

# Magnetic resonance imaging in staging of locoregional prostate cancer: comparison of results with analysis post-surgical histopathology

## *A ressonância magnética no estadiamento locorregional do câncer de próstata: resultados comparados com a análise histopatológica pós-cirúrgica*

MANOEL EDUARDO DAUMAS CALDAS, AsCBC-RJ<sup>1</sup>; LUIZ CARLOS DUARTE DE MIRANDA, ACBC-RJ<sup>2</sup>; LEONARDO KAYAT BITTENCOURT<sup>3</sup>

### A B S T R A C T

Conventional staging for locoregional prostate adenocarcinoma has been demonstrated as potentially underdiagnosing. Therefore, prostate MRI is emerging as an important tool for staging before surgery. Advanced techniques such as diffusion and dynamic contrast enhancement also contribute to increasing its accuracy. In this preliminary study, MRI was compared with prostate histopathology samples, reaching 78% sensitivity and 100% specificity for tumor localization; 33% sensitivity and 100% specificity for extracapsular extension; 100% sensitivity and 100% specificity for involvement of the seminal vesicles. It is possible to believe that these preliminary results are promising, and more cases will tend to confirm these data.

**Key words:** Prostatic neoplasms. Neoplasm staging. Magnetic resonance spectroscopy. Histopathology.

### INTRODUCTION

Physicians often face histopathology results of radical prostatectomy specimens in patients with advanced malignancy that were expected to have a prostate-confined disease. The traditional locoregional staging with digital exam, transrectal ultrasonography and computed tomography is notoriously limited<sup>1,2</sup> and the use of Magnetic Resonance Imaging (MRI) has emerged as the image category of choice. Its advanced techniques such as diffusion, dynamic contrast and spectroscopy have added specificity to the findings of basic sequences<sup>3,4</sup>.

The aim of this study is to compare MRI findings suspicious for prostate cancer with histopathological examination in patients undergoing radical prostatectomy considering tumor location (unilateral or bilateral), extra-capsular extension, seminal vesicle invasion and obturator lymph node invasion.

### METHODS

Between March and June 2009 we evaluated 11 consecutive patients in the HUCFF-UFRJ diagnosed with prostate cancer, with an indication for radical prostatectomy according

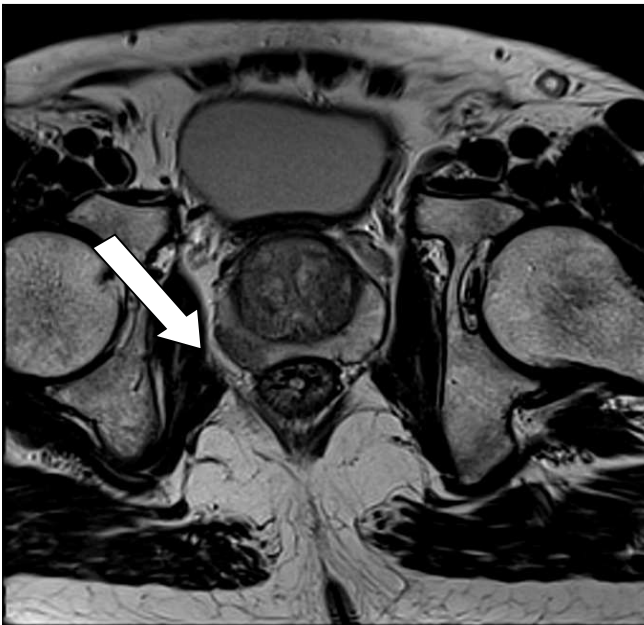
to the criteria of the Brazilian Society of Urology guidelines. The study was approved by the HUCFF Ethics in Research Committee and logged in to SISNEP with CAAE number 0057.0.197.000-09. All patients signed an informed consent. We performed MRI of the prostate with a 1.5T apparatus (Avanto, Siemens, Germany). The suspicious appearance for neoplastic involvement comprises nodular areas with low signal on T2-weighted sequences (Figure 1). We also obtained advanced diffusion and dynamic contrast enhancement sequences to confirm and increase the specificity of T2-weighted sequences, according to widely known criteria<sup>3,4</sup> (Figures 2 and 3). Extra-capsular extension was considered when we found extra-prostatic nodules, obliteration of periprostatic fat, invasion of the neurovascular bundle or evident trans-capsular tumor<sup>4</sup>. Surgical specimens were sent to standard histopathologic examination. The results were compared using the following criteria: location (unilateral or bilateral), extracapsular extension, seminal vesicle invasion and obturator lymph node invasion.

### RESULTS

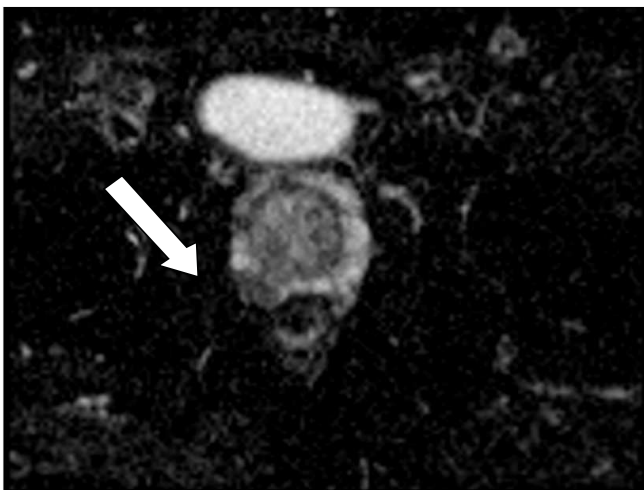
In all 11 cases the main tumor focus (>0.5 cm) was correctly located by MRI. As for tumor location (unila-

Work done at the Departments of Urology and Radiology, Hospital Universitário Clementino Fraga Filho – Universidade Federal do Rio de Janeiro - HUCFF-UFRJ - Rio de Janeiro, Brazil.

1. Resident, Urology Service, Hospital Universitário Clementino Fraga Filho – Universidade Federal do Rio de Janeiro Rio de Janeiro, Brazil; 2. Associate Professor, Department of Surgery, Universidade Federal do Rio de Janeiro- Rio de Janeiro, Urology Service, Hospital Universitário Clementino Fraga Filho, Rio de Janeiro, Brazil; 3. M.D., Radiologist, CDPI and Multi-Imagem; Master's Degree Graduate, Radiology Department, Hospital Universitário Clementino Fraga Filho – Universidade Federal do Rio de Janeiro Rio de Janeiro, Brazil.



**Figure 1** - T2-weighted image showing hypointense nodular area in the prostate peripheral zone in the middle third to the right (arrow).



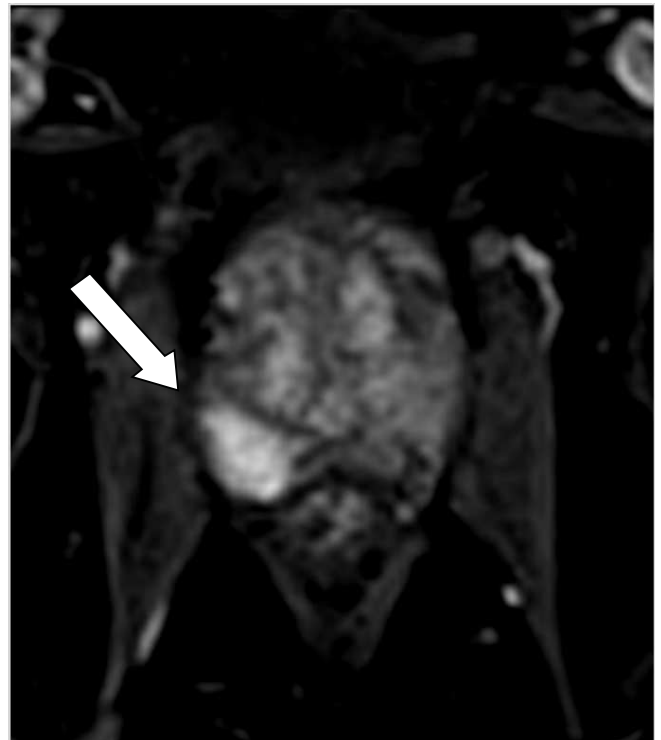
**Figure 2** - Map of apparent diffusion coefficient showing hypointense area in the same location that the image weighed in T2, suggesting high cellularity (arrow).

teral x bilateral), MRI showed a sensitivity of 78% and specificity of 100%, with an accuracy of 82%. The lowest sensitivity was due to microscopic foci (<0.5 cm) of bilateral disease, undetectable by MRI. In search of extracapsular

## RESUMO

Estadiamento loco-regional convencional para adenocarcinoma de próstata tem sido demonstrado um tanto quanto subdiagnosticado. Por isso, RM da próstata está emergindo como uma ferramenta importante para o estadiamento pré-cirúrgico. Técnicas avançadas, como a difusão e valorização de contraste dinâmico também contribuem para aumentar a sua acurácia. Neste estudo preliminar, a RM de próstata foi comparada com amostras de histopatologia, alcançando sensibilidade de 78% / especificidade de 100% para a localização do tumor; sensibilidade de 33% / especificidade de 100% para extensão extra-capsular; 100% de sensibilidade / especificidade e 100% da extensão das vesículas seminais. É possível acreditar que estes resultados preliminares são promissores, e mais casos tendem a confirmar estes dados.

**Descritores:** Neoplasias da próstata. Estadiamento de neoplasias. Espectroscopia de ressonância magnética. Histopatologia.



**Figure 3** - Dynamic contrast enhancement demonstrating early and intense uptake by suspected nodular area, suggesting neoangiogenesis (arrow).

extension, MRI had a sensitivity of 33%, 100% specificity and accuracy of 82%. Only one case had seminal vesicle invasion, which was correctly identified by MRI. There were no cases of lymph node invasion in any of the methods.

## DISCUSSION

Anticipating the results of histopathology, thus optimizing neoplasia staging, is a big challenge in radiology. Although we are dealing with a method dependent on experience and training of the radiologist and ours is a small sample, initial results are promising. The use of magnetic resonance imaging in preoperative staging of prostate adenocarcinoma attempts to predict events that may influence surgical approach and the patient's postoperative staging<sup>5</sup>. More cases to be aggregated in this study can generate analyses with a higher degree of statistical significance.

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### Contact with author:

Manoel Eduardo Daumas Caldas

E-mail: [manoel.caldas@yahoo.com.br](mailto:manoel.caldas@yahoo.com.br)