Director: Christina Dieli-Conwright PhD, MPH, FACSM, CSCS

Honors/Awards/Scholarships

Clinical and Community Research Award 2019
Southern California Clinical and Translational Science Institute
Center for Image Acquisition MRI Pilot Scanning Award 2018
USC Mark and Mary Stevens Neuroimaging and Informatics Institute
Student Research Award 2015
Southwest Chapter of the American College of Sports Medicine
Julia Brown Undergraduate Research Scholarship 2015
UCSD Academic Enrichment Programs
San Francisco Police Credit Union Scholarship 2012
MHS Athletic Booster Club Scholarship 2012
MNLL Trudy Dale Scholarship 2012

Professional Services

Reviewer for Medicine & Science in Sports and Exercise, Journal of Clinical and Translational Research, BMC Geriatrics, and Nutrition Research.

Extracurricular Master of Business Administration (MBA) Courses

University of Southern California Marshall School of Business 2018-2019

MOR-572 Leadership and Self-Management
MOR-554 Leading Innovation and Change
BAEP-563 Corporate Entrepreneurship
BAEP-556 Technology Feasibility