# Discovering genes for singing ability in Australian families

### Research Opportunity

PhD students

### Department / School

Department of Medicine (Austin Health)
Melbourne School of Psychological Sciences
Melbourne Conservatorium of Music

### Location

Melbourne Brain Centre, Austin Hospital
Redmond Barry Building, Parkville Campus
Melbourne Conservatorium of Music, Southbank

### Summary

Music abilities are core to what makes us human, with singing ubiquitous in all cultures. Anecdotal evidence suggests that singing ability runs in families, supporting its genetic basis, however no research has systematically traced it across generations. Using an innovative web-based singing program and the latest molecular genetic techniques, this project aims to discover singing ability genes through the first Australian study of large families with many talented singers. This will generate new knowledge on the origins of human musicality and help Australia develop a sustainable source of cultural capital. It will build interdisciplinary research capacity and inform bespoke music learning programs that account for individual differences.

| Primary Supervisor | Email | Number | Webpage |
|---|---|---|---|
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## Project Details

**Supervisors: A/Prof. Michael Hildebrand (DoM, Austin), Prof. Sarah Wilson (MSPS), Prof. Gary McPherson (MCM); Prof. Samuel Berkovic (DoM, Austin)**

Music is ubiquitous and forms part of our basic human design, being central to our mental health, and social and cultural wellbeing. Our general capacity to perceive, produce, and enjoy music in the absence of formal training suggests that music may be "hardwired" in our genetic makeup. A recent review indicated that deliberate practice may account for as little as 30% of the variance in expertise. Whether musicians are born or made remains hotly debated, with surprisingly little empirical research into the relative contributions of genes and environment in emerging musicianship.

Our team recently investigated heritability of singing using a twin study design examining the relative contributions of genetic and environmental factors. We tested 1189 monozygotic (MZ) and dizygotic (DZ) twins (517 pairs; 155 singletons), measuring their singing ability using a unique web-based singing program we purpose-built for the study.

This underscores the main aims of this PhD project: (1) To characterise the phenotype of 'in-tune' singing ability; (2) To examine large multiplex families with a high incidence of high singing ability to determine the mode of inheritance; (3) To use molecular genetic approaches of linkage analysis and whole genome sequencing to identify chromosomal regions and genetic variants associated with high singing ability.

In behavioural genetics it is well-established that heritability of complex traits, like high singing ability, is likely due to additive genetic effects of multiple genes of small effect. The advantage of studying large multiplex families is that they are more likely to have fewer genes of larger effect, making gene discovery more likely. Thus, we hypothesise that by measuring the complex nature of singing in a set of large multiplex families, we will discover genetic loci that contribute to high singing ability.

Our team has an exciting PhD opportunity for a multidisciplinary project examining cognitive and genetic contributions to singing ability uniquely designed to leverage expertise across top behavioural, medical and musical schools.

Local and overseas students are encouraged to apply. 3.5 year stipend offered.

Essential criteria: Honours or Master's degree in Behavioural Genetics or Bioinformatics and Statistics or Molecular Genetics or Molecular Biology; High academic marks that would meet eligibility for enrolment in a Research Higher Degree at the University of Melbourne.

Desirable criteria: Interest in music and/or musical background; Training in cognitive assessment; Experience in bioinformatics or molecular laboratory work.

For further information, contact:

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