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PROSTATE CANCER

Irreversible electroporation is a safe and feasible option for focal therapy

A small clinical study from groups in London and Sydney has shown that irreversible electroporation (IRE) is an effective treatment for prostate tumours, with an excellent safety and adverse-effect profile.

The concept of focal therapy to minimize the negative effects of prostate cancer treatment is well established. However, the therapeutic outcomes of focal therapies are variable and are often associated with adverse effects, including rectourethral fistulae. IRE uses nonthermal energy to create nanopores within the cell membrane of tumour cells, which results in cell death, and can be targeted specifically to cancerous cells without affecting surrounding tissue.

In this report, IRE was administered using the NanoKnife® system (Angiodynamics, USA), which uses carefully positioned needles to delineate the treatment area. Needle placement was checked using transrectal ultrasonography (TRUS), as was the distance between needles, which should not exceed 2 cm. The system calculates the dosage to be delivered on the basis of the number of needles used, the distance between them and the active electrode length used to obtain an electrical field of 20–40 A—the optimum level for complete ablation without associated thermal damage. 1 week after treatment, contrast-enhanced MRI was employed to evaluate the effect of the treatment, including any evidence of rectourethral fistulae. Patients also received serum PSA tests every 3 months and multiparametric MRI (mpMRI) scans 6 months after the treatment and then yearly.

Overall, 34 patients across the British ($n = 20$) and Australian ($n = 14$) centres were treated. Median operative time was just 27 min, and 94% of men were discharged the same day. Incidence of toxic effects after the procedure was low, with no instances of urethral stricture and two of urinary retention; six men reported debris or haematuria, five had dysuria and five experienced UTI. No instance of rectourethral fistula was observed.

Furthermore, the adverse-effect profile of the treatment was excellent, with erectile function preserved in 19 of 20 men for whom follow-up data was available at 6 months. 100% of men who were continent before the procedure remained continent after their IRE treatment.

Disease control following IRE was also encouraging, with a median ablation area of 12 ml, and median serum PSA level of 3.2 ng/ml at 6 months after treatment. Follow-up imaging with mpMRI raised suspicions of residual disease in six men, two of whom remained on active surveillance as their serum PSA level dropped following the IRE procedure. Of the four men who chose to be retreated, one underwent a repeat IRE treatment, two received focal treatment with high-intensity focused ultrasonography and one opted to receive radical prostatectomy, owing to histological verfication of treatment failure and biopsy-confirmed Gleason 3 + 4 disease.

"The study shows that electroporation seems safe, feasible and has limited morbidity," first author Massimo Valerio told *Nature Reviews Urology*. "However, it is a retrospective analysis with small sample size, heterogeneous population and no strict outcome measures. To verify these results, we need a protocol-based trial including a homogeneous population, robust outcome measures and strict follow-up. This is what we are currently doing in a stage IIa IDEAL guidelines compliant trial."

As an initial assessment of the IRE technology, this study demonstrates its feasibility and safety. However, further assessment, as the authors agree, will be needed before it can be considered in the standard focal therapy armamentarium.

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Original article Valerio, M. *et al.* Initial assessment of safety and clinical feasibility of irreversible electroporation in the focal treatment of prostate cancer. *Prostate Cancer Prostatic Dis*. doi:10.1038/pcan.2014.33