Robot for Prostate Focal Laser Ablation Cancer Treatment under Magnetic Resonance Imaging Guidance

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Technology description

The technology comprises a needle guidance robot for MRI-guided prostate focal laser ablation and a custom software platform allowing treatment planning and real-time tracking of the procedure. Prostate cancer is the second leading cause of death from cancer in men. When detected early, the majority of cases are confined to the prostate gland itself. Focal therapies for treating localized cancerous tumors, which focus only on those parts of the prostate affected by the cancer, have emerged as an alternative to whole-gland procedures, which can lead to impotence and incontinence. Focal laser ablation (FLA) is a leading focal therapy which efficiently treats the tumor while minimizing damage to surrounding tissues. Though widely used, current FLA methods are inefficient, inaccurate, and require a great deal of manual guidance by the physician. This technology successfully addresses these problems without compromising efficacy, placing itself at the forefront of prostate cancer treatment.

The robot is mounted upon a platform on the MRI table and positioned under the prostate. The robotic apparatus guides a needle to a target location. A robotic frame allows vertical and horizontal movement of the apparatus, and a separate remote movement mechanism allows the needle to change yaw so that it may be angled to most effectively target the cancerous area while avoiding sensitive areas. After the robotic apparatus is in position, he physician need merely push the needle in to the required depth so that ablation may begin. The software meanwhile calculates the minimal number of ablations while covering the entire tumor and minimizes collateral damage. It communicates with the MRI scanner and gives updated images of the prostate after each ablation until the tumor is fully treated. This provides optimal tumor coverage with high accuracy but without the need for scanning the patient between ablations. With improved accuracy and optimal tumor coverage, the technology makes prostate cancer treatment more efficient by necessitating fewer ablations and costly MRI scans, safer by reducing damage to surrounding tissue, and more effective by covering all of the tumor without sacrificing efficiency and safety.

Institution

University of Georgia

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com