

GUDMAP

GenitoUrinary Development Molecular Anatomy Project

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About GUDMAP

The GenitoUrinary Development Molecular Anatomy Project (GUDMAP) is an open access online resource developed by a consortium of researchers which provides gene expression data, transgenic mice and tools to facilitate research and teaching. Initially GUDMAP focused on the murine urogenital system but more recently it has been extended to include:

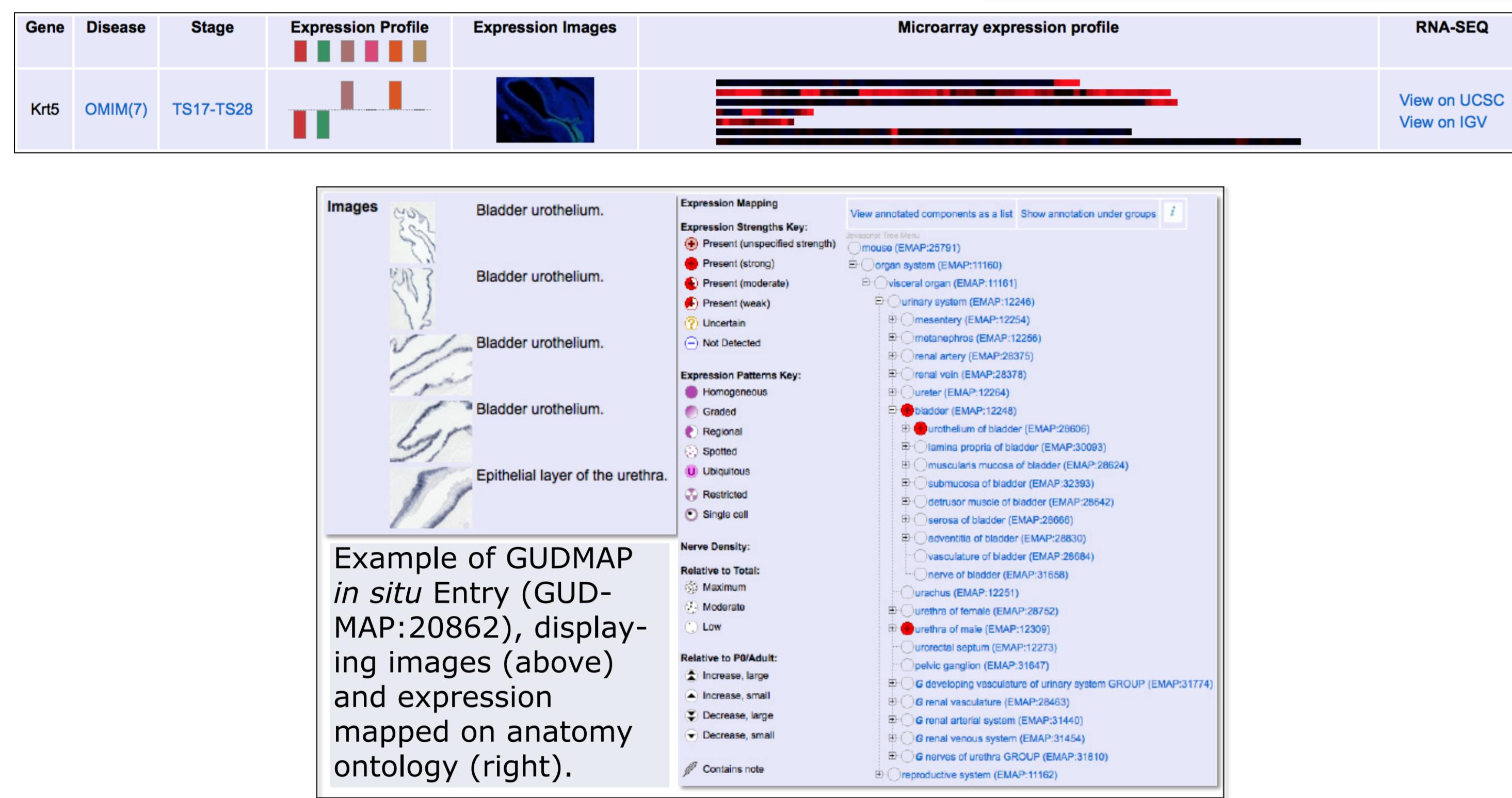
- **Nociceptive GUDMAP (nGUDMAP)** focuses on nociceptors and cell types associated with pain processing for the murine lower urinary tract and pelvic region.
- **Human GUDMAP (hGUDMAP)** extends the gene expression database to include data sets that annotate human bladder, urethra and kidney.

GUDMAP data includes: **Large-scale in-situ hybridisation screens, 3D OPT data, microarray gene expression data and sequencing data.** Expression data are annotated using a **high-resolution ontology** specific to the developing GU system.

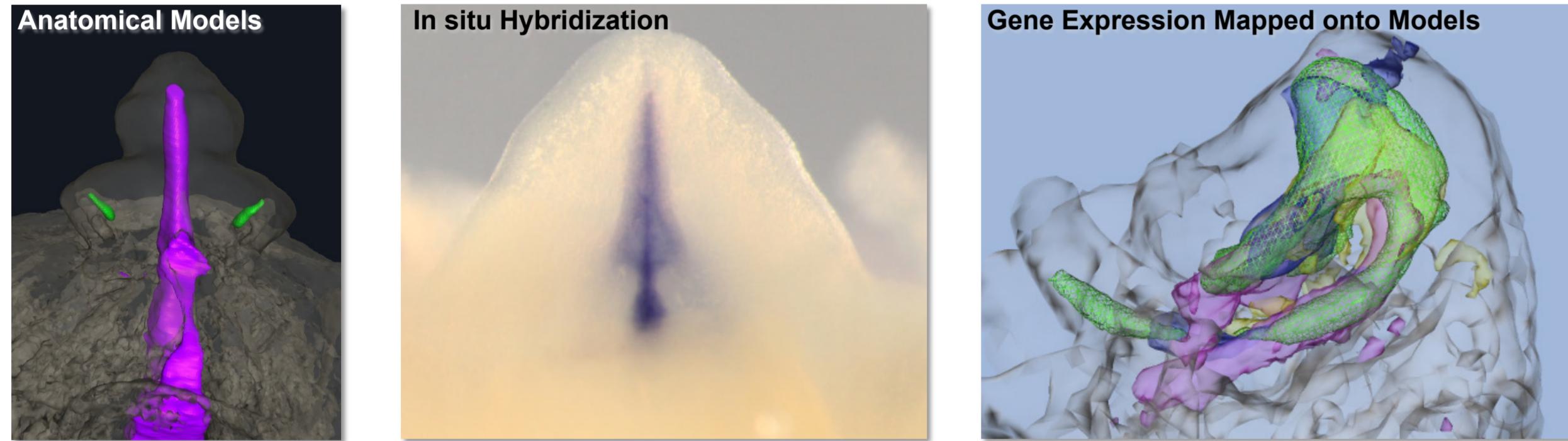
Beginning in 2017 the GUDMAP database will expand the set of online tools available to researchers and begin incorporating more human kidney and urinary tract data.

Summary 'gene-strip' (below) provides an overview of expression data available for each gene. Clickable links connect to in-situ data & images, disease/phenotype associations and microarray data.

Database Statistics		
Assay Type	Entries	Genes
All In Situ Hybridisation (ISH):	10760	3692
Wholemount ISH (WISH):	7346	2896
Section ISH (SISH):	3414	1437
OPT ISH:	59	31
Immunohistochemistry (IHC):	170	32
Transgenic Reporters:	135	38
Microarray:	467	-
Sequencing:	337	-

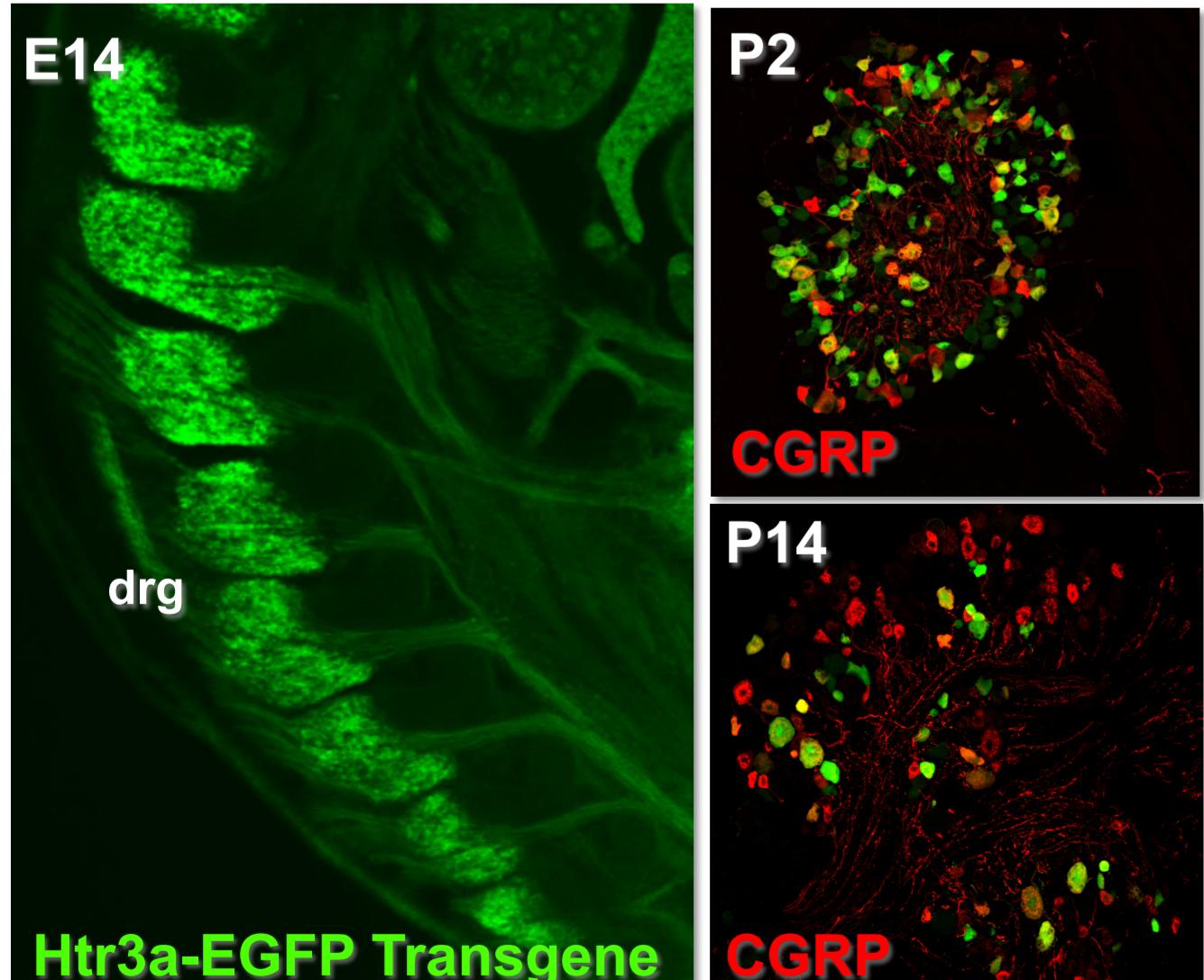


OPT 3D Atlas of Gene Expression in Developing Genital Tuberlcle and Urethra (M. Cohn Lab)

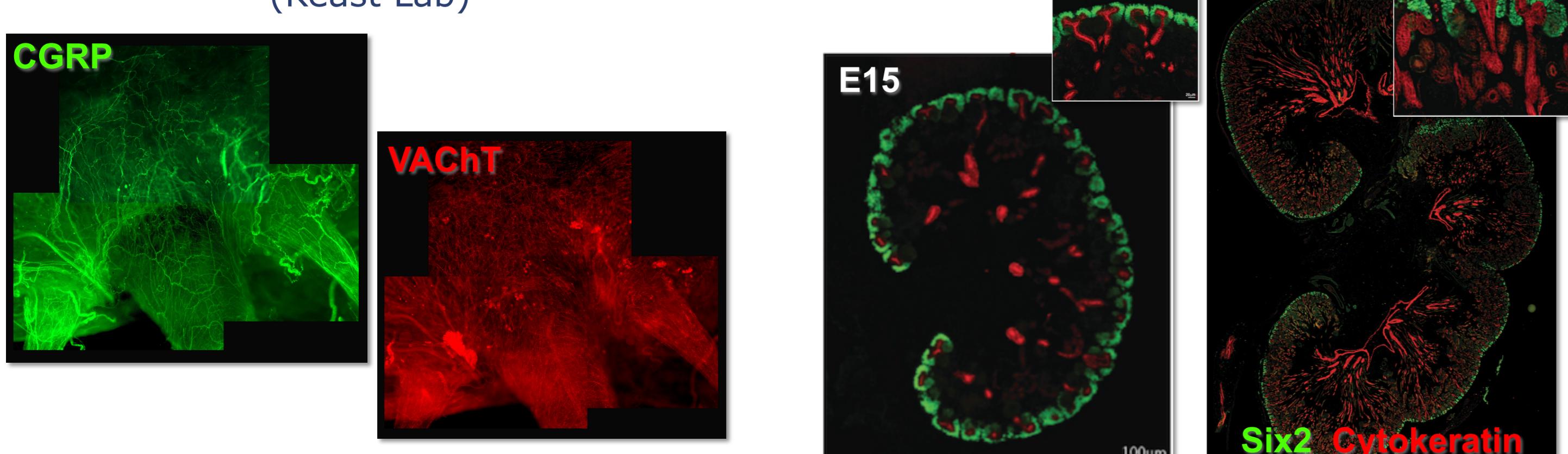


Nociceptive GUDMAP "nGUDMAP"

Developing DRG Immunohistochemistry (Southard-Smith Lab)

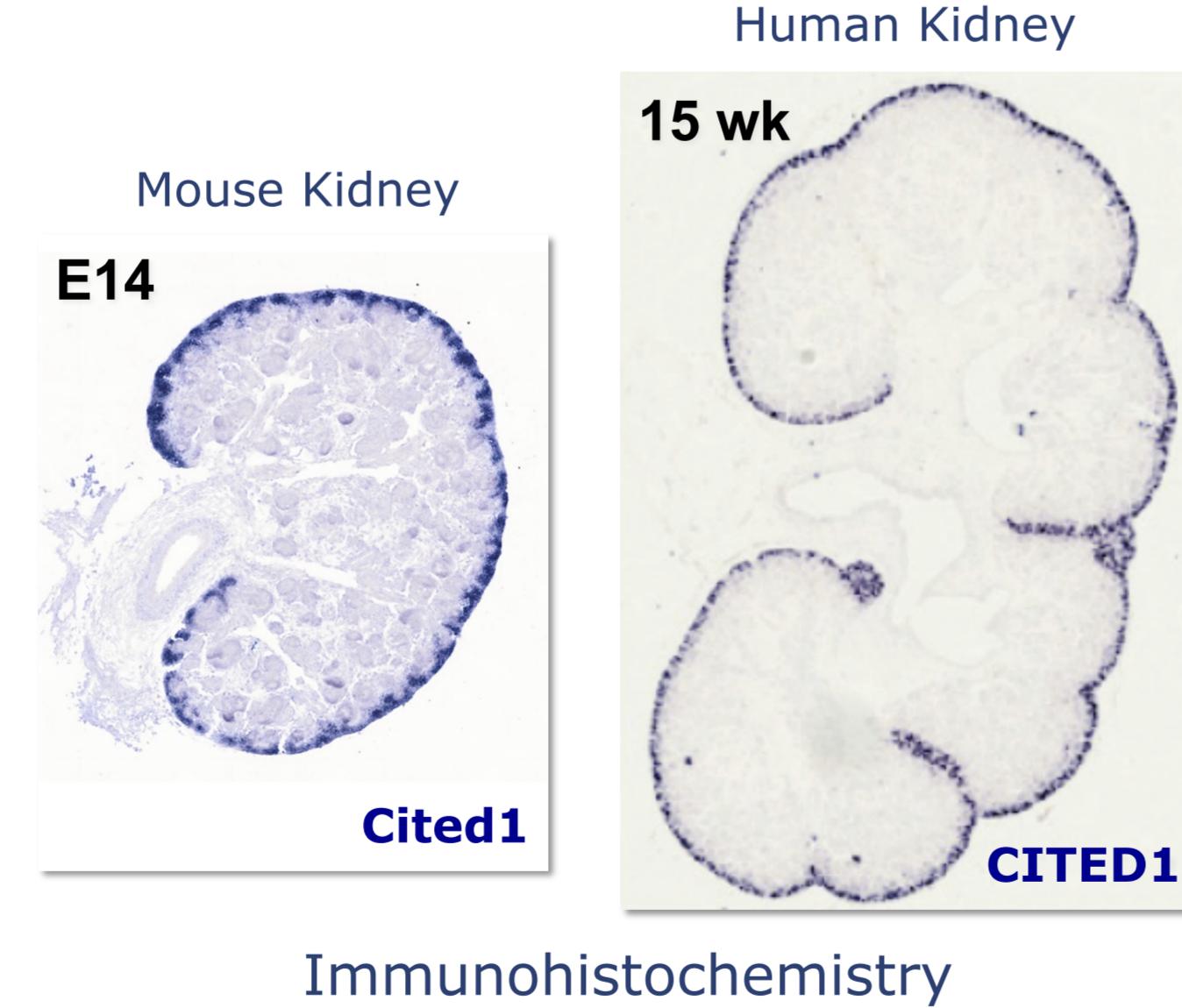


Adult LUT Immunohistochemistry (Keast Lab)

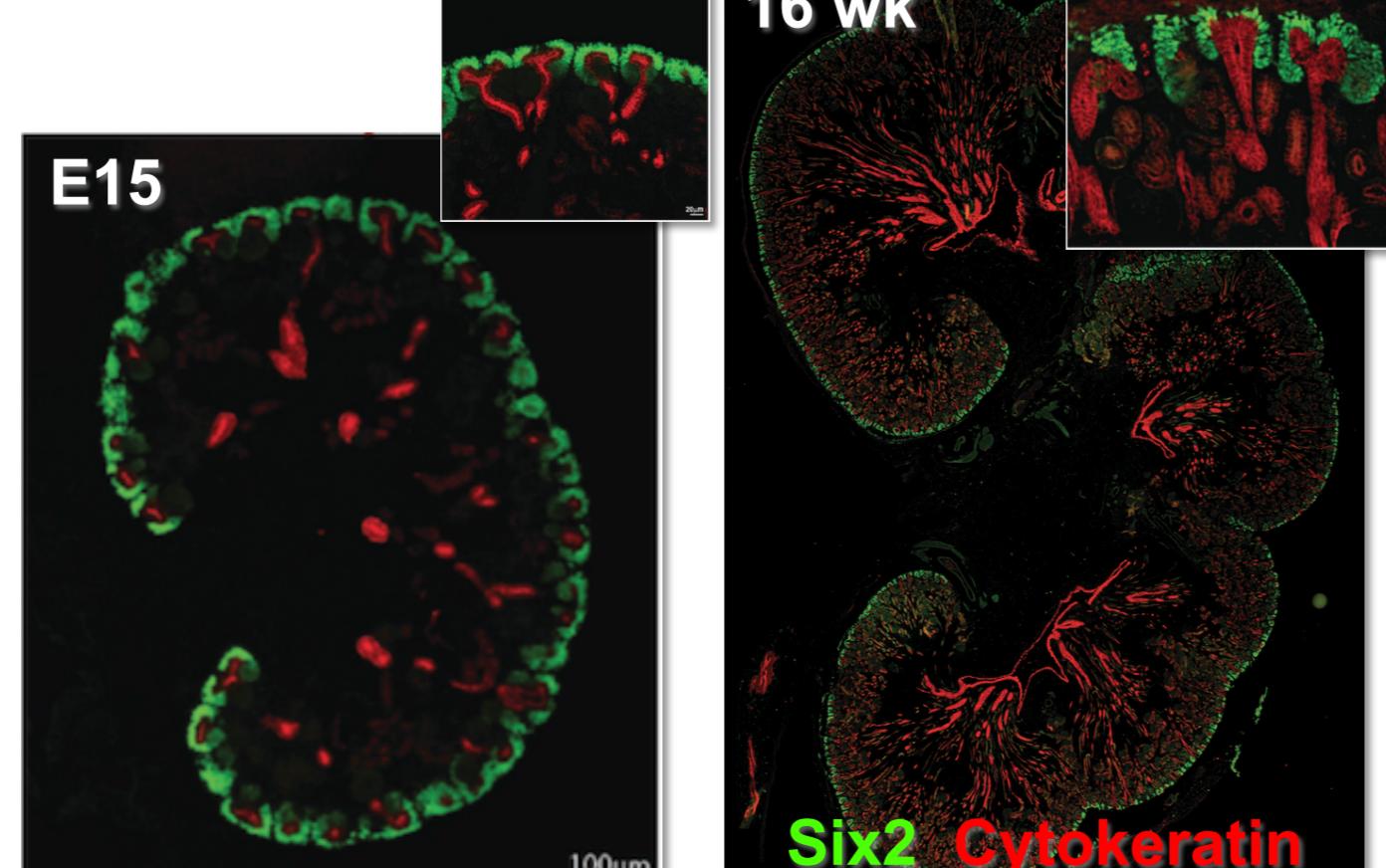


Human GUDMAP "hGUDMAP"

In Situ Hybridization (A. McMahon Lab)



Immunohistochemistry

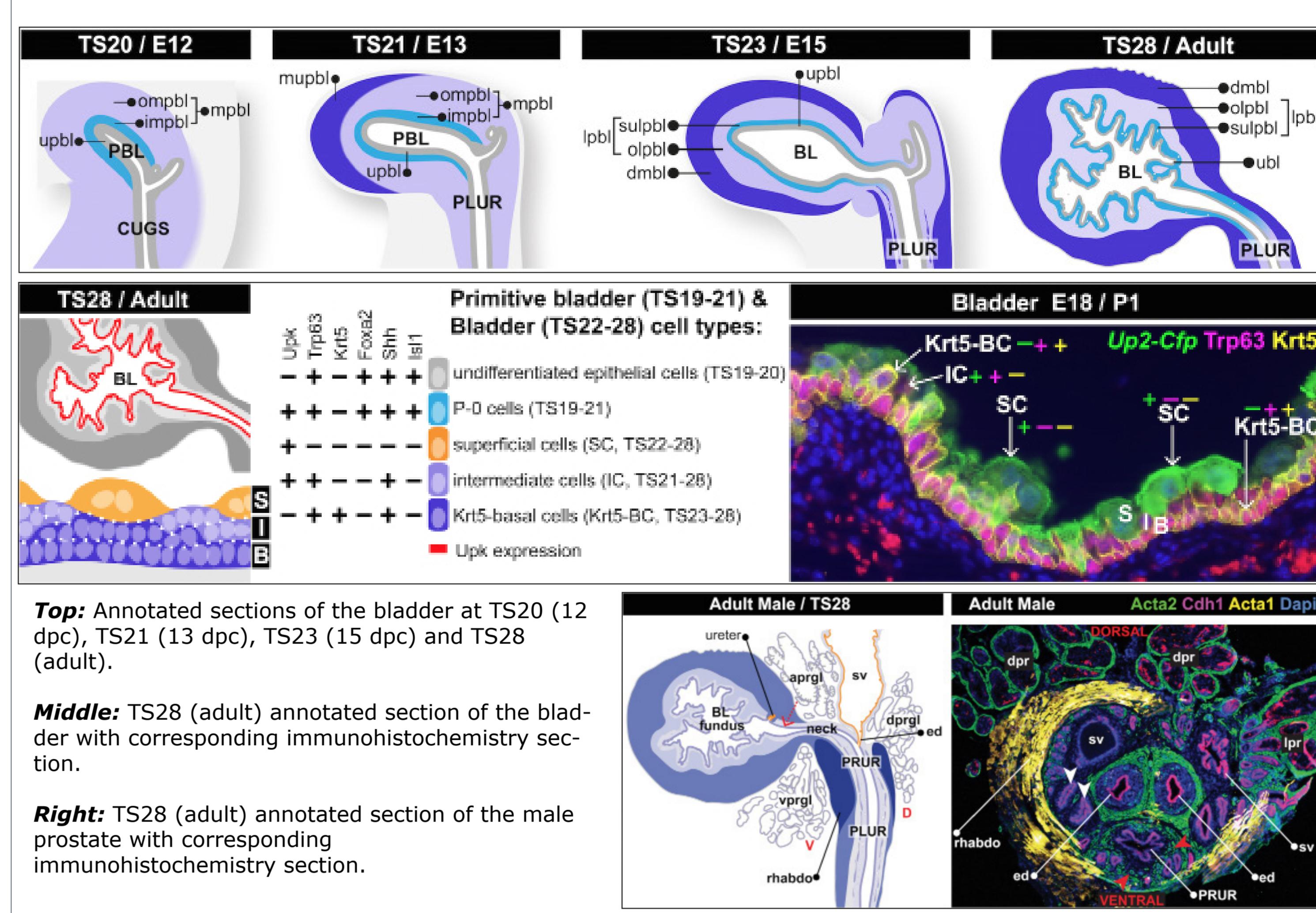


Schematics, Tutorials & Tissue Summaries

GUDMAP holds an extensive archive of high-quality schematics diagrams that illustrate different views of the developing mouse GU system

www.gudmap.org/Schematics/index.php

These help supplement **tutorials** describing GU organogenesis (Matt Kaufman) and enrich the GUDMAP Tissue Summary pages.

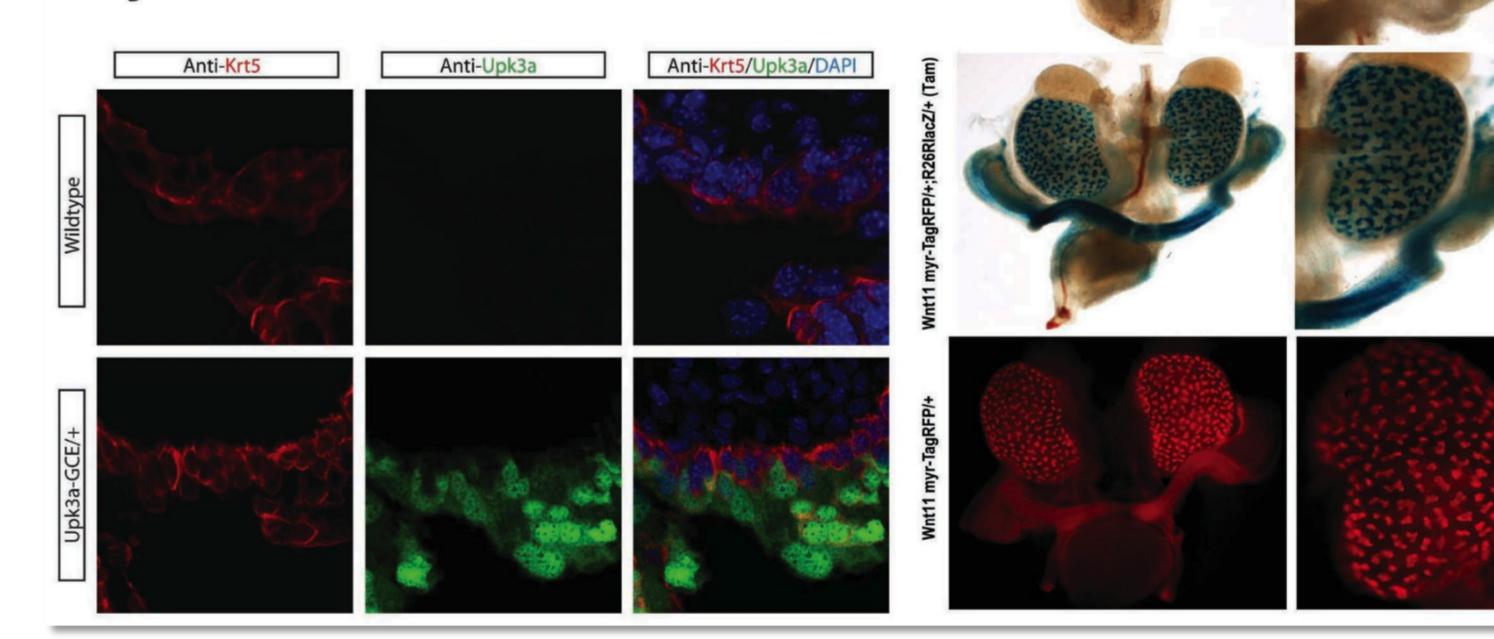


Novel Mouse Strains for Visualising, Isolating and Genetically Manipulating the GU System

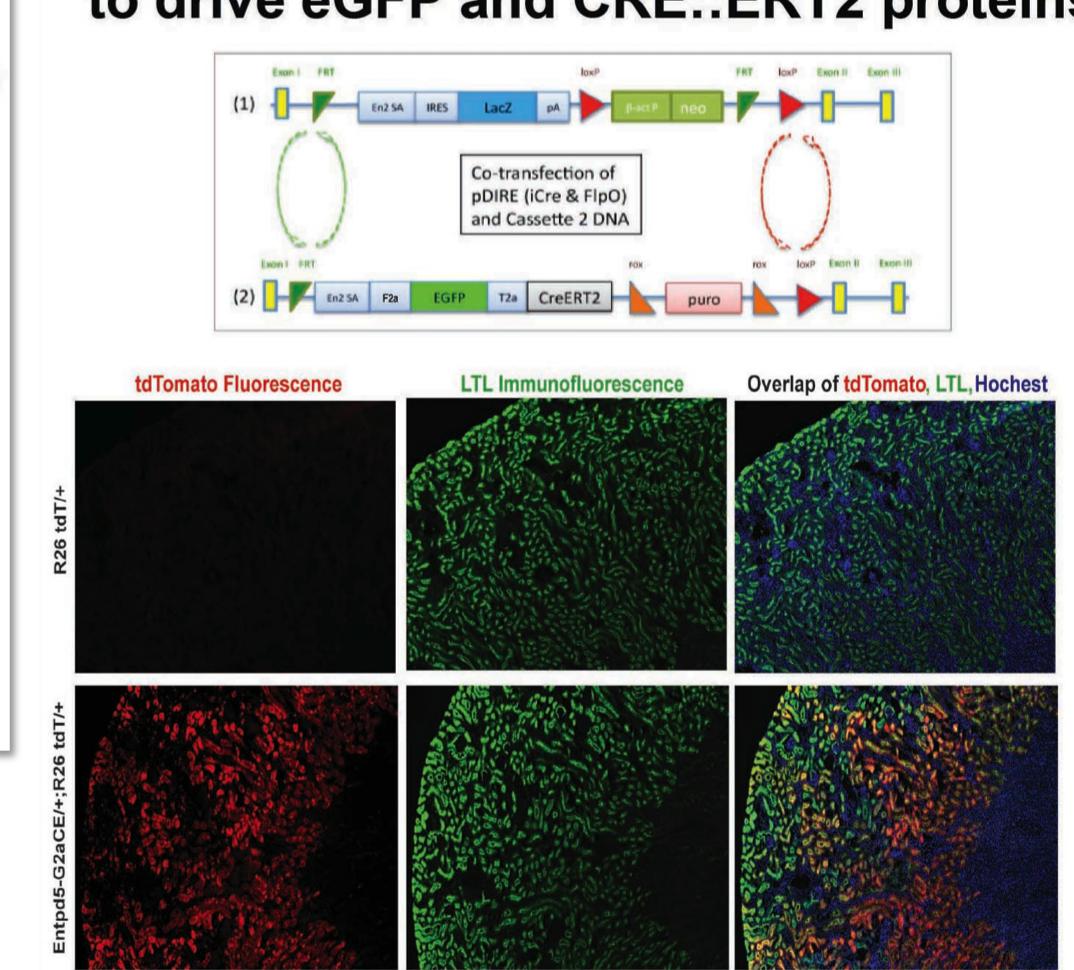
Goals:

- To mark key cell populations in order to isolate, trace and modulate gene activity through drug inducible CRE recombinase.
- Mice made available through the MMRRC (Jackson Labs).

Part I: Use BAC mediated mouse transgenesis to drive eGFP and RFP::Cre::ERT2 fusion proteins in specific cell types in the GU system

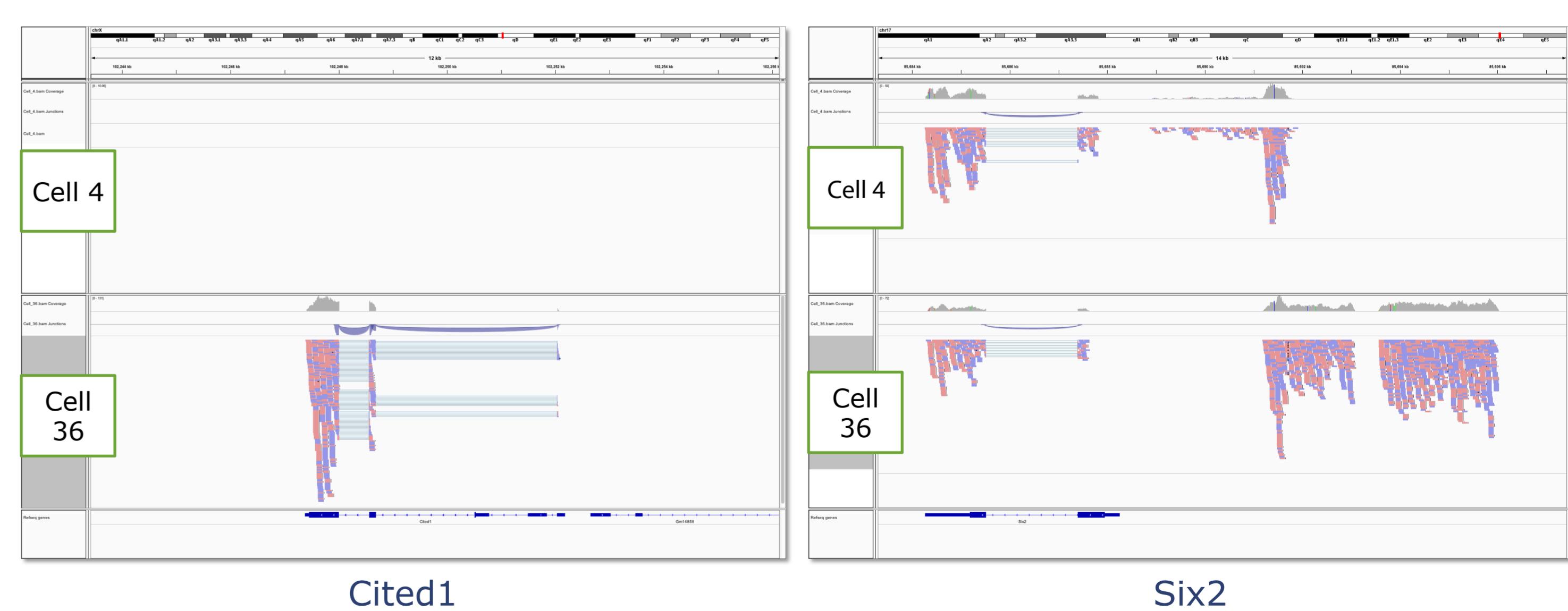


Part II: Obtain ES Cell clones through KOMP(NIH) and EUCOMM Consortia, create new alleles by dual Recombinase Mediated Cassette Exchange (dRCME) to drive eGFP and CRE::ERT2 proteins



Gene Expression Profile Analyses of GUDMAP Data

IGV Genome Browser View of Single Cell Data - E11.5 metanephric mesenchyme (S. Potter and B. Aronow)



References

- All past contributors to GUDMAP can be found at www.gudmap.org/About/Projects/
- Armfeld BA, Seifert AW, Zheng Z, Merton EM, Rock JR, Lopez M-C, et al. Molecular Characterization of the Genital Organizer: Gene Expression Profile of the Mouse Urethral Plate Epithelium. *J Urol.* 2016 Oct;196(4):1295–302. PMCID: PMC5293367
- Keast JR, Smith-Anttila CJA, Osborne PB. Developing a functional urinary bladder: a neuronal context. *Front Cell Dev Biol.* 2015;3(Pt 1):53. PMCID: PMC4555086
- O'Brien LL, Guo Q, Lee Y, Tran T, Benatz J-D, Whitney PH, et al. Differential regulation of mouse and human nephron progenitors by the Six family of transcriptional regulators. *Development.* 2016 Feb 15;143(4):595–608. PMCID: PMC4760318
- Ton HT, Smart AE, Aguilar BL, Olson TT, Kellar KJ, Ahern GP. Menthol Enhances the Desensitization of Human α 3 β 4 Nicotinic Acetylcholine Receptors. *Mol. Pharmacol.* 2015 Aug;88(2):256–64. PMCID: PMC4518085