

# Patients movements during MRI-TRUS fusion prostate biopsy – an un-appreciated phenomenon - quantification and implications on accuracy .

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## Introduction –

MRI Image guided Prostate biopsies are currently a well-established practice, most commonly done using various fusion systems. These procedures are usually done in office settings with local anesthesia only .Patients movements during biopsies are often observed due to pain and discomfort and may impair the accuracy of the MRI-TRUS fusion. To our knowledge the magnitude of such movements, although recognized, was never recorded

## Methods

The Navigo workstation ( UC-Care, Israel) is an electromagnetic based MRI-TRUS fusion system. In addition to the sensor attached to the TRUS probe, a second sensor is attached to the patient's back above the L5 vertebra. This sensor is used as a reference of patient's pelvis movements, hence representing the prostate spatial displacements. Any patient movement (3 axes) is automatically recognized and adjusted for in real time. We recorded continuously the movements of patients undergoing fusion biopsies in the left lateral decubitus position, under either local anesthesia (LA) with peri-prostatic Lidocaine block, or under general anesthesia (GA). The tracking recorded any patients movements starting from the initial prostate scan and up to the conclusion of all the biopsies.

## Results

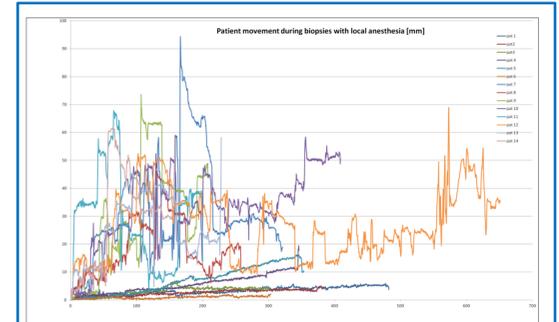
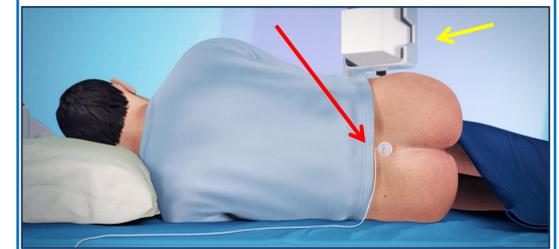
Procedures were done in 2 medical centers (1- Emek m.c., Afula, Israel , 2- Bnai Zion m.c. , Haifa, Israel) between 2014 and 2016. Of the 24 patients - 14 had LA ( Emek m.c.), while 10 had GA ( Bnai Zion m.c.). Procedure time was  $9.9 \pm 3.1$  min and  $9.6 \pm 3.3$  min respectively, average core number was  $13.7 \pm 4$  and  $20.2 \pm 6.4$  respectively. The mean movement during scan phase was  $12.9 \pm 11.5$ mm for LA and  $1.3 \pm 1.9$  mm for GA; the mean maximal movement in the scan phase was  $25.1 \pm 22.5$ mm and  $2.3 \pm 3.2$ mm correspondingly. During biopsies phase mean movement was  $17.8 \pm 13.2$ mm for LA and  $2.1 \pm 1.7$  mm for GA; the mean maximal movement in *biopsies phase* was  $41.7 \pm 31.4$ mm and  $9.7 \pm 7.9$ mm correspondingly. Patients, in both the LA group ( see graph A) or the GA group ( see graph B), showed tendency towards being either “jumpy” or “Calm”,- these characteristics were kept throughout the entire procedure ( i.e. a “jumpy” patient remained “jumpy” , and vice versa).

## Conclusions

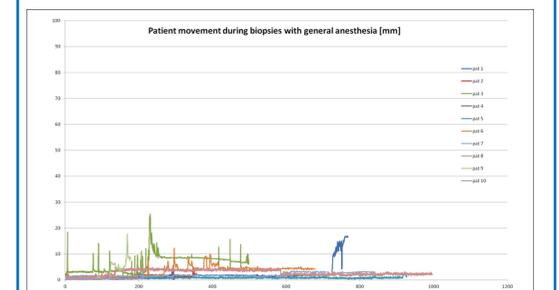
Significant movements were recorded in all patients, but much more so in those under local anesthesia only. Local anesthesia offers inferior pain control and discomfort hence the difference in movement's magnitude. It is mandatory that physicians performing MRI-TRUS fusion biopsies will be aware of these movements and the possible inaccuracy of their guided biopsies. Addressing this inaccuracy is clinically crucial as prostate cancer diagnosis may be significantly affected. Although performing procedures under general anesthesia may lower movements magnitude it does not assure an acceptable minimal movement hence – it does not assure fusion accuracy. It seems mandatory, in patient undergoing biopsy under general anesthesia, and much more so in those getting only local anesthesia, to assure that the fusion system in use is designed so that any patient movement is accounted and adjusted for in real-time.



- Clinic set-up for prostate biopsy with MRI-TRUS fusion.
- The red arrow indicates the location of the body sensor (L5 spinal vertebra).
- The yellow arrow indicates the electromagnetic transmitter.



Graph A – Patients movements under local anesthesia



Graph B – Patients movements under general anesthesia