

**MaHRC Welcomes  
Director Michael Thaut, PhD**

January 26, 2016

The Music and Health Research Collaboratory  
Faculty of Music, University of Toronto



UNIVERSITY OF TORONTO  
FACULTY OF MUSIC

## **A message from the Dean of the Faculty of Music**

The Faculty of Music is very pleased to welcome Dr. Michael Thaut to the University of Toronto and to the position of Director of the Music and Health Research Collaboratory (MaHRC). Established in 2012, MaHRC has quickly grown to an interdisciplinary network in music, medicine, and health sciences, with some 25 clinical research labs and 50 affiliated faculty appointments across UofT, the University Health Network, and associated institutions across the GTA and beyond. Under the leadership of Founding Director, Prof. Lee Bartel, MaHRC has raised international awareness of the innovative potential of music and health in fundamental research, clinical practice, and societal wellbeing. Dr. Thaut, as the international leader in Neurologic Music Therapy and a deeply experienced researcher and clinical practitioner, has a mandate to move MaHRC to the next level of aspiration and achievement. We look forward to working with him and other MaHRC associates at the Faculty of Music, the University of Toronto, and beyond to define new levels of understanding of the neurophysiological basis and scientific potential of music and sound, and to affirm the global potential of music and health as a territory for transformative research and innovative clinical practice. Welcome, Michael!

Don McLean,  
Dean, Faculty of Music

### **Program**

3:10 – 4:45 **The State of the MaHRC**  
with Founding Director of MaHRC, Lee Bartel

#### **Featured Short Research Activity Reports**

- Dr. Allan Gordon, MD, FRCP(C) Clinical Neurologist and Director of the Wasser Pain Management Centre, Mount Sinai Hospital.
- Kevin Komisaruk, D.Mus.
- Thenille Braun-Janzen, PhD. MaHRC Post Doc
- Dr. Morris Freedman, MD, FRCP(C). Director of the Centre for Memory and Neurotherapeutics, and Medical Director of the Ross Memory Clinic at Baycrest
- Aline Moussard, PhD. MaHRC Associated Post Doc, Baycrest

4:45 – 6:00 **Welcome Reception – Walter Hall Foyer**

6:00 **Official Welcome**

6:00 – 6:05 **Vice President Research & Innovation, Vivek Goel**

6:05 – 6:15 **Dean Don McLean**

6:15 – 7:00 **Dr. Michael Thaut, Director of MaHRC,  
“Looking to the Future of MaHRC”**

## Introducing Michael Thaut, PhD



Dr. Thaut is an international leader in neurologic music therapy. His research in brain function and music focuses both on temporal information processing related to rhythmicity and on the biomedical applications of music to the neurologic rehabilitation of cognitive and motor functions. His landmark

discoveries concerning how auditory rhythm entrains motor and cognitive functions have led to the recognition of music as a language of brain rehabilitation. Dr. Thaut has developed a clinical system of Neurologic Music Therapy, which is applied world-wide and is endorsed by the World Federation of Neurorehabilitation. This program has reached thousands of researchers and music therapy practitioners around the world. At the University of Toronto, his new research will use pathway and complexity studies to examine the effects of rhythm on basal ganglia and cerebellar function, thereby furthering our understanding of the role of music in neurodevelopment and neurorehabilitation.

Dr. Thaut received his PhD in music and movement science from Michigan State University. He also studied at the Mozarteum Music University in Salzburg, Austria. At Colorado State University (CSU) he was Professor of Music and Neuroscience and also served as Administrative Director of the School of the Arts from 2001 to 2010. He was Director of CSU's Center for Biomedical Research in Music since 1994. Dr. Thaut has been a Visiting Professor in medical and music schools around the world (USA, Germany, Italy, Japan), and since 2010 has been Chancellor of the SRH-University System in Germany.

Over the past decade, Dr. Thaut and his co-investigators have received over \$4 million in prestigious and highly competitive research funding from the US National Institutes of Health (NIH) and private foundations. He received the American Music Therapy Association's National Research Award in 1993 and its National Service Award in 2001. His recent publication (with Volker Hoemberg), *The Oxford Handbook of Neurologic Music*

*Therapy* (2014), was second overall in the British Medical Association (BMA) Book Awards for neurology (600 entries), an unprecedented achievement for a work in music and medicine. Dr. Thaut has authored/coauthored six books and over 200 scientific publications in multiple fields. His publications have appeared in leading journals, including *Frontiers in Psychology*, *Brain Sciences*, the *Journal of Cognitive Neuroscience*, *Annals of the New York Academy of Sciences*, *Music Perception*, and the *Journal of Music Therapy*. Dr. Thaut is in demand globally (China, EU, UK, USA, Japan) as a keynote speaker on music, medicine, and neurorehabilitation therapy, and American and international TV and print media have featured his research. In addition, he is an elected member of the World Academy of Multidisciplinary Neurotraumatology and the World Federation of Neurologic Rehabilitation, is an International Fellow of the Royal Society of Medicine, and serves as Vice-President of the International Society for Music in Medicine.

Much of Dr. Thaut's career research has focused on rehabilitation using musical and rhythmic stimulation of functional neural channels to access damaged neurologic circuits. Dr. Thaut is in the approval process for the Canada Research Chair Tier 1 that was announced for the Faculty of Music by the Vice President Paul Young in June 2014. Prof. Thaut will pursue his CRC research program in the rich context of UofT's Music and Health Research Collaboratory (MaHRC), where he will lead the strategic agenda and help drive the innovative efforts of MaHRC's extraordinary interdisciplinary research teams. He will contribute strongly to the training of graduate students and post-doctoral fellows in UofT's recently established multidisciplinary and collaborative graduate program (MA and PhD) in Music and Health, to the research in its affiliated hospitals and research clinics, and to the development of the Canadian and international music therapist community through his recognized and certified training program in Neurologic Music Therapy.

In addition to his groundbreaking work as a researcher and clinician, Dr. Thaut is an accomplished musician, having trained as a violinist at the Mozarteum in Salzburg, with special research and performance expertise in fiddle music (his *Das grosse Fiddlebuch* is in its 3rd edition) and improvisation (including its neurological bases). He also trained as a music educator with special interest in Orff at the Mozarteum and continuing his studies in Music Education through into his doctorate. This polymath capacity gives him exceptional cross-disciplinary credibility with advanced musicians as well as medical researchers and clinical practitioners in music therapy and neurorehabilitation.

# The Collaboratory

MaHRC is an organization of collaboration — in essence an umbrella organization that seeks to provide leadership in the broad interests in music and health research and foster connections and collaboration among researchers. The following organizations work in collaboration with MaHRC:

- Music & Cognition Laboratory, UTM — Glenn Schellenberg
- Auditory Development Laboratory, UTM — Sandra Trehub
- Laboratory for Infant Studies, UTS — Mark Schmuckler
- Music Cognition Laboratory UTS — Mark Schmuckler
- Wasser Pain Management Centre — Dr. Allan Gordon
- Science of Music, Auditory Research and Technology Lab, Ryerson Univ— Frank Russo
- MAPLE Lab (Music, Perception, Acoustics & LEarning) McMaster Univ — Michael Schutz
- Conrad Institute for Music Therapy Research, Wilfrid Laurier University — Heidi Ahonen
- The Royal Conservatory of Music — Sean Hutchins
- Musicians' Clinics of Canada — Dr. John Chong
- Voice Disorders Clinic, St. Michael's Hospital — Dr. Jennifer Anderson
- Health, Arts and Humanities Program, University of Toronto — Dr. Allan D. Peterkin
- Vigour Projects — Dr. David Alter
- MEG Lab, Baycrest — Bernhard Ross
- ERP Lab, Baycrest — Claude Alain
- Centre for Memory and Neurotherapeutics, Baycrest. — Dr. Morris Freedman
- Department of Health, Aging, & Society, McMaster — Dr. Gavin Andrews
- Room 217 Foundation — Bev Foster
- The Voice Clinic — Aaron Low
- Sun Life Movement Disorders Research and Rehab Centre, Laurier Univ — Quincy Almeida
- Institute for Life Course and Aging — Lynn MacDonald
- Quality of Life Research Unit — Rebecca Renwick
- Vaughan Sound Therapy Centre — Dr. Lili Naghdi

## MaHRC International Advisory Council

**Vera Brandes** <sup>C1</sup> Director of the Research Program in Music-Medicine, Paracelsus Medical University, Salzburg, Austria

**Jane Edwards** <sup>C1</sup> PhD RMT. Discipline Leader, Mental Health School of Health and Social Development, Deakin University, Geelong Waterfront Campus, Geelong, Victoria, Australia; Inaugural President and Founding Member, International Association for Music & Medicine

Joanne Loewy <sup>C1</sup> DA, LCAT, MT-BC Director of the Louis Armstrong Center for Music and Medicine, New York.

**Dr. Gottfried Schlaug** <sup>C1</sup> MD, PhD. Director of the Neuroimaging Laboratory and Director of the Stroke Recovery Laboratory, Dept. of Neurology, Beth Israel Deaconess Medical Center; Co-Director of Comprehensive Stroke Center, Beth Israel Deaconess Medical Center, and Chief, Cerebrovascular Division, Dept. of Neurology, BIDMC.

**Dr. Ralph Spintge** MD. Director of the Department of Algesiology and Interdisciplinary Pain Medicine and the Regional Pain Centre DGS as well as Professor of MusicMedicine at Sportklinik Hellersen, Lüdenscheid University for Music and Drama HfMT Hamburg; President of the International Society for Music in Medicine; Co-Editor in Chief of the Journal of Music & Medicine.

**Connie Tomaino** <sup>C1</sup> DA, MT-BC, LCAT. Senior Vice-President for Music Therapy at Beth Abraham Health Services, and Executive Director and Co-founder of the Institute for Music and Neurologic Function in New York.

# The People and Research of MaHRC

## Faculty of Music Internal Core Members

\*NOTE: numbers refer to research interest in MaHRC spheres: 1. Therapy & Medicine, 2. Body Brain, Mind, 3. Society & Culture, 4. Science & Health of Performance, 5. Music in Human Development.

MaHRC Director, Michael Thaut, C2,M2 PhD, Neuroscience, Neurologic Music Therapy

MaHRC Founding and Associate Director, Lee Bartel, C1, C2, M1,M2, A1,F1,R1, I1, D1, E1, E2, F2, T1, MO1 Music Education & Health, 1, 2, 5, 4, 3\*

Caryl Clark, Musicology, 3

Michelle Colton, Percussion and Rhythm, 2

Amy Clements-Cortes, C1, C2, A1 Music Therapy, Music Medicine Research 1, 2

Darryl Edwards, G1 Vocal Performance 4

John Haines, Medieval Musicology, 3

Mary Enid Haines, V1 Vocal Performance, 4

Bina John, Y1 Early Childhood Music Education, 5, 3

Midori Koga, W2 Piano Pedagogy, 4

Kevin Komisaruk, MP1 Music in Palliative Care, 1, 2, 3

Ellen Lockhart, Musicology, 3

Lorna MacDonald, Vocal Performance & Pedagogy 4, 1, 3

Gillian MacKay, Conducting, 2

Don McLean, C1 2

Ken McLeod Musicology 3

Nasim Niknafs, Y1 3

Joshua Pilzer, C1, C2 Ethnomusicology 3

Annette Sanger, Ethnomusicology 3

Peter Stoll, Clarinet performance, 4

Camille Watts, Flute Performance 4

Timothy Ying, Chamber Music – Strings 2, 3

## Adjunct and Cross-Appointed Research Associates of MaHRC

**Heidi Ahonen**, <sup>C1, C2, A1,F1,PD1</sup> PhD, MTA. Director of Conrad Institute for Music Therapy Research; Professor of Music Therapy at Wilfrid Laurier University.

**Claude Alain**, <sup>C1, C2</sup> PhD. Assistant Director and Senior Scientist of the Rotman Research Institute at the Baycrest Centre and Professor in the Department of Psychology & Institute of Medical Sciences, University of Toronto.

**Quincy Almeida**, <sup>C1, C2, PD1</sup> PhD. Associate Professor, Department of Kinesiology and Physical Education, Faculty of Science; Director, Sun Life Movement Disorders Research & Rehabilitation Centre, Wilfrid Laurier University.

**Dr. David Alter**, <sup>C1, C2,M1,M2</sup> MD, PhD, FRCPC. Cardiologist in the Department of Medicine, St. Michael's Hospital and Toronto Rehabilitation Institute, Associate Professor in the Department of Medicine. Senior Scientist in the Institute for Clinical Evaluative Sciences.

**Dr. Jennifer Anderson**, <sup>V1</sup> MD, FRCSC. St Michael's Hospital, Assistant Professor and Otolaryngologist in Chief, Department of Otolaryngology - Head and Neck Surgery University of Toronto

**Gavin Andrews**, <sup>C1</sup> PhD. Professor, Department of Health, Aging, & Society, McMaster University. Specialty: Human Geography and Social Gerontology.

**Dr. John Axler**, <sup>C1, C2</sup> MD, CCFP. Primary Care Today Course Director, and Director of Continuing Education Projects for the Department of Family and Community Medicine, University of Toronto.

**Elaine Biddiss**, <sup>W1</sup> PhD. Associate Member Rehabilitation Science, Assistant Professor, Institute of Biomaterials and Biomedical Engineering, University of Toronto; Scientist, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital. Director, PEARL (Possibility Engineering and Research Lab

**Katherine M. Boydell**, <sup>C1, C2</sup> PhD. Senior Scientist and Scientific Director of Qualitative Inquiry, Child Health Evaluative Sciences, The Hospital for Sick Children; Associate Professor, Departments of Psychiatry and Dalla Lana School of Public Health.

**Dr. Davor Cepo**, <sup>C1, C2</sup> DC. Wasser Pain Management Centre, Mount Sinai Hospital; Instructor in the McMaster Contemporary Medical Acupuncture Program.

**Tom Chau**, PhD. Vice President, Research - Holland Bloorview Kids Rehabilitation Hospital; Director, Research - Bloorview Research Institute; Associate Professor, Institute of Biomaterial & Biomedical Engineering, University of Toronto; Canada Research Chair in Paediatric Rehabilitation Engineering

**Dr. Joseph Chen**, <sup>C1, I1</sup> MD, FRCSC. Otolaryngologist-in-Chief at Sunnybrook Health Sciences Centre; Professor, University of Toronto.

**Joyce Chen**, <sup>C2, M2</sup> PhD. Scientist, Sunnybrook Research Institute, Assistant Professor (status), Department of Physical Therapy, Associate Member, Rehabilitation Sciences Institute, Member, Heart and Stroke Foundation Canadian Partnership for Stroke Recovery

**Dr. John Chong**, MD, CGPP, ABIME, FACPM, FRCPC, DOHS, ARCT. Medical Director of Musicians' Clinics of Canada.

**Amy Clements-Cortes**, <sup>C1, C2, A1</sup> PhD. MTA, MT-BC, FAMI. Senior Music Therapist, Baycrest Centre; Assistant Professor, University of Toronto; President of World Federation of Music Therapy.

**Angela Colantonio**, <sup>C2, A1</sup> PhD. Professor and CIHR Chair in Gender, Work and Health, Occupational Science and Occupational Therapy, University of Toronto; Senior Scientist and Director, Toronto Rehabilitation Institute, UHN.

**Karen Davis**, <sup>C2</sup> PhD. Prof. Surgery; Head, Div of Brain, Imaging and Behaviour - Systems Neuroscience, Tor Western Res Inst, UHN

**Dr. Norman Doidge**, MD, FRCP(C). MACPsa. Assistant Professor of Psychiatry, Faculty of Medicine, UT, CAMH Clarke Institute Division

**Colleen Dockstader**, <sup>R1</sup> PhD. Assistant Professor, Human Biology Program, University of Toronto; Research Associate, Dept of Psychology, Division of Haematology/Oncology, The Hospital for Sick Children, Paediatric Brain Tumour Program.

**Michael J Evans**, <sup>C1, C2, A1</sup> PhD. Professor of theoretical statistics and biostatistics, University of Toronto, with cross-appointment to the Dalla Lana School of Public Health.

**Mary Jane Esplen**, <sup>C2, BC1, NI, P1</sup> Director deSouza Institute; Professor, Department of Psychiatry, Faculty of Medicine, University of Toronto; Affiliate Scientist, Lunenfeld Research Institute, Mount Sinai Hospital, Toronto; Affiliate Scientist Ontario Cancer Institute.

**Joaquin Farias**, PhD. Director of the Neuroplastic Training Institute. Toronto

**Dr. Morris Freedman**, <sup>C1, C2, A1</sup> MD, FRCP(C). Head of Neurology, Executive Medical Director of the Centre for Memory and Neurotherapeutics, and Medical Director of the Ross Memory Clinic at Baycrest; Professor in the Division of Neurology, Department of Medicine; Director of the Behavioural Neurology Section, Division of Neurology, University of Toronto. Scientist at the Rotman Research Institute of Baycrest Centre.

**Shari Geller**, <sup>BC1</sup> PhD. Clinical psychologist, and creator of the Therapeutic Rhythm and Mindfulness Program (TRM™). On the teaching faculty in Health Psychology at York University and for the Applied Mindfulness Meditation (AMM) program at University of Toronto.

**Dr. Allan Gordon**, <sup>C1, C2, E1, E2, F2, T1</sup> MD, FRCP(C) Clinical Neurologist and Director of the Wasser Pain Management Centre, Mount Sinai Hospital.

**Jessica Grahn**, <sup>C1, C2, M2</sup> PhD. Assistant Professor at the Centre for Brain and Mind in the Department of Psychology, University of Western Ontario.

**Christine Guptill**, PhD. OT Reg. (Ont.). Assistant Professor, Department of Occupational Therapy, University of Alberta; Adjunct Professor, Music & Health Research Collaboratory, University of Toronto; Research Associate, Musicians Clinics of Canada; Chair, Education Committee, Performing Arts Medicine Association; Co-Founder, Health Advisory Team, National Youth Orchestra Canada

**Robert Harrison**, <sup>C1</sup> PhD. Senior Scientist in Otolaryngology, Neurosciences & Mental Health, and Auditory Science at Sick Children's Hospital; Scientific Director of The Hearing Foundation of Canada. Professor, Department of Otolaryngology, Head and Neck Surgery; Professor, Department of Physiology, Institute of Biomaterials & Biomedical Engineering.

**Sylvain Houle**, PhD. Director of the Research Imaging Centre at the Centre for Addiction and Mental Health (CAMH) and the University of Toronto.

**Gabriela Ilie**, <sup>C1, C2</sup> PhD. Lecturer, Department of Psychology, University of Toronto, UTS; Post-Doctoral Fellow, St. Michael Hospital, Neurosurgery, Injury Prevention Office and Centre for Addiction and Mental Health

**Pia Kontos**, <sup>C1, C2</sup> PhD. Scientist, Toronto Rehabilitation Institute; Assistant Professor in the Dalla Lana School of Public Health.

**Nancy J. Lobaugh**, PhD. CAMH Independent Scientist with the Research Imaging Centre MRI Suite and Assistant Professor of Neurology at the University of Toronto Faculty of Medicine.

**Aaron J. Low**, <sup>G1</sup> MSc. Speech-Language Pathologist, The Voice Clinic, Toronto.

**Renee Lyons**, <sup>MO1</sup> PhD, Founding Chair and Scientific Director Emeritus Bridgepoint Collaboratory for Research and Innovation, Bridgepoint Active Healthcare; Professor, Dalla Lana School of Public Health and Institute for Health Policy, Management and Evaluation, University of Toronto

**Lynn McDonald**, <sup>C1, C2</sup> PhD. Professor, Faculty of Social Work; Director, Institute for the Life Course and Aging; Scientific Director, National Initiative for the Care of the Elderly (NICE)

**Patricia McKeever**, <sup>W1</sup> PhD. Professor Emeritus, Faculty of Nursing University of Toronto and Adjunct Scientist, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital.

**Dr. Henry Moller**, MD, DABSM, FRCPC. Assistant Professor, Department of Psychiatry, University of Toronto; Toronto Sleep Clinics.

**Sylvain Moreno**, <sup>C2</sup> PhD. Simon Fraser University, School of Engineering Science.

**Dr. Lili Naghdi**, <sup>F1</sup> MD, CCFP. The Health Centre of Maple, Sound Therapy Centre of Vaughan.

**Michelle Nelson**, <sup>MO1, MP1</sup> PhD. Research Scientist, Bridgepoint Collaboratory for Research and Innovation, Bridgepoint Health; Adjunct Professor, Daphne Cockwell School of Nursing, Ryerson University; Assistant Professor, Dalla Lana School of Public Health, UofT

**Kristine Newman**, RN, CRN(C), PhD. Daphne Cockwell School of Nursing, Ryerson University.

**Dr. Allan Peterkin**, <sup>C1, C2</sup> MD, FRCPC(C). FCFP. Associate Professor, Psychiatry and Family Medicine, University of Toronto; Coordinator, Family Medicine Fellowship in Psychotherapies; Coordinator, Narrative Medicine and Humanities Program at Mount Sinai Hospital;

**Dr. Larry M. Picard**, <sup>C1, C2, E1, E2, F2</sup> MD. FRCPC(C). Clinical Neurologist, Wasser Pain Management Centre, Mount Sinai Hospital.

**Rebecca Renwick**, <sup>C1, C2, A1</sup> PhD. Professor, Department of Occupational Science and Occupational Therapy; Director of the Quality of Life Research Unit. University of Toronto.

**Larry E. Roberts**, <sup>C1</sup> PhD. Professor Emeritus in the Department of Psychology, Neuroscience, and Behaviour at McMaster University.

**Mark Rosenberg**, <sup>C1</sup> PhD. Professor of Geography, Professor of Community Health and Epidemiology, Canada Research Chair in Development Studies, Queen's University; Co-chair of the Earth System Science Partnership Joint Project on Global Environmental Change and Human Health.

**Bernard Ross**, <sup>C1, C2, A1, S1</sup> PhD. Senior Scientist at Rotman Research Institute, Baycrest Centre and Associate Professor in the Department of Medical Biophysics.

**Frank Russo**, <sup>C2</sup> PhD. Associate Professor, Department of Psychology, Ryerson University; Director, Science of Music, Auditory Research and Technology Laboratory.

**Glenn Schellenberg**, PhD. Professor, Dept of Psychology, University of Toronto. Director, Music & Cognition Laboratory, UTM

**Mark Schmuckler**, PhD. Professor, Department of Psychology, University of Toronto; Director, Laboratory for Infant Studies; Director, Music Cognition Laboratory, UTS.

**Michael Schutz**, PhD. Assistant Professor of Music, McMaster University; Director, MAPLE (Music, Acoustics, Perception, and Learning) Lab. Core member, McMaster Institute for Music and the Mind (MIMM) Associate Member, Department of Psychology, Neuroscience, & Behaviour

**Sandra Trehub**, PhD. Professor Emeritus, Department of Psychology, University of Toronto; Director, Auditory Development Laboratory, UTM

**Lidan You**, <sup>C1, C2</sup> PhD. Assistant Professor, Department of Mechanical and Industrial Engineering, University of Toronto. Specialty: Cellular and molecular biology, biomechanics, mechanotransduction, and computational modeling.

## MaHRC Research Collaborators

**Dr. Paolo Campisi,**<sup>G1</sup> MD, FRCSC, FAAP. Otolaryngologist, Department of Otolaryngology – Head & Neck Surgery at the Hospital for Sick Children; Professor, Vice-Chair Education and Director, Postgraduate Education, Department of Otolaryngology - Head & Neck Surgery, University of Toronto

**Alison Chasteen**<sup>C1</sup> PhD. Associate Professor of Psychology, University of Toronto; Associate Scientist, Kunin-Lunenfeld Applied Research Unit, Baycrest

**Robert Chen**<sup>C2</sup> Senior Scientist, Toronto Western Research Institute, Catherine Manson Chair in Movement Disorders, Professor of Medicine (Neurology), University of Toronto, Editor-in-Chief, Canadian Journal of Neurological Sciences. Speciality: Electro-stimulation and Parkinson's

**Dr. Hance Clarke**<sup>C2</sup> MD PhD FRCPC Assistant Professor University of Toronto, Staff Anesthesiologist / Clinician Scientist, University Health Network, Medical Director Pain Research Unit, Toronto General Hospital, Director Transitional Pain Program, Toronto General Hospital. Specialty: Chronic Pain.

**Dr. Sharon Cohen,**<sup>C2, A1</sup> Director, Toronto Memory Program. Assistant Professor, Behavioural Neurology, Faculty of Medicine, University of Toronto; Graduate Dept. of Speech Language Pathology. Specialty: Alzheimer's, Clinical Trial Design.

**Norma M. D'Agostino,**<sup>BC1</sup> PhD, C. Psych. Psychologist, Psychosocial Oncology & Palliative Care, UHN; Lecturer. Department of Psychiatry, University of Toronto.

**Marta DeLuca,**<sup>V1</sup> MCISc Faculty of Speech Language Pathology, University of Toronto

**Trina Diner,**<sup>BC1</sup> MMsc, Thunder Bay Regional Health Centre

**Dr. Jonathan Downar,**<sup>D1</sup> MD PhD FRCPC. Assistant Professor, Department of Psychiatry, University of Toronto; Co-Director of the MRI-Guided rTMS Clinic at University Health Network, Scientist at the Toronto Western Research Institute; Scientist, Krembil Research Institute

**Guy Faulkner,** PhD<sup>M2</sup> Professor, Faculty of Kinesiology and Physical Education, University of Toronto

**Dr. Corinne E. Fischer,** MD. Adjunct Scientist in the Keenan Research Centre of the Li Ka Shing Knowledge Institute; Director of Geriatric Psychiatry, Director of Memory Disorders Clinic, and Director of the Geriatric Mental Health Outreach Program, St. Michael's Hospital; Associate Professor, Psychiatry, University of Toronto.

**Dr. Luis Fornazzari,** MD, FRCPC. Department of Psychiatry, St. Michael's Hospital; Behavioral Neurologist, Assistant Professor - Division of Neurology, University of Toronto; Clinical Director Neuro and Geriatric Psychiatry Program, Centre for Addiction and Mental Health (CAMH); Clinical Director of Geriatric Psychiatry, University of Toronto.

**Bev Foster,**<sup>N1, P1, MO1</sup> MA. Executive Director, Room217 Foundation

**Lendra Friesen,**<sup>C1</sup> PhD. Assistant Professor of Speech, Language, and Hearing Sciences, University of Connecticut. Previously Research Scientist, Sunnybrook Health Sciences.

**Takako Fujioka**<sup>C1, C2, W2, S1</sup> PhD. Assistant Professor, CCRMA (Center for Computer Research in Music and Acoustics), Department of Music, Stanford University; Scientific Associate at the Rotman Research Institute, Baycrest Centre. Specialty: works specifically on the neuroscience of music and brain plasticity.

**Dr. Peter Giacobbe,**<sup>D1</sup> MD, FRCPC. Assistant Professor, Department of Psychiatry, Division of Brain and Therapeutics and Division of Geriatric Psychiatry, University of Toronto; Head of the Electroconvulsive Therapy Service, Co-Head of the rTMS service, Director of the Fellowship Program.

**Dr. Michael Goldberg,**<sup>T1</sup> DDS, Dip Perio, FRCDC. Associate Professor, Department of Periodontics; Director, Severe and Refractory Periodontal Disease Research and Treatment Unit; Director, Implant Monitoring and Assessment Clinic, Faculty of Dentistry, University of Toronto; Director of Periodontics, Department of Dentistry, Mount Sinai Hospital.

**Jack Goodman,** PhD<sup>M1, M2</sup> Professor, Faculty of Kinesiology and Physical Education. Goldring Centre for High Performance Sport

**Dr. Michael Gordon,**<sup>C1</sup> MD, MSc, FRCPC Director of Medical Ethics and Medical Program Director of Palliative Care, Baycrest Geriatric Health Care System, Professor of Medicine University of Toronto

**Dr. Adrian Grek**<sup>C1</sup> MD, FRCPC. Associate Professor, Geriatric Psychiatry, University of Toronto; Head of the Geriatric Psychiatry Ambulatory Program, Mount Sinai Hospital

**Jeffrey Hoch,**<sup>C2</sup> PhD. Scientist, Keenan Research Centre of the Li Ka Shing Knowledge Institute, and Research Scientist, Centre for Research on Inner City Health, St. Michael's Hospital; Director, Centre for Excellence in Economic Analysis Research (CLEAR), St. Michael's Hospital; Director, Pharmacoeconomics Research Unit, Cancer Care Ontario Associate Professor, Institute of Health Policy, Management and Evaluation, University of Toronto; Adjunct Scientist, Institute for Clinical Evaluative Sciences.



**Jennifer M. Jones**,<sup>BC1</sup> PhD. Scientist, Princess Margaret Cancer Centre; Affiliate Scientist, Toronto General Research Institute.

**Dr. Sidney Kennedy**<sup>C2, D1</sup> Professor of Psychiatry and Psychiatrist-in-Chief at University Health Network, University of Toronto; Scientist, Toronto General research Institute; President of the International Society for Affective Disorders. Specialty: Mood disorders, Electro-stimulation.

**Andres Lozano**<sup>C2</sup> MD, PhD, FRCSC. RR Tasker Chair in Functional Neurosurgery, UHN; Canada Research Chair in Neuroscience (Tier 1); Dan Family Chair in Neurosurgery, University of Toronto; Senior Scientist, Division of Brain Imaging & Behaviour Systems – Neuroscience, Toronto Western Research Institute. Specialty: Neurosurgery, Deep Brain Stimulation research.

**Donald J. Mabbott**<sup>R1</sup> PhD. C.Psych. Associate Chief, Academic and Professional Practice, Member of Paediatric Brain Tumour Program Haematology/Oncology, Sick Kids Hospital; Associate Professor Paediatrics, Psychology, U of T; Senior Scientist, Neurosciences & Mental Health, Sick Kids research Institute.

**Susan Marzolini** PhD.<sup>M1, M2</sup> Exercise Physiologist and Scientific Associate at Toronto Rehab/University Health Network

**Julie Mendelson**<sup>C1</sup> PhD. Affiliate Scientist, Toronto Rehabilitation Institute

**Gwen Merrick**,<sup>V1</sup> MHSc Faculty of Speech Language Pathology, University of Toronto

**Dr. Paul Oh** MD, FRCPC.<sup>M1, M2</sup> Medical Director of the Cardiac Rehab and Secondary Prevention Program at the Toronto Rehabilitation Institute and Staff Physician in the Department of Medicine at Sunnybrook.

**Dr. Alexander J. Osborn**,<sup>G1</sup> MD, PhD. Paediatric & Adult Otolaryngologist & Head-Neck Surgeon, The Voice Clinic, Toronto

**Denise Paneduro**,<sup>E1, E2, F2</sup> PhD Cand. Research Coordinator, Wasser Pain Management Centre, Mt Sinai Hospital.

**Kara Patterson**, PhD. Assistant Professor, Department of Physical Therapy, University of Toronto

**Anne Patteson**,<sup>C1</sup> PhD. Queens University, Former Director of Research for Learning Through the Arts (LTTA), The Royal Conservatory of Music (Toronto)

**Leah Pink**,<sup>E1, E2</sup> MN, NP-Adult, Wasser Pain Management Centre, Mount Sinai Hospital

**Colleen Ray**,<sup>C2</sup> Psychologist, Behavioural Neurology, Baycrest; Behavioural Supports Ontario Unit. Specialty: interventions to ameliorate behavioral and emotional challenges associated with neurological disorders.

**Susan Rotzinger**,<sup>C2, D1</sup> PhD. Assistant Professor, Department of Psychiatry, University of Toronto, Clinical Research Project Manager, Department of Psychiatry, University Health Network. Specialty: Depression research.

**Tom A. Schweizer**, PhD. Director, Neuroscience Research Program, St. Michael's Hospital; Scientist in the Keenan Research Centre of the Li Ka Shing Knowledge Institute of St. Michael's Hospital; Assistant Professor, Faculty of Medicine (Neurosurgery), University of Toronto; Assistant Professor, Institute of Biomaterials and Biomedical Engineering (IBBME), University of Toronto; Adjunct Assistant Professor, Applied Health Science, University of Waterloo

**Scott M. Sellick**,<sup>BC1</sup> PhD, C. Psych. Director of Psychosocial Oncology and Trina Diner Manager of Palliative Care and Telemedicine; Thunder Bay Regional Health Services)

**Craig Simmons**<sup>C1, C2</sup> PhD. Associate Professor and Canada Research Chair in Mechanobiology, Department of Mechanical and Industrial Engineering, Institute of Biomaterials and Biomedical Engineering, University of Toronto.

**Thérèse Stukel**, PhD.<sup>M2</sup> Senior Scientist, Institute for Clinical Evaluative Sciences (ICES), Central Health System Planning & Evaluation Research Program

**Donald Stuss**, PhD, C.Psych, Past President and scientific director, Ontario Brain Institute; Affiliate scientist, Evaluative Clinical Sciences, Hurvitz Brain Sciences Research Program, Sunnybrook Research Institute; Senior Scientist, Rotman Research Institute; Associate Scientist, Discipline of Imaging in the Program of Neuroscience, Sunnybrook Health Sciences Centre; Professor, Graduate Dept. of Rehabilitation Science, Faculty of Medicine, University of Toronto; University Professor Department of Psychology, Faculty of Arts and Science; Department of Medicine (Neurology), Faculty of Medicine; Centre for Studies of Aging, University of Toronto; Founding Director (1989-2008) Rotman Research Institute, Baycrest

**Jean-Eric Tarride**,<sup>C2</sup> PhD. Associate Professor, Department of Clinical Epidemiology & Biostatistics, McMaster University; Director, Health Economics and Reimbursement at AstraZeneca Canada. Specialty: Health Economics, economic evaluation of health technologies and the treatment of uncertainty in health technology assessments (HTAs) and decision-making process.

**Dr. Howard Tennenbaum**,<sup>T1</sup> DDS, PhD, FRCD(C), FICD. Professor; Head of Periodontology, Faculty of Dentistry, University of Toronto; Head of Periodontics, Mount Sinai Hospital; Professor, Department of Laboratory Medicine and Pathophysiology, Faculty of Medicine, University of Toronto.

**William To**,<sup>V1</sup> MSc. Department of Otolaryngology-Head and Neck Surgery, University of Toronto

**Laurel Trainor**<sup>C1, C2, M2</sup> PhD. Professor, Department of Psychology, Neuroscience & Behaviour, McMaster University, and Director, McMaster Institute for Music and the Mind.

**Jiahui Wong**,<sup>BC1, NI, P1</sup> PhD. Assistant Professor, Dept of Psychiatry, U of T; Scientist and Manager, de Souza Institute  
**Dr. Camilla Zimmerman**,<sup>P1</sup> MD, PhD. Head of Palliative Care for the UHN; Medical Director of the Harold and Shirley Lederman Palliative Care Centre at Princess Margaret; Scientist, Princess Margaret Cancer Centre, Associate Professor of Medicine, University of Toronto, and holds the Rose Family Chair in Supportive Care in the Faculty of Medicine at the University of Toronto.

## Post Doctoral Fellows

Thenille Braun Janzen,<sup>D1, F2</sup> PhD.

Aline Moussard, PhD

## Graduate Students - Doctoral

Sarah Rose Black,<sup>P1</sup>

Catherine Haire

Alicia Howard,<sup>T1</sup>

Cheryl Jones

Vivek Sharma

Linnea Thacker

## Graduate Students - Masters

Sophia Christopher,<sup>M2</sup>

Shannon Duane,<sup>M2</sup>

Cynthia Kaarto

Veronica Vuong,<sup>E2</sup>

## Team Research Projects

**Short-Term Effects of Rhythmic Sensory Stimulation in Alzheimer's Disease: An Exploratory Pilot Study.** Co-PI's: Lee Bartel, Heidi Ahonen, Dr. Morris Freedman, Amy Clements Cortes, et al. Eighteen participants with AD received 6 sessions (2/wk) of visual stimulation and 6 sessions somatosensory sound stimulation (40Hz) randomized cross-over. Results on the Saint Louis Univ Mental Status (SLUMS) showed a positive effect size of .6 per treatment session with the 40Hz and no effect with video. Paper submitted. **Team Members are marked A1**

**Connaught Global Challenge Application 1 (2012) – Music Medicine and Aging.** L. Bartel, PI. This application for the million dollar Connaught Grant was the mechanism that brought together much of the MaHRC team. The grant proposed research on music treatments for Alzheimers, Parkinsons, Pain, Tinnitus, and Stroke with an overlay of quality of life. Connaught awarded Bartel \$115,000 to develop the concept further through visiting scholars and post doc research. **CoApplicants and Collaborators for this grant are marked: C1**

**Connaught Global Challenge Application 2 (2014) - “Music Medicine in Neuro-Rehabilitation: Foundations and Applications of Sound Stimulation.”** L. Bartel, PI. This application for the million dollar grant consolidated the MaHRC team and extended it. Theoretically this application focused on rhythmic sensory stimulation and its potential effect on conditions related to oscillatory brain dysrhythmia: Parkinson's, Alzheimer's, Pain, and Major Depressive Disorder. Connaught awarded Bartel \$100,000 to fund a Post Doctoral fellow who is now pursuing two of the conditions, fibromyalgia and major depression. **CoApplicants and Collaborators for this grant are marked: C2**

A “side-effect” of the two Connaught applications was the decision by the Vice-President Research and Innovation, Dr. Paul Young, to fund a Canada Research Chair Tier 1 in MaHRC. Dr. Michael Thaut has been nominated for this position.

**A Study of the Effect of Sound/Music as Brain Stimulant on Major Depressive Disorder (Part of CAN-BIND2)** Dr. Sidney Kennedy, Lee Bartel, Post Doc: Thenille Braun Janzen, et al. This program of research consists of a set of studies focused on the effect of music and sound stimulation on the symptoms of Major Depressive Disorder. This study is part of CAN-BIND 2 with University of Toronto (University Health Network and Centre for Addiction and Mental Health), McMaster University, Queen's University, University of Guelph, University of Ottawa, McGill University, University of Calgary, University of British Columbia and collaborative partners: Ontario Cancer Biomarker Network and Ontario Brain Institute. The sound treatment is premised on three mechanisms – prefrontal asynchrony, thalamocortical dysrhythmia, and cognitive arousal. Study stages will involve EEG imaging of the effect of rhythmic sensory stimulation (RSS), pilot studies using music with a “positive” valence, RSS stimulation of gamma neural oscillation, and bilateral entrainment at alpha frequencies. Funded by Connaught and CAN-BIND. **Team members marked: D1**

**Vibroacoustic Therapy for Ehlers-Danlos Syndrome: A Case Study.** Dr. Larry Picard, Lee Bartel, PhD; Dr. Allan Gordon, et al. Ehlers-Danlos Syndrome (EDS) is a congenital, heterogeneous group of connective tissue disorders caused by gene mutations in various types of fibrillar collagen. EDS is commonly associated with pervasive chronic pain. In this single case study, the patient participated in a study of six weeks' duration, four weeks of active treatment followed by two weeks “washout.” The patient was given 20 daily self-administered treatment sessions with a vibroacoustic device (Sound Oasis VTS1000) over the course of four weeks. The treatment consisted of music with embedded low pitch stimulation in the 36 – 73Hz range with 40 Hz dominant. The music featured mono and binaural high alpha and beta entrainment. The case is currently being prepared for publication. **Team members marked: E1**

**A Pilot Study of the Effect of Vibroacoustic Therapy for Ehlers Danlos Syndrome.**

Dr. Allan Gordon, Dr. Larry Picard, Lee Bartel, PhD; et al. Ehlers-Danlos Syndrome (EDS) is a congenital, heterogeneous group of connective tissue disorders caused by gene mutations in various types of fibrillar collagen. EDS is commonly associated with pervasive chronic pain. This pilot study with 20 participants will test the effect of low frequency sound stimulation (gamma frequencies in 36- 73Hz range with 40Hz dominant) and music featuring mono- and binaural-based entrainment in the 10 – 15Hz range. A pre- and post-treatment assessment will be used with: The Visual Analog Scale (VAS); The Brief Pain Inventory, Short Form (BPI-SF); The Multi-Dimensional Mood Questionnaire (MDMQ); The Quality of Life Enjoyment and Satisfaction Questionnaire, Short Form (Q-LES-Q-SF). This study is now in ethical review. **Team members marked: E2**

**The Effect of Low Frequency Sound Stimulation on Patients with Fibromyalgia: A Clinical Study.** Co-PI's: Dr. Lili Naghdi, Heidi Ahonen, Lee Bartel. Open label - 19 participants with Fibromyalgia (FM) receive 10 sessions over 5 weeks of somatosensory sound stimulation (23 minutes at 40Hz sine wave) with Nexneuro lounge. Outcome measures: FM Impact Questionnaire (FIQ), Jenkins Sleep Scale (JSS), Pain Disability Index (PDI), range of motion, muscle tone, and self-report. The results showed significant improvements with median scores: FIQ 81%, JSS 90%, PDI 49.1%. Medication dose was reduced in 73.68% and totally discontinued in 26.32%. Time sitting and standing without pain increased significantly. Cervical muscle ROM increased from of 25% to 75% while muscle tone changed from hypertonic to normal. In this study the LFSS treatment showed no adverse effects and patients receiving the LFSS treatment showed statistically and clinically relevant improvement. Publication: Naghdi, L., Bartel, L., Ahonen, H., Macario, P. The Effect of Low Frequency Sound Stimulation on Patients with Fibromyalgia: A Clinical Study. Pain Research & Management. January/February 2015 20(1) **Team Members marked: F1**

**A Study of the Effect of Rhythmic Sensory Stimulation and Music on Fibromyalgia.** Dr. Allan Gordon, Dr. Larry Picard, Lee Bartel, Thenille Braun Janzen. The present study examines the effectiveness of Rhythmic Sensory Stimulation at 40 Hz with sound on improving pain management and quality of life among patients with fibromyalgia. The treatment involves 30 minutes of daily rhythmic vibroacoustic stimulation at 40Hz, 5 days per week, for 5 weeks. The treatment is self-administered by the patients at home with the Sound Oasis VTS 1000 portable device. Measures of pain severity, fibromyalgia symptoms, sleep quality, and depression, will be compared before and after treatment between the treatment and control groups. This study currently in progress. **Team members marked: F2**

**GLEE (Global Laryngeal Efficiency Evaluation): A prospective study to measure vocal health and athleticism of singing students.** Aaron J. Low, Dr. Alexander J. Osborn, Dr. Paolo Campisi, Darryl Edwards DMA. This prospective study follows undergraduate and graduate singers at the U of T School of Music. Participants undergo evaluation upon entry to the program, and then annually while they remain in the program and choose to participate in the study. The

purpose is threefold: 1) to determine if objective measures of singing performance correlate with subjective evaluations of performance and progress through a singing program 2) to determine if objective data might be used as an effective adjunct in gauging teaching efficacy, and 3) to determine if objective measures of vocal athleticism serve as valuable predictors of success within a singing program.

**Team marked with: G1**

**Music Ability Retraining in Cochlear Implant Recipients.** Dr. Joseph Chen, Lee Bartel et al. This project began with a qualitative study of post-lingual cochlear implant recipients to determine abilities to enjoy music. From this study software was designed to diagnose and rehabilitate the perceptual abilities needed to enjoy music. This software, based on an increasing attention model and using melodic pattern recognition, was been validated as a diagnostic tool and most tested for its efficacy as a training tool with positive results. It is now in its last stages of reprogramming into a commercially viable package for MED-EL, Austria. **Team members marked: I1**

**The Music Activity INTervention for Adherence Improvement through Neurological entrainment (MAINTAIN) trial.**

Dr. David Alter PI, et al. Physical activity is associated with a 35% decrease in cardiovascular mortality. It is for this reason that structured exercise cardiac rehab programs have been implemented for patients with cardiac related issues. Unfortunately, patients can experience attrition rates of up to 50%, undermining the benefits of the cardiac rehab exercise program. The aim of this study is to introduce music as a co-intervention to improve exercise adherence (defined as the volume of physical activity) within patients participating in cardiac rehabilitation.

Our prior study (MAINTAIN-1) examined the effects of tempo-pace synchronized music with and without added rhythmic beats [known as Rhythmic Auditory Stimulation (RAS)] on improving exercise adherence. The music group demonstrated a significantly higher volume of weekly exercise than the control group. Additionally, the group assigned to music with added RAS participated in twice the amount of weekly physical activity as the non-RAS music group. MAINTAIN I funded by Ontario Centres of Excellence with \$50,000. **Team members marked M1**

This study (MAINTAIN –II) will build on our previous study by further assessing the effect of RAS implementation on exercise adherence. We also aim to explore the potential mechanisms, such as mood, perceived exertion, and dissociative attention, by which preference-based tempo-pace music may improve exercise adherence among patients participating in cardiac rehabilitation. MAINTAIN II funded by Heart & Stroke Foundation with \$218,000. **Team members for MAINTAIN II are marked M2**

**Music Optimization Study at Bridgepoint Hospital.** Rene Lyons, Lee Bartel, Michelle Nelson, Bev Foster et al. The purpose of this study was to explore how music can be optimized in complex care environments, supporting improved quality of life and outcomes for patients with multiple chronic conditions. The study examined the feasibility of music care in complex rehabilitation and care, and specifically, the music care approach as a strategic framework for music optimization at Bridgepoint Health. Data were collected to gain information from various Bridgepoint Hospital stakeholders using four methods: (1) Design charrettes with 29 outside experts and internal staff including architects, artists, designers, professional musicians, composers, music educators, music stakeholders from other Toronto hospitals, and Bridgepoint patient family members. Bridgepoint staff included a nurse, geriatric psychiatrist, vice president, and chaplain; (2) Musical café – 29 Bridgepoint patients participated in a 90-minute afternoon focus group by sharing their lived musical experiences at Bridgepoint and their advice regarding music use at Bridgepoint; (3) Electronic questionnaire delivered through the Daily Dose newsletter which invited ideas for music care; (4) Ideas box – Fifty-eight people from the larger Bridgepoint community submitted music care ideas via 13 idea boxes placed at nursing stations, and other common areas throughout the building. **Team marked with: MO1**

**Survey of Nurses' Attitudes Towards the Use of Music as a Therapeutic Tool in Health Care and Their Need for Education in its Application.** MJ Esplen, et al. A cross-sectional survey of Ontario health professionals (n=210) across Ontario completed on attitudes, current knowledge, perceived interest, barriers and past experiences with using music in health care. Data analysis recently completed. **Team members marked: N1**

**The efficacy of long-term whole-body vibration in the treatment of Parkinson's disease - Clinical Trial.** Adam K. Koebel, Quincy J. Almeida, Heidi Ahonen. Whole-body vibration has previously been shown to elicit short-term therapeutic effects on motor symptoms of Parkinson's disease (PD). However, attempts to translate these short-term

effects into sustainable long-term improvements have thus far been unsuccessful. Recent contrasting physiological research in animal models of PD has suggested that the vibratory protocol being utilized in these studies may have been less than optimal for eliciting potential long-term disease-modifying effects. Therefore, in this study, the vibration stimulus was programmed at a higher-frequency (40Hz) and was administered in lengthier sessions to better reflect available preclinical research. The study compared 12-weeks of whole-body vibration therapy to simulated vibration treatments with the objective of determining if vibration therapy elicits sustainable improvements in PD related motor symptoms when compared with placebo controls. A parallel group double-blind placebo-controlled research design was being used, with assessments conducted before and after the intervention period. Outcome measures included the motor section of the Unified Parkinson's Disease Rating Scale (UPDRS); a quantitative gait analysis; 3-meter Timed-Up-and-Go (TUG) test; and time to complete a grooved pegboard task. **Team marked: PD1**

**Rhythmic Sensory Stimulation as a Model of Plasticity and Rehabilitation in Children with Cognitive Impairments.**

Colleen Dockstader, Lee Bartel, et al. Cognitive impairment is consistently reported in children treated with cranial radiation (CRT) for a brain tumor and the chronic neurocognitive sequelae typically worsen over time. Using Magnetoencephalography (MEG), we recently showed that gamma rhythms are both globally and regionally disrupted in children who show cognitive processing deficits after treatment for a brain tumor. There is a particularly high correlation between a dearth of sensorimotor gamma rhythms (from 40-100Hz) and slowed information processing speed in this population. Using a vibrotactile stimulator to artificially drive fast rhythms in the sensorimotor cortex we attempt to induce central gamma rhythms in children treated with CRT. Initial results indicate vibrotactile stimulation at 20Hz produces a stronger response increase in children treated with cranial radiation. We suggest that the exaggerated local gamma response to tactile stimulation represents a local compensation for damaged long-range connections. To date, there is no study that has examined the impact of rhythmic stimulation mimicking 'normal' rhythmic responses to restore natural rhythm patterns, or their effects on remediating correlative cognitive deficits. Our next step is to attempt to cultivate long-range connections via rhythmic stimulation in regions that show strong connectivity in healthy children.

**Team members marked: R1**

**Music supported stroke rehabilitation. Bernhard Ross, Takako Fujioka, et al.** For this clinical trial, chronic stroke patients with unilateral impairments of arm and hand function were randomly assigned to two types of intervention training. During ten weeks of training, patients received either a conventional graded repetitive arm exercise program or a novel music supported therapy, whereby patients practiced repetitive motor actions during music making on a piano or percussion instrument. In addition to positive impact of music on motivation and emotional state, the hypothesis was that the interaction cycle of action and perception during music making strengthens the connections between auditory and sensorimotor brain areas and thus facilitates plastic reorganization of impaired brain networks.

To test the hypothesis, the patients underwent extensive behavioural testing and neuroimaging using magnetoencephalography (MEG) and functional magnetic resonance imaging (fMRI).

35 stroke patients completed the therapy and testing sessions, and data are currently being analyzed. The project has been funded by the Canadian Institutes for Health Research and the Heart and Stroke Foundation of Canada. **Team members marker: S1**

**A study of music as a treatment for Temporomandibular Disorder (TMD).** Alicia Howard, Dr. Allan Gordon, Dr. Michael Goldberg, Dr. Howard Tenenbaum, Lee Bartel (supervisor). This study is examining the effectiveness of two interventions: 1) vibroacoustic chair, Sound Oasis VTS1000 with music that induces increased 10 – 15Hz brain oscillation and stimulates gamma activity with low frequency sound (30 – 70Hz) and 2) sessions of listening to self-selected music. The randomized cross-over design with a 4 week washout between treatments is being conducted with 24 patients. Outcome measures are: 1) Visual Analog Scale 2) Daily Pain Rating Scale 3) Glasgow Benefit Inventory. Currently in progress. **Team marked with: T1**

**The Effects of External Vibration on Voice Quality in Classically Trained Singers.** Dr. Jennifer Anderson PI, et al. External vibration therapy (VT) is a novel therapeutic tool posited to enhance voice quality. However, although there are anecdotal reports, VT has not been evaluated by a placebo-controlled study in singers. The purpose of our study

was to first, develop a protocol for external vibration therapy and second, evaluate the effects of VT on specific acoustic parameters in trained singers in an acute setting. To date, 25 subjects have been randomized into either a treatment (VT) or placebo control group. Before and after VT or placebo, acoustic data was collected including perturbation measures, voice range profile, and subjective measures. Subjects allocated to the treatment group received a 10 minute therapy session using a Lilo Siri Vibrator on five bilateral muscle sites of the neck. Subject allocated to the control group received the same therapy, except that the device was modified to produce negligible oscillatory movement. Early data analysis (after 8 subjects completed) did not indicate any significant change in the parameters collected from pre to post VT over the control group. There was a trend towards mild increase in perturbations measures after VT compared to the control group. However, a perceived reduction in effort was also noted after VT. Currently, the results for all 25 subjects are in the final analysis phase. **Team members marked: V1**

#### **The Art of Waiting: Evaluation of an Interactive Media Experience in a Children's Hospital Clinic Waiting Space.**

Elaine Biddiss, Patricia McKeever, et al. Our findings supported the development of ScreenPlay2.0 in 2015. We partnered with UK Composer, Deirdre Gribben who became Composer in Residence @ HBKR. Funded by the Leverhulme Trust, Gribben composed an original interactive piece of birdsong to augment ScreenPlay. Funding: CIHR, \$187,071. **Team members marked: W1**

#### **Development of a Portable Balance Toolkit to Enhance Music Performance.** Midori Koga, Takako Fujioka et al.

Using a Nintendo Wii Balance Board in various teaching and learning environments, we have been investigating how a heightened awareness of body balance may reduce the risk of pain and musculoskeletal disorders in musicians and lead to greater musical freedom and expressivity. During Stage I of the project we developed the toolkit for measuring body balance. The Portable Balance Toolkit (PBT) is comprised of the Wii Balance Board, user customizable software, and any Bluetooth equipped Apple computer. In Stage II of the project we have been exploring and assessing efficacy of the various uses of the PBT in the percussion, conducting, piano, voice, and flute studios of the faculty of music. The response from students and teachers using the PBT has been extremely positive. In Stage III we will begin to gather preliminary data and look at possibilities for future research. Questions in the survey and interviews will focus on the efficacy of the Portable Balance Toolkit, its ease of use, its applicability to playing their instrument (or singing, conducting), its effect on pain and/or muscular tension, its affect on audiation and musicianship, and ideas for future and further use of the tool. Stage IV: Beyond the ITIF We are currently in discussions with members of the current project team and others, to develop a proposal to continue the work seeded by the ITIF grant, transitioning from what is currently primarily a teaching project into a research endeavour. **Team marked: W2**

**Empowering at-risk youth through music: A pilot project.** Bina Ann John, Nasim Niknafs. This qualitative pilot project will offer at-risk youth in a juvenile temporary detention center, twelve hours of music making experiences through group and private music lessons at the Regent Park School of Music. Students, in groups of 5, will be engaged in lessons to provide: (1) time to experiment with a variety of instruments and genres, and (2) instruction in songwriting and sound production. Outcomes will be measured with an adaptation of the Youth Justice Outcome Indicators that examines factors including (1) positive social and emotional behaviors, (2) increased musical skills, (3) the development of a musical identity, and (4) increased youth engagement with supports. **Team marked with: Y1**

## **In Proposal Submission Stage**

**A Randomized Control Trial of a Novel Therapeutic Rhythm and Mindfulness (TRM) Intervention for Breast Cancer Survivors.** Shari Geller, Mary Jane Esplen, et al. In response to the growing need for effective and validated interventions that can reduce fatigue and improve Breast Cancer (BC) survivors' overall well-being, we developed an innovative group intervention called Therapeutic Rhythm and Mindfulness (TRM)<sup>TM</sup>. TRM combines multiple empirically validated techniques in promoting wellness, including mindful awareness, relaxation, guided imagery, and percussion instruments exercises. TRM has evolved through BC survivorship input, is innovative, and provides women with new techniques and tools to decrease fatigue and distress, while enhancing positive emotion and vitality as they move forward in their cancer journey. This is the first proposed randomized control trial (RCT) of TRM. The proposed RCT will test the efficacy of TRM compared with a control condition (standard care plus educational book on cancer survivorship), in reducing fatigue, depression and overall mood disturbances (primary outcomes), and increasing vitality, mindful awareness and social connectedness (secondary outcomes). **Team members marked: BC1**

**Exploring patient experience of volunteer-facilitated music performance.** Kevin Komisaruk Michelle Nelson. Music listening is noted to have both psychosocial and cognitive benefits for stroke rehabilitation patients, both when mediated by a music therapist, and when experienced in other contexts. Simultaneously, hospital volunteers, including those with latent musical ability, are seeking valued patient facing roles in these same environments. In some contexts, and despite a lack of clinical training and musical experience, these volunteers may be a potentially valuable and untapped resource to address post-stroke anxiety. This study proposes to pilot outcome measures and explore whether there are clinically meaningful changes to anxiety, patient experience, emotional well-being and functional improvement for individuals with stroke, conditioned by both volunteers' empathy and musical aptitude. Patient interventions are framed within a model referred to in this study as "Empathic Musical Performance." Volunteers, including clinical staff volunteers, will be selected for high degrees of empathy and musical aptitude, and subsequently trained by music students to implement high degrees of interpretive detail referred to as "Performance Micro-Variation" (Komisaruk, in preparation) in the performance of musical works for patients at Bridgepoint Active Healthcare. It is hoped this initial study will lay the conceptual and theoretical groundwork to support the development of a future trial. **Team marked: MP1**

**Music Care for Quality Palliative Care Populations: A pilot randomized controlled trial using Room 217 Music (grant proposal to be submitted Spring 2016 to Canadian Cancer Society Research Institute).** MJ Esplen, B Foster, et al. Music therapy has shown efficacy in enhancing physical comfort through pain reduction and improvements in fatigue, thereby contributing to improved quality of life. Despite the benefits of music-oriented interventions, few patients receive these as a component of end of life treatment. Barriers include lack of knowledge on how to use music as a therapeutic strategy and lack of access to music therapists to provide the interventions. While music therapists typically administer music interventions with clinical goals and intentions, music can be used in health care in many ways; for example, care givers can be trained in providing musical support through pre-recorded music. Our "Room 217" pre-recorded music resources have been designed for health care. A pilot RCT design is planned to inform a larger multi-site trial. Feasibility of a music care intervention delivered by volunteer/ care providers trained by a music therapist will be assessed with the following outcomes: 1) confidence in using a music intervention; 2) patient participation rate and attrition rate; 3) feasibility of patients completing multiple outcome measures on symptoms and quality of life. Effect sizes of outcomes (quality of life, pain, agitation, spiritual well-being, and sleep) will be calculated. **Team members marked: P1**

## **Individual MaHRC Member Research**

**Joyce L Chen.** My research in the laboratory for Promoting Upper Limb Stroke rEcovery aims to develop and validate novel therapeutic interventions that facilitate the recovery of arm and hand movements after stroke. One area of our research aims to understand how we can harness music to facilitate mood and movements after stroke. Listening to music makes us feel good and often makes us want to move - who has not had the urge to sway their hips when listening to a samba tune? Understanding the links between music, mood, and movement may help us devise novel and fun interventions for stroke recovery. The PULSE lab is involved in several studies related to music and health: 1) Effects of music listening on movement; 2) Use of auditory feedback to improve reaching; 3) Music supported rehabilitation in people with chronic stroke (leads Takako Fujioka, Deirdre Dawson, Bernhard Ross); 4) Music supported rehabilitation and interactive computer play in children with Cerebral Palsy (lead Elaine Biddiss); 5) The relationship of rhythm abilities and gait after stroke (leads Kara Patterson, Jessica Grahm); 6) Cardiac Rehab and Music Playlists study (leads David Alter, Lee Bartel).

**Patricia McKeever.** I led a study titled, Songs of Children Said to be Silent funded by the SickKids Foundation, Saunders Complex Care initiative. We converted severely disabled childrens' ANS signals into 'music'. Results have been published and Co-I, Blain-Moraes has partnered with technology company.

**Pia Kontos.** I recently led a CIHR-funded study to explore elder-clowning in dementia care. Elder-clowning is the most recent innovation in arts-based programs for residents living with Alzheimer's disease or a related dementia (ADRD), in long-term residential care (LTRC). Key elements of elder-clowning include verbal, physical, and musical interactions that incorporate fantasy, surprise, inversion, physical comedy, and storytelling. Elder-clowns are distinct from paediatric clowns in that they use minimal or no make-up, wear clothing from a previous era (i.e. 1950s swing dresses), and tailor their interactions to the adult context of residents of LTRC. Key outcomes of the CIHR-funded pilot evaluation of elder-clowning included a significant decrease in residents' neuropsychiatric symptoms and a significant improvement in their

quality of life. Additionally elder-clowning strategies and techniques were explored. Clown-resident interactions (e.g. co-constructing songs) highlight the extraordinary attentiveness and responsiveness of elder-clowns to residents' initiation of affective, creative, and playful engagement through verbal and non-verbal expression.

**Michael Schutz.** The MAPLE Lab trains graduate and undergraduate students using interdisciplinary approaches to explore music's cognitive basis. Our research assists music educators, performers, and scholars, and helps inform psychologists, neuroscientists, therapists/clinicians, and sound designers. We investigate the multi-modal nature of music, with ongoing projects exploring sensorimotor integration, as well as the role of visual information in music listening. The National Institutes of Health funded a study to design more effective treatments for children with Autism Spectrum Disorder (ASD). Other projects apply our findings on musical timbre in improved design of auditory alarms in medical devices. We are also exploring the complex relationship between composers and performers in conveying emotion to listeners. This work led to an ongoing knowledge mobilization initiative visualizing different interpretations of JS Bach's "Well Tempered Clavier." This tool is available freely online, and appears with summaries of other projects and team members at [www.maplelab.net](http://www.maplelab.net).

**Ken McLeod.** I am currently working on a SSHRC funded research project and book on the topic of Popular Music and Automotive culture including work relating to the effects of automotive noise pollution and on the relationship of listening to music while driving, particularly the potential impairment to concentration that listening to various types of popular music may incur. Included are issues surrounding identity and psycho acoustic sound design in automobiles. I am also working on an article on Liberace, AIDS, and Aging in Popular Music. My previous book, *We Are the Champions: The Politics of Sports and Popular Music* (Ashgate 2011) examines the role of sports and popular music in constructing racial, gender, ethnic, socio-economic and national identities and the role that popular music plays in exercise and improving physical performance.

**Gavin Andrews.** I am a qualitative health geographer, and hence I am conceptually and theoretically concerned with the dynamics between music, space and place. This includes an interest in the geographical origins and spread of popular music, popular music and place-identity, and most recently – through non-representational theory – the production of popular musical soundscapes and atmospheres (i.e. music's 'taking place'). Here are my 6 publications in the area of music, only one of my empirical interests.

- **Andrews G J, Kearns R A, Kingsbury, P, Carr E** (2011) Cool aid? Health and place in the work of Bono and U2 *Health and Place* 17, 185-194
- **Andrews G J, Kingsbury P, Kearns R** (2014) Introducing the dynamics between popular music, health and place in Andrews G J, Kingsbury P, Kearns R *Soundscapes of wellbeing in popular music*. Ashgate
- **Andrews G J** (2014) 'Gonna live forever': Noel Gallagher's spaces of wellbeing in Andrews, G J Kingsbury P, Kearns R *Soundscapes of wellbeing in popular music*. Ashgate
- **Andrews G J** (2014) A force from the beginning: wellbeing in the affective intensities of pop music. *Aporia* 6, 4, 6-18
- **Andrews G J** (2016) Soundscapes in *International Encyclopedia of Geography* Wiley -AAG
- **Andrews G J and Drass E** (2016) From The Pump to Senescence: Two musical acts of more-than-representational 'acting into' and 'building new' life. In Fenton N and Baxter J *Practicing qualitative research in health geography*. Ashgate.

**Tom Chau.** My lab has been exploring the prefrontal hemodynamic responses to music using near infrared spectroscopy, with the goal of decoding emotional responses in non-verbal children. My lab has also been investigating physiological synchrony among non-verbal children, their caregivers and therapists, during music therapy sessions. Recently, we created a "DJ app" for single-switch users and are launching a study to understand the paediatric experience of engagement in group music making, where one of the band members contributes via the "DJ app."

**Amy Clements-Cortes.** I have been exploring the application of music and music therapy techniques in alleviating emotional distress (e.g. anxiety, grief, pain and relationship completion in palliative care and rehabilitation). Projects include: (1) The Use of Voice in Palliative Care Music Therapy- Looking at the role of the voice and singing in music therapy with adults in palliative care (underway). (2) Buddy's Glee Club: Singing for Health and Wellness, Multi-Phase Investigation with four papers published in *Activities, Adaptation & Aging*, 37(4); *Canadian Journal of*



*Music Therapy*, 20(1); and *Music and Medicine*, 7(4), 7-12, and 13-23. (3) Taking Flight: Music Therapy Internship Experiences from the Eyes of the Pre-Professional, with a paper in *Journal of Music Therapy*, 52(2); (4) Getting Your Groove on with the Tenori-On with a paper in *Music Technology and Education* 7(1), and (5) Sing-A-Long of the 1930s with a paper in *Music Technology and Education*, 7(2).

**Norman Doidge.** I am documenting the music and sound therapy work of psychologist Paul Madaule, who has had 45 years experience using sound therapy to help treat children and adults with learning disorders, auditory processing problems, sensory processing problems, and autistic spectrum difficulties. Madaule originally trained with Dr. Alfred Tomatis, but has made a number of his own innovations to sound and music therapy. His innovations have allowed him to help children and adults who were failed by other known treatments. This work, and other listening and sound therapy work, is described in my new book *The Brain's Way of Healing*, the follow up to *The Brain That Changes Itself*. I am working particularly on understanding how to decide which neuroplastically based intervention to use in different clinical situations, and have developed a framework of the stages of neuroplastic healing. I argue that sound and music therapies work, over the long term, because the brain has neuroplastic properties. I am now following cases over the very long term to determine outcomes.

**Joaquin Farias.** My particular interest is in focal dystonia in musicians and am continuing to develop understanding through clinical practice. I am also keenly interested in the phenomenon of entrainment of the brain activity, hemispheric synchronization and the use of Rhythmic Sensory Stimulation to induce neuroplastic changes in the brain during rehabilitation of neurological disorders. I am particularly interested in ways to address Thalamo-Cortical Dysrhythmia through exposure to external and internal rhythms during exercise based training. My clinical exploration takes into consideration the connections between emotions and movement and pays special attention to the role that rhythm and timing in movement coordination.

**Kristine Newman.** I am conducting a study entitled, "Intelligent Assistive Technologies: De-escalation of Agitation through Individualized Music Intervention." The purpose of this study is to use a music intervention to decrease the agitation of healthy agitated individuals. The results of the study will help select the most appropriate method for recognizing reducing behaviours of individuals in an agitated state and the use of an individualized music intervention.

## MaHRC COMING EVENTS

### **Collaborative Program in Neuroscience Distinguished Lecture**

Presenter: Michael Thaut

Topic: Music and the Brain: From Neuroscience to Clinical Translations

Tuesday, February 23, 1:10 – 2:30

Walter Hall, Faculty of Music

### **Music & Health Colloquium**

Presenters: Corene Thaut, Jessica Grahn

Topic: Rhythmic Auditory Stimulation for Gait Training in Parkinson's Disease

Tuesday February 23 3:10 – 4:30

Edward Johnson Building, Room 216

### **Special MaHRC Lecture:**

Presenter: Michael Bakan, Florida State University, Tallahassee

Topic: Music and Autism: An ethnomusicological perspective.

Monday, March 14, 2:00 – 3:00 pm

Edward Johnson Building, Room 130

### **Music & Health Colloquium**

Speaker: Elaine Biddiss, Holland Bloorview

Topic: The Development of Music-Rehab Interfaces: ScreenPlay, Biosong, and Musical Steps.

Tuesday March 29, 3:10 – 4:30

Edward Johnson Building, Room 216

### **Sounds of Science: Music, Medicine, and Technology**

May 3, evening

McMillan Theatre, Faculty of Music

### **International Otolaryngology Conference**

#### **Cochlear Implants and Music**

May 13, 2016 Afternoon

Sheraton Hotel, Toronto

Featuring: Keynotes by Michael Thaut and Sandra Trehub

Panel Discussion led by Lee Bartel

#### **Neurologic Music Therapy Training Course**

May 12 – 15

Faculty of Music

University of Toronto

## **Other NMT events and presentations by Dr. Thaut**

February 10-14

**NMT Academy:** Fellowship and Training Institute, TIRR Memorial Hermann, Houston TX

April 13-15

**Symposium Music in Rehabilitation:** European Stroke Conference, Venice Italy

April 21-24

**NMT Academy:** Training Institute, Arizona State University

May 10-13

**Symposium Neurologic Music Therapy:** World Congress of Neurorehabilitation, Philadelphia PA

For more NMT Academy information please consult the website at [www.nmtacademy.co](http://www.nmtacademy.co)

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