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Title: A New Technique for Treating Low-risk Prostate Cancer—Super Active Surveillance

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Author Questionnaire

1. **Microscopy**: Does your protocol require the use of a dissecting or stereomicroscope for performing a complex dissection, microinjection technique, or something similar? **No**

2. **Software:** Does the part of your protocol being filmed include step-by-step descriptions of software usage? **No**

   Videographer: Please capture the screen of the instrument for all shots labelled SCREEN, as backup

3. **Filming location:** Will the filming need to take place in multiple locations? **No**

4. **Testimonials (optional):** Would you be open to filming two short testimonial statements **live during your JoVE shoot**? These will **not appear in your JoVE video** but may be used in JoVE's promotional materials. **Yes**

   If **Yes**, please provide the **full name and designation** (e.g., Director of [Institute Name], Senior Researcher [University Name], etc.) of the author willing to participate.

   Fu Chunlong, Attending Physician of Urology

Current Protocol Length
Number of Steps: 17
Number of Shots: 35

Introduction

Videographer: Obtain headshots for all authors available at the filming location.

1.1. **Fu Chunlong:** I focus on prostate cancer, where many patients with low-risk disease still undergo unnecessary treatment. My goal is to develop a more proactive and patient-centered approach to active surveillance.

1.1.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:2.8*

What are the current experimental challenges?

1.2. **Fu Chunlong:** Clearer imaging technologies are needed to identify lesions, enable precise focal tumor eradication, and achieve the optimal balance between oncological control and functional preservation.

1.2.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

What significant findings have you established in your field?

1.3. **Cui Liang:** Super active surveillance is a safe, effective, and feasible novel treatment strategy for low-risk prostate cancer.

1.3.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

What questions will future research focus on?

1.4. **Cui Liang:** Cryoablation for prostate cancer demonstrates the great potential of the application of cryotherapy and immunotherapy, and the immune effects of cryoablation require more clinical and basic research to explore the specific mechanisms.

1.4.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:2.12*

Videographer: Obtain headshots for all authors available at the filming location.

Ethics Title Card

This research has been approved by the Ethics Committee at the Civil Aviation General Hospital

Protocol

NOTE: The SCs are filmed by the videographer

2. Integration of 18F-PSMA PET/MR Imaging in Targeted Cryoablation of the Prostate

Demonstrator: Zhang Xun

2.1. To begin, obtain a patient list that includes patients who have a pathologically confirmed diagnosis of prostate adenocarcinoma obtained through a prostate system puncture **[1]**.

2.1.1. WIDE: Talent reviewing a patient chart with prostate adenocarcinoma confirmed via puncture biopsy.

2.2. Ensure the availability of a cryotherapy system and a real-time image fusion ultrasound system **[1]**. Prepare a USB flash drive containing 18F-PSMA PET/MR *(Eighteen-F-P-S-M-A-Pet-M-R)* imaging data **[2]**.

2.2.1. Talent inspecting cryotherapy system and image fusion ultrasound unit in the procedure room.

2.2.2. Talent inserting USB flash drive labeled "18F-PSMA Data" into computer port.

2.3. Next, choose the appropriate puncture target framework according to the prostate volume and tumor location **[1]**.

2.3.1. SCREEN: Talent choosing the puncture framework on planning software.
Videographer: Please capture the screen of the instrument for all shots labelled SCREEN, as backup

2.4. Prepare a V-shaped variable cryoprobe with an adjustable diameter range from 1.5 to 5 centimeters and two temperature probes **[1]**.

2.4.1. Talent laying out the V-shaped variable probe and two temperature probes on a sterile tray.

2.5. Now, connect the USB flash drive to the integrated ultrasound system **[1]**. Import the imaging data into the ultrasound fusion software for preoperative planning and target marking **[2]**. Complete the full cryoablation preoperative plan **[3]**.

2.5.1. Talent connecting USB flash drive to the ultrasound machine.

2.5.2. SCREEN: Show the import interface of the fusion software, importing 18F-PSMA PET/MR data and marking target lesions.

2.5.3. SCREEN: Display the completed cryoablation planning screen with highlighted target regions.

2.6. Next, position the patient in the lithotomy position **[1]**. Administer 0.5 grams of Levofloxacin intravenously 30 minutes before surgery **[2]**. Insert a three-lumen pure silicone catheter following the infusion **[3]**.

2.6.1. Talent positioning patient into lithotomy position on surgical bed.

2.6.2. Talent preparing and administering Levofloxacin via IV.

2.6.3. Talent inserting a three-lumen silicone urinary catheter after infusion.

2.7. Apply ultrasound and preoperative planning markers from the 18F-PSMA PET/MR images to perform intraoperative registration **[1]**.

2.7.1. Show alignment of real-time ultrasound with preoperative 18F-PSMA PET/MR markers on the fusion software.

2.8. Now, insert the variable probe into the identified lesion using the image fusion guidance **[1]**.

2.8.1. Shot of the variable cryoprobe being inserted into the tumor lesion under fusion imaging.

2.9. Place a temperature probe in the perineal puncture site anterior to the rectum or in the Denonvilliers fascia **[1]**.

2.9.1. Talent carefully positioning a temperature probe in the perineal puncture site anterior to the rectum.

2.10. Irrigate the bladder with saline solution through the three-lumen catheter to protect the urethra from frostbite **[1-TXT]**.

2.10.1. Talent irrigating bladder with warmed saline through the catheter. **TXT: Saline temperature: 50 °C**

2.11. To start the cryotherapy system, rapidly lower the front end of the cryoprobe to below minus 140 degrees Celsius **[1]**. Use ultrasound to monitor the ice ball formation in real-time, ensuring its edge extends 0.5 centimeters beyond the preoperative tumor boundary **[2]** while keeping the rectal temperature probe above zero degrees Celsius **[3]**.

2.11.1. SCREEN: Display the cryoprobe temperature falling below minus 140 degrees Celsius.

2.11.2. SCREEN: Show real-time ultrasound view of ice ball expanding beyond target zone.

2.11.3. SCREEN: Rectal probe temperature maintained above zero.

2.12. Gradually reduce the freezing power while maintaining the ice ball's coverage area for 5 minutes **[1]**. Apply helium gas to rapidly warm the probe tip to above 15 degrees Celsius and maintain the temperature for 5 minutes **[2-TXT]**.

2.12.1. SCREEN: Show system screen indicating reduced freezing power and countdown

for 5-minute hold.

2.12.2. SCREEN: Show helium gas warming sequence with timer maintaining temperature over 15 degrees Celsius. **TXT: Repeat freezing and rewarming**

2.13. Once cryotherapy is complete, remove all probes from the patient **[1]**. Apply pressure to the puncture site to stop bleeding and cover with a sterile dressing **[2]**.

2.13.1. Talent withdrawing cryoprobe and temperature probes.

2.13.2. Talent pressing gauze on puncture site and securing sterile dressing.

2.14. Observe the urine color in the catheter **[1]**. If the urine is clear, do not perform bladder irrigation. If blood is visible, perform bladder irrigation **[2]** then transfer the patient to the anesthesia recovery room **[3-TXT]**.

2.14.1. Shot of urine in catheter tubing.

2.14.2. Talent performing bladder irrigation.

2.14.3. Shot of patient being pushed into recovery area. **TXT: Discharge patient 2 - 3 days after catheter removal**

Results

3. Results

3.1. Nine patients underwent surgery successfully without any intraoperative complications **[1]**. A total of 12 prostate adenocarcinoma lesions were treated using cryoablation across the 9 patients **[2]**.

3.1.1. LAB MEDIA: Table 1

3.1.2. LAB MEDIA: Table 1 *Video editor: Use the 2nd table labelled Table 1. Highlight the "Number of lesions" column*

3.2. The median postoperative follow-up time was 37 months, with a range of 14 to 61 months **[1]**.

3.2.1. LAB MEDIA: Table 2. *Video editor: Highlight the row "Postoperative follow-up time (month)" and its value "37".*

1. **Adenocarcinoma**
Pronunciation link: https://www.merriam-webster.com/dictionary/adenocarcinoma
IPA (American): /ˌædɪnoʊˌkɑːrsɪˈnoʊmə/
Phonetic spelling: *AD-uh-noh-kar-sih-NOH-muh*

2. **Cryotherapy**
Pronunciation link: https://www.merriam-webster.com/dictionary/cryotherapy
IPA (American): /ˈkraɪoʊˌθɛrəpi/
Phonetic spelling: *KRY-oh-theh-ruh-pee*

3. **Ultrasound**
Pronunciation link: https://www.merriam-webster.com/dictionary/ultrasound
IPA (American): /ˈʌltrəˌsaʊnd/
Phonetic spelling: *UL-truh-sownd*

4. **Prostate**
   Pronunciation link: https://www.merriam-webster.com/dictionary/prostate
   IPA (American): /ˈprɑːˌsteɪt/
   Phonetic spelling: *PRAH-stayt*

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5. **Lithotomy** (as in lithotomy position)
   Pronunciation link: https://www.merriam-webster.com/dictionary/lithotomy
   IPA (American): /lɪˈθɑːtəmi/
   Phonetic spelling: *lih-THAH-tuh-mee*

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6. **Levofloxacin**
   Pronunciation link: https://www.merriam-webster.com/dictionary/levofloxacin
   IPA (American): /ˌliːvoʊˈflɑːksəsɪn/
   Phonetic spelling: *LEE-voh-flok-suh-sin*

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7. **Denonvilliers fascia**
   Pronunciation link: https://www.howtopronounce.com/denonvilliers
   IPA (American): /dəˌnɒnvɪlˈjeɪrz ˈfæʃə/
   Phonetic spelling: *duh-NON-vil-YAYRZ FASH-uh*

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8. **Cryoablation**
   Pronunciation link: https://www.merriam-webster.com/dictionary/cryoablation
   IPA (American): /ˌkraɪoʊəˈbleɪʃən/
   Phonetic spelling: *KRY-oh-uh-BLAY-shun*