Supplementary Materials:

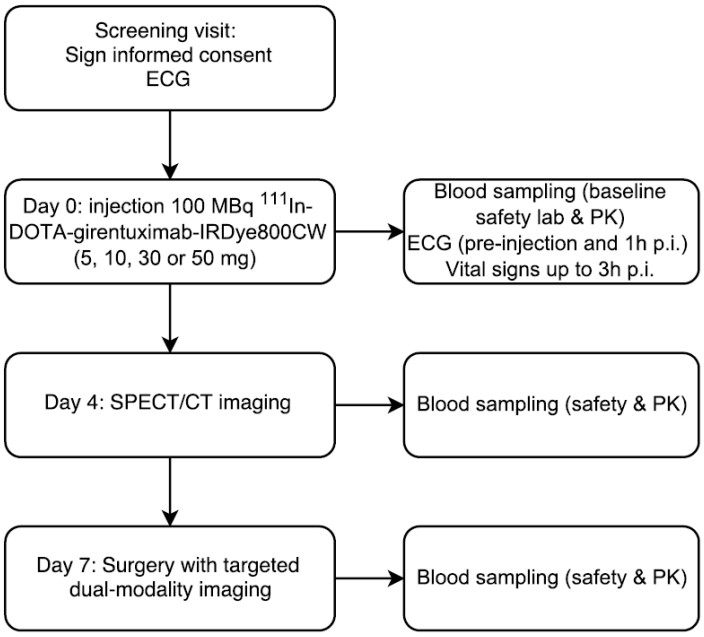

Fig. S1. Flowchart study protocol. PK = pharmacokinetics. In addition, blood sampling for safety analysis was performed 2 to 3 weeks after surgery.

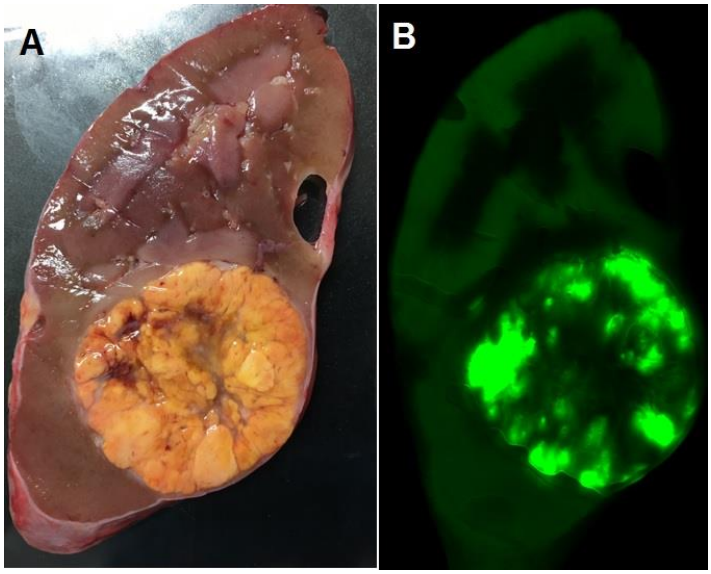

Fig. S2. Patient #1: Fluorescence imaging of a slice of a radical nephrectomy specimen visualized considerable intratumoral heterogeneity in the uptake of ^{111}In-DOTA-

girentuximab-IRDye800CW. A high tumor-to-normal fluorescent contrast was seen at the tumor borders and lower uptake in the center of the tumor. **(A)** Macroscopic photograph. **(B)** Fluorescence image obtained with the Odyssey flatbed fluorescence scanner.

Table S1. Overview of AE that were possibly related

Patient #	Protein dose	Duration of hospital admission (days)	Adverse event	Intervention	CTCAE Grade
2	5	2	Increased creatinin day 4 p.i.**	-	I
6	10	4	Malaise day after injection	-	I
9	30	6	Thrombocytosis day 4 p.i.**	-	I
11	50	4	Increased amylase day 7 p.i.	-	I
14*	50	2	Increase amylase day 4 p.i.	-	I

Blood for safety analyses was tested for the following parameters; hemocytometry (Hb, Ht, leucocytes, thrombocytes), kidney function and electrolytes (creatinin, sodium, potassium, phosphate and calcium), liver chemistry (ALAT, ASAT, GGT LDH, ALP, bilirubin, amylase), albumin and C-reactive protein. p.i.= post injection. All lab changes were transient.*Patient with a CAIX-negative tumor. ** Unlikely to be related.

Movie S1. Intraoperative gamma probe detection during radical nephrectomy 7 days after administration of ^{111}In-girentuximab-IRDye800CW in a ccRCC patient.

Movie S2. Real-time intraoperative fluorescence imaging 7 days after administration of ^{111}In-girentuximab-IRDye800CW during open partial nephrectomy in a ccRCC patient.