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## A study illustrating the viability of in-vivo simultaneous hyperpolarized $^{129}\text{Xe}$ MRI and $^{15}\text{O}$ -water PET measurements

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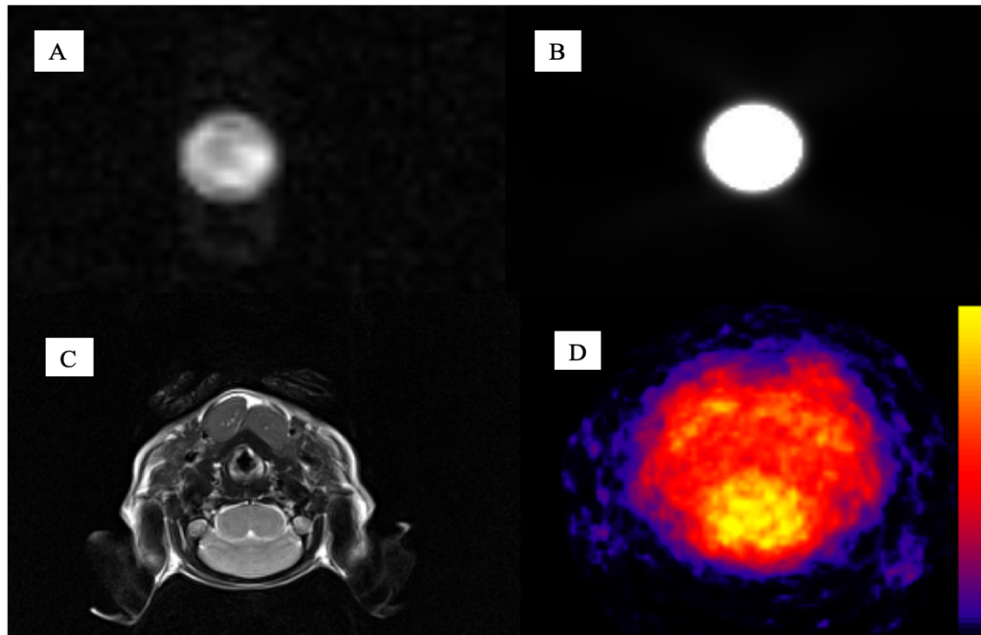
Sembhi, Ramanpreet K., "A study illustrating the viability of in-vivo simultaneous hyperpolarized  $^{129}\text{Xe}$  MRI and  $^{15}\text{O}$ -water PET measurements" (2023). *Inspiring Minds – A Digital Collection of Western's Graduate Research, Scholarship and Creative Activity*. 411.  
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$^{129}\text{Xe}$  is a stable, non-radioactive-isotope, capable of being imaged with MRI.  $^{15}\text{O}$ -water PET (positron emission tomography) is a gold-standard imaging method. *We propose to utilize gold-standard  $^{15}\text{O}$ -water PET to validate our  $^{129}\text{Xe}$ -based perfusion imaging methods using a one-shot, multi-modal-imaging approach utilizing simultaneous PET/MRI.*

**Globally our group is the first one to perform successful validation work** for  $^{129}\text{Xe}$ -based brain perfusion techniques, directly and simultaneously with  $^{15}\text{O}$ -water PET using phantom scans.  $^{129}\text{Xe}$ /PET images indicate that the diameter of the phantom from both PET and MRI images are similar clearly indicating the feasibility of the simultaneous hyperpolarized  $^{129}\text{Xe}$  MRI and  $^{15}\text{O}$ -water PET measurements. This enabled the next step of in-vivo imaging which we performed on a small animal model.

As  $^{129}\text{Xe}$  provides higher sensitivity and superior SNR as compare to other imaging techniques. It would be much more cost-effective alternative to PET for imaging stroke, brain cancer and other brain diseases.

#### **RESULTS:**



**Figure 1: Panels A, B, and C, D represents as follows: 2D axial A)  $^{129}\text{Xe}$  MRI image, B)  $^{15}\text{O}$ -water PET image obtained for xenon dissolved in  $^{15}\text{O}$ -water inside the syringe phantom, C)  $^1\text{H}$  image and D)  $^{15}\text{O}$ -water distribution (PET) image obtained from rat brain.**