RENAL CELL CARCINOMA \mu Glucose HIF-1 signaling pathway transport Epithelial cell of proximal renal tubule Increased nutrients Proximal renal tubule K05448 and oxygen K13375... Angiogenesis Hypoxia, Pseudohypoxia VEGF signaling DNA pathway K09097... K17386 Autocrine Normoxia growth stimulation Degradation K08774 TGF-β signaling pathway +u Ubiquitin mediated proteolysis Conventional (clear-cell) E3 ubiquitin ligase complex Cell proliferation renal-cell carcinoma Epithelial cell of proximal renal tubule Proximal renal tubule ➡ Survival K04438 K05099 K07293 Cell-junction Migration Invasion Ets1 Cell polarity Actin cytoskeleton Proliferation MAPK signaling Cell-cycle progression pathway Papillary renal-cell Motility carcinoma (Type 1) Renal collecting Proximal renal Epithelial cell of proximal renal tubule Glucose duct HIF-1 signaling pathway tubule transport Epithelial cell of renal collecting duct . Increased nutrients K05448 and oxygen Hypoxia, Pseudohypoxia DNA K13375... Angiogenesis VEGF signaling pathway K09097... Normoxia K17386 Degradation Autocrine growth stimulation K08774 TGF-β signaling +u pathway K03871 O_2 Furnarate: K03873 Citrate cycle Collecting-duct Malate Cell proliferation carcinoma Papillary renal-cell carcinoma (Type 2) Mitochondrion Intercalated cell of renal collecting duct epithelium Intercalated cell of renal collecting duct Genetic alterations Oncogenes: MET K09594 Tumor suppressors: VHL, FH, BHD Oncocytoma Chromophobe renal carcinoma 05211 7/24/13 (c) Kanehisa Laboratories