

Real-Time MRI & Applications in Radiotherapy

Radiation therapy uses a high-energy beam of X-rays that travels through the patients body to kill cancer cells. The beam is highly susceptible to magnetic fields, so MRI takes place before treatment to investigate the position of the cancer cells and the target where the beam should be aimed. The new technology assigns MRI to be done during treatment in such a way that the beam can be relocated in real-time in cases where the target shift as the patient breathes or moves, such as a lung tumour that moves when the patient breathes.

Jan Lagendijk, introduced the idea of combining Real-Time MRI with Radiation Therapy technology, in 1999. The advantage of this machine is to reduce the probability of nearby healthy tissues to be irradiated during the radiation of the cancer cell. Using this technology, it is possible to diagnose the highly accurate radiation dose to make a highly-targeted treatment.

Real-time magnetic resonance imaging (MRI) refers to the continuous monitoring ("filming") of moving objects in real time. Recent advances in real-time MRI result in high-quality images with acquisition times of only approximately 30ms. Real-time MRI promises to add important information about diseases of the joints and the heart. In many cases MRI examinations may become easier and more comfortable for patients.

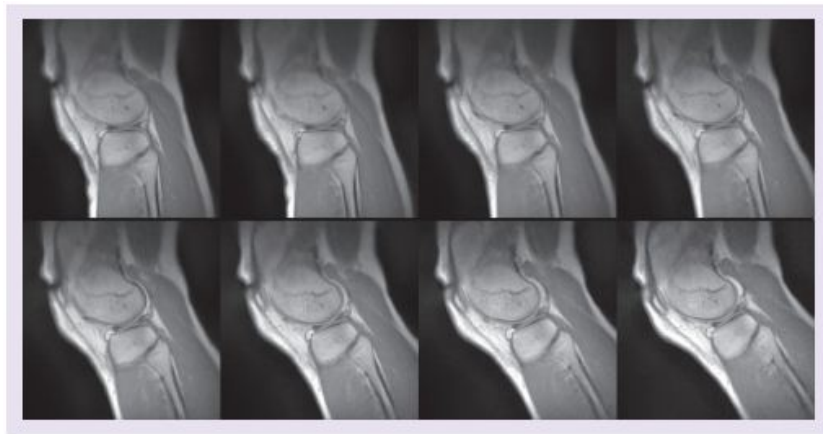


Figure 1: **Real-time MRI of voluntary knee bending after a mild contusion.** Selected frames taken every 4 s from (top and bottom) two different sections of respective movies at 333 ms temporal resolution (3 fps) acquired using refocused radial fast low-angle shot

Figure by <http://www.futuremedicine.com/doi/pdf/10.2217/iim.12.32>