Prostate Cancer Treatment with Irreversible Electroporation
Efficacy and Safety in 377 Patients over 5 Years

Klein, Nina; Günther, Enric; Zapf, Stefan; El Idriessi, Rachid; Mikus, Paul; Rubinsky, Boris; Stehling, Michael

Introduction
Irreversible Electroporation (IRE) is a novel tissue ablation modality which selectively destroys cells whilst preserving non-cellular tissue elements. It has low toxicity on critical anatomical structures such as vessels, nerves (neuro-vascular bundle) and viscus (rectum, bladder and urinary sphincter). IRE may thus be a feasible therapy for prostate cancer (PCa), since it has the potential to avoid the side effects of surgical and radiation treatment of PCa such as impotence, incontinence and rectal damage. Further, IRE may be suitable for the treatment of recurrent PCa and advanced T4 cancers, which are not amenable to surgery and radiation therapy anymore.

Materials and Methods
Our Patient Cohort
- Number of evaluated patients: 377
- Mean age at IRE: 65 ± 9 years
- Mean prostate volume: 32 ± 20 ml
- 263 patients had a focal ablation, 114 patients were treated whole gland, 67 patients had history of recurrences after other treatments.
- In all cases MRIs were obtained before and 24h after treatments.
- Almost all relapse cases initially had high-risk prostate cancer.
- Of all recurrent cases, 18/310 had IRE as a primary treatment, while of the 67 patients who had IRE after other therapies, 6 had recurrent disease.
- In 100% of the treatments were successful in terms of complete tumor ablation as defined by treatment planning and evaluated using MRI and PSA.
- All IRE treatments were performed with an Angiodynamics Inc. NanoKnife®-System.
- Main selection criteria for the patients: rejection of any other type of treatment (surgical, radiation, pharmacological, active surveillance, etc.).
- The presented results are not part of a clinical trial. Instead, the most adequate treatment was chosen individually for each patient by consensus between the patient, the involved physicians and physicists. Therefore, treatment approach and goals vary.
- Follow-up exams (consultation, PSA and MRI) were carried out approx. 3, 6, 12, 18, 24, 36 and months after treatment.

Results
- All treatments were completed within 24 hours without any report of wound pain.
- In one patient with a beginning rectum infiltration, a recto-urogenital fistula occurred and was successfully treated conservatively.
- Almost all relapse cases initially had high-risk prostate cancer.
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Conclusion
- Treatment of PCa with IRE is efficacious and safe, as can be judged from a follow-up time of up to 5 years.
- IRE has extremely low toxicity, with reduced common side effects of established PCa treatments.
- IRE is ideally suited for function preserving and ambulant treatment of PCa.
- IRE is also suitable for the treatment of prostate cancer recurrences after any kind of previous treatment and for advanced T4 and T3 cancers which are not amenable to surgery or radiation therapy anymore.
- Damage to the bowel can be avoided altogether, continence was fully preserved in all and persistent change in potency (> 9 month) was reported in only 8% of the cases.
- MRI is a powerful tool for the diagnosis and staging as well as follow-up of PCa but should be combined with 3D-biopsy for optimal treatment planning.
- Survival benefit (for focal and whole gland ablations) will need to be determined by long-term studies.