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

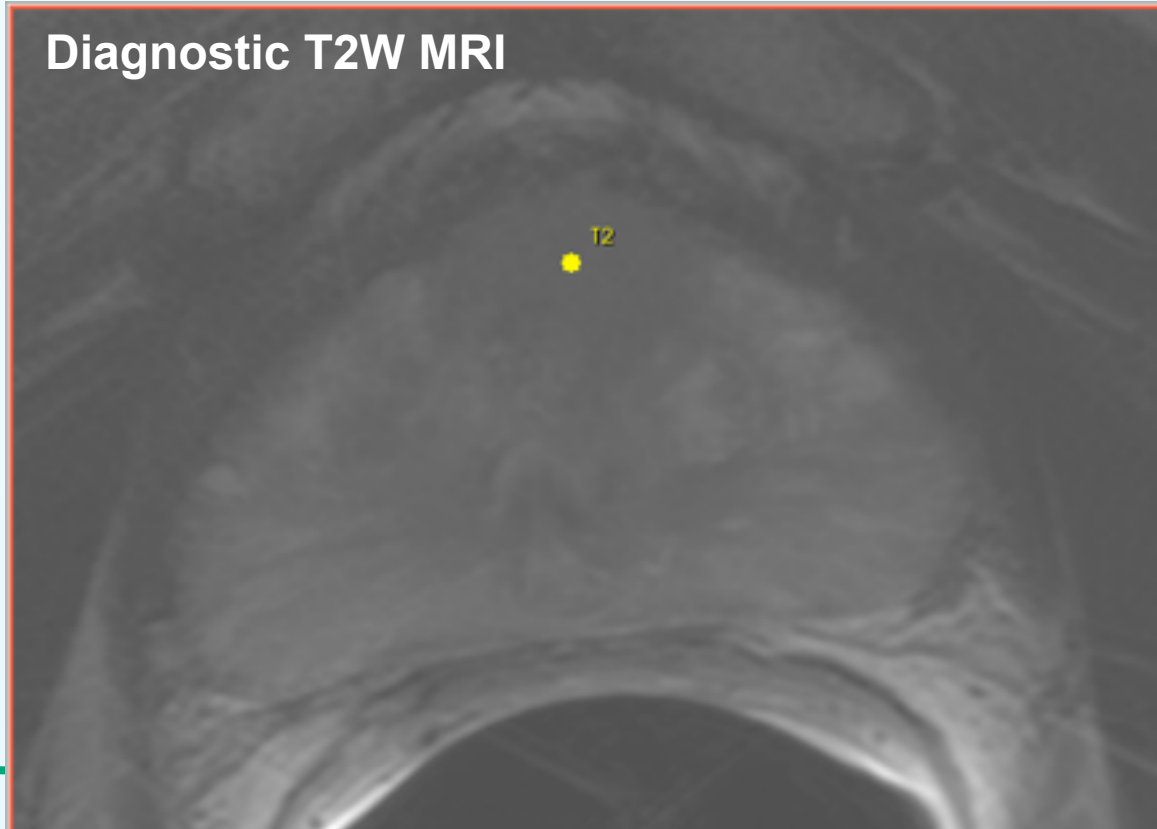### Brigham and Women's Hospital, Boston, USA

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)*

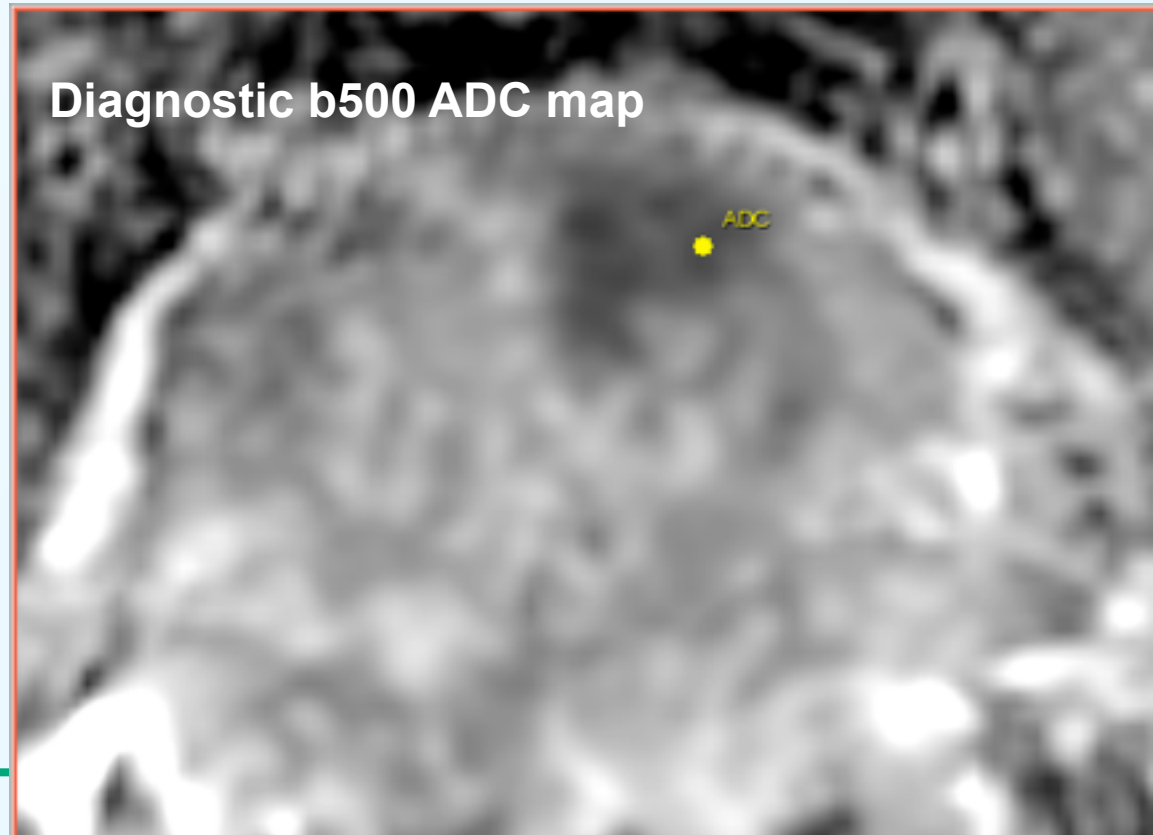**Diagnostic T2W MRI**

T2

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)*
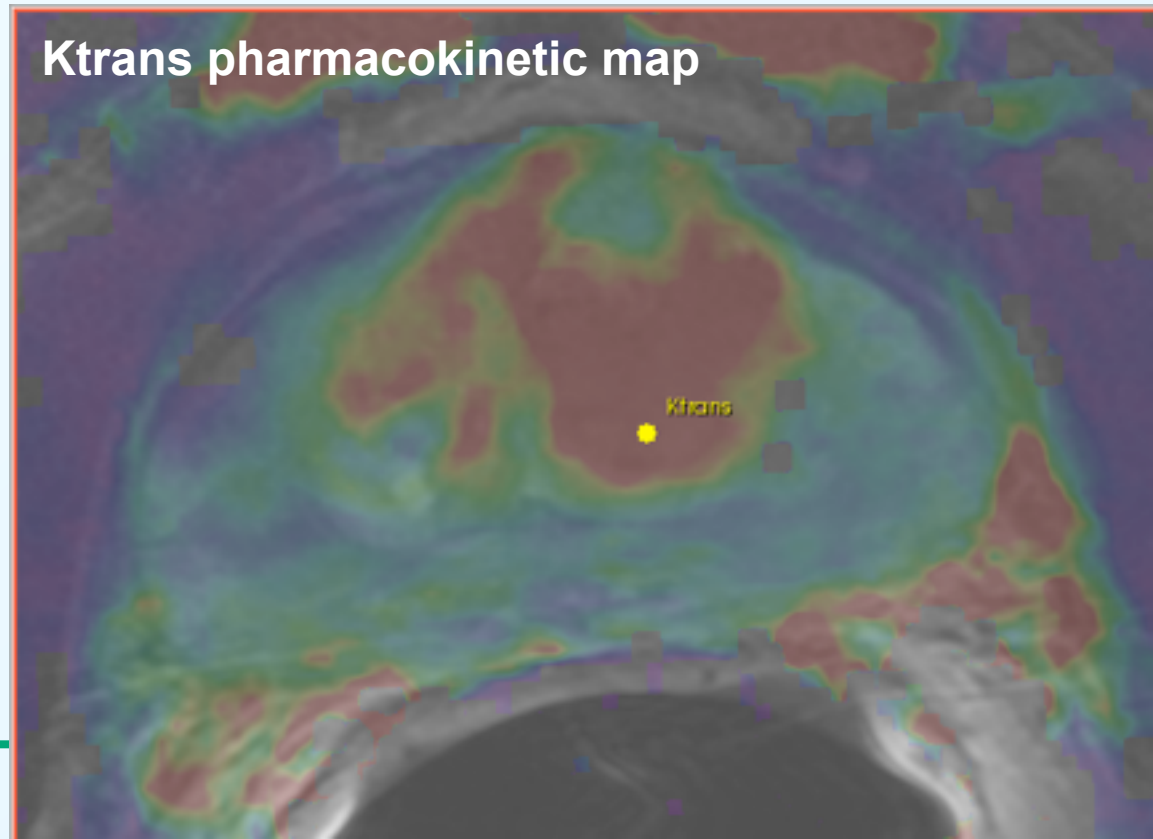

Diagnostic b500 ADC map

Diagnostic imaging and planning

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

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

Ktrans pharmacokinetic map

Diagnostic imaging and planning

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

http://slicer.org

Patient setup

- Closed bore scanner
- Surface and body coils used for imaging (no endorectal coil)
- Patient in lithotomy position
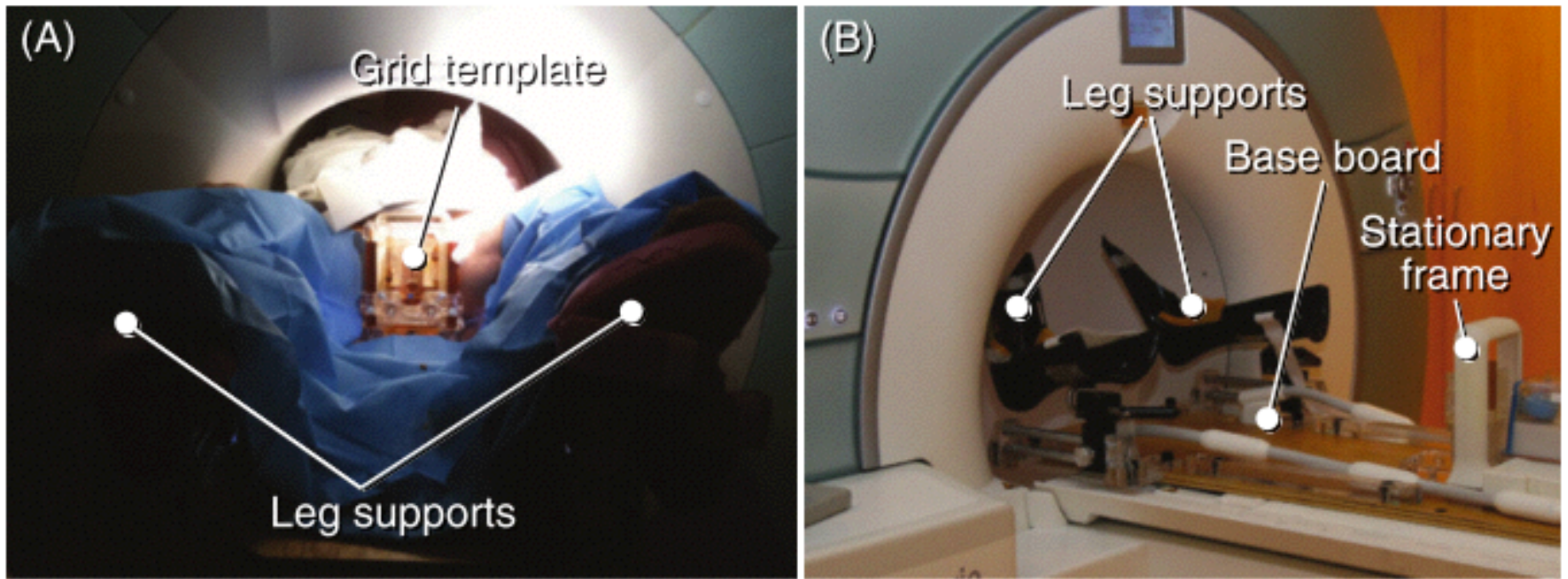
Tokuda J, Tuncali K, Iordachita I, Song S-E, Fedorov A, Oguro S, Lasso A, Fennessy FM, Tempany CM, Hata N. In-bore setup and software for 3T MRI-guided transperineal prostate biopsy. Physics in medicine and biology. 2012 September 21;57(18):5823–40.

Patient-to-template registration
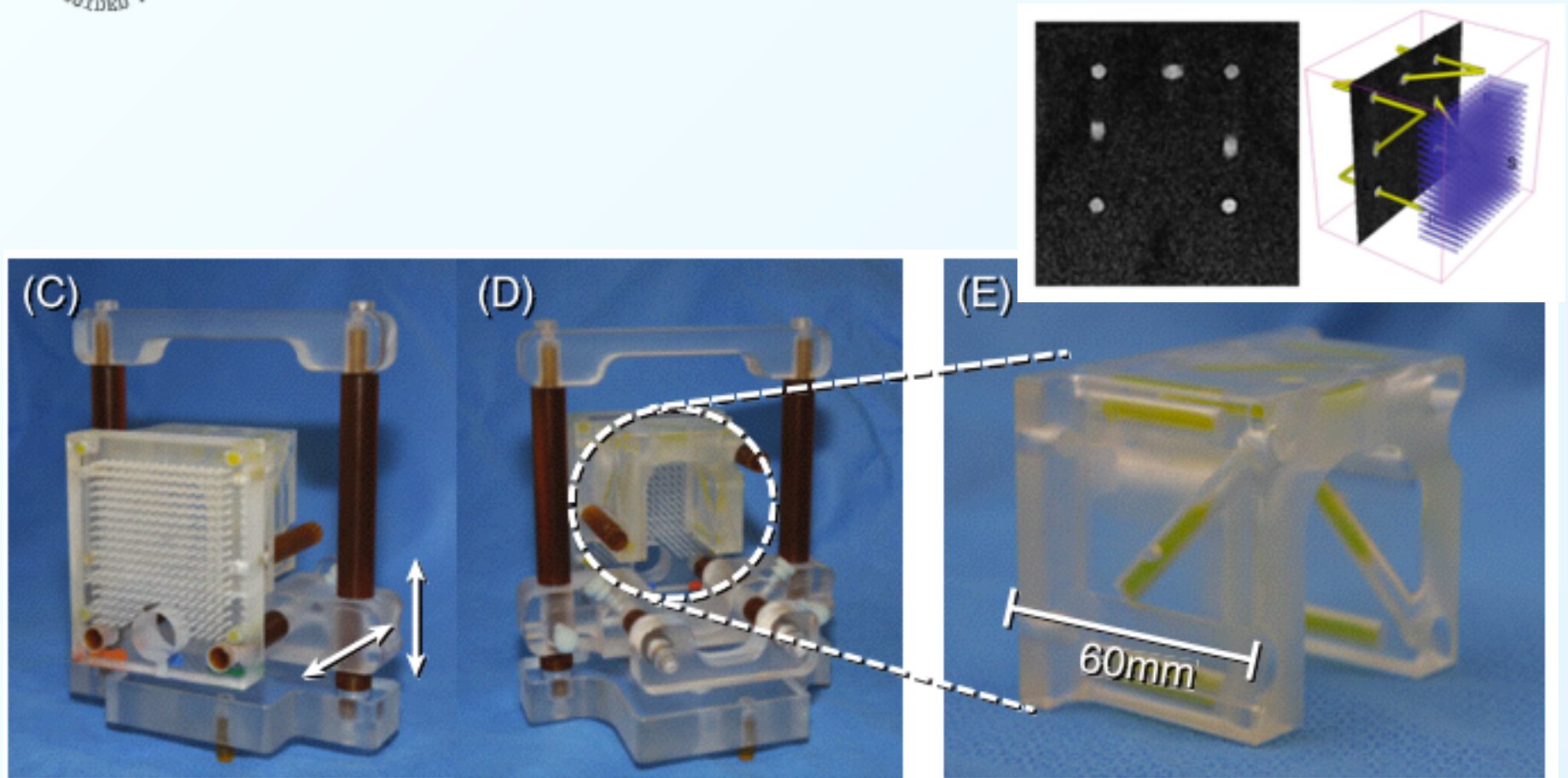
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Biopsy target re-identification

- Intensity-based registration
- User-guided initialization
- Rigid/affine/deformable transformation
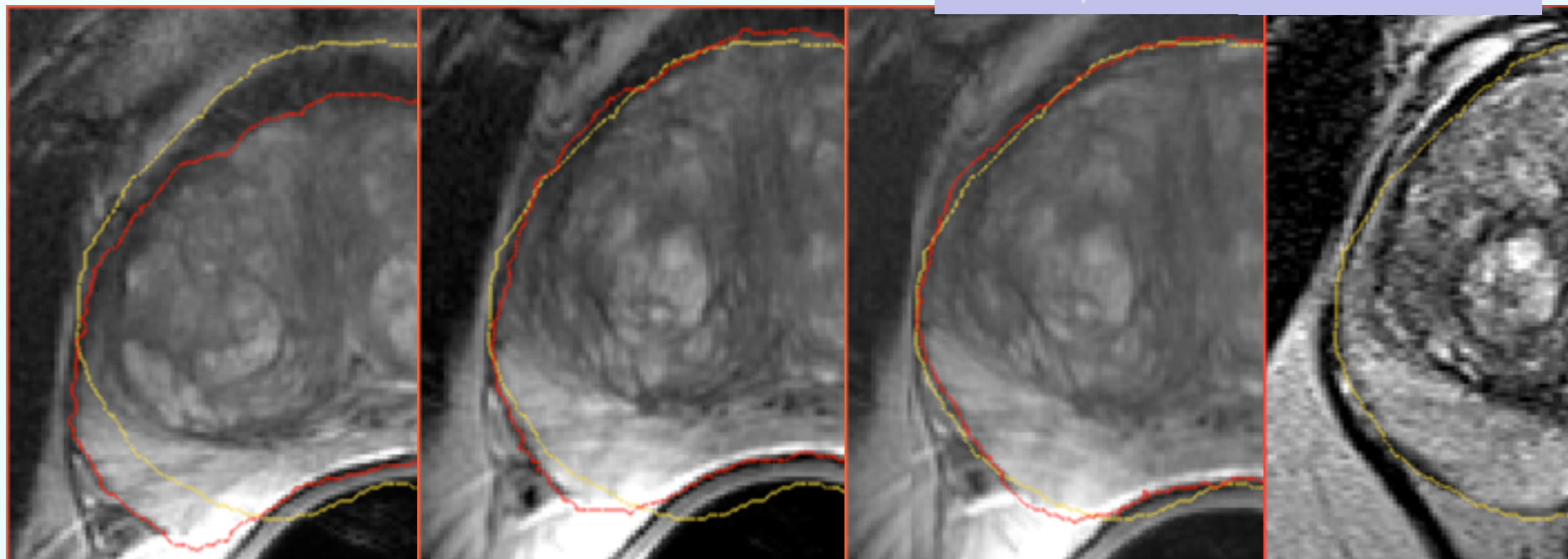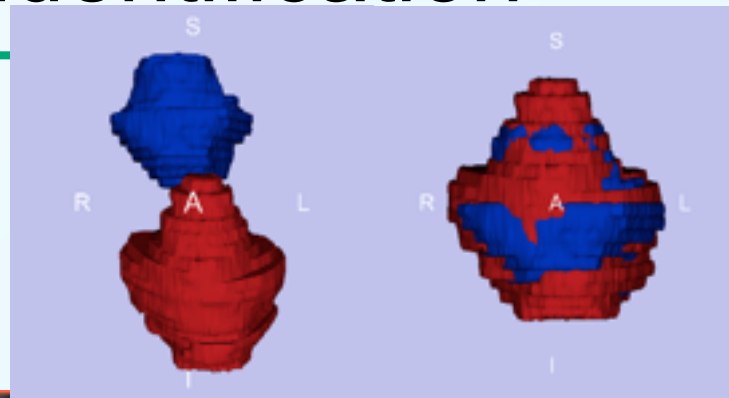
Fedorov A, Tuncali K, Fennessy FM, Tokuda J, Hata N, Wells WM, Kikinis R, Tempany CM. Image registration for targeted MRI-guided transperineal prostate biopsy. Journal of magnetic resonance imaging : JMRI. 2012 May 29;36(4):987–992.

Needle insertion plan calculation

Needle placement confirmation