Comparing 1.5 Tesla with 3.0 Tesla in Magnetic Resonance Imaging

June 2011

CADTH Project in Brief

Technology
Magnetic resonance imaging (MRI) scanners produce detailed images of internal body structures used for diagnosis and monitoring of a wide range of conditions. Most Canadian hospitals that offer MRI to patients have 1.5 Tesla (T) MRI scanners, but more powerful magnet strengths, such as 3.0 T, are now available. More powerful magnet strengths may provide faster scan times or better quality images, but it is unclear if this leads to improved patient care. Safety concerns for 3.0 T MRI include increased noise and heat, and that the greater magnetic effect might make 3.0 T MRI unsuitable for some patients with specific implanted devices.

Issues
Health care decision-makers faced with purchasing MRI technology find this decision a difficult one. MRI scanners are high-cost, rapidly advancing technologies that lack comparative research reporting on patient benefits, such as improved diagnosis and treatment. The decision is further complicated by the need to consider current and future clinical applications, and the fact that the purchased MRI may have to be used for a number of years.

Methods
The CADTH pilot project assessed the comparative clinical benefits, limitations, and safety considerations of 1.5 T MRI and 3.0 T MRI scanners. Given the complexity of decisions involved in purchasing MRI scanners, CADTH convened a panel of experts comprising a public member, members with expertise in the critical evaluation of evidence, and members with expertise in radiology.

The panel members developed guidance statements by considering:
- a systematic review of existing evidence
- a supplemental, narrative review on safety issues
- manufacturer information
- clinical expertise
- public values and preferences.

Results
Guidance statements were produced.
Key messages based on the guidance were developed.
Intervention tools to support the uptake of the guidance were developed.

Key Message
For most medical conditions, use of 3.0 T MRI or 1.5 T MRI leads to similar health outcomes, including safety. Based on expert opinion, 3.0 T MRI may offer advantages for advanced clinical neurosciences and some cardiovascular applications.

Other Considerations
The panel provided additional information to guide decisions about MRI scanner placement:
- Consider installing 3.0 T MRI where it will support clinical programs and research — but note the operation of 3.0 T MRI will require more clinical expertise and paramedical personnel.
- 3.0 T MRI can operate as a stand-alone unit, while partnering it with 1.5 T MRI may better serve the full spectrum of patients.

For complete Optimal Use Reports and Intervention Tools: www.cadth.ca

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