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Simultaneous Positron Emission Tomography (PET)/Magnetic Resonance (MR) Imaging

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Magnetic resonance imaging (MRI) is a non-invasive tool. Conventional MRI provides anatomical images with little information about the function of the anatomy. Positron emission tomography (PET) provides images of the function of the organs (e.g. glucose uptake) non-invasively with no anatomical information. Functional MRI (fMRI) gives information of blood oxygenation level within the central nervous system which is related to function. Combining both MRI and PET allows the visualization of functional and anatomical changes together providing much more information than either method can provide on its own.

When one image is acquired before another, it is difficult to align the images (image registration) because of motion of the subject. If the organ being imaged moves due to respiration, for instance, then image registration is even more challenging. If the subject's physiological response and/or anatomy varies with time, the images from the two different modalities when collected at different times do not necessarily capture the same changes, making correlation of results difficult. Simultaneous PET/MR imaging can be used to overcome many of these challenges.

Here we present data acquired from simultaneous PET/MR imaging. The MR images were acquired with a 7T 21 cm bore Bruker Avance III NMR system with Paravision 5.0. The PET images were acquired with a NuPET (Cubresa, Inc) with a 67.2 mm (axial) x 58.9 mm (transaxial) field of view which was inserted in the bore of the magnet. These data will demonstrate the feasibility and utility of simultaneous PET/MR imaging.

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Primary authors: Prof. MARTIN, Melanie (University of Winnipeg); Ms PALMER, Vanessa (Cubresa, Inc); Dr HERRERA, Sheryl (University of Winnipeg, Cubresa, Inc.); Ms ARMSTRONG, Katrina (University of Manitoba); Prof. STECINA, Katinka (University of Manitoba); Ms ANDERSON, Melissa (University of Winnipeg); Mr SANNESS SALMON, Henri (University of Winnipeg); Ms ZHANG, Huixin (Winnipeg Regional Health Authority); Prof. ZHANG, Michael (University of Winnipeg); Prof. HUANG, Liping (Department of Physical Therapy, Chinese PLA General Hospital, Beijing, China)

Presenter: Prof. MARTIN, Melanie (University of Winnipeg)

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