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Magnetic Resonance Methods to Assess Therapy Response in Oncology

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Dynamic Nuclear Polarization (DNP) together with the sample dissolution procedure to enhance weak magnetic resonance signals from molecular tracers provides the opportunity to perform *in vitro* and *in vivo* molecular and metabolic imaging. Following the injection of molecules that are hyperpolarized via dissolution DNP, real-time measurements of their biodistribution and metabolic conversion can be recorded. This technology therefore provides a unique tool for probing cellular metabolism in a noninvasive manner. Numerous preclinical applications have demonstrated the enormous potential of hyperpolarized carbon-13 MRI for *in vivo* metabolic imaging and several research hospitals across the globe are currently performing clinical studies on patients. The most promising applications to have clinical impact are predicting and assessing therapy response in oncology. In this lecture, I will introduce the hyperpolarized carbon-13 MR technology and present how metabolic changes induced by radiotherapy or immune response can be detected by magnetic resonance.

