Preface to the Special Issue

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Preface to the Special Issue

Ralph Spintge, MD[1] and Joanne V. Loewy, DA, LCAT, MT-BC[2]

Neuroimaging in current times has provided us with structural and functional insights into the human brain, which up until now have been unmatched in science history. However, even with the most recent scientific developments at hand, the 3-D brain images gained using magnetic resonance imaging (MRI) are limited by poor resolution of 1 mm in each direction.

Katrin Amunts, professor of structural–functional brain mapping, and her colleagues at the Jülich Aachen Research Alliance in Germany recently sought to fill the image gap by building a "BigBrain model," exceeding the typical resolution by a factor of 50 in each direction.[1] The new 3-D model is based on the brain of a 65-year-old woman, embedded in paraffin, cut into 7404 slices, each 20 μm thick, using a microtome. The slices were scanned at high resolution and each image was aligned to the 3-D MRI reference model.

Dr Amunts has shared that it took almost a year to scan all the slices, and she spent another 4 years correcting for artifacts and distortions, in order to achieve the 3-D reconstruction. The BigBrain model will serve as a detailed reference map for doctors and scientists, and importantly for functional neuroscience, displaying detailed cell structures of areas where certain functional activity patterns are observed. In the end, data from cellular neuroscience can be integrated with data from neurophysiological studies, thus creating a common reference space, a real BigBrain model.

It will be possible, moving forward, for instance, to integrate data from studies on music processing in the brain with structural information about brain regions down to the cellular level. The next phase of research in music and medicine will undoubtedly be providing new insights into unique portals of our understanding related to music and neural function.

Clearly the music and medicine community has great interest in such investigations. Over the course of the past 10 years, a wealth of data from neuroscience study has been accumulating. Studies describing the central nervous processing of music are on the upsurge. An example of an overview of such research was provided in the *Neuroscience and Music* book series published by The New York Academy of Sciences.[2]

This special issue of *Music and Medicine,* guest edited by Thomas Stegemann, includes a selection of outstanding experts in the field of neuroscience and music. Dr Stegemann has brought together a variety of topics and authors who contribute to our knowledge base in this exciting and explosive area of music medicine and music therapy. The state-of-the-art articles cover such diverse areas as electroencephalography as a research tool, neurobiological aspects and foundations of the so-named neurologic music therapy (NMT), the socializing capacities of music function which enhance speech recovery and production, and music in relation to neurobiologically based variances in human behavior.

The articles in this issue provide our readership with exciting insights into recent advances in both research and research-based practice demonstrating the brain's vital impact of music on human life. We are certain that the pages before you will update and consolidate clinicians and investigators alike on the critical topics that serve to expand our understanding of music and neurologic function.

References

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[1]Sportklinik Hellersen and University of Music and Drama Hamburg, Regional Pain Center, Lüdenscheid, Germany
[2]The Louis Armstrong Center for Music & Medicine, Beth Israel Medical Center, New York, NY, USA

Corresponding Author:
Ralph Spintge, Sportklinik Hellersen and University of Music and Drama Hamburg, Regional Pain Center, Paulmannshoeherstr 17, 58515 Lüdenscheid, Germany.
Email: ralph.spintge@hellersen.de