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NEWS FROM THE UNIVERSITIES

MR IMAGING OF THE KNEE AT 3T – DIAGNOSTIC PERFORMANCE AND COMPARISON WITH 1.5T

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The range of available magnetic field strengths for clinical knee MRI has expanded over the last 20 years, from below 0.2T to 1.5T, and, recently, 7T. The major advantage of high field strength MRI is the improvement in the signal-to-noise ratio (SNR), which can be used to either increase image resolution or decrease scan time and the chance for motion artifacts.

Despite the definite cost advantages to the use of lower-field MRI systems, and the recent improvements in the performance of low-field magnets, most radiologists, if given an option, would prefer high-field MRI. This is fueled by the general assumption that higher magnetic field strength should lead to better diagnostic performance.

Recently, with the advent of 3T systems, the field strength quarrel has flared up again. Although the standard magnet strength for routine MRI is still 1.5T, knee MR equipment is by and by shifting to 3T. However, to date, objective evidence of improved diagnostic ability at 3T is lacking.

This doctoral thesis bundles several papers regarding the diagnostic performance of routine MRI obtained at 1.5 and 3T for evaluating internal derangements of the knee joint.

Firstly, we determined the accuracy of MRI in the diagnosis of meniscal and anterior cruciate ligament (ACL) tears at 1.5 and 3-T, on different patient populations, and analyzed the causes of MR diagnostic error, compared to arthroscopy. In our studies, we found comparable accuracy rates with similar causes of errors for 1.5 and 3T MRI (1-3).

Secondly, we have provided a prospective comparison between 1.5 and 3T MRI of the knee, in the same individuals, to assess the actual improvement in performance of 3T MRI. In our study, we used a receiver-operator-characteristic (ROC) analysis, because this is the best available method to measure diagnostic accuracy of various imaging methods without bias. Results from our study demonstrate diagnostic equivalence between 1.5 and 3T magnetic field strength in the evaluation of internal derangement of the knee (4, 5). Our study findings disagree with the general assumption that higher field strength automatically increases the reliability of the MR report in the detection of knee pathologies.

The recently developed three-dimensional (3D) turbo spin-echo (TSE) sequences with isotropic resolution exploit the particular advantages that come with higher field strength. They are now commercially available on many MR vendor platforms. These acquisitions, typically used at 3T in combination with dedicated multi-channel coils, entail a variable flip angle refocusing pulse and allow extremely large turbo factors. The advantage of the new 3D TSE acquisitions is their capability of mimicking the contrast properties of conventional two-dimensional (2D) TSE proton-density weighted acquisitions. It was the third aim of this thesis to investigate the diagnostic value of the newly developed 3D TSE acquisition as compared to conventional 2D TSE acquisition for comprehensive knee joint assessment at 3T. In our study (6), the 3D TSE sequence by no means surpassed the performance of the conventional 2D TSE technique. To date, the 3D TSE sequence needs further optimization before it can be used as a single sequence in the MR evaluation of the knee at 3T.

Finally, we examined whether different clinically and arthroscopically confirmed ACL pathologies have distinctive preoperative findings on MRI. We found that the use of MRI is insufficient to assess the functional status of the ACL (7), mainly because of the many patterns of partial tears and the frequent similarity of partial tears to complete tears or even to mucoid degeneration of the ACL (8). In particular, our studies showed that the ability to detect partial ACL tears and the ability to distinguish complete from partial tears were similar for 1.5 and 3T MRI protocols (4).

In general, we conclude that a routine 3T protocol does not significantly improve diagnostic performance of knee MRI compared to a 1.5T protocol. Apparently, many other factors affect diagnostic performance of knee MRI, including study design and population characteristics, observer experience, coil design, and definition of disease criteria. Further studies are needed to determine which field strength is optimal for routine knee imaging.

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ANNOUNCEMENT

FONDS EM. PROFESSOR DR. A. L. BAERT, PERIODE 2013-2014

In december 2012 vond de inhuldiging plaats van het "Fonds em. Prof.Dr.A.L.Baert" in de rectorale salons van de Universiteitshallen.

Dit fonds wordt nu beheerd door het Leuvens Universiteitsfonds en zal de "Wetenschappelijke Prijs em.Prof. Dr.A.L.Baert", opgericht in 1997, verderzetten.

De 9de Prijs zal uitgereikt worden in 2014.

Deze prijs kan worden toegekend aan een radioloog, opgeleid aan één van de vier Nederlandstalige universiteiten in België, op basis van een met goed gevolg verdedigde doctoraatsthesis, door een jury die zal benoemd worden door het stichtingscomité.

Slechts werken die minder dan 2 jaar oud zijn op de datum van hun indiening kunnen in aanmerking worden genomen. Het werk moet opgesteld zijn in het Nederlands of in het Engels, met in beide gevallen, een uitgebreide samenvatting van minstens 15 bladzijden in het Nederlands (interlinie 1, ca. 47 regels per blz.).

De prijs kan slechts toegekend worden aan een nog niet bekroond werk. De auteur van het bekroonde werk krijgt de titel "Laureaat Wetenschappelijke Prijs Em. Prof. Dr. A. L. Baert".

De kandidaten moeten hun werk samen met hun curriculum vitae indienen in 6 gedrukte exemplaren bij Em. Prof. Dr. A.L. Baert en 1 exemplaar bij de secretaris, **uiterlijk op 30 september 2014**. Het stichtingscomité bepaalt de exacte datum van de toekenning van elke tweejaarlijkse prijs, voorzien in de maand december. De eerste toekenning van de prijs is uitgereikt in december 1998.

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