Tissue-Engineered Lung: An In-Vivo Model of Airway Injury and Regeneration

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Background

- Lung disease causes more than 230,000 deaths per year in the US
- Human lung often responds to injury by scarring rather than repair
- Molecular and cellular mechanisms of human lung regeneration are largely unknown
- Currently existing models of lung regeneration are somewhat limited

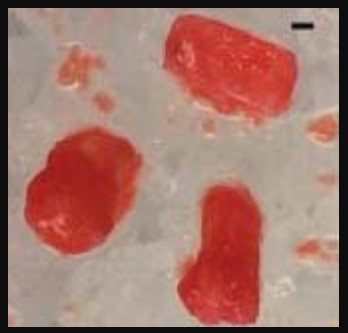
GOAL

To develop a more “complete” model of in vivo lung regeneration that allows to study the complex mechanisms driving lung regeneration

Methods

Native postnatal lung
(14 days)

Dissociation

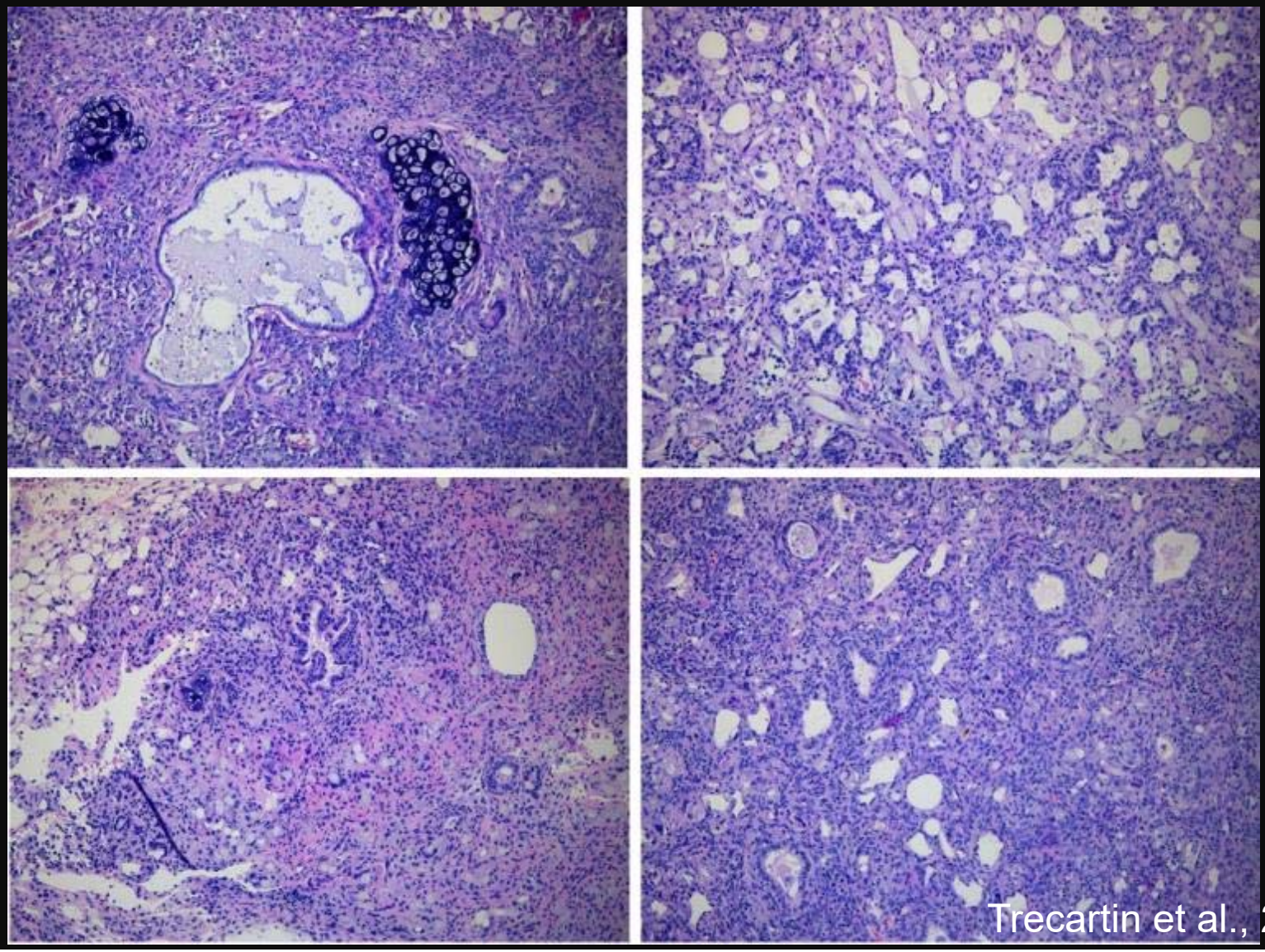


Seeded polymers

Collect at different time points

Trecartin et al., 2016

Distinguishable proximal and distal structures via H&E

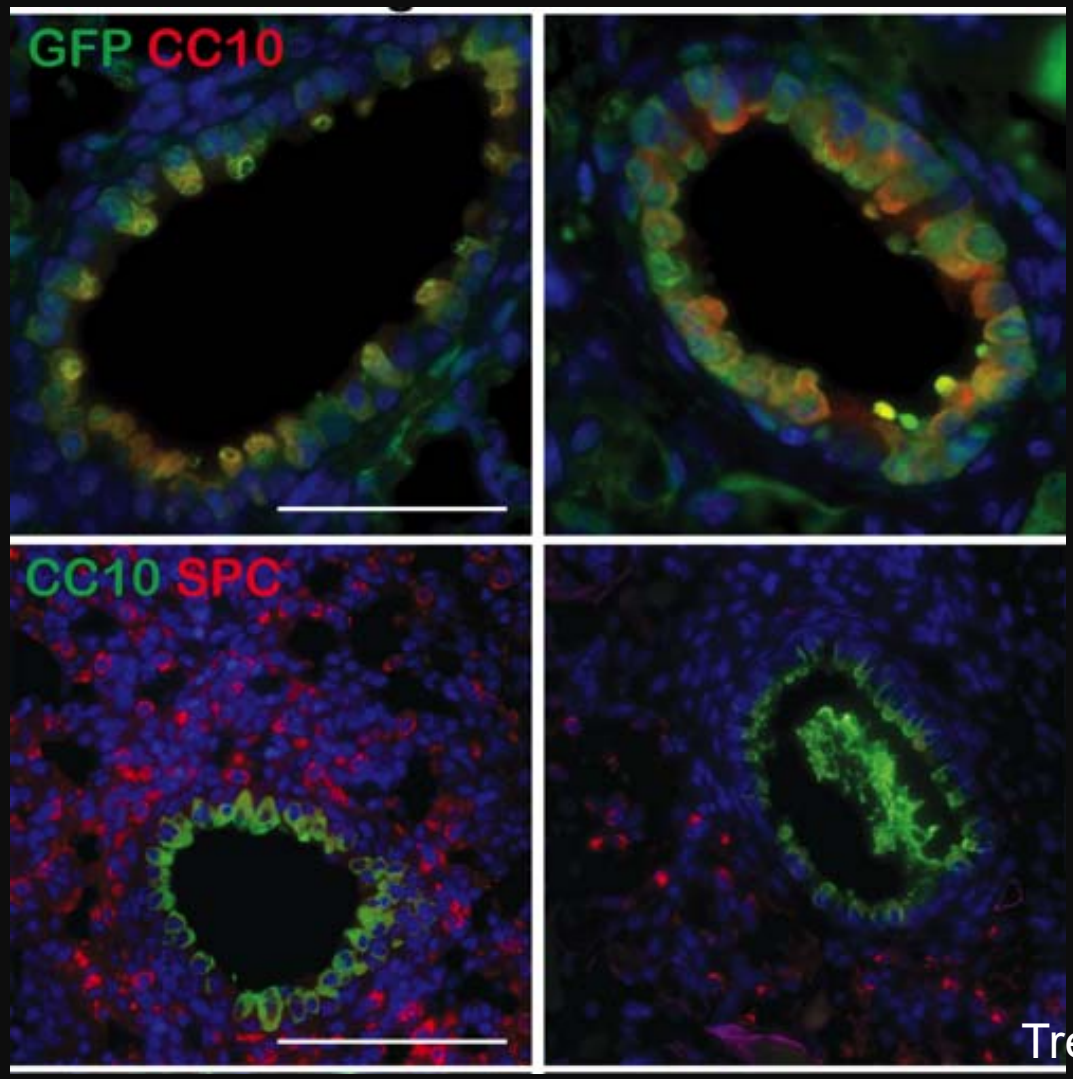


Trecartin et al., 2016

TELu airways are of donor origin

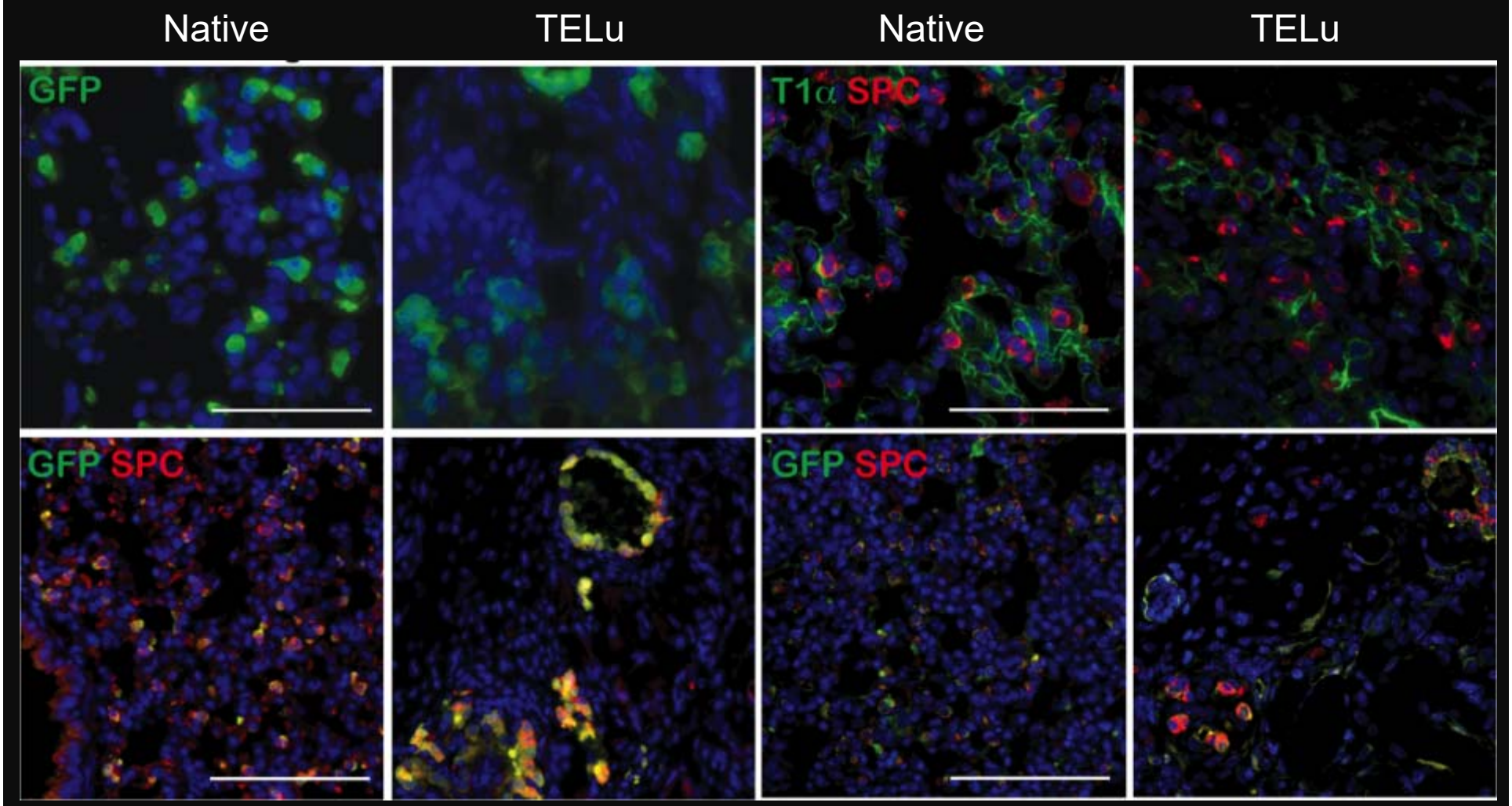
GFP native lung implanted into NOD-SCID mouse for 4 weeks

Native TELu



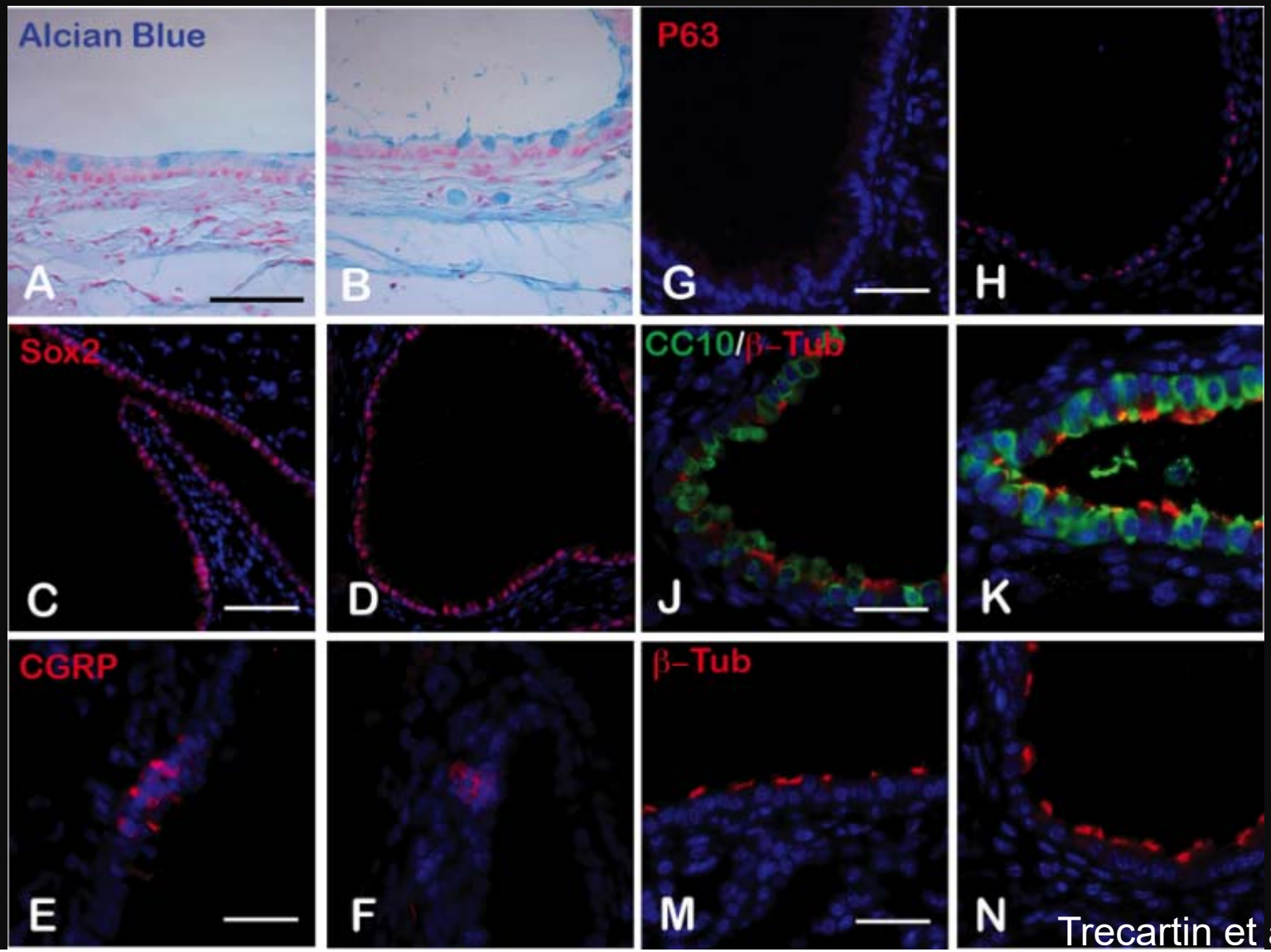
Trecartin et al., 2016

SPC positive cells are derived from donor cells



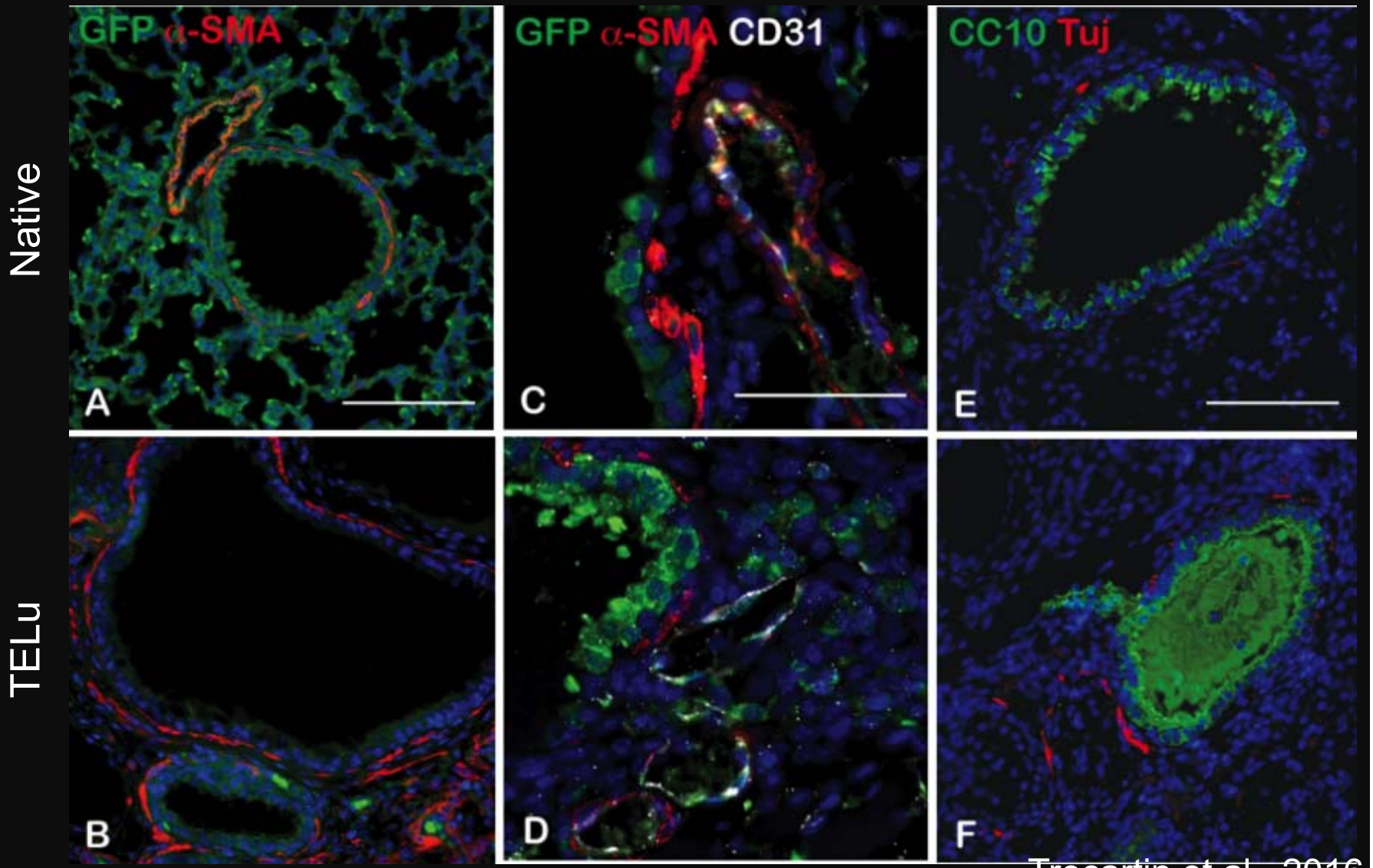
Trecartin et al., 2016

Characterization of epithelial markers



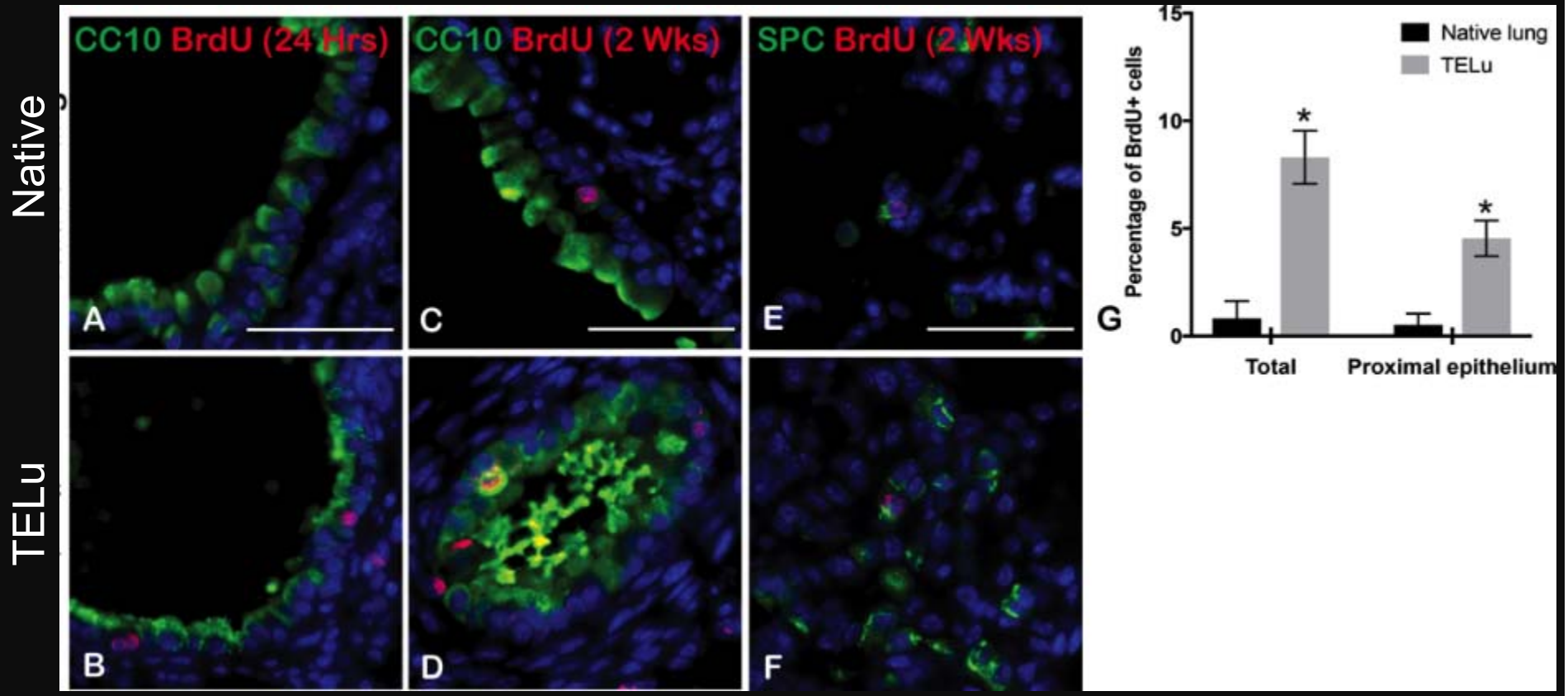
Trecartin et al., 2016

Characterization of mesenchymal markers



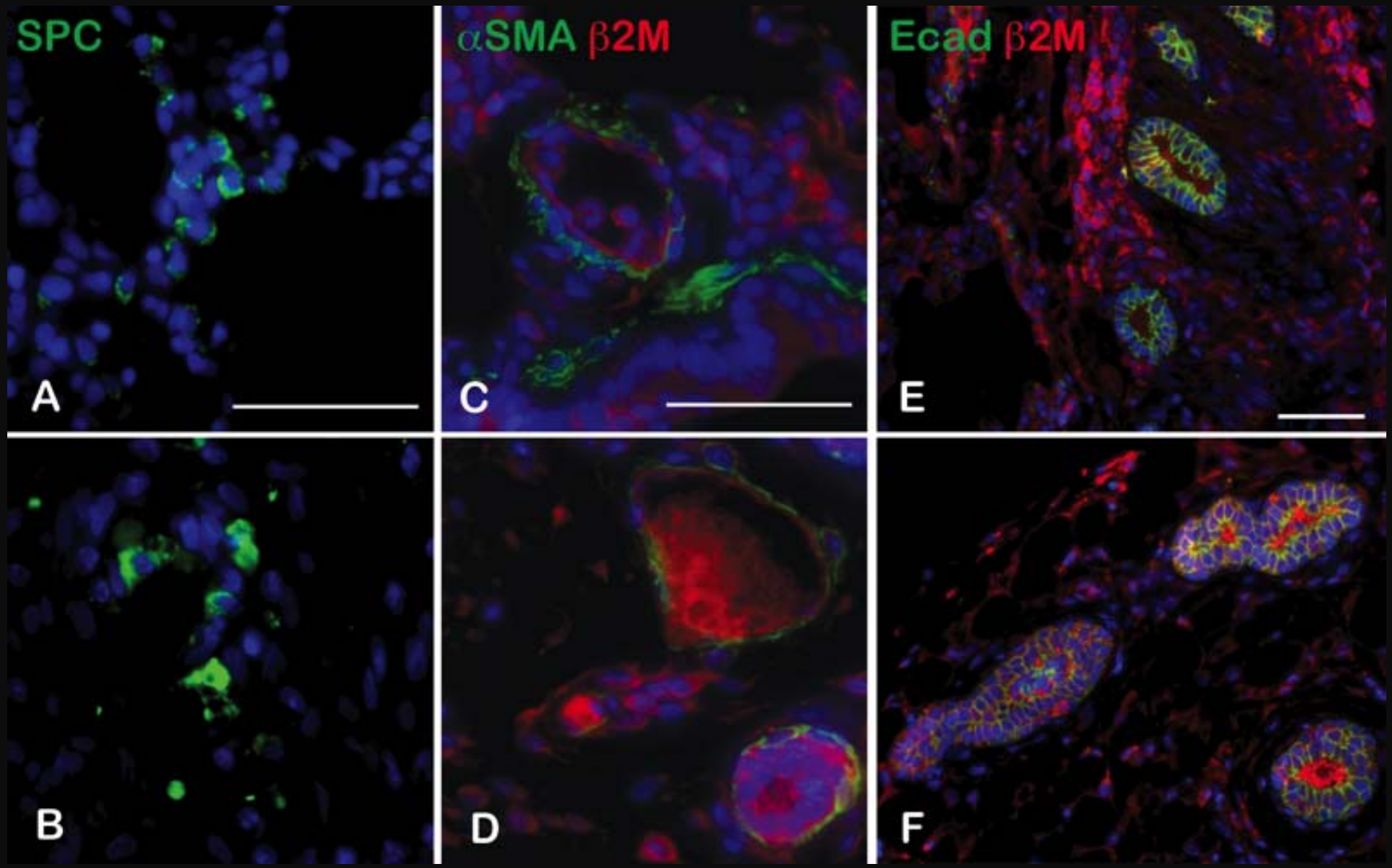
Trecartin et al., 2016

Higher proliferative rate seen in TELu



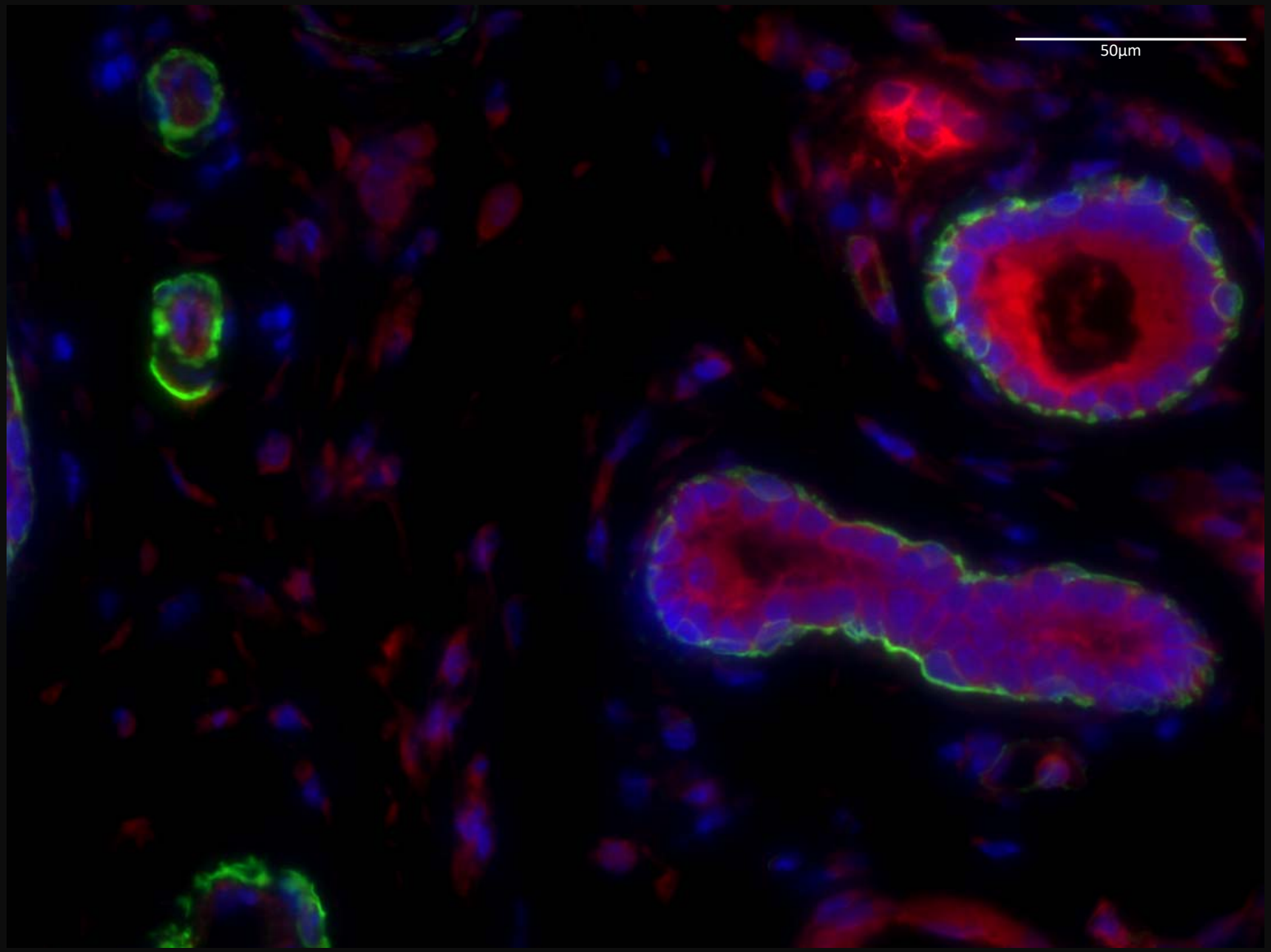
Trecartin et al., 2016

Generating Human TELu



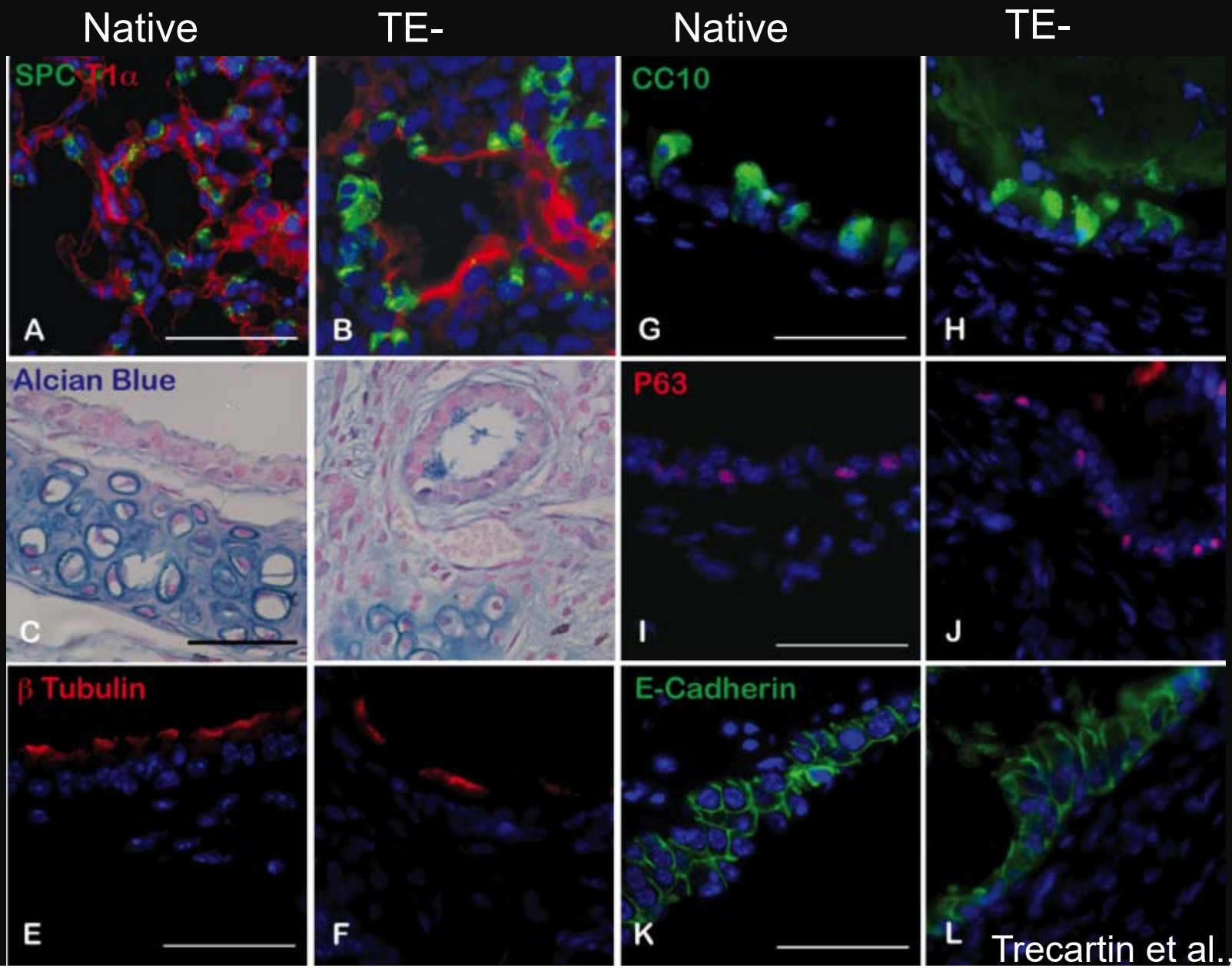
Trecartin et al., 2016

Smooth Muscle cells in hTELu



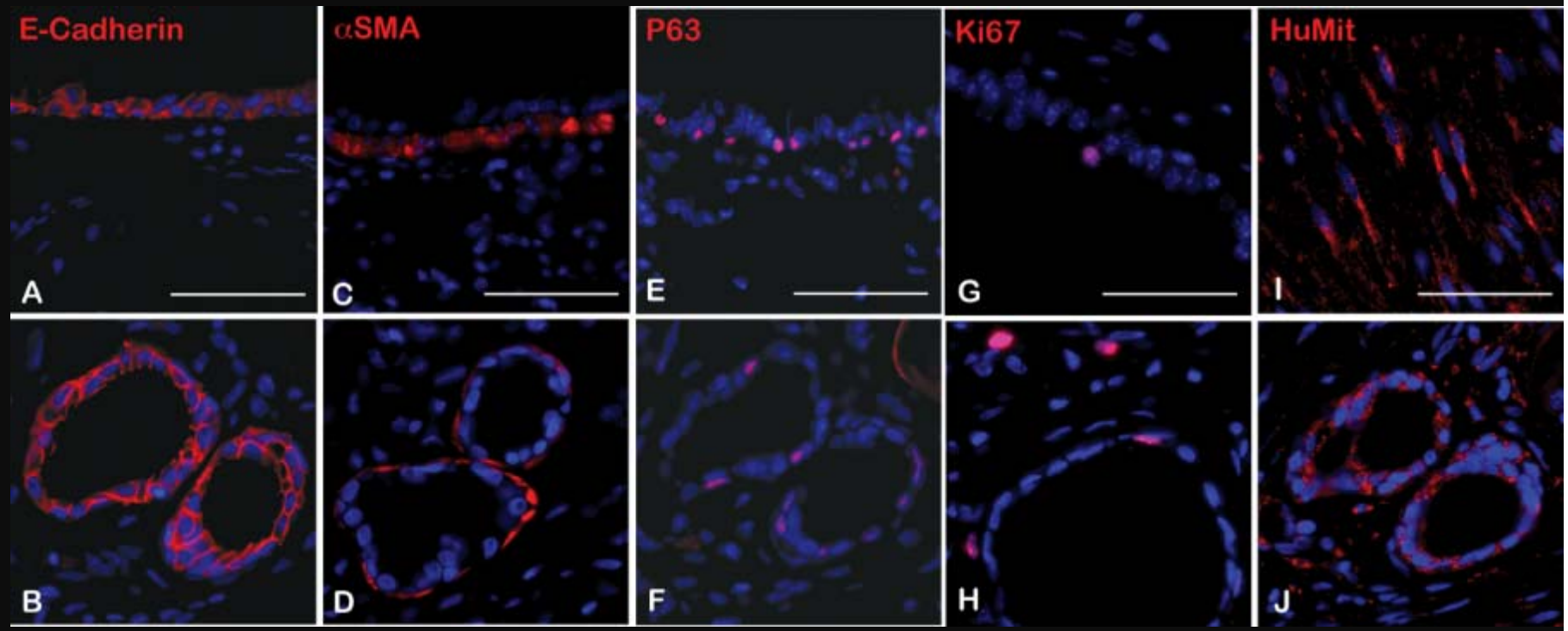
α-SMA B2-micro

Generation of compartment specific tissue



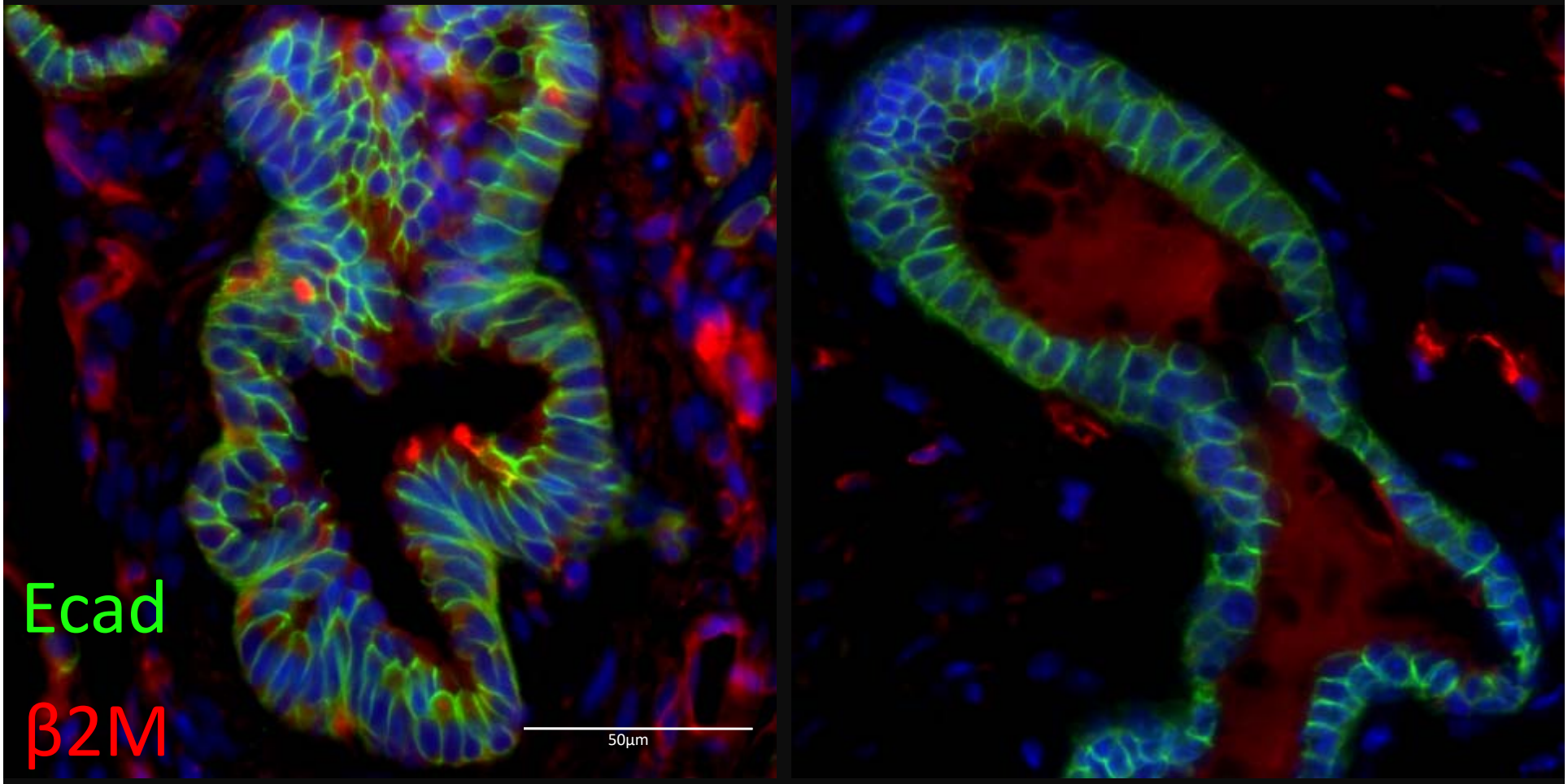
Trecartin et al., 2016

Human TE-Trach displaying epithelial and mesenchymal markers

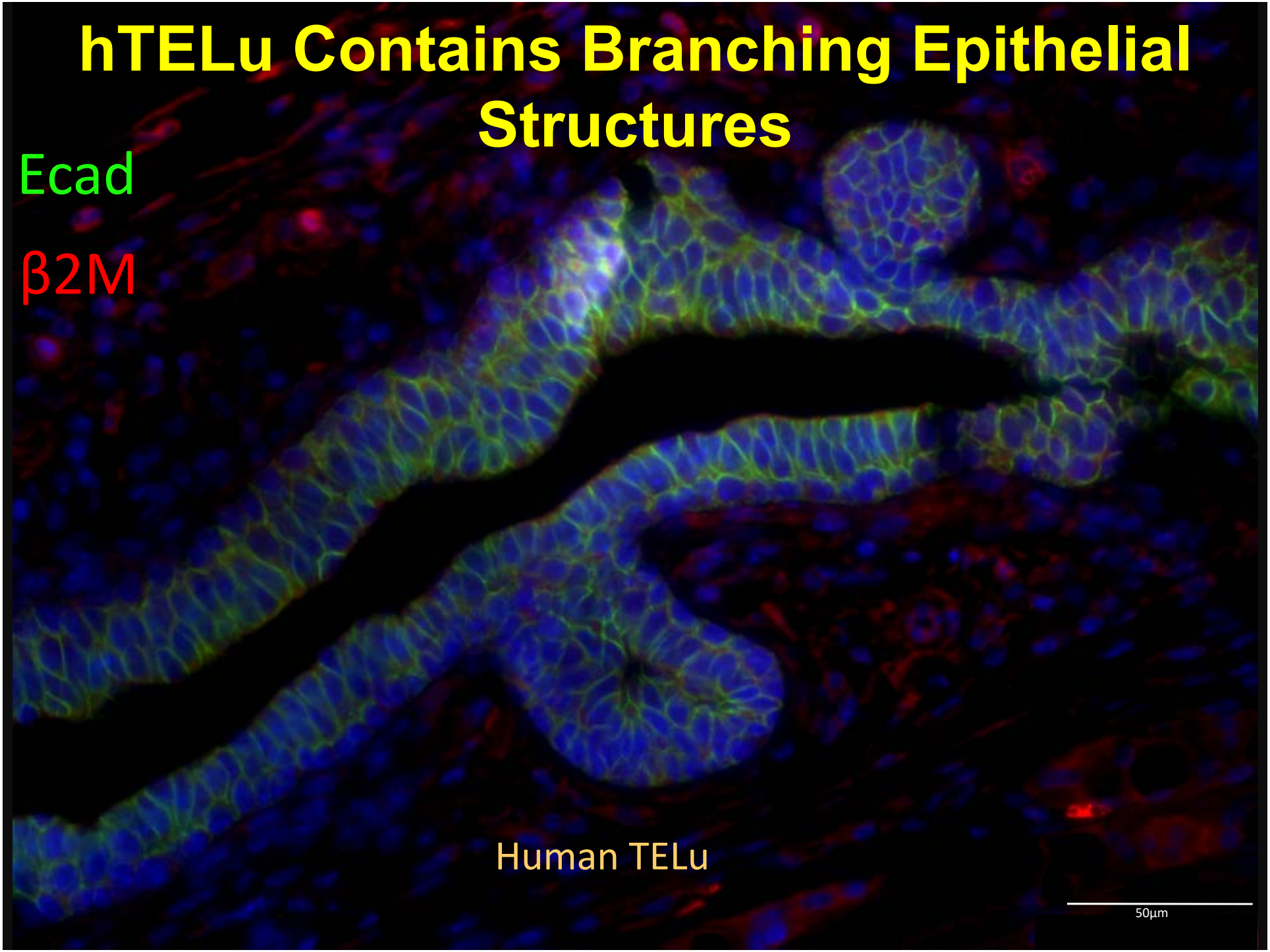


Trecartin et al., 2016

hTELu Contains Large Epithelial Structures



hTELu Contains Branching Epithelial Structures



Summary

- Murine TELu containing all cell types, e.g. SPC positive cells, likely AEC2s, Club cells, Ciliated cells, Smooth muscle cell and nerve cells
- Human TELu containing epithelial structures, SPC positive cells, Smooth muscle cells
- Proximal and distal regional structures can be generated distinctly

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