



# Patients' anxieties and fears: a comparison between transrectal prostate biopsy and prostate MRI

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**Background:** Prostate biopsies are an invasive procedure that can lead to anxieties and fear before the examination. Prostate magnetic resonance imaging (MRI) is seen as a non-invasive test although it is known that “scanxiety” affects many patients. Transrectal ultrasound (TRUS)-guided prostate biopsies and multiparametric prostate MRI (mpMRI) are commonly used methods in patients with suspected prostate cancer (PCa). This study investigates fears and anxieties towards the TRUS and mpMRI.

**Methods:** All patients scheduled for mpMRI or TRUS biopsy between January and December 2018 were asked to participate in this single-center study. A total of 196 completed questionnaires were returned and included.

**Results:** On a 5-point Likert scale the fear of the examination was lower for the mpMRI [1.53; 95% confidence interval (CI): 1.38 to 1.69] than for a TRUS biopsy (2.47; 95% CI: 2.21 to 2.71). In detail, patients with a scheduled TRUS biopsy had significantly higher levels for fear of pain [2.49 (95% CI: 2.19 to 2.78) vs. 1.51 (95% CI: 1.35 to 1.67);  $P < 0.001$ ] and fear of complications [2.71 (95% CI: 2.45 to 2.98) vs. 2.11 (95% CI: 1.89 to 2.32);  $P = 0.001$ ]. There was no relevant difference about the fact that patients knew what to expect [3.02 (95% CI: 2.68 to 3.35) vs. 2.99 (95% CI: 2.70 to 3.26);  $P = 0.47$ ] and the expectation that the examination will go over well [3.24 (95% CI: 2.92 to 3.57) vs. 3.27 (95% CI: 3.00 to 3.58);  $P = 0.55$ ].

**Conclusions:** On average, fear levels were moderate before mpMRI and TRUS biopsy. Patients are more afraid of TRUS biopsy than mpMRI but the differences were low. The biggest fear remains the fear of the result of the examinations independently of the method.

**Keywords:** Prostate multiparametric prostate magnetic resonance imaging (prostate mpMRI); prostate biopsy; prostate cancer (PCa); patient preference; transrectal ultrasound (TRUS)

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## Introduction

Prostate cancer (PCa) is the second most common cause of cancer-related death in men. Its incidence rises and it will double by 2030 as the global population ages (1). Current guidelines state that an ultrasound-guided biopsy is standard

of care for PCa detection. Often a transrectal ultrasound (TRUS)-guided biopsy is performed. Multiparametric prostate magnetic resonance imaging (mpMRI) has evolved during the last decade. Sensitivity and specificity of mpMRI have been extensively analyzed. By now, the current

European Association of Urology (EAU) guidelines on PCa present diagnostic pathways that include mpMRI after an initial risk assessment as well as direct biopsy indications (2). This more prominent role of mpMRI is the result of multiple publications that showed the diagnostic value of mpMRI (3-7). Both, TRUS and mpMRI, are invasive procedures from a patient's point of view.

It has been published that the majority of patients perceive prostate biopsies as a traumatic experience, physically and psychologically (8). Some regard the procedure as significantly painful (9). Six percent of patients judged that the procedure should be performed under general anaesthesia (10). Due to the invasive nature of a prostate biopsy there is a small risk of infection (below 3%) (11). TRUS biopsies are associated with a risk of complications and pain (12).

It is known that MRI can cause anxiety in patients, most often because of claustrophobia. 14.2% of patients need tranquillizers prior to the exam and up to 5% abort the MRI examination due to anxiety (13). One study found that 10% of patients suffer from panic or claustrophobia during an MRI examination (14), while another study published that up to 30% of patients suffer from severe anxiety reactions (15). Katznelson *et al.* assume that prevalence

of claustrophobia and anxiety is higher than previously published (16). Lately, studies on the topic of "scanxiety", a word derived from scan and anxiety, became popular on PubMed with 25 studies published since 2018.

The commonly used TRUS biopsy and the evolving mpMRI are two methods available to assess patients with suspected PCa. Although it is often assumed that mpMRI will be chosen over biopsy (17) patients' preferences towards the one or the other method have not been analyzed yet.

The assumption that patients would choose mpMRI over TRUS needs to be verified and patients' fears regarding these examinations need to be investigated. Therefore, the aim of this study is to compare TRUS and mpMRI regarding the level of patients' fears and worries, comfort during the procedure as well as patients' preference towards these examinations. Influence of prior examinations, whether TRUS or mpMRI, on fear levels are assessed. We present this article in accordance with the TREND reporting checklist (available at <https://tau.amegroups.com/article/view/10.21037/tau-24-239/rc>).

## Methods

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was granted approval by the institutional review board at the Medical University of Innsbruck (EK-Nr. 1162/2017). Patients were informed about the study. Patients were sent the questionnaire and written consent was obtained from all participants, who returned the questionnaire.

Patients scheduled for a prostate MRI or a TRUS biopsy during January and December 2018 were asked to participate in this single-centre study. The decision by the referring physician to request a TRUS biopsy or a mpMRI and the indication for the examination [e.g., rise in prostate-specific antigen (PSA) or routine annual assessment] were not scrutinized. Patients received a letter 1 to 4 weeks prior to the planned examination. They were asked to complete the questionnaires and to return them to Radiology Department in an enclosed return envelope on the day of their examination.

The questionnaire evaluated the fear of examination, fear of pain during the examination, fear of results, and fear of complications. As there is no validated questionnaire for the specific study question patients were given a set of questions which are often associated with fear and anxieties. Patients could rate if the fear of MRI or the fear of TRUS biopsy was greater compared to each other. Patients were

### Highlight box

#### Key findings

- Patients are more afraid of prostate biopsies than of prostate magnetic resonance imaging (MRI).
- The differences in the level of fear between prostate biopsies and MRI are very low.
- Both, prostate biopsies and prostate MRI, are well tolerated.

#### What is known and what is new?

- Prostate biopsy is an invasive test in patients with suspected prostate cancer (PCa). Prostate MRI now has a role in the primary diagnostics of PCa as well.
- It has been published, that prostate biopsies are painful and that up to 30% of patients suffer from anxiety reactions during MRI.
- Our study shows that the levels of fear of patients prior to prostate MRI are lower than prior to prostate biopsy, but on a five-point Likert scale the difference is small.

#### What is the implication, and what should change now?

- The idea of sparing patients a prostate biopsy seems unnecessary as the differences of levels of fear between prostate biopsies and prostate MRI are small on a five-point Likert scale.
- In order to choose the appropriate exam for patients many factors are important, but prostate biopsy and prostate MRI are both well tolerated.

**Table 1** Group characteristics

Scheduled examination	Prostate MRI	TRUS biopsy
Questionnaires sent out	243	143
Included	126	70
Age (years)	65.6±7.1	65.7±7.8
Prior biopsy	94 (74.6)	38 (54.3)
Number of prior biopsies		
1	56 (44.4)	24 (34.3)
2	25 (19.8)	9 (12.9)
≥3	13 (10.3)	5 (7.1)
Prior MRI	75 (59.5)	51 (72.9)
Number of prior MRI		
1	40 (31.7)	32 (45.7)
2	28 (22.2)	15 (21.4)
≥3	7 (5.6)	4 (5.7)

Data are presented as n, mean ± SD, or n (%). MRI, magnetic resonance imaging; TRUS, transrectal ultrasound; SD, standard deviation.

asked if they knew what to expect and if they thought the examination would go well. If the patient already had a prior MRI or TRUS biopsy, they were asked if this prior examination was unpleasant, painful or memorable, as well as if they would repeat the examination if necessary.

Prostate MRI were performed in the following manner: a 3-T Magnetom Skyra MRI machine (Siemens AG, Erlangen, Germany) with a bore width of 70 cm was used. The duration of the examination was up to 30 minutes. No rectal coil was used. The imaging protocol followed the Prostate Imaging Reporting and Data System (PI-RADS) guidelines. All patients received butylscopolamine and gadolinium intravenously. No anxiolytic drugs were administered.

Prostate biopsies in Radiology Department were performed in the operating room. Patients were placed in lithotomy position. A prophylactic antibiotic was given (cefuroxime 1.5 g) Patients received a regional anaesthesia in the periprostatic neurovascular bundle using 10 mL 1% lidocaine. The urologist took 10 samples during a randomised biopsy. If mpMR images were available an MRI/TRUS technical fusion biopsy was performed before the randomised biopsy by a dedicated uro-radiologist who took five targeted biopsy cores. The fusion biopsies were

followed by systematic biopsies within the same session. A LOGIQ 9 ultrasound machine (GE Healthcare, Chicago, IL, USA) was used.

### Statistical analysis

All data were collected and stored in Microsoft Excel 16.16.9 (Microsoft Corporation, Redmond, WA, USA). Statistical analysis was carried out in GraphPad Prism 7.0c (GraphPad Software Inc., La Jolla, CA, USA) and SPSS Statistics 23.0 (IBM Corporation, Armonk, NY, USA).

The number of prior biopsies and prior MRIs is given as mean [95% confidence interval (CI)]. Likert scale-based items (fear of examination, sleep disturbance, fear of pain, fear of complications, expectation, that everything would go well, knowing what to expect and whether mpMRI or TRUS biopsy was worse compared to each other) are reported as mean with 95% CI. According bar-plots depict mean and standard error of the mean (SEM). A Kruskal-Wallis test was used to compare the above parameters between the MRI and TRUS group, results are given as mean (95% CI) and P values. The same was carried out for parameters relating to prior experiences of mpMRI and TRUS biopsy (unpleasantness, painfulness, and readiness to repeat the examination). Finally, an ordinal regression analysis was carried out to evaluate whether the number of prior TRUS biopsies or mpMRI had an influence on the reported fear level prior to the scheduled examination both in the TRUS group and MRI group. Results are given as odds ratio (OR) with 95% CI and P value. P values <0.05 were considered significant.

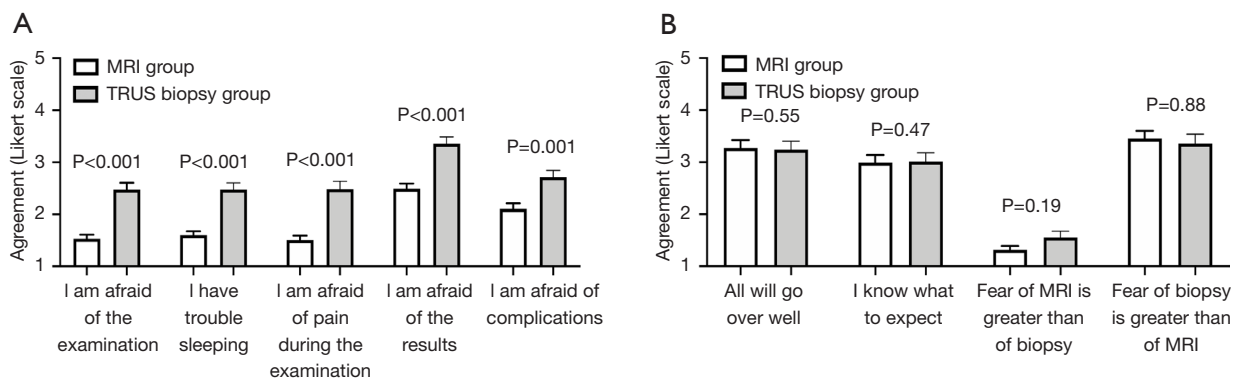
## Results

### Patient characteristics

Three hundred and seventy-seven questionnaires were sent to patients (143 TRUS biopsy, 234 mpMRI), overall 196 (70 TRUS biopsy, 126 mpMRI) returned the questionnaires and were included in this study. The mean age was 65.6±7.3 years. The questionnaire contained statements and patients were asked to rate their agreement to the statements on a 1 to 5 scale (1= I do not agree at all; 5= I completely agree).

For an overview of group characteristics, please refer to *Table 1*.

For both groups fear levels were low to moderate before the examination: On a five-point Likert scale, the average fear of the examination was 1.87 (95% CI: 1.72 to 2.02), the



**Figure 1** Comparison of experiences of prior MRI examination (A) or prior biopsy (B) in the MRI and TRUS biopsy group. MRI, magnetic resonance imaging; TRUS, transrectal ultrasound.

degree of sleep disturbances regarding the upcoming event was 1.78 (95% CI: 1.64 to 1.92), the fear of pain was 1.86 (95% CI: 1.70 to 2.02), and the fear of complications was 2.34 (95% CI: 2.16 to 2.50), with only the fear of results being moderate to high at 2.81 (95% CI: 2.65 to 2.97).

Patients expressed high confidence that the examinations would go over well (3.26; 95% CI: 3.04 to 3.49) and that they knew what to expect (3.00; 95% CI: 2.78 to 3.22). As a surrogate parameter for general fears of contact with the health care system, patients were asked on their motivation to see a doctor in general. They reported a moderate motivation to see a doctor in general (2.40; 95% CI: 2.21 to 2.59).

#### **Patients' expectations: comparison between TRUS and MRI group**

Patients with a scheduled TRUS biopsy had significantly higher levels for fear of examination [2.47 (95% CI: 2.21 to 2.71) vs. 1.53 (95% CI: 1.38 to 1.69);  $P<0.001$ ], sleep disturbances [2.47 (95% CI: 2.21 to 2.23) vs. 1.60 (95% CI: 1.44 to 1.75);  $P<0.001$ ], fear of pain [2.49 (95% CI: 2.19 to 2.78) vs. 1.51 (95% CI: 1.35 to 1.67);  $P<0.001$ ], fear of results [3.36 (95% CI: 3.10 to 3.62) vs. 2.50 (95% CI: 2.31 to 2.69);  $P<0.001$ ], and fear of complications [2.71 (95% CI: 2.45 to 2.98) vs. 2.11 (95% CI: 1.89 to 2.32);  $P=0.001$ ] (Figure 1A), while there was no relevant difference in regard to expectations that the examination would go over well [3.24 (95% CI: 2.92 to 3.57) vs. 3.27 (95% CI: 3.00 to 3.58);  $P=0.55$ ], or that patients knew what to expect [3.02 (95% CI: 2.68 to 3.35) vs. 2.99 (95% CI: 2.70 to 3.26);  $P=0.47$ ]. Patients rated their fear of mpMRI not significantly higher, when they had a TRUS biopsy scheduled compared to

patient planned for an mpMRI [1.55 (95% CI: 1.31 to 1.80) vs. 1.32 (95% CI: 1.17 to 1.46);  $P=0.19$ ]. Likewise, the fear of TRUS biopsy (compared to MRI) was not different in the TRUS group compared to the MRI group [3.36 (95% CI: 3.00 to 3.72) vs. 3.46 (95% CI: 3.17 to 3.75);  $P=0.88$ ] (Figure 1B).

#### **Patients' prior experiences**

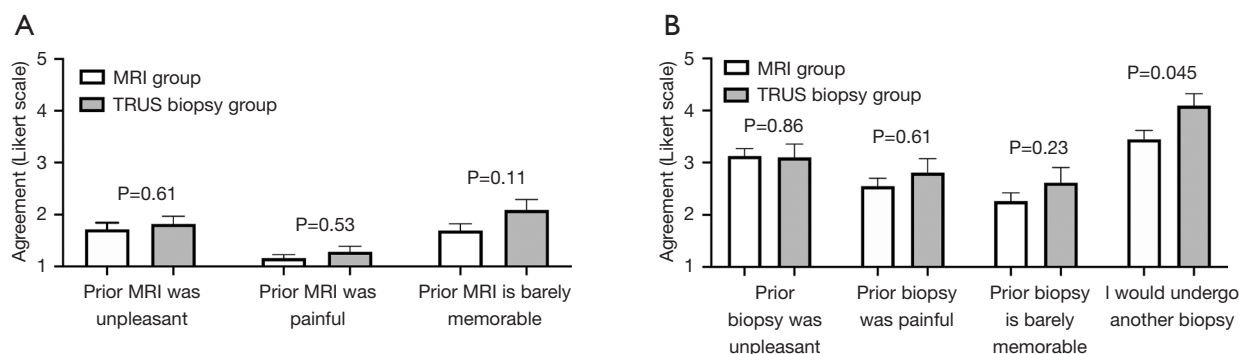
There was no significant difference between both groups regarding the experience of unpleasantness, pain or memorability of prior mpMRI (Figure 2A) or unpleasantness, painfulness and memorability of prior TRUS biopsy, only the readiness to repeat the biopsy was higher in the TRUS group (Figure 2B).

#### **Influence of prior examinations on fear levels before TRUS biopsy and mpMRI**

The Likert-based fear level was not influenced significantly by the number of prior TRUS biopsies or prior mpMRI in either group. In the TRUS group, the ORs were 1.044 (95% CI: 0.815 to 1.338;  $P=0.73$ ) for an increasing number of prior biopsies and 1.069 (95% CI: 0.686 to 1.665;  $P=0.76$ ) for an increasing number of prior mpMRI. In the MRI group, the ORs were 0.712 (95% CI: 0.468 to 1.084;  $P=0.08$ ) for an increasing number of prior biopsies and 1.019 (95% CI: 0.689 to 1.507;  $P=0.93$ ) for an increasing number of prior mpMRI.

#### **Discussion**

Prostate MRI has been evaluated over the last decade and



**Figure 2** Comparison of fear levels and sleep disturbance (A), as well as general attitude and expectation to MRI vs. TRUS biopsy (B). MRI, magnetic resonance imaging; TRUS, transrectal ultrasound.

there are continuously new publications on this topic. But most publications focus on PCa detection rates (18-20).

Today, mpMRI has a role in the primary diagnostics of PCa additional to the well-established TRUS biopsy. As there are two methods now for patients with suspected PCa, it is important to know patients' fears and feelings as well as preferences towards mpMRI or TRUS biopsy. As a novelty, our study focuses on these aspects and compares mpMRI and TRUS biopsy.

Patients in the TRUS group reported higher levels of fear from the planned procedure, they were more afraid of pain and suffered more from sleep disturbances prior to the examination compared to patients in the MRI group. The differences between the groups were small (about one point on a five-point Likert scale) but statistically significant. It is noteworthy, that patients in the MRI group had a fear of complications, which was only 0.6 points lower than in the TRUS group. This differs from the radiologic perspective, as MRI is generally seen as a non-invasive diagnostic test.

We expected that patients feared TRUS biopsies more than mpMRI, but we did not expect the differences to be so low. Nonetheless, these results seem to support the common assumption that patients would choose mpMRI over TRUS biopsy (17).

Surprisingly, despite these worries, all patients—regardless of TRUS or mpMRI—were equally convinced that the planned examination would go well. Most patients in both groups said they knew what to expect regarding the planned examination. These two favourable findings might be due to good patient information. However, a substantial part of patients had already undergone at least one or both examinations previously and were therefore no novice to the procedures.

Patients' biggest fear was the fear of the results of the examination. This is true for both groups, although patients in the TRUS group were more afraid of the results than patients in the MRI group. It is known that 25–50% of people are worried about cancer (21-23). Our results seem to reflect this general fear of cancer. It is not known how to deal with this fear. But it is known from other severe diseases that patients wish for an early diagnosis (24).

Many patients had previous TRUS biopsies and mpMRI. We asked if patients had a good memory of previous examinations. We found that patients remember previous mpMRI examinations better than previous prostate biopsies. This suggests that laying still in the bore of an MRI machine for 30 minutes is an impressive experience for patients.

Patients did not agree with the statement that mpMRI is unpleasant and agreed even less with the statement that it is painful. The level of agreement to the statement "Prostate biopsy is unpleasant" was about 3 (1= I do not agree at all; 5= I completely agree), but the level of agreement to the statement "Prostate biopsy is painful" was below 3. It is known that memory of pain and its intensity might be inaccurate. While some authors think that the memory of acute pain is overestimated (25,26) others believe that acute pain is underestimated (27). However, the majority of our patients did not report TRUS biopsy as a traumatic experience, as published earlier (8). Our findings conflict with those of Crundwell *et al.* who found that the procedure is significantly painful (9).

We expected that patients would be less fearful after multiple prior TRUS biopsies or mpMRI. To our surprise, this was not the case. The reasons for this result cannot be properly elucidated in our questionnaire-based study and

need to be addressed in further studies.

Patients in both groups said to be more afraid of TRUS biopsies than of mpMRI. Although we did not ask specifically about claustrophobia, our patients did not report high levels of fear prior to mpMRI. This might allow to conclude that the rate of claustrophobia during an MRI examination might not be as high as published earlier (13-16). Despite the fact that patients were more afraid of TRUS biopsies, most patients were willing to repeat a biopsy, if it was deemed necessary for their health.

Fears regarding an upcoming MRI or CT examination are now being described as "scanxiety". This phenomenon has been examined in patients with lung cancer (28), in patients with advanced cancer (29), in patients undergoing a coronary CT angiography (30), and patients with unruptured intracranial aneurysms (31). To reduce fear and anxiety regarding upcoming examinations patients need to understand the process of the examinations, they need practical preparations so they can plan ahead for the examination and should be familiar with relaxations techniques.

Our study has several limitations. It is a questionnaire-based study. Therefore, the validity of the patients' answers cannot be verified. In order to keep the questionnaire simple and to ensure a high return rate, we did not examine possible co-factors, which might enable us to draw conclusions about the patient's personality. There is a potential selection bias, as patients who declined biopsy or mpMRI due to poor previous experiences might not have been included. As always with this study design, it is impossible to know how those, who did not return the questionnaires, feel about the research topic.

## Conclusions

Patients are more afraid of TRUS biopsies than of mpMRI. They find TRUS biopsies more painful, but not as traumatic as previously published. Prostate MRI seems to be better tolerable as published earlier. The differences regarding levels of anxiety are statistically significant, yet they are low. Therefore, we conclude that patients tolerate mpMRI and TRUS biopsies well but would prefer mpMRI over biopsies. The most prominent fear before both examinations is the fear of the results.

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## Footnote

*Reporting Checklist:* The authors have completed the TREND reporting checklist. Available at <https://tau.amegroups.com/article/view/10.21037/tau-24-239/rc>

*Data Sharing Statement:* Available at <https://tau.amegroups.com/article/view/10.21037/tau-24-239/dss>

*Peer Review File:* Available at <https://tau.amegroups.com/article/view/10.21037/tau-24-239/prf>

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <https://tau.amegroups.com/article/view/10.21037/tau-24-239/coif>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by institutional ethics board of the Medical University of Innsbruck (EK-Nr. 1162/2017) and informed consent was taken from all the patients who returned the questionnaire.

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