### Trial Description

**Title**

Prospective, monocentric, clinical phase-I/II study of the effectiveness of the percutaneous irreversible electropropagation (IRE) of locally confined kidney tumors (renal cell carcinomas) - IRENE.

**Trial Acronym**

IRENE

**URL of the trial**

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**Brief Summary in Lay Language**

The aim of the study is the evaluation of the ablation efficiency of the percutaneous irreversible electroporation (IRE) as primary ablation therapy of locally confined renal cell carcinoma (≤4cm, see inclusion and exclusion criteria). The ablation success will be proofed by magnet resonance imaging (MRI) and histologically after partial kidney resection or tumornephrectomy 4 weeks after IRE. Hypotheses: Kidney tumors ≤4cm can be ablated completely by percutaneous IRE. Surrounded structures and renal tissue can be preserved.

**Brief Summary in Scientific Language**

Purpose: This is the first human study of IRE in operable patients with localized kidney cancer to evaluate the ablation efficacy.

Methods: IRE is a new soft-tissue ablation technology that locally applies ultrashort high voltage pulses (3kV, 50A, 100μs) without heat effect. It just causes electrical breakdown of the lipid bilayer of in vivo cells via needle-like electrodes induced high-electric field. This generates nanometer sized pores with irreversible permeabilization of the cell membrane that ends in apoptosis and necrosis. The extracellular matrix is not altered that is usually associated with thermal ablation techniques. Hence, anatomical borders, organ integrity and function are preserved. Results: Previous experimental studies investigated the ablation potential of IRE in liver, kidney, lung, prostate, heart, pancreas, brain, dermis, breast and muscle. IRE led to a localized complete decellularization. In the ablation zone located structures such as blood vessels, nerves, exocrine glandular ducts, urethra, ureter, urine collecting system were spared out and showed regeneration. First clinical results demonstrated safety and effect of IRE in ablation of renal, liver, lung and pancreatic cancer as well as metastases from different entities. Long-
term multicentre results of IRE in liver, panceas and lung cancer are awaited in next years. Conclusions: Urology is increasingly confronted with IRE as a new minimal-invasive technology. Depending on further urologic studies, IRE could be superior to thermal ablation methods such as RFA and cryotherapy and play a more important role as an alternative to other ablation methods for small kidney tumors.

Organizational Data

- DRKS-ID: DRKS00004266
- Date of Registration in DRKS: 2012/07/23
- Date of Registration in Partner Registry or other Primary Registry: 2013/10/15
- Investigator Sponsored/Initiated Trial (IST/IIT): yes
- Ethics Approval/Approval of the Ethics Committee: Approved
- (leading) Ethics Committee Nr.: 73/12, Ethikkommission der Medizinischen Fakultät der Otto-von-Guericke-Universität Magdeburg

Secondary IDs

- Universal Trial Number (UTN): U1111-1140-0415
- Primary Registry-ID: NCT01967407 (ClinicalTrials.gov)
- EUDAMED-No. (for studies acc. to Medical Devices act): CIv-12-04-006021
- BfArM-No.: DE/EKST41/00020520
- Other Secondary-ID: 00006415 (BfArM-Nr. Medizinprodukt)

Health condition or Problem studied

- ICD10: C64 - Malignant neoplasm of kidney, except renal pelvis
- ICD10: D41.0 - Neoplasm of uncertain or unknown behaviour: Kidney

Interventions/Observational Groups

- Arm 1: 1. Initial diagnostical examination of the renal mass.
  2. If any extended diagnostical examination for treatment planning.
  3. Day -29 to -1: Recruitment.
  4. Day -1: MRI of the kidneys, ECG, physical examination, blood chemistry, urosonography, if any MAG-3-clearance, life quality assessment.
  5. Day 0: Percutaneous diagnostical biopsy with histopathological investigation and therapeutically, CT- and/or ultrasound-guided, ECG-synchronized irreversible electroporation (IRE) of the kidney tumor in endotracheal anæsthesia und muscle relaxation. Use of 1-6 IRE probes with 90-100 pulses of 1500-3000 volts und 20-50 amperes each.
8. Day 27: Postinterventional follow-up: MRI of the kidneys, ECG, physical examination, blood chemistry, urosonography, if any MAG-3-clearance, life quality assessment.
11. Day 102: Follow-up: MRI of the kidneys, ECG, physical examination, blood chemistry, urosonography, if any MAG-3-clearance, life quality assessment. Termination of the study.
12. Individual follow-up due to the EAU-guideline.

**Characteristics**

- **Study Type:** Interventional
- **Study Type Non-Interventional:** [---]*
- **Allocation:** Single arm study
- **Blinding:** [---]*
- **Control:** Uncontrolled/Single arm
- **Purpose:** Treatment
- **Assignment:** Single (group)
- **Phase:** N/A
- **Off-label use (Zulassungsüberschreitende Anwendung eines Arzneimittels):** N/A

**Primary Outcome**

Treatment effectiveness of the irreversible electroporation (IRE) with regard to rate of persisting active tumor tissue in the histopathological and radiological examination 4 weeks after IRE.

**Secondary Outcome**

1) Procedural compatibility of IRE and the following tumor area resection.
2) Side effects of percutaneous IRE of localized renal tumors.
3) Life quality after IRE (EORTC CQLQ-30, VAS).

Observation time (day -1 to day +102). Follow-up after IRE of the kidney tumor = 16 weeks = 4 month. Follow-up after partial or total kidney resection = 11 weeks = 3 month.

**Countries of recruitment**

- DE Germany
Locations of Recruitment

- University Medical Center *Universitätsklinik für Urologie und Kinderuroplogie, Magdeburg*

Recruitment

- Planned/Actual: **Actual**
- (Anticipated or Actual) Date of First Enrollment: **2014/03/12**
- Target Sample Size: **20**
- Monocenter/Multicenter trial: **Monocenter trial**
- National/International: **National**

Inclusion Criteria

- Gender: **Both, male and female**
- Minimum Age: **18 Years**
- Maximum Age: **no maximum age**

Additional Inclusion Criteria

- one or more localized, resectable kidney tumors (≤4 cm) suspicious of malignancy or histology -proven renal cell cancer (RCC)
- patients desire for therapy and surgical therapy
- Karnofsky-index >70% and ECOG ≤ 1
- Age ≥ 18 Jahre
- life expectancy ≥ 12 month
- compliance of the patient taking part in a study
- informed consent

Exclusion Criteria

- violation against one or more inclusion criterias
- cardial pacemaker or other electrical implants
- QT-intervall >550 ms or cardiac arrhythmias or condition after myocardial infarction, that make an ECG-synchronisation unfeasible
- known cardial ejection fraction < 30% or NYHA 3-4
- known epilepsy
- second malignancy (except basal-cell carcinoma and cerival carcinoma in situ)
- immunesuppression or HIV-positive patients
- active infection or severe health interference, that make taking part in a study unfeasible
- pregnancy, laction period, no contraception
- metastatic disease
- palliative status
- running or executed RCC therapy
- taking part in another clinical study for RCC
- inoperable
- rejection of interventional or surgical therapy by the patient
- circulatory instability
- generell contraindications for anesthesia, endotracheal anesthesia and muscle relaxation
- psychiatric disorders that make taking part in a study or giving informed consent unfeasible
- haemorrhage, Impossible intermission of taking blood thinner, untreatable thrombophilia
- thromboplastin time ≤50 %, thrombocytes ≤50 Gpt/L; partial thromboplastin time >50
- MRI incompatibility
- metal implants <1 cm closed to the kidney / kidney tumor
- contraindication for biopsy and punction of the renal tumor under CT-guidance

Addresses

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Sources of Monetary or Material Support

- Institutional budget, no external funding (budget of sponsor/PI)

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Status

- Recruitment Status: Recruiting complete, follow-up complete
- Study Closing (LPLV): 2018/01/09

Trial Publications, Results and other documents

- Background literature Review SRM
- Trial results IRENE study protocol
- Paper IRE criteria
- Background literature IRE study sequence
- Paper first results IRENE
- Paper Upper-Urinary-Tract Effects After Irreversible Electroporation (IRE) of Human Localised Renal-Cell Carcinoma (RCC) in the IRENE Pilot Phase 2a Ablate-and-Resect Study
- Paper Initial Assessment of the Efficacy of Irreversible Electroporation (IRE) in the Focal Treatment of Localised Renal-Cell Carcinoma (RCC) with Delayed-Interval Kidney Tumour Resection (IRENE Trial - an Ablate-and-Resect Pilot Study).
- Paper Initial assessment of clinical feasibility, safety and efficacy of NanoKnife irreversible electroporation (IRE) in the focal treatment of localized renal cell carcinoma (RCC) with delayed interval tumor resection (IRENE trial)
- Paper Prüfbericht IRENE-Studie

Please note:
There are additional attributes available concerning this trial. To open an extended view please click here.