Robotic Treatment Option for Prostate Cancer

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Technology description

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.
Existing FLA technologies use a grid template consisting of rows and columns of holes to guide the laser fiber. However, this is a suboptimal solution because it has limited accuracy (just 5mm between holes), does not allow angling of the needle apparatus to avoid sensitive areas, does not support remote insertion of the needle (meaning the patient must be removed from the MRI scanner every time the needle is reinserted), and does not include a user interface for effective treatment planning.

This technology addresses these problems by utilizing a robotic apparatus to more effectively administer the procedure. It has superior accuracy, angulation, and remote insertion capabilities to other FLA methods. The product also includes a software platform allowing planning of the treatment and real-time visual feedback during the procedure. This minimizes the number of patient removals from the scanner, increasing procedure efficiency and cutting down on costly MRI scans. Further, the robotic apparatus removes the need for the physician to manually guide the needle, making the procedure more efficient and straightforward. Most importantly, it makes the procedure safer, as the increased accuracy greatly reduces chance of damage to surrounding tissue. Overall, this technology is safer, more efficient, and less costly than existing technologies and thus represents the future of prostate cancer treatment.

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. 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

邮 箱：yeyingsheng@zf-ym.com