



Université Claude Bernard



Lyon 1



HIFU FOCAL : TECHNIQUES ET RÉSULTATS

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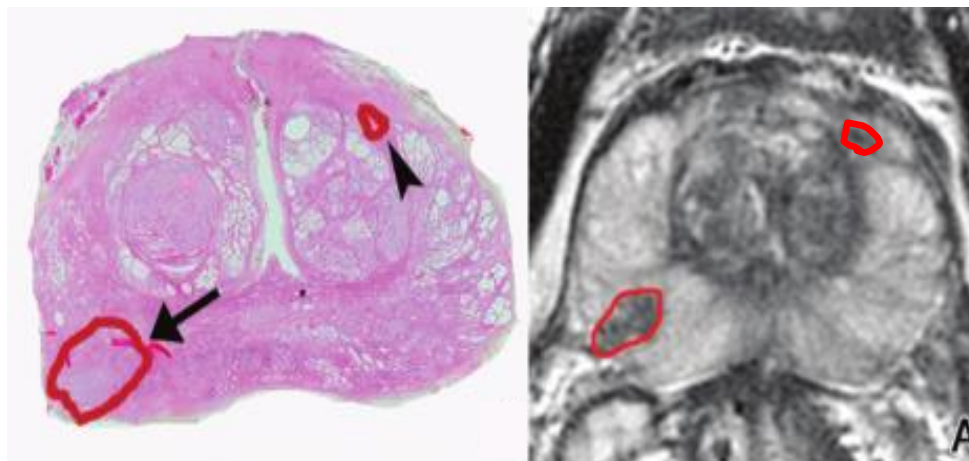
Principes du traitement focal

- Diagnostic et localisation précise
- Traitement du cancer identifié
- Préserver le tissu prostatique normal
- Préserver la fonction urinaire et érectile
- Sans compromettre la survie



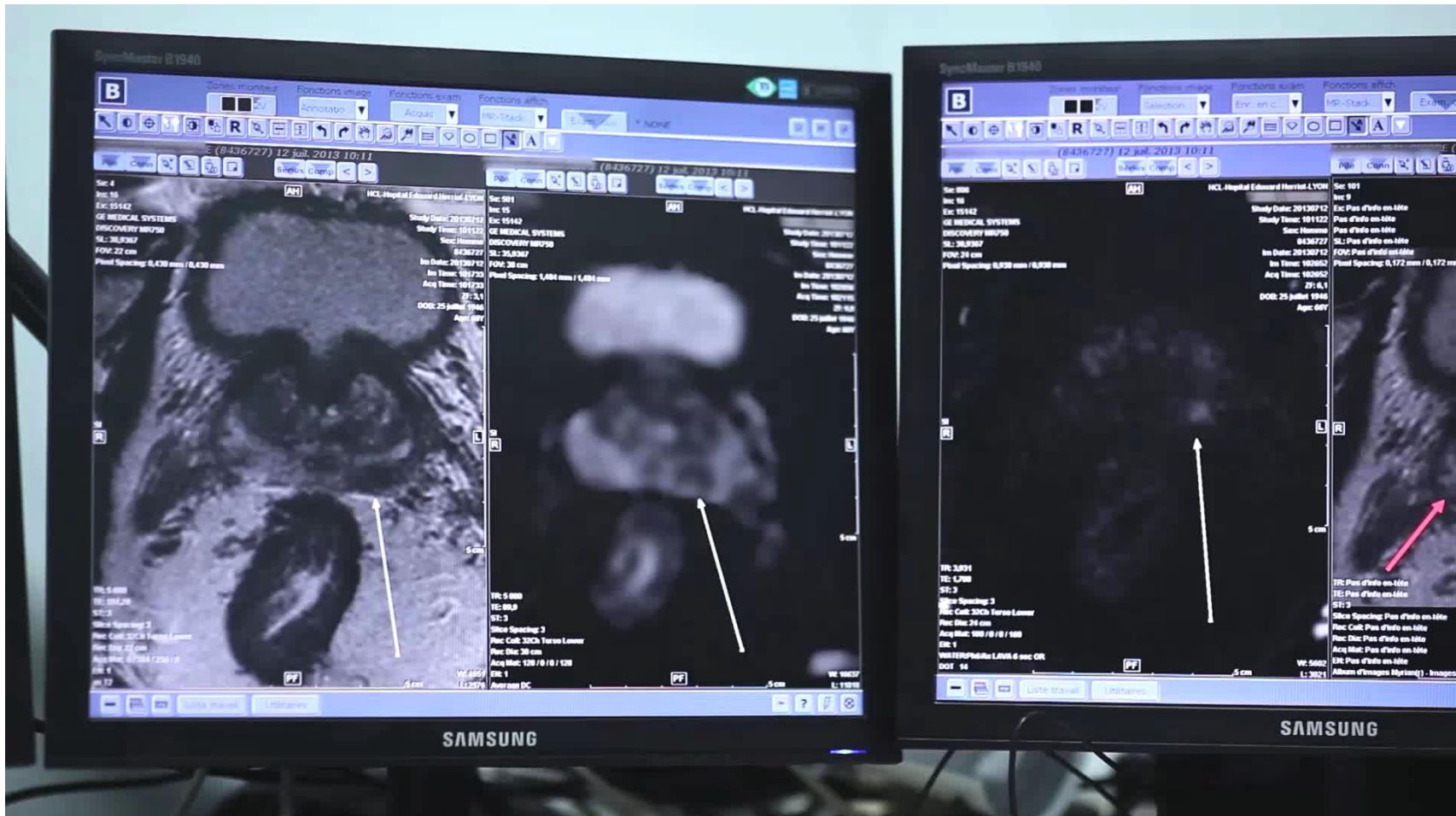
Nécessité d'un diagnostic optimal

- IRM++++: radiologue spécialisé et motivé
 - ISUP 1, volume < 0.5 cc: 21-29%
 - ISUP 1, volume \geq 0.5 cc: 49-60%
 - ISUP 2, volume < 0.5 cc: 56-63%
 - ISUP 2, volume \geq 0.5 cc: 88-92%
 - ISUP \geq 3: 96%
- Biopsies randomisées ET ciblées avec système de fusion



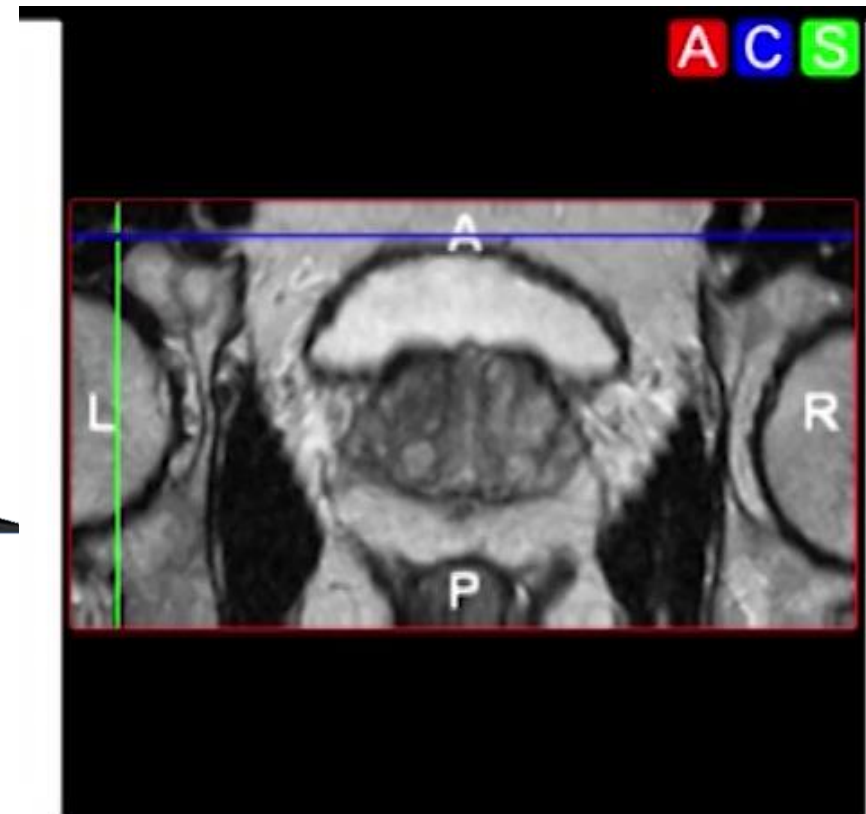
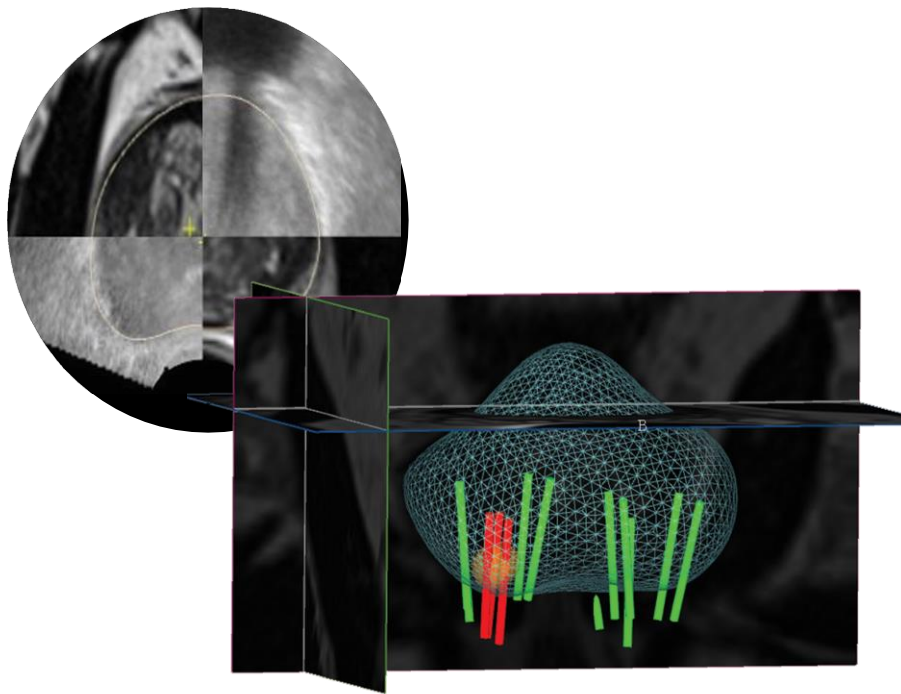
Bratan F et al. Eur Radiol 2013; 23:2019

IRM prostatique et contournage des cibles



Biopsies de fusion IRM/echo

■ 3D TRUS/MRI Fusion

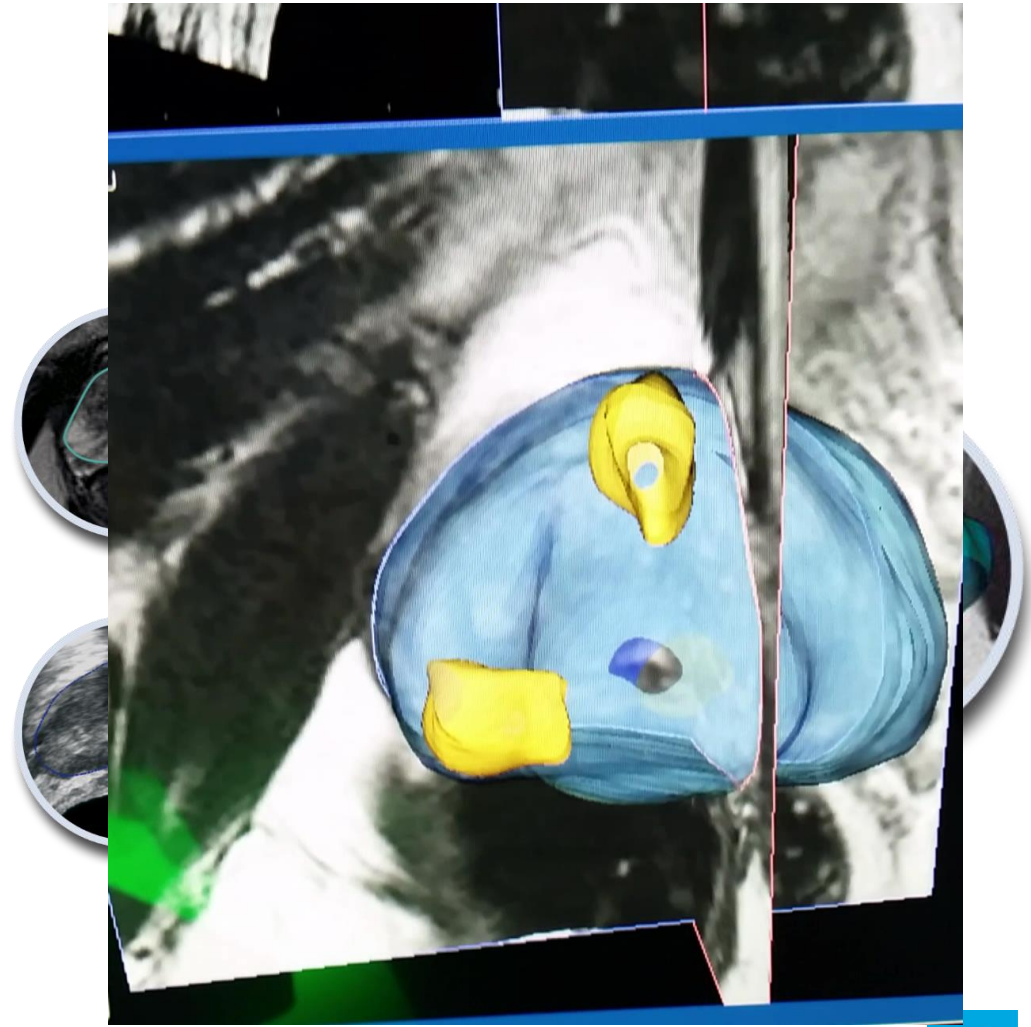
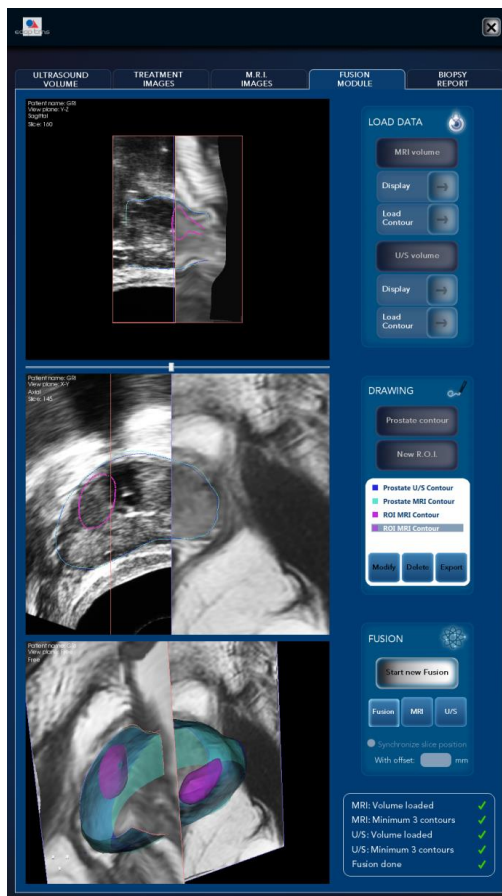


■ Tumour positive cores

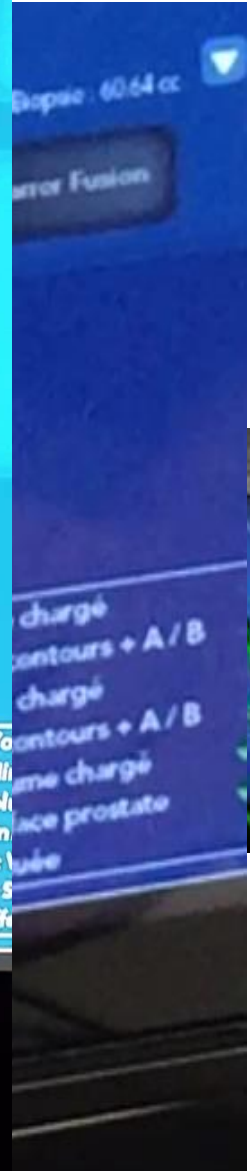
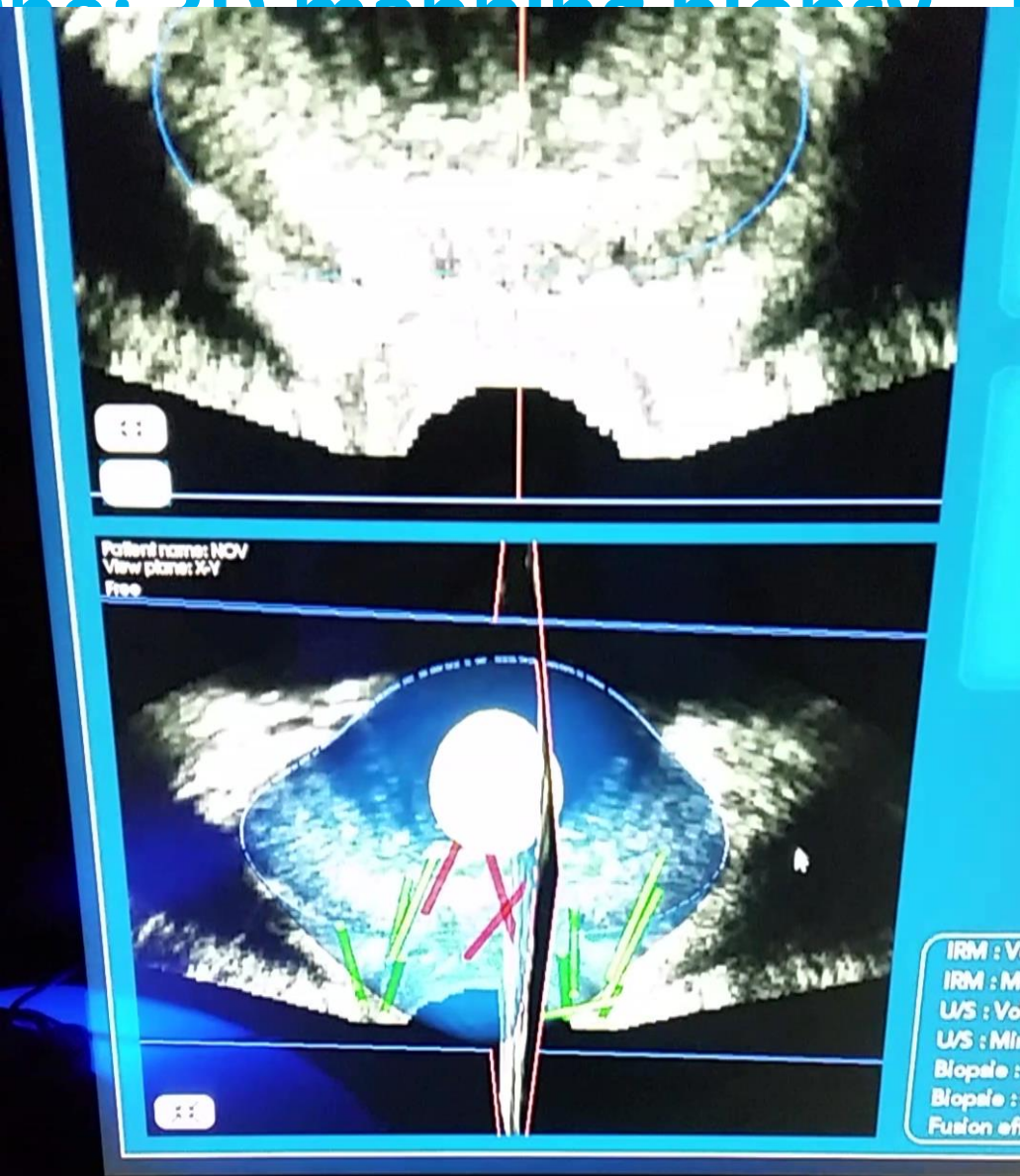
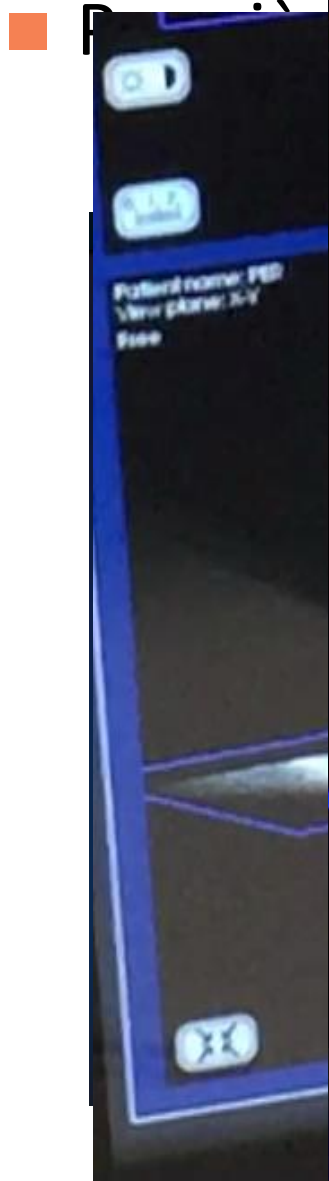


FocalOne: MRI - Live US fusion

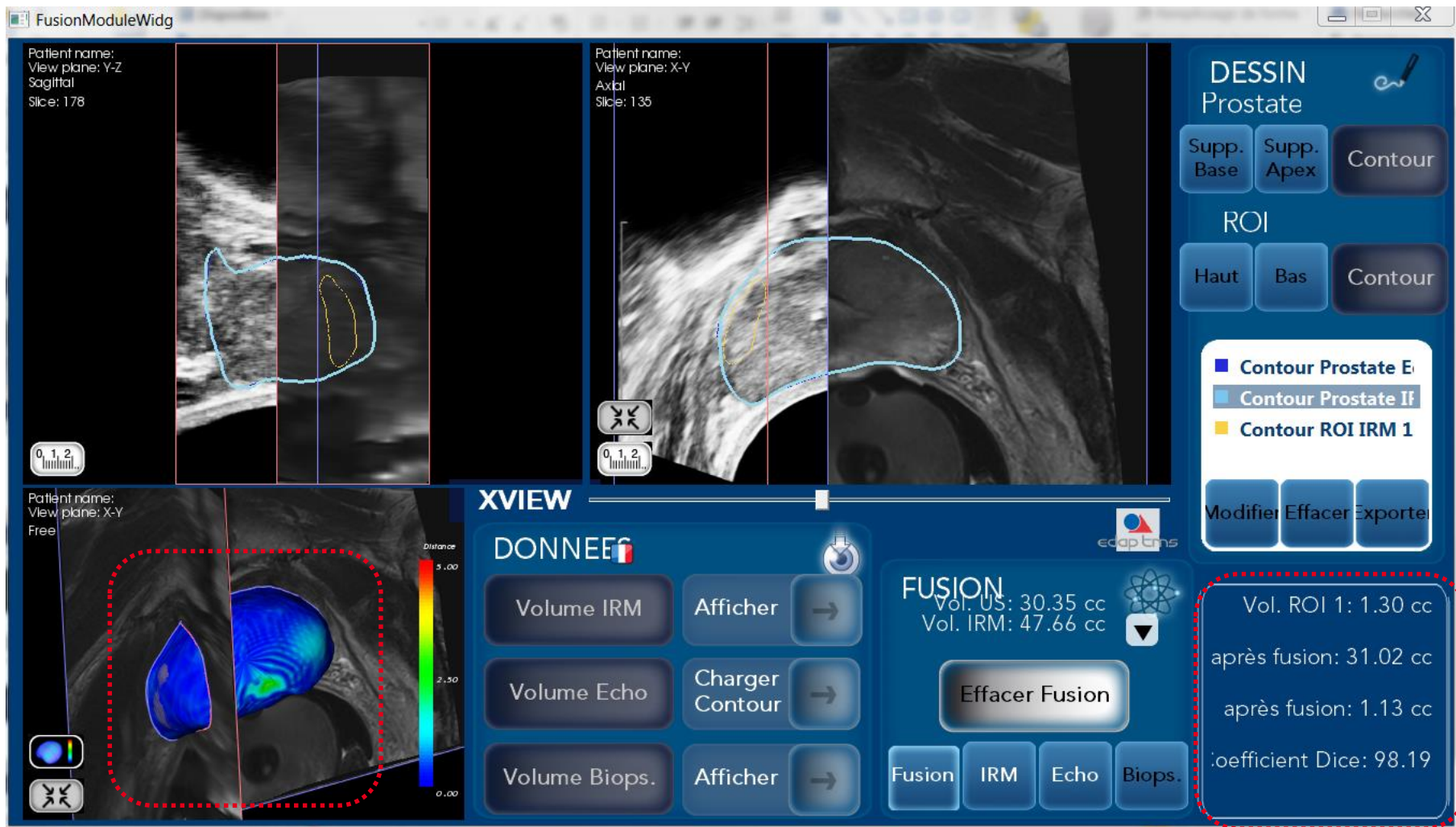
- Première étape: fusion IRM/echo



FocalOne: 2D mapping biopsy - Live US



Contrôle de la qualité de fusion



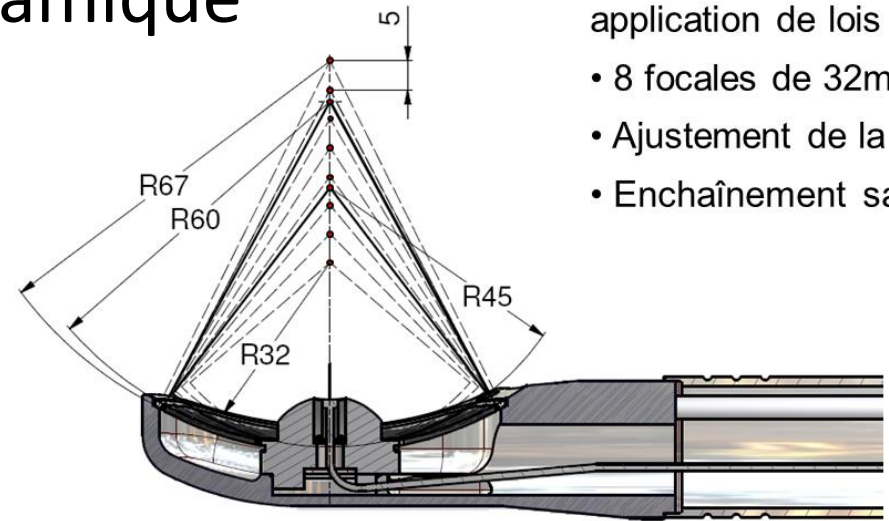
Hausdorff Distance

DICE index



Traitement conformationnel

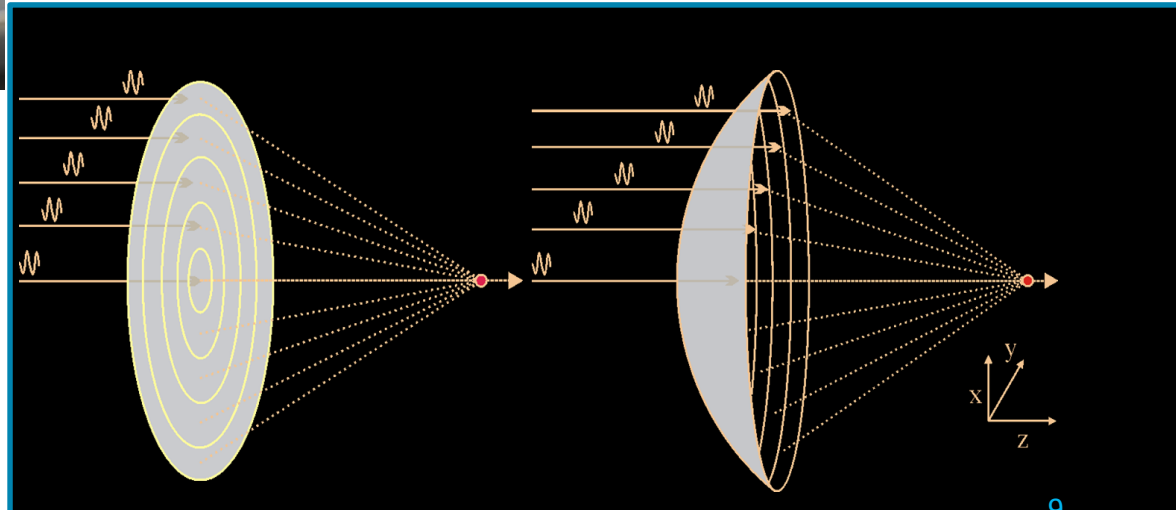
■ Sonde à focalisation dynamique



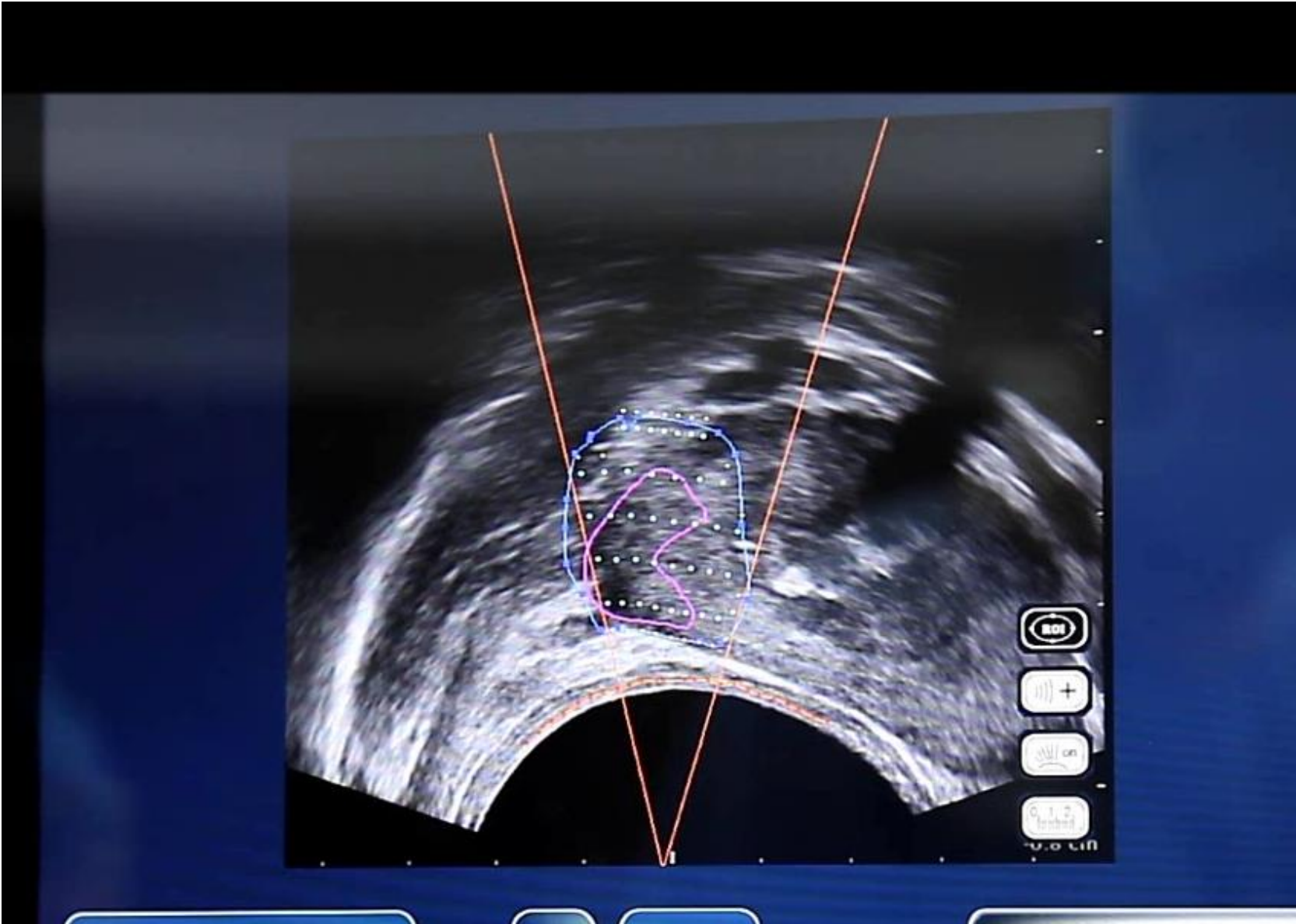
- application de lois
- 8 focales de 32m
 - Ajustement de la
 - Enchaînement sa

$$t_2 = \frac{d_0 - d_2}{c}$$

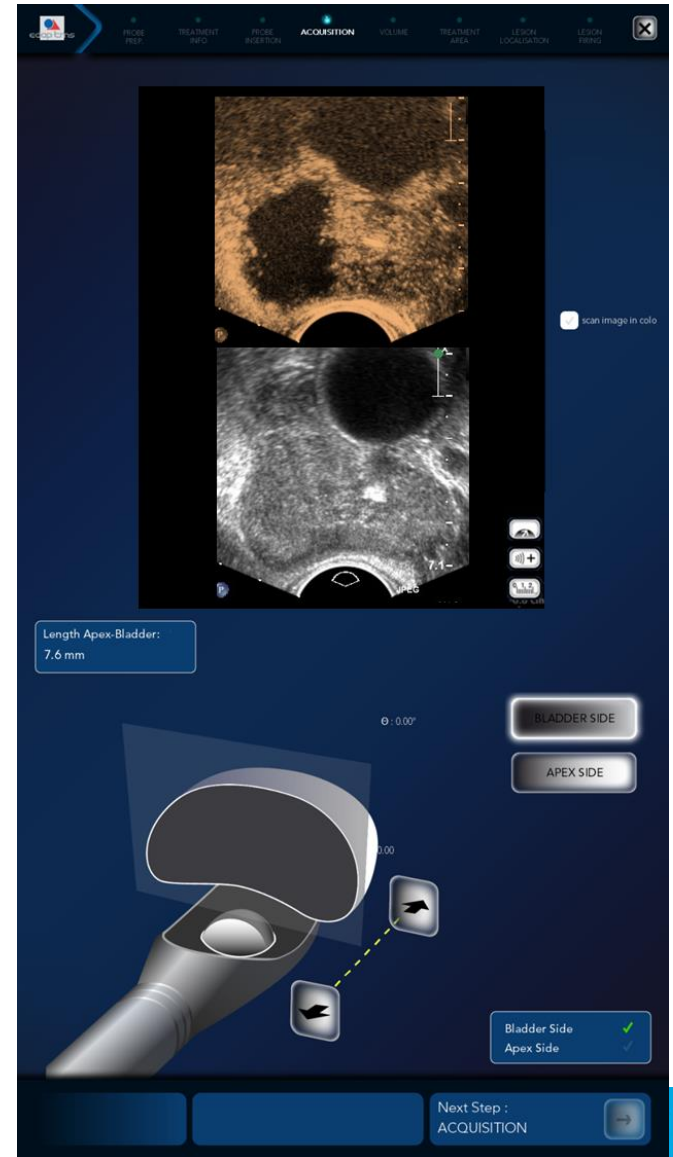
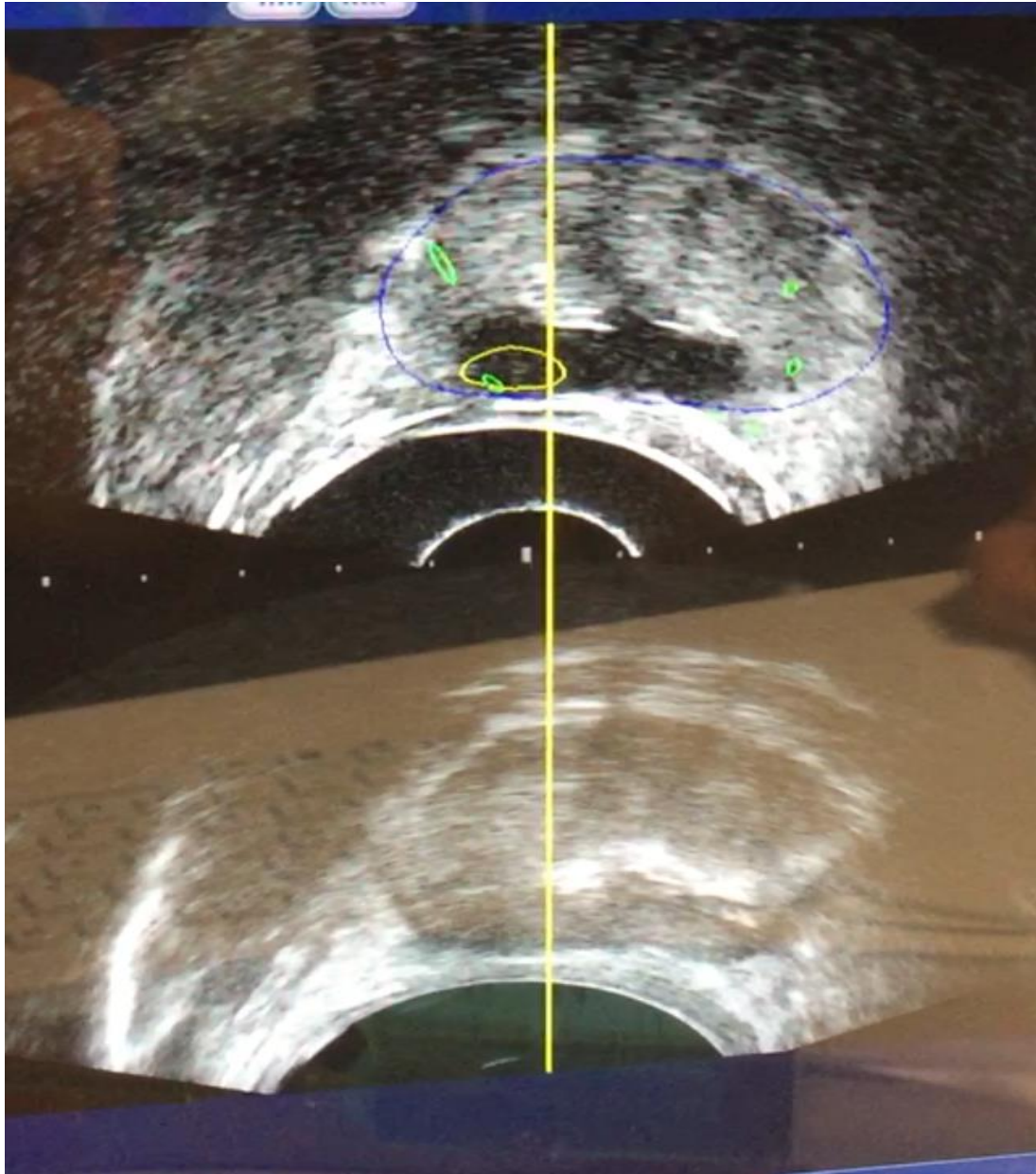
$$P(t) = P_0(t) + P_1(t - t_1) + P_2(t - t_2)$$



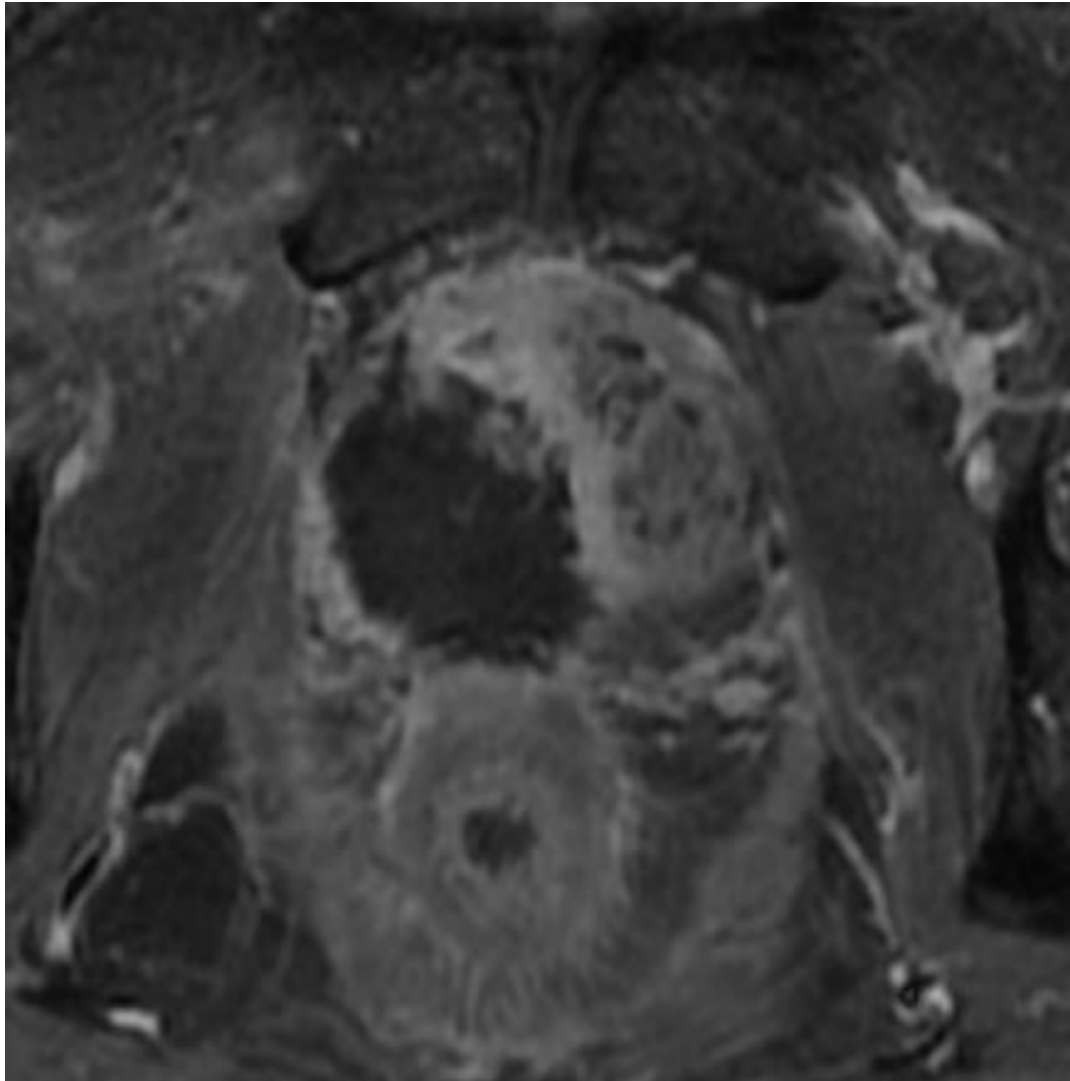
Traitement focal HIFU avec ajustement en direct



Contrôle final à la fin du traitement : Echo de contraste fusionné avec IRM et/ou biopsies 3D



Contrôle sur l'IRM post opératoire



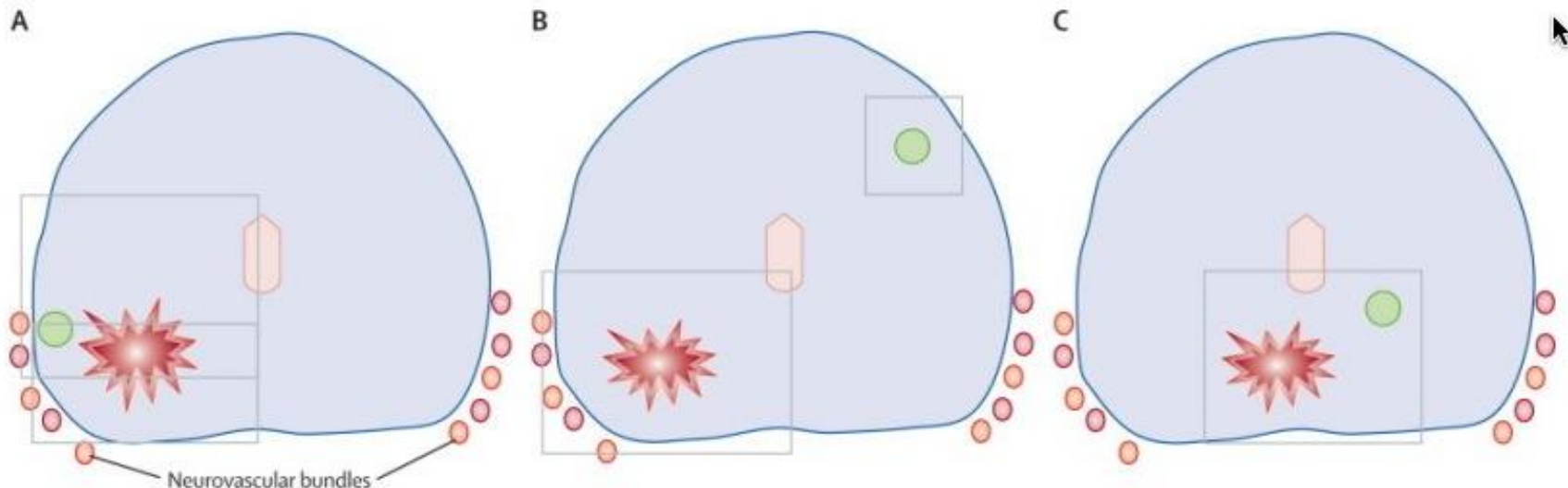
HIFU Focal: Résultats

ABLATHERM



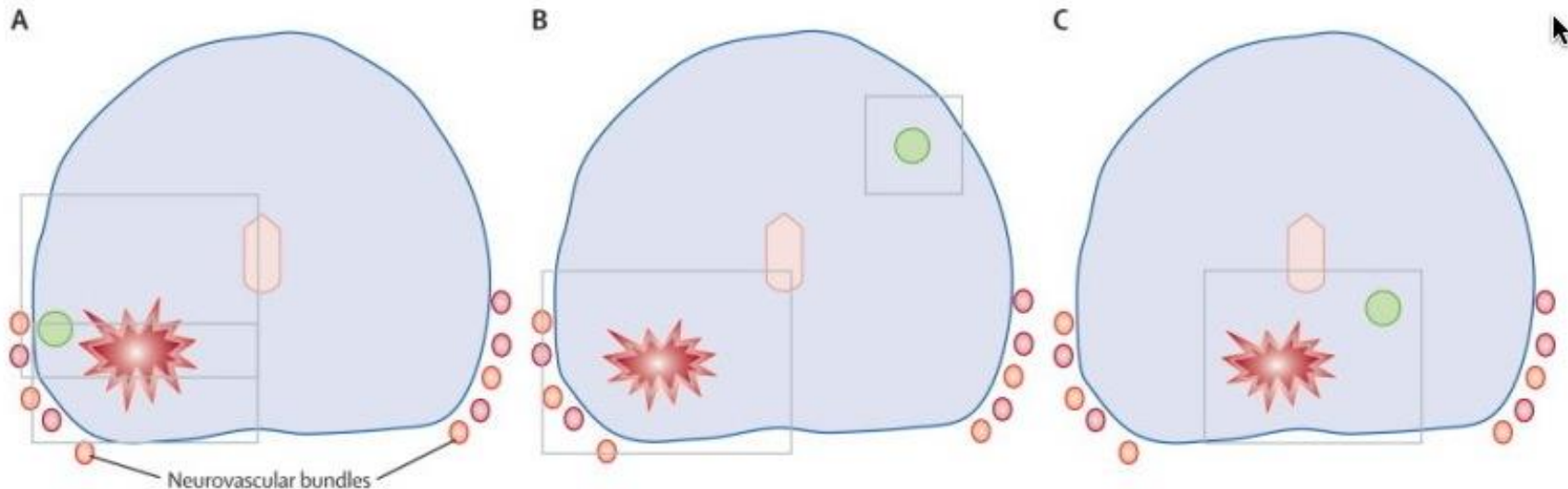
THE LANCET Oncology

- 41 patients, 73% intermediate or high risk
- 49% hemiablation, 37% multifocal et 15% central treatment
- MRI, Template biopsies
- HIFU (sonablate) <60% of prostate volume
- Follow up: MRI at 6 months with targeted biopsy of the treated area. (Retreatment with HIFU in case of positive biopsy)
- MRI at 12 months



THE LANCET Oncology

- At 12 months: IPSS improvement, 38 patients (90%) « leak free and pad free »
- Overall IIEF-15 scores: similar at 12 months but decrease of the IIEF-15 erectile and orgasmic. Penetration possible in 90% (NS uni), 100% (NS bi)
- At 6 months: 23% of positive biopsy with 8% of significant cancer
- 4 retreatments. No evidence of disease in 95% of the cases



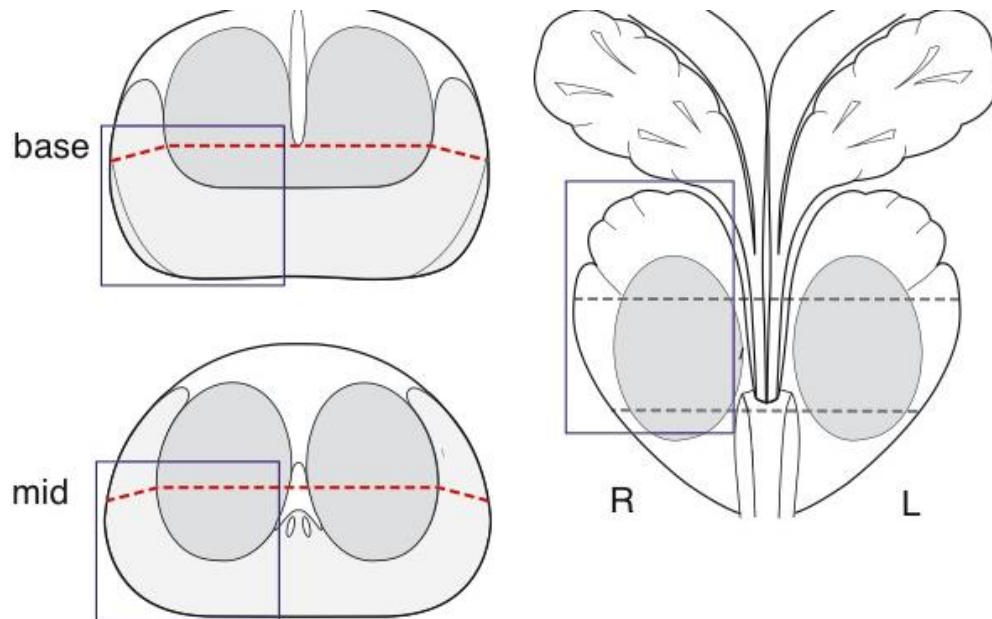
ETUDE BELGE

- HIFU Hemiablation, 50 patients, 38.5month mean FU
- At 5 years:
 - Metastasis SR: 93%
 - Cancer specific survival: 100%
- Continence : 94%
- Potency: 80%



Etude AFU Hémiablation

- Unilateral tumor (MRI and biopsy)
- Gleason ≤ 7 (3+4), PSA < 10 ng/ml
- ≤ 2 positive sextants
- +/- TURP
- Control by MRI and biopsy



Rischmann P, et al. Focal High Intensity Focused Ultrasound of Unilateral Localized Prostate cancer: A Prospective Multicentric Hemiablation Study of 111 Patients. Eur Urol. 2016 Oct 6. PMID: 27720531.



Association
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d'Urologie

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Etude AFU Hémiablation

111 patients, Follow up: 30.4 month

■ Negative Biopsy: **Treated lobe: 88.1%**

Entire prostate: 67.3%

■ IPSS significantly improved

■ Erectile function preservation : 78.4%

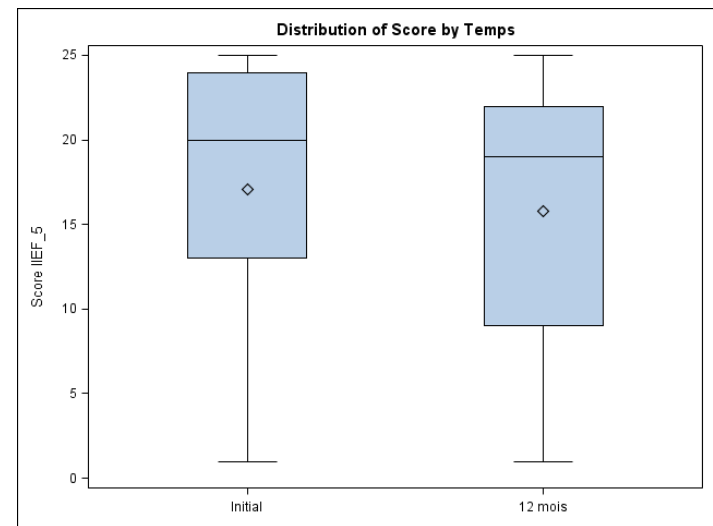
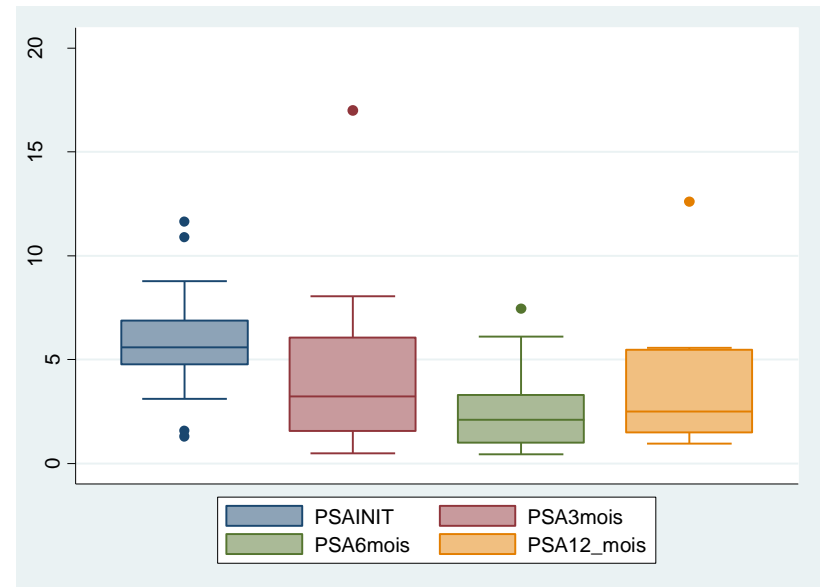
■ Continence: 97.2%

■ At 2 years, **Radical treatment free survival rates: 89%**



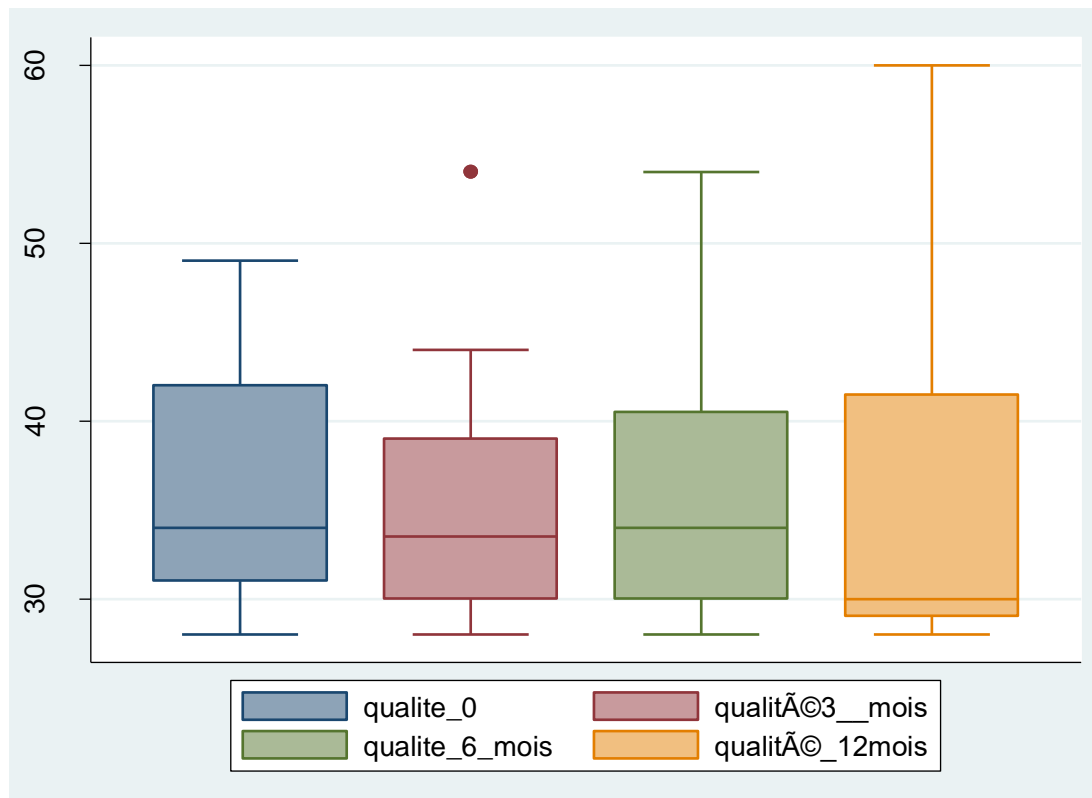
Etude AFU Hémiablation

- Initial PSA : 6.4 ± 3.3
- At one year mean PSA decrease: **59.9%**
- Erectile function preserved in **78.4%** at one year



Etude AFU Hémiablation: résultats intermédiaires

- Initial QLC-30 : 34.2 ± 5.09 Médian : 32.5
- QLC-30 6 months : 34.9 ± 6.6 Médian : 30
- QLC-30 12 months : 34.8 ± 8.67 Médian : 30.5



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Etude AFU Hémiablation

- Second HIFU session : 8 (23.5%)
- Robotic Prostatectomy : 7 (20.6%)
- EBRT: 3 (8.8%)
- Active surveillance: 16 (47.1%)
- **89%** without radical treatment

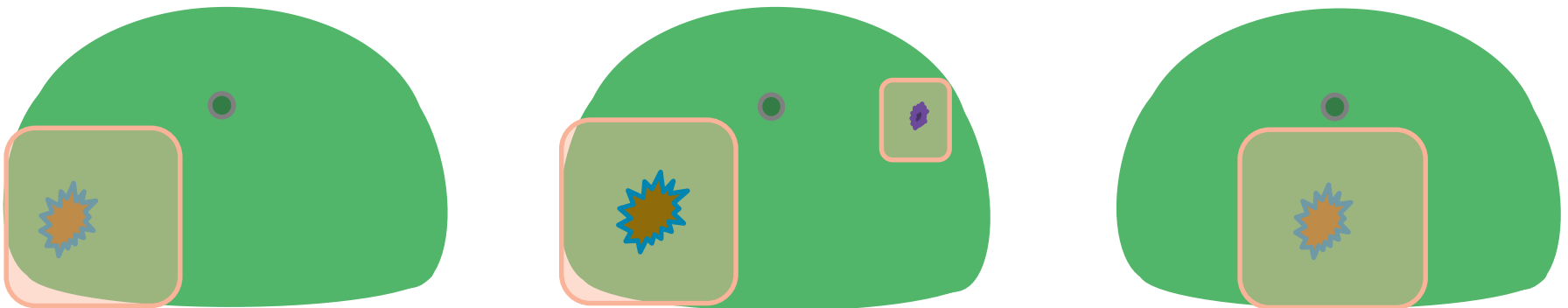


HIFU Focal: Résultats

FOCALONE

IDITOP 3

- Patients between 50 and 80 years
- PSA \leq 10ng/ml, T1-T2
- Multiparametric MRI and biopsy
(12 random and 2 targeted on each target)
- HIFU focal Treatment (FocalOne)



IDITOP 3

- 30 patients
- 35 cancer targets confirmed by MRI+biopsy
- Mean age 67,3 ±5,4 years
- Clinical stage: T1 = 68%, T2 = 32%
- Gleason: 6 (3+3): 50%, 7 (3+4): 50%
- Significant cancer: 24 (85%)

IDITOP 3: Results

- Mean treated volume: $10,5 \pm 5$ cc (28% of total prostate volume)
- Positive biopsy (whole prostate): 23%
- Significant residual cancer: (Gleason 7 or Gleason 6 > 3mm) : 9,4%
- **No significant cancer in 90.6% of the treated target**



IDITOP 3: PSA

- Pre HIFU PSA : $5,81 \pm 5,45$ ng/ml
- Nadir PSA : $2,27 \pm 19$ ng/ml
- PSA at 6 month: $2,79 \pm 2,18$ ng **-51.9%**

Continence

- **6.6%** of post operative new incontinence
(At 6 months)

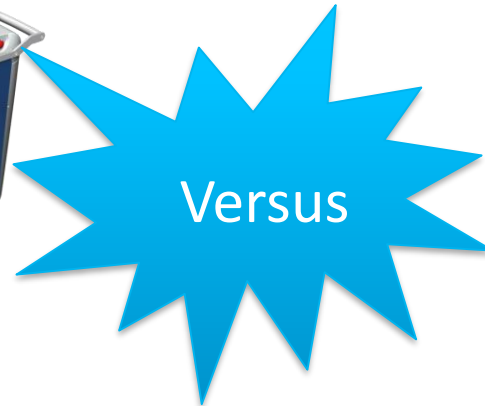
Erectile fonction

- Potency preserved (IIEF5>16) :
 - 71.4% at 6 months



Le traitement focal fait-il vraiment mieux?

- Etude comparant le robot et un traitement focal par HIFU



HIFU Focal vs. Prostatectomie robot

- Même ville (Lyon)
- Même période (2009-2014)
- Même diagnostic (IRM/Biopsies)
- Risques faibles et intermédiaire (\leq ISUP 2)
- Suivi minimum: 1 an
- Comparaisons par score de propension à un an

HIFU Focal vs. Prostatectomie robot

- 53 Focal HIFU et 66 PR Robot
- Trifecta: HIFU > PR $OR:8.26$ ($p=0.005$)
- Continence: HIFU > PR ($p=0.002$)
- Qualité de vie: HIFU > PR ($p=0.004$)
- IIEF5 (1 an): HIFU > RP ($p=0.05$)



Arnouil N, Gelet A, Matillon X, Rouviere O, Colombel M, Ruffion A, Mège-Lechevallier F, Subtil F, Badet L, Crouzet S.
[Focal HIFU vs robot-assisted total prostatectomy: Functionnal and oncologic outcomes at one year].
Prog Urol. 2018 Oct;28(12):603-610.

Etude anglaise

- 1032 patients (2005 – 2017), 2 centres, 6 chirurgiens
- Suivi médian 36 mois, survie globale à 96 mois: 97%
- Survie sans traitement radical: 91% à 60 mois et 81% à 96 mois



Stabile A, Orczyk C, Hosking-Jervis F, Giganti F, Arya M, Hindley RG, Dickinson L, Allen C, Punwani S, Jameson C, Freeman A, McCartan N, Montorsi F, Briganti A, Ahmed HU, Emberton M, Moore CM. Medium-term oncological outcomes in a large cohort of men treated with either focal or hemi-ablation using high-intensity focused ultrasonography for primary localized prostate cancer. BJU Int. 2019 Sep;124(3):431-440

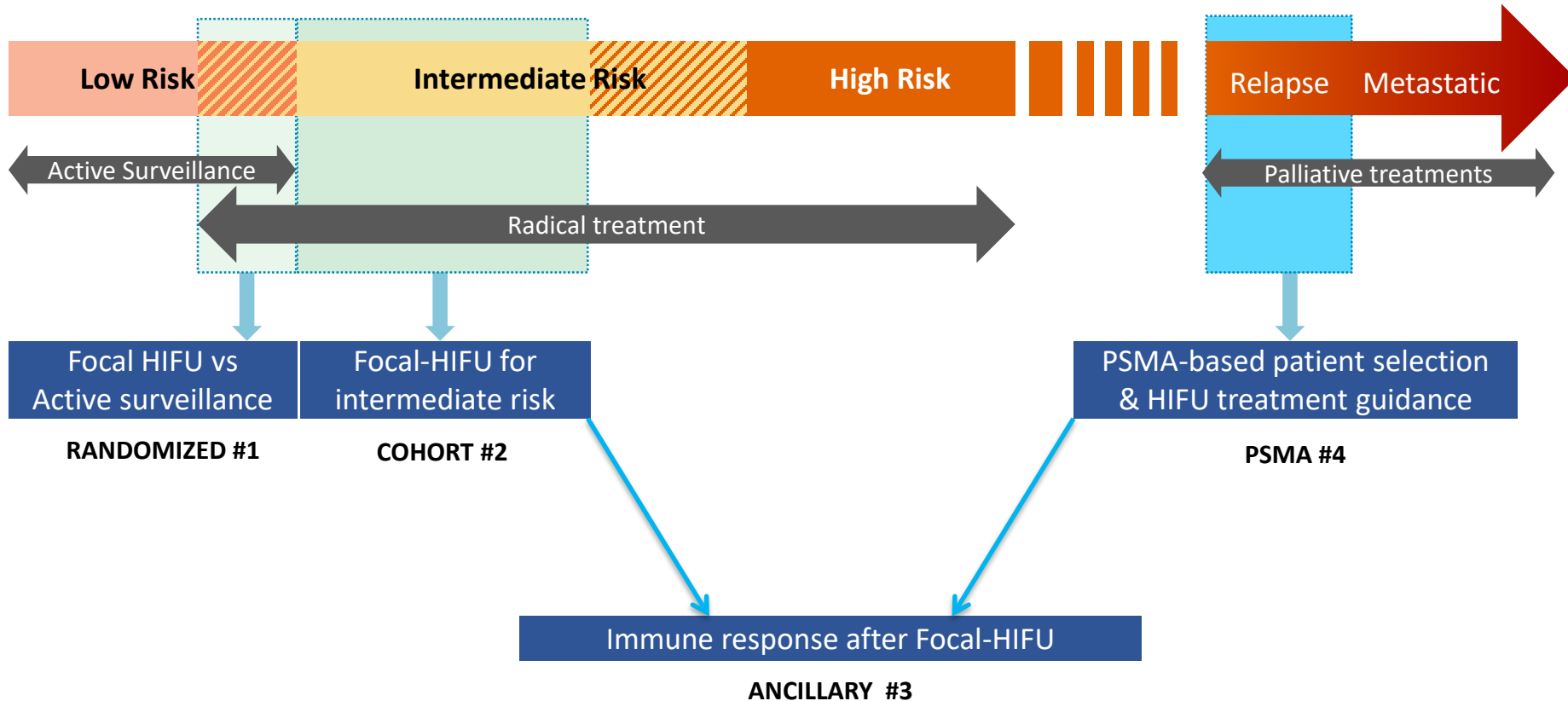
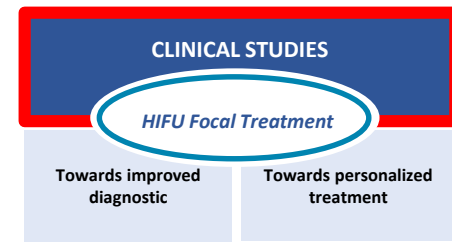


ETUDES EN COURS

FOCALONE



CLINICAL STUDIES



HIFU Focal Treatment : A new paradigm for prostate cancer



Principaux résultats du traitement focal

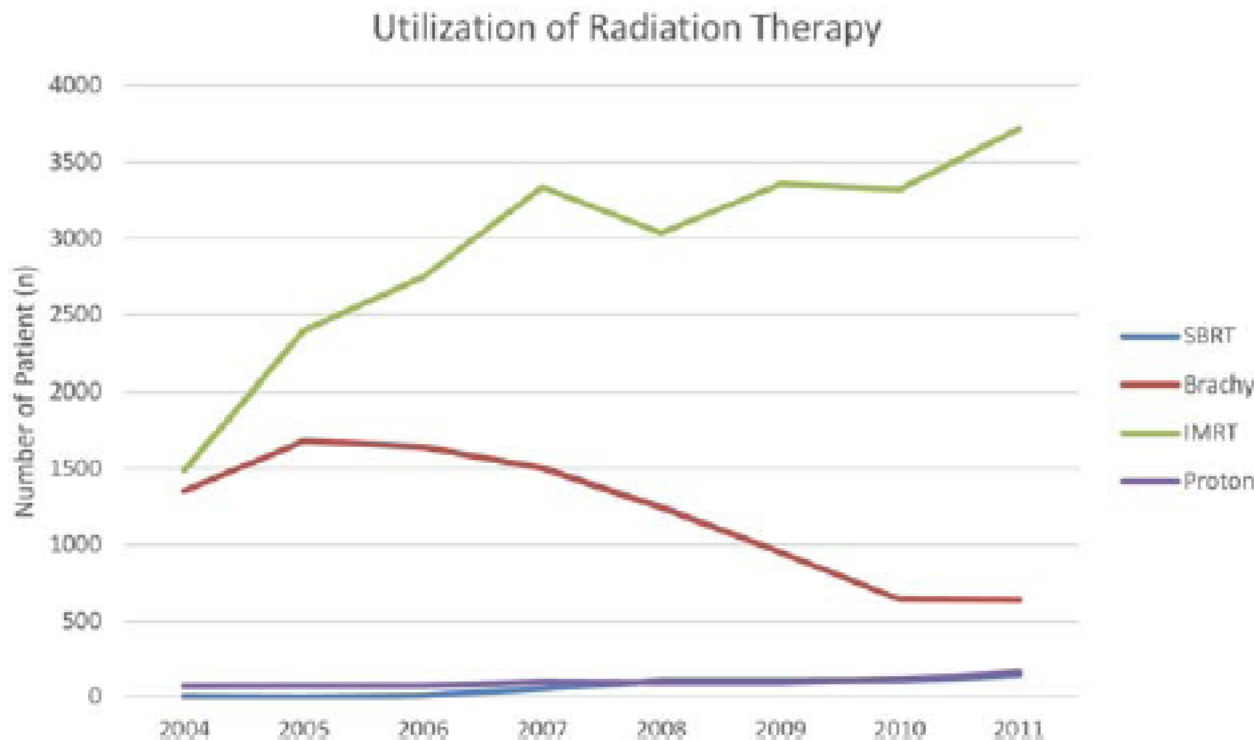
- Survie sans traitement radical: 89% à 3 ans, 81% à 96 mois
- Significativement moins d'effets secondaires que la chirurgie
- Possibilité de **retraiter** ou de passer aux traitements standards
- Toujours en évaluation: essais cliniques++++
 - HIFUSA
 - FOCAL
 - OPTI

Actualité de la curiethérapie

TABLE 4. Cor

Gastrointestinal
 Urinary nonincontinence
 Urinary incontinence
 Hip fracture
 ADT

Abbreviations: ADT, and
 radiotherapy.



tion	P
=2172	
(%)	.37
(%)	<.001
(%)	<.001
(%)	<.001
(%)	.02
(%)	<.001

T, stereotactic body

Figure 2. Use of radiotherapy for patients with prostate cancer between 2004 and 2011. Brachy indicates brachytherapy; IMRT, intensity-modulated radiotherapy; SBRT, stereotactic body radiotherapy.



Halpern JA, Sedrakyan A, Hsu WC, Mao J, Daskivich TJ, Nguyen PL, Golden EB, Kang J, Hu JC. Use, complications, and costs of stereotactic body radiotherapy for localized prostate cancer. *Cancer*. 2016 Aug 15;122(16):2496-504





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Merci