



3T MRI-guided Transperineal Targeted Prostate Biopsy: Setup and Workflow

Brigham and Women's Hospital, Boston, USA



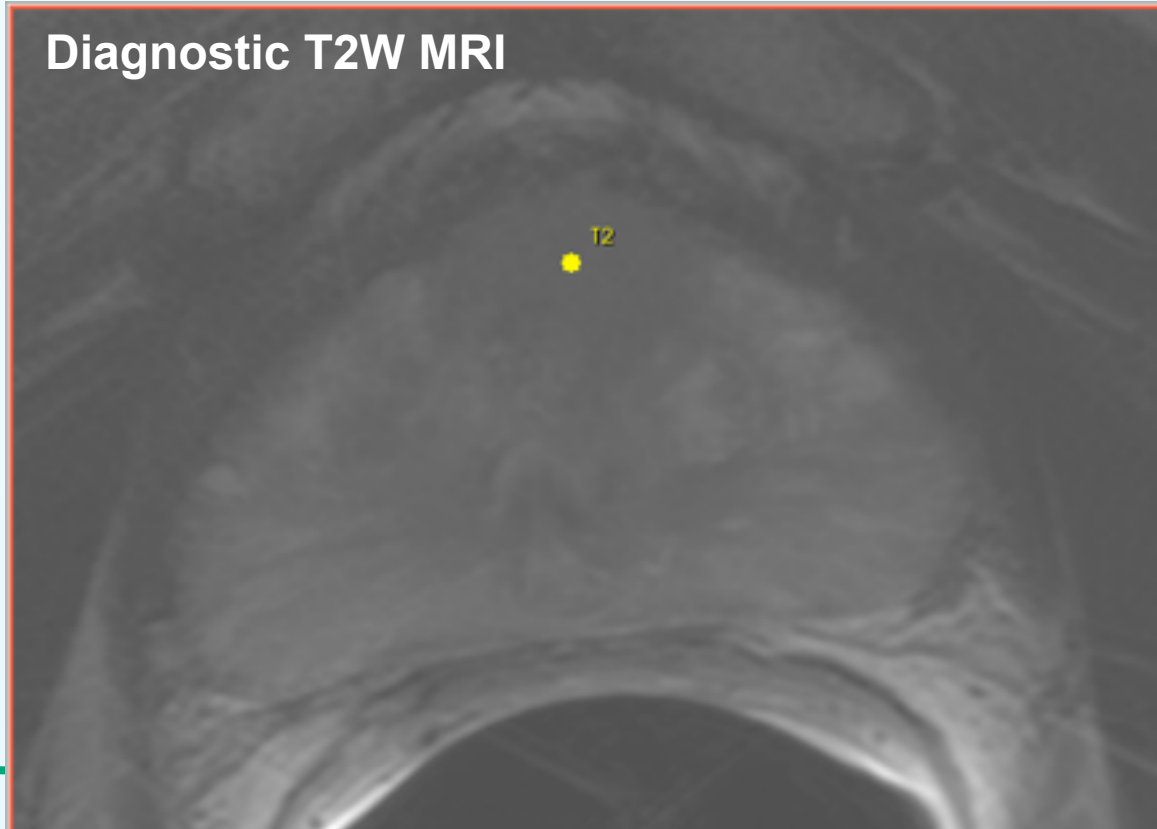


Diagnostic imaging and planning

- Multi-parametric MRI with endorectal coil at 3T [1]
- Pharmacokinetic modeling from DCE MRI
- Biopsy target selection

[1] *GE Signa HDxt 3.0T (GE Medical Systems, Waukesha, WI), Medrad Endorectal Coil (Medrad, Pittsburgh, PA)*

Diagnostic T2W MRI

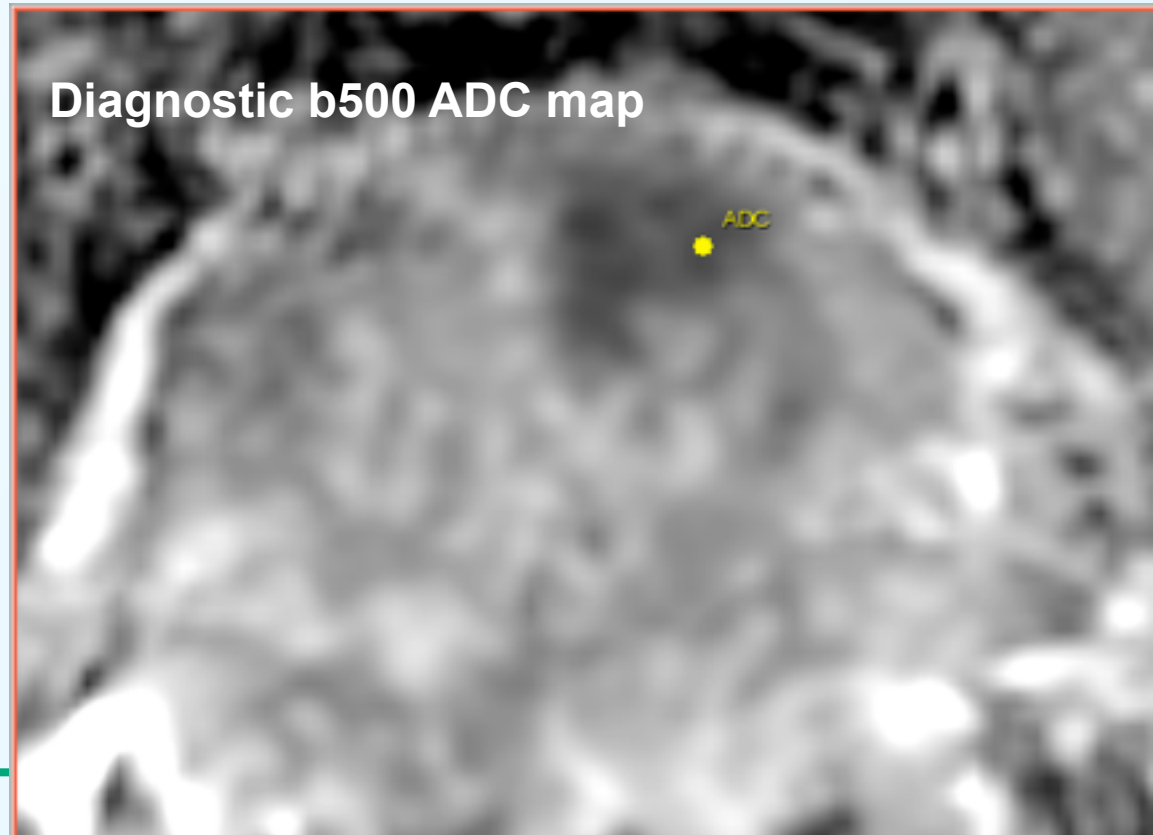




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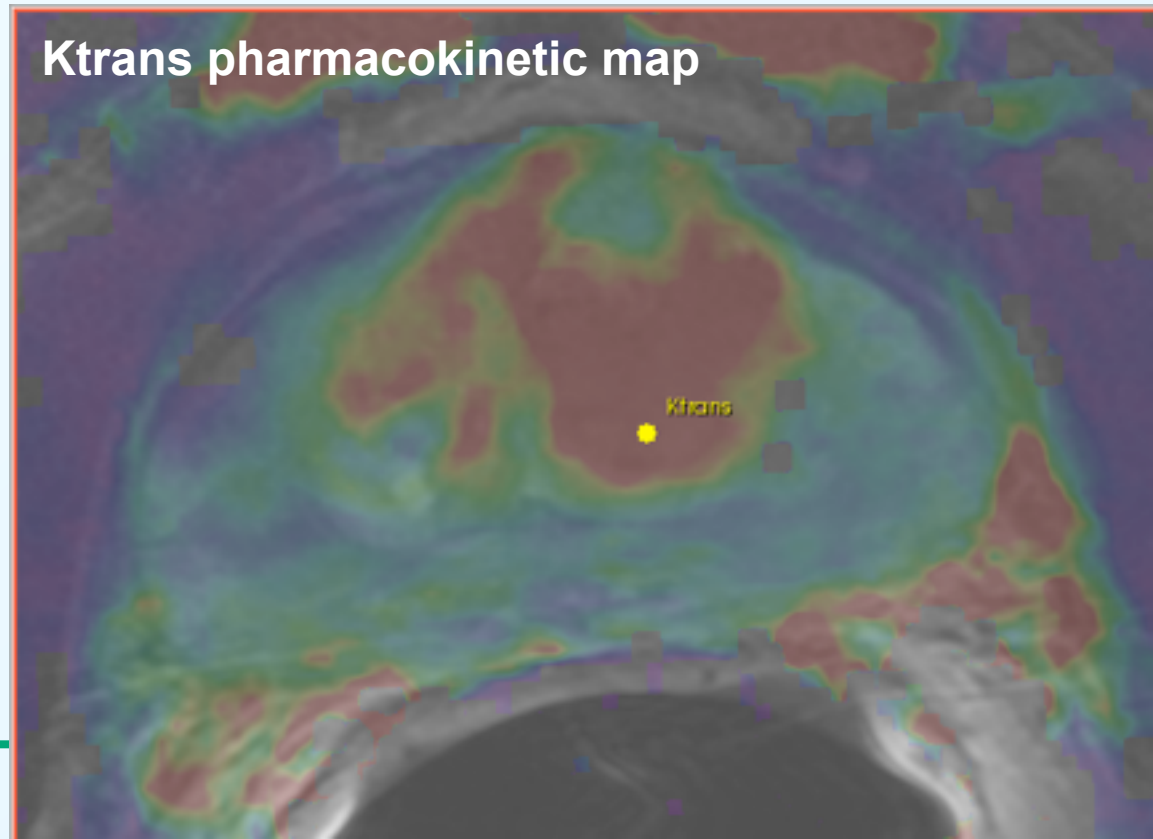


Diagnostic imaging and planning

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[1] *GE OncoQuant research software (GE Research, Niskayuna, NY)*

Ktrans pharmacokinetic map





Diagnostic imaging and planning

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<http://slicer.org>



Prostate Biopsy Technical Form

Patient: _____
MRI Date: _____

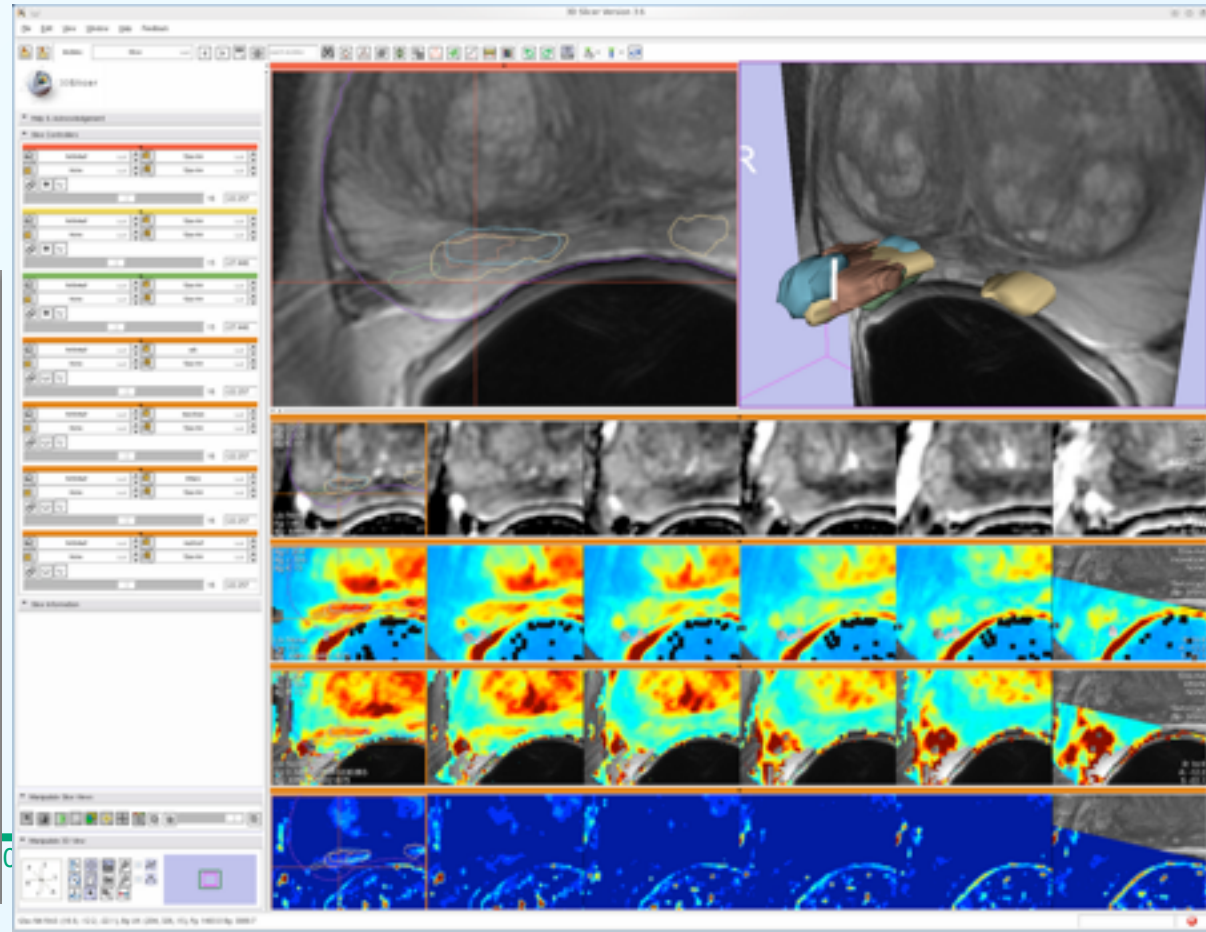
Overall impression (post-biopsy/hemorrhage artifact, image quality):

Confidence scale
Definitely not present = 1
Probably not present = 2
Indeterminate = 3
Probably present = 4
Definitely present = 5

Target suspicion confidence rating

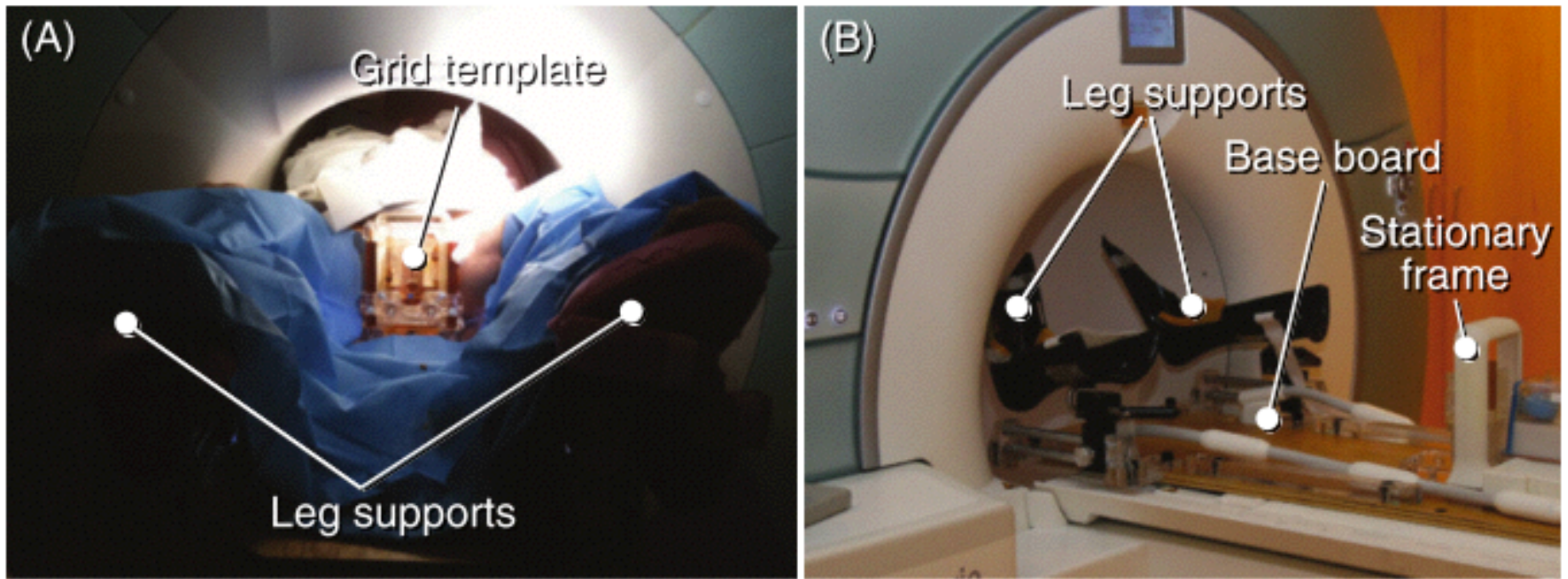
Parameter	Quality	Target confidence			
T2W					
DWI b500					
DWI b1400					
Subtract					
K ^{trans}					
V _e					
Maxslope					
AUC90					
TTP					

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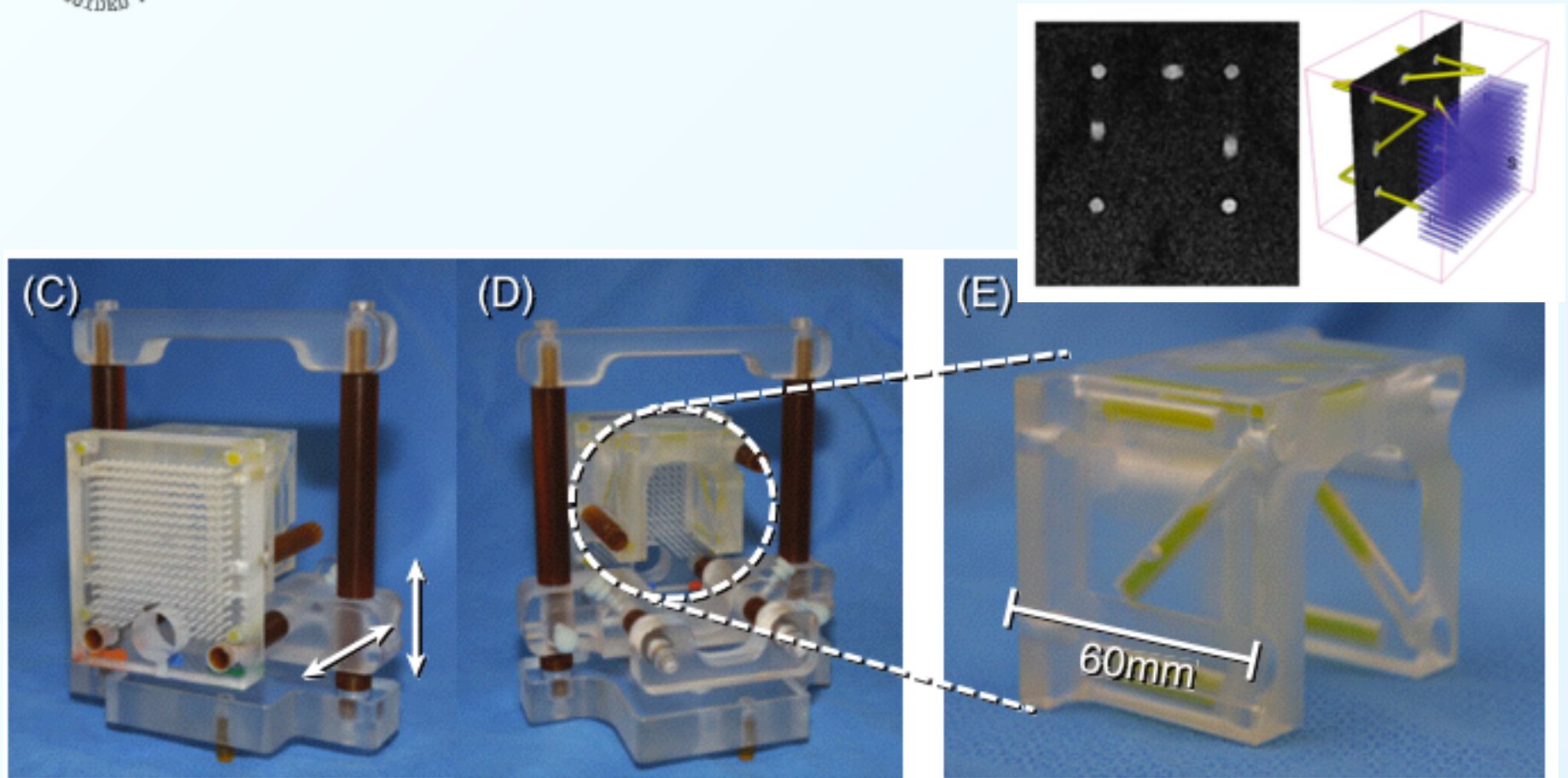
Patient setup

- Closed bore scanner
- Surface and body coils used for imaging (no endorectal coil)
- Patient in lithotomy position



Tokuda J, Tuncali K, Iordachita I, Song S-E, Fedorov A, Oguro S, Lasso A, Fennessy FM, Tempany CM, Hata N. In-bore setup and software for 3T MRI-guided transperineal prostate biopsy. *Physics in medicine and biology*. 2012 September 21;57(18):5823–40.

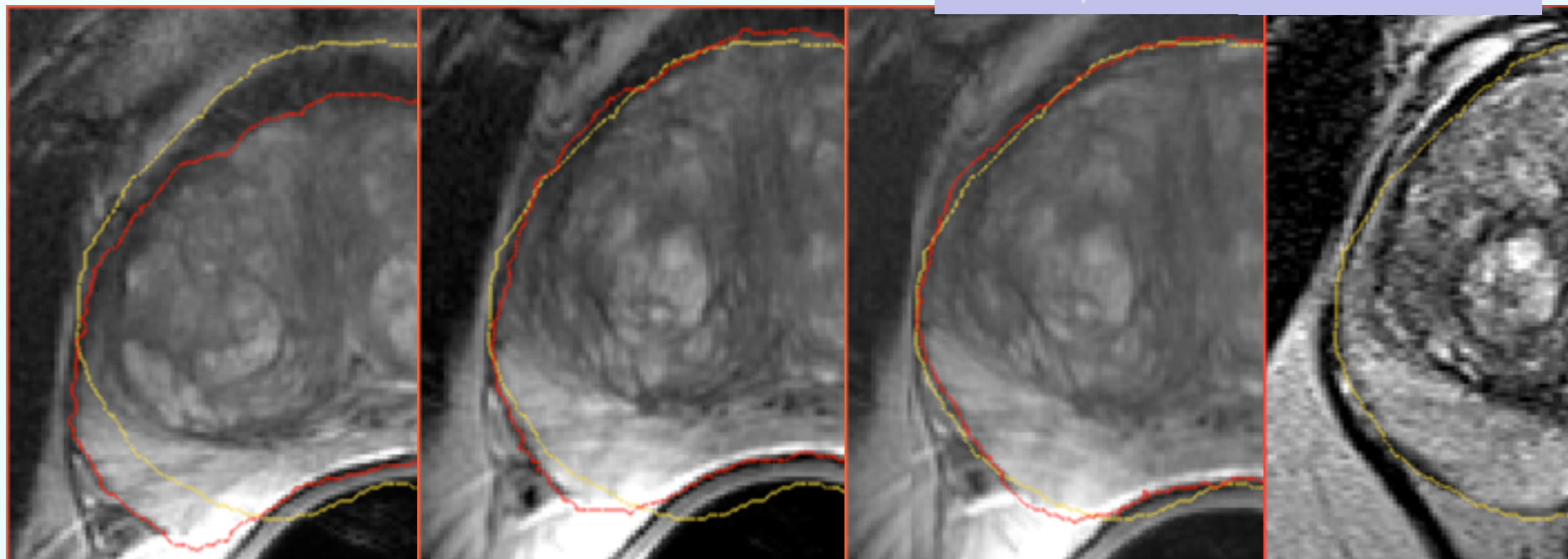
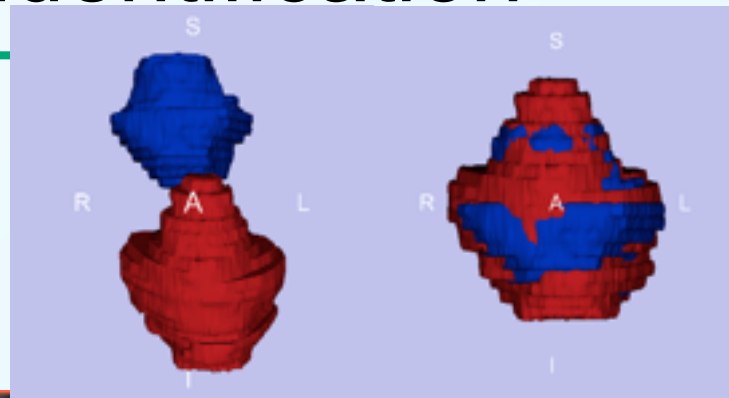
Patient-to-template registration



Tokuda J, Tuncali K, Iordachita I, Song S-E, Fedorov A, Oguro S, Lasso A, Fennessy FM, Tempany CM, Hata N. In-bore setup and software for 3T MRI-guided transperineal prostate biopsy. *Physics in medicine and biology*. 2012 September 21;57(18):5823–40.

Biopsy target re-identification

- Intensity-based registration
- User-guided initialization
- Rigid/affine/deformable transformation



Fedorov A, Tuncali K, Fennessy FM, Tokuda J, Hata N, Wells WM, Kikinis R, Tempny CM. Image registration for targeted MRI-guided transperineal prostate biopsy. *Journal of magnetic resonance imaging: JMRI*. 2012 May 29;36(4):987–992.

Needle insertion plan calculation

3D Slicer Version 3.5 Alpha

File Edit View Window Help Feedback

Modules: ProstateNav

3DSlicer

Workphase
Scanner: OFF
Configuration Calibration Targeting Verification

Wizard
3 / 4. Targeting
Set target points.
Targeting Volume: IM-0001-00011
Target List: ProstateNavTargetList
 Add target by image click Coverage Needle Template

Name	R	A	S	Needle	Or
T1	-15.9...	6.60...	72.1...		0.0
T2	4.16...	1.99...	72.1...		0.0
T3	10.5...	14.6...	72.1...		0.0
T4	-13.1...	15.8...	72.1...		0.0
T5	-69.4...	0.55...	39.8...		0.0

Reformat None
IM-0001-0001-label IM-0001-00011
23 72.129

Reformat None
IM-0001-0001-label IM-0001-00011
139 10.503

Reformat None
IM-0001-0001-label IM-0001-00011
3D Slicer -- Secondary Window



Needle placement confirmation

