Introduction & Objectives: In patients with renal cell carcinoma (RCC) in a solitary kidney, partial nephrectomy is imperative, preserving quality of life and increasing survival compared to hemodialysis. If technically feasible without compromising the oncological outcome, minimal invasive surgery is to be preferred. We aim to demonstrate the feasibility of extracorporeal robot-assisted kidney autotransplantation (eRAKAT) with tumor excision on the bench in an oncological setting.

Materials & Methods: A 59-year old woman was diagnosed with a biopsy-proven clear cell RCC, grade 2, cT2aN0M0, in a solitary left kidney, with an eGFR of 63ml/min. She received 6 months of neo-adjuvant axitinib-pembrolizumab to reduce tumor volume and enable partial nephrectomy. Given the size of the tumor and the need for prolonged cold ischemia, we decided to perform eRAKAT with extracorporeal tumor enucleation. A four phasic CT was done, allowing a digital 3D model for pre-operative planning. The nephrectomy and autotransplantation was performed according to earlier published methods for RAKAT. Tumor enucleation was done extracorporeally on the bench.

Results: Tumor diameter at diagnosis was 88mm and reduced to 74mm pre-operatively after neo-adjuvant therapy. The total surgery took 11 hours and 20 minutes. Post-operative complications contained a Clavien-Dindo grade II with the need for 2 units of packed cells. Total hospital stay was 12 days. The patient had a reduced eGFR dropping at postoperative day 2 to 14 ml/min, only to spontaneously recover to the pre-operative range within 3 weeks. Pathology reported the tumor as clear cell ypT2b N0. Six months postoperatively, imaging shows no evidence of recurrence, normal vascularization patterns and preserved kidney function.
Conclusions: To our knowledge, this is the first case in which eRAKAT is performed in an oncologic setting. eRAKAT resulted in complete tumor resection while maximizing quality of life and preserving renal function. We only recommend this technique in very select RCC cases, specifically in those with a solitary kidney in which in situ partial nephrectomy is deemed impossible. It should only be performed by an experienced surgeon, in a center with an adequate intensive care unit, interventional radiology department and vascular surgeons stand-by.