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URINE-DERIVED iPSCs

- Establishment of patient specific pluripotent stem cells
- Differentiation of iPSCs towards various cell types
- Study of various diseases

Primary urine cell cultures

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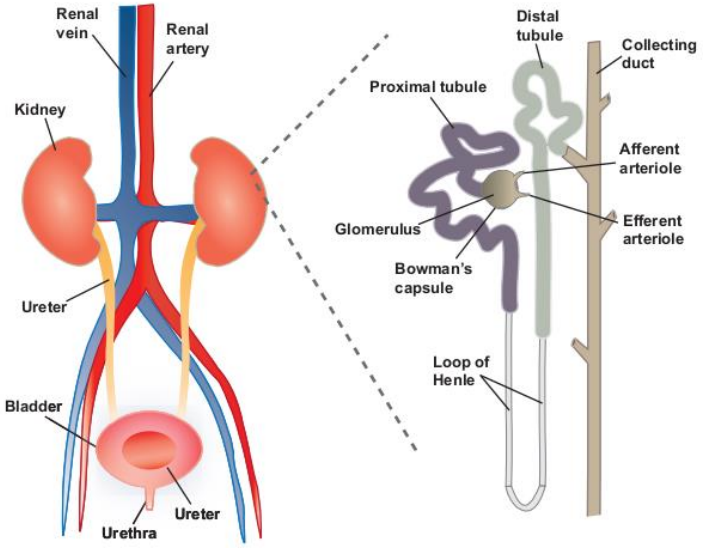
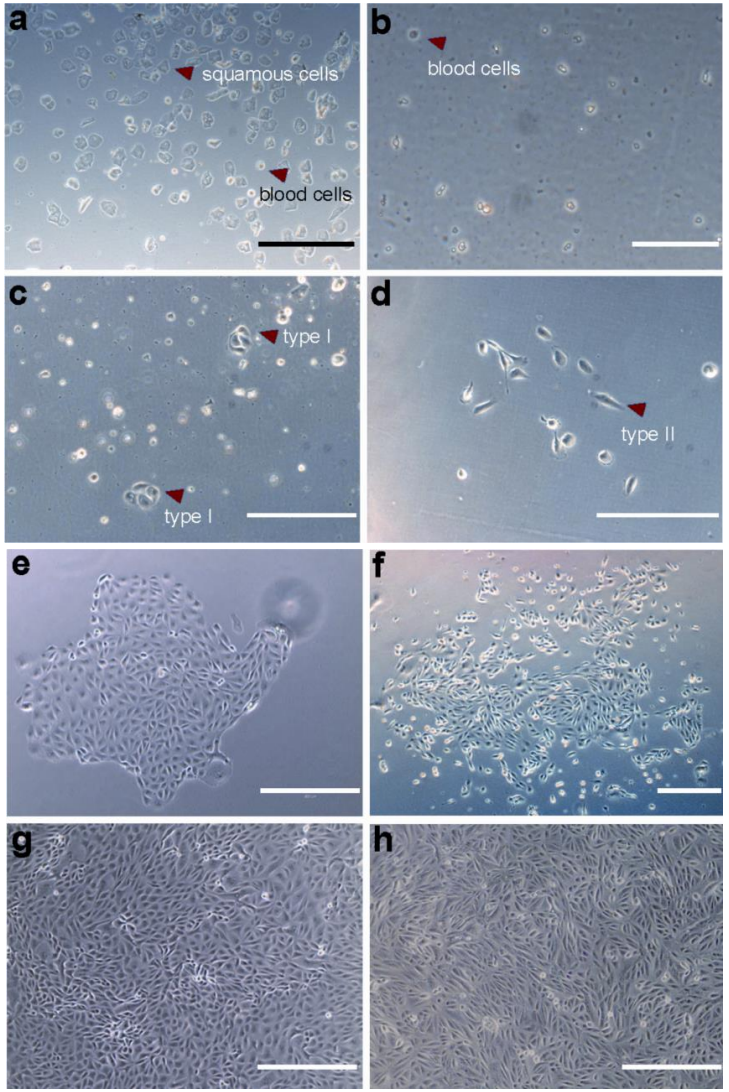
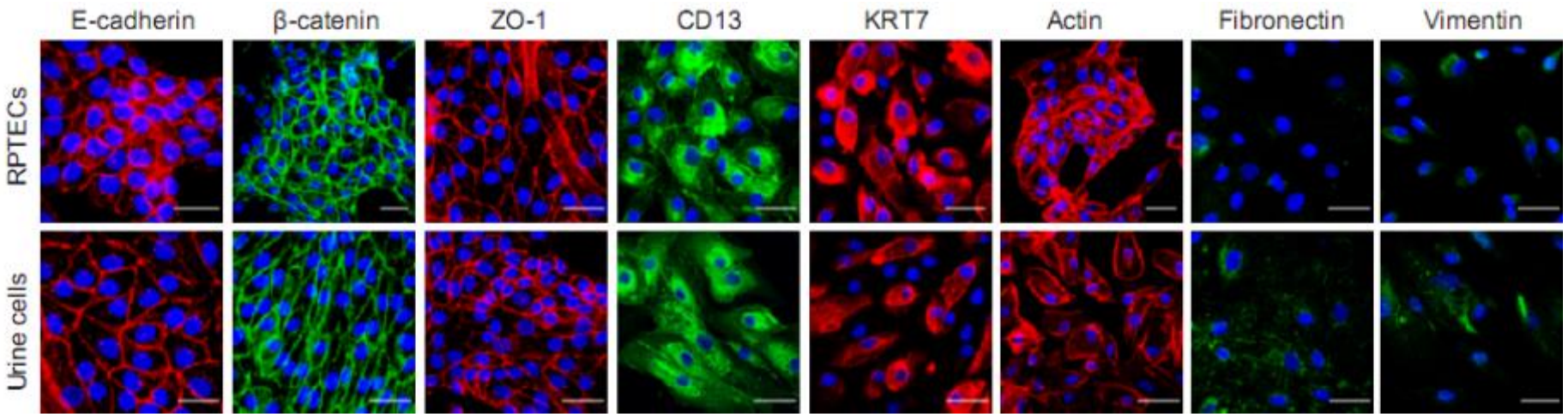




Zhou T, Nat Protoc 2012

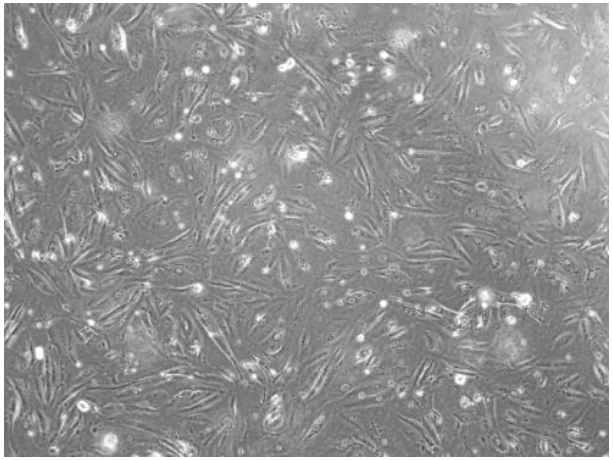
Primary urine cell cultures
Proximal tubular epithelial cells

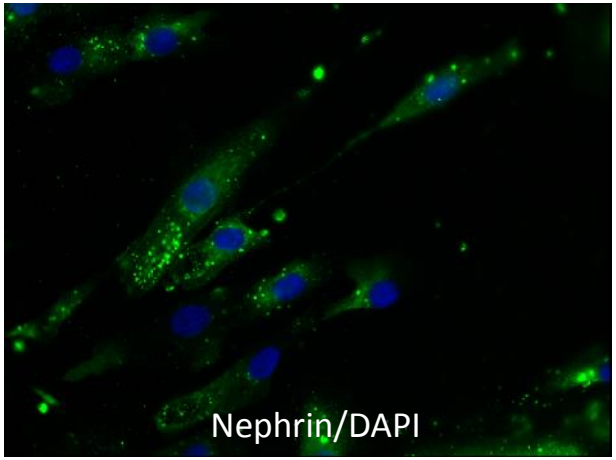


Urine-derived renal proximal tubular epithelial cells can only be grown for a few population doublings in vitro before entering replicative senescence and show expression of the typical epithelial and cell-type specific markers comparable to cells isolated from kidney tissue biopsies.

Zhou T, JASN 2011

Primary urine cell cultures
Podocytes





Urine-derived podocytes can be grown for about 13 population doublings in vitro before entering replicative senescence and show expression of the typical podocyte marker nephrin.

Primary urine cell cultures
Mesenchymal stem cells

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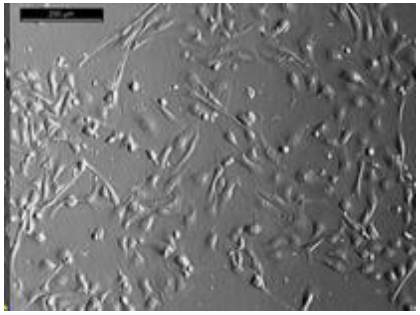
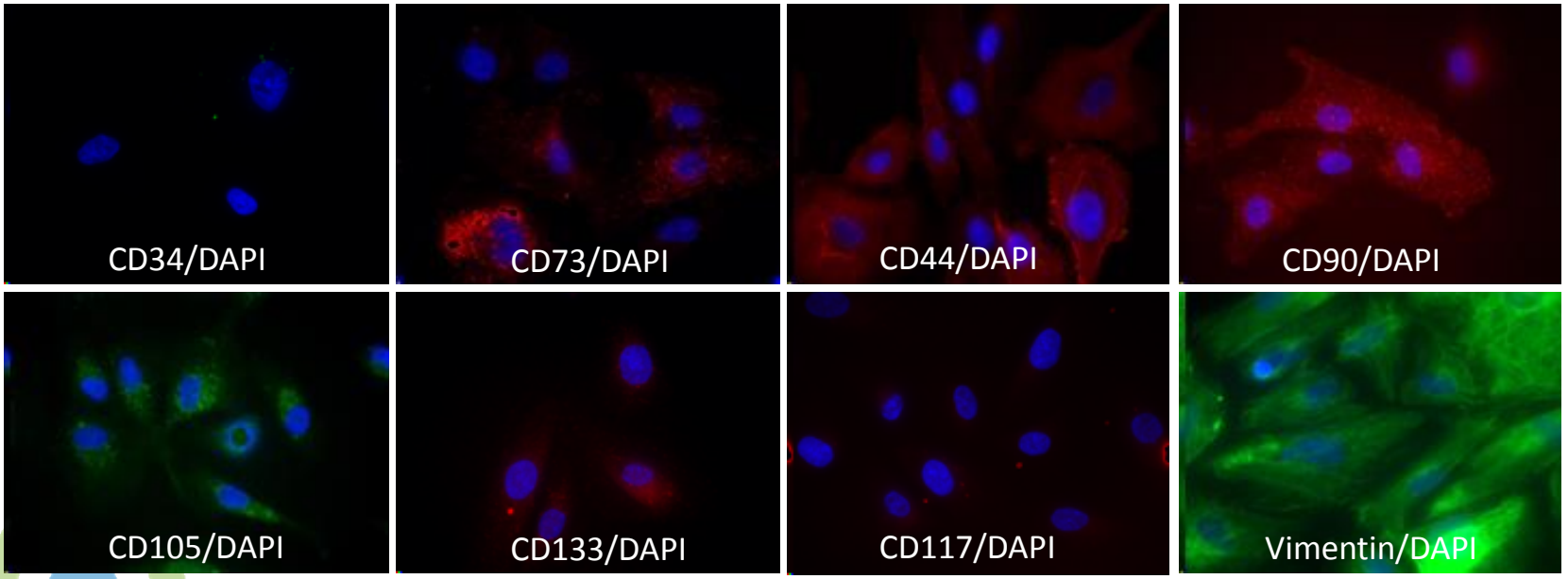


Urine-derived mesenchymal stem cells are characterized by the typical morphology of mesenchymal stem cells and expression of typical marker proteins such as CD44, CD73, CD90 CD105, CD117 and CD133 as well as the mesenchymal marker vimentin. Additionally, the cells can be differentiated towards the adipogenic, chondrogenic and osteogenic lineage and show immunomodulatory properties.



Urine-derived iPS cells
Morphology during reprogramming

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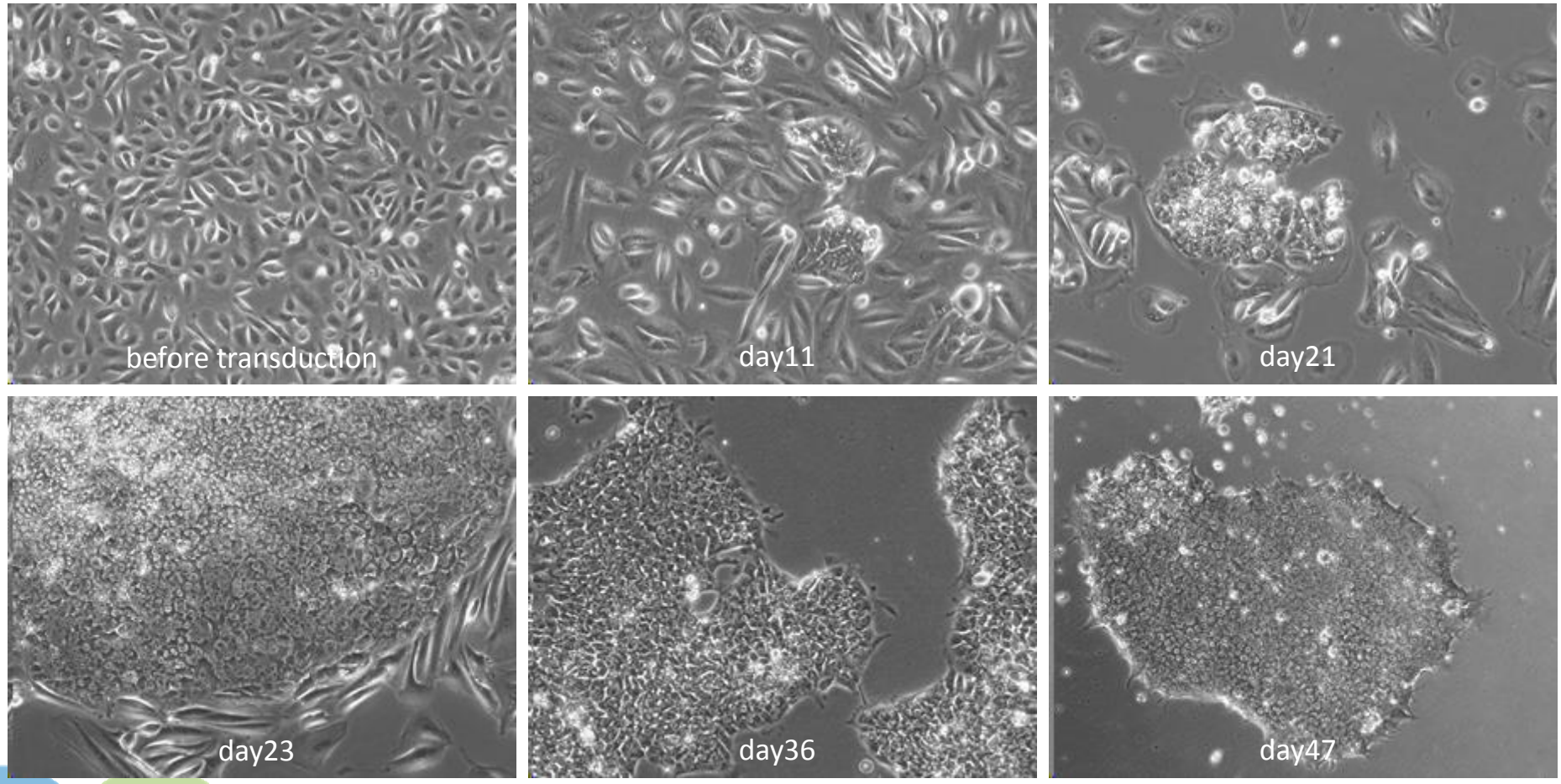

Reprogramming of urine-derived podocytes by overexpression of the four Yamanaka-factors Oct3/4, Sox2, Klf4 and c-myc using Sendai-virus and selection of individual clones.

Urine-derived iPS cells
Expression of pluripotency markers

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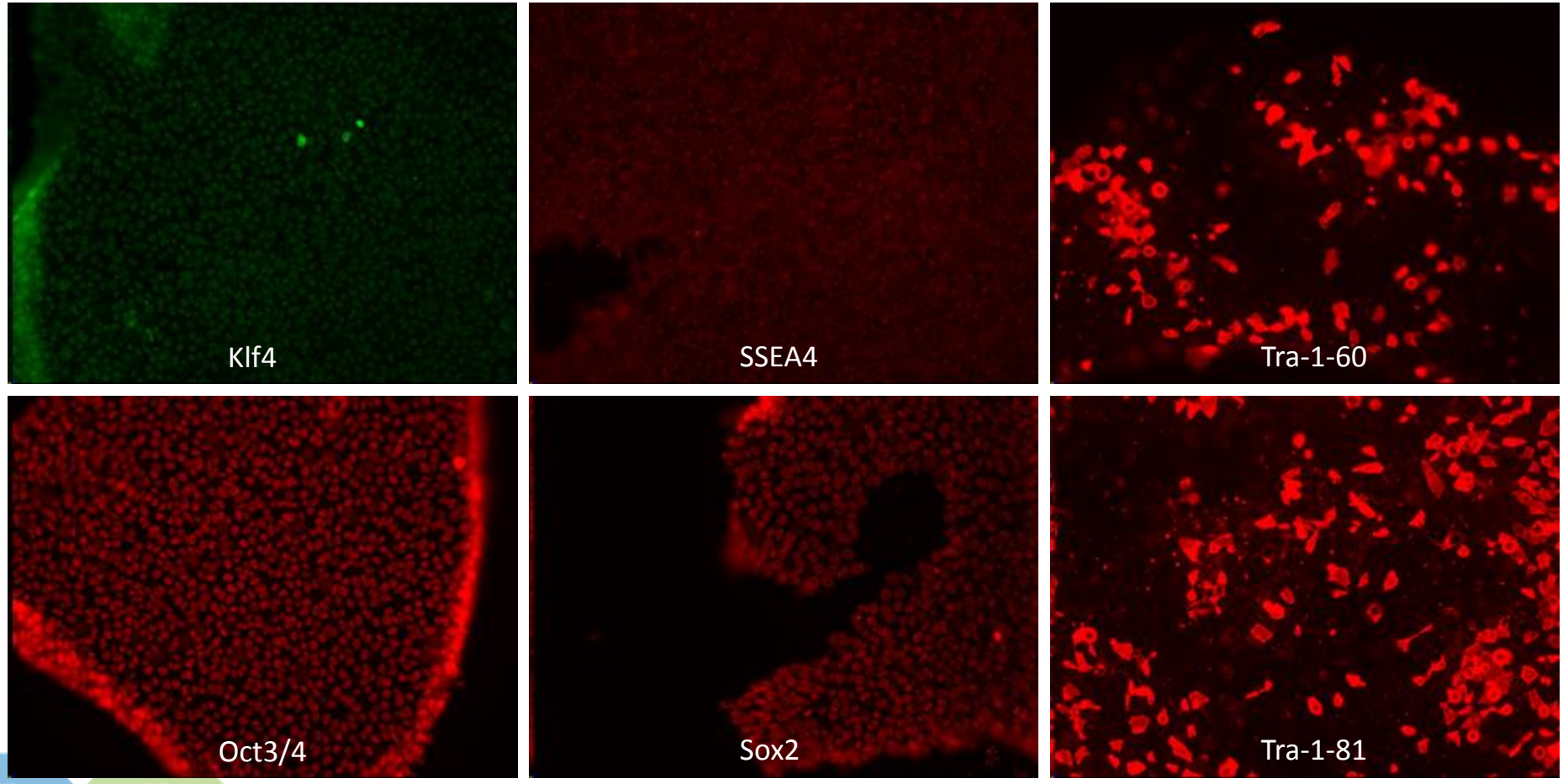

Urine-derived iPS cells show expression of typical pluripotency markers such as Kl4, SSEA4, Oct3/4, Sox2, Tra-1-60 as well as Tra-1-81 as indicated by immunofluorescence stainings.

Urine-derived iPS cells
Differentiation capacity

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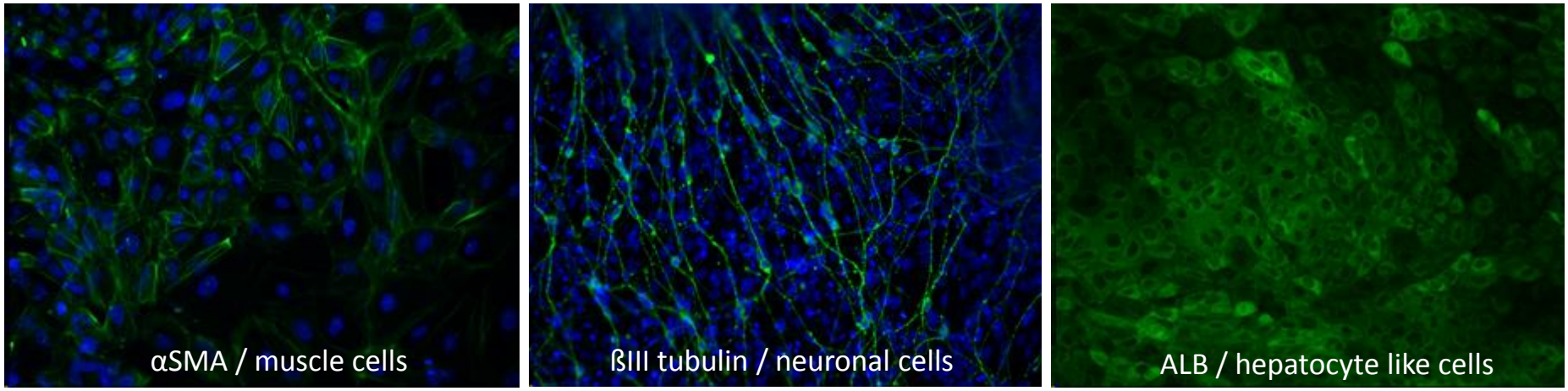
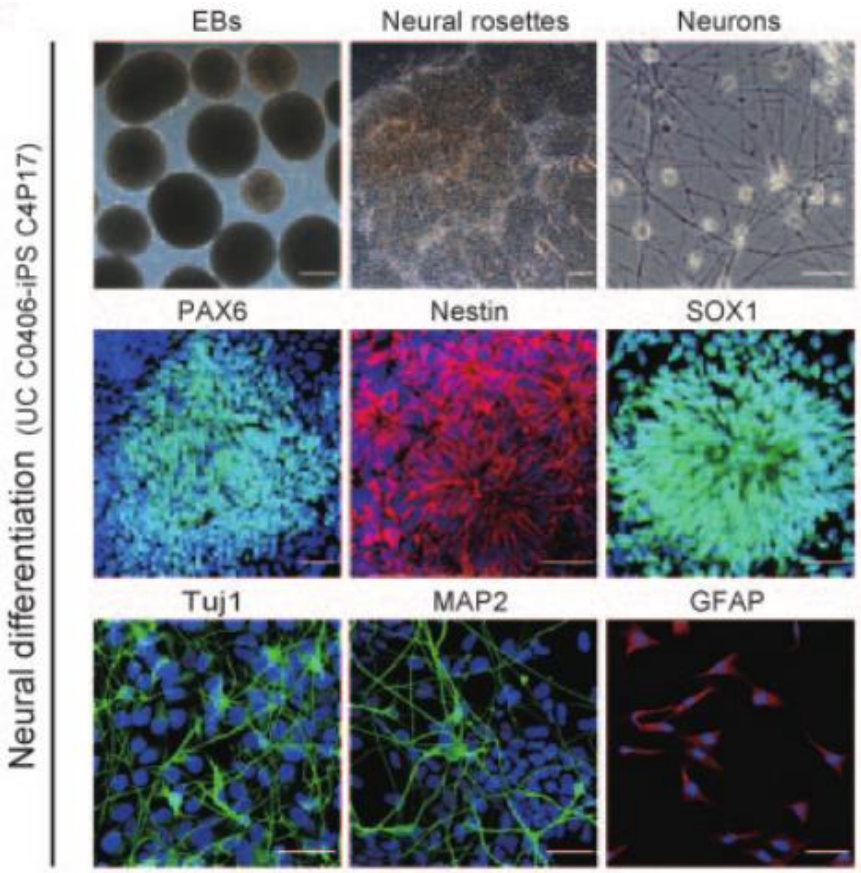
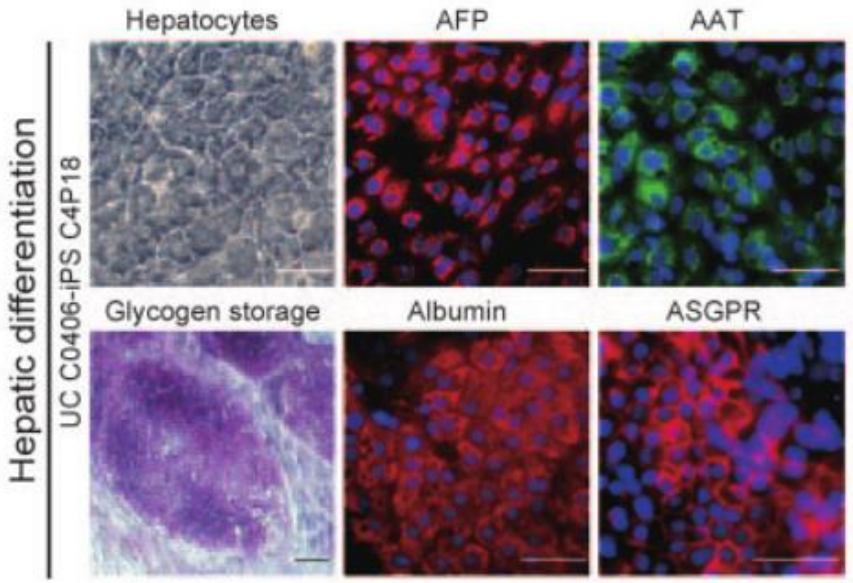
mesoderm | ectoderm | endoderm

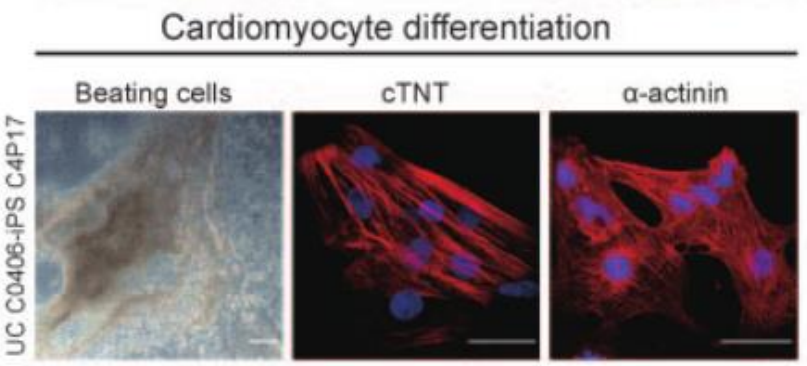


Urine-derived iPSCs can be differentiated towards cells of the three germ layers (mesoderm, ectoderm, endoderm) such muscle cells, neuronal cells and hepatocyte like cells.

Urine-derived iPS cells
Directed differentiation



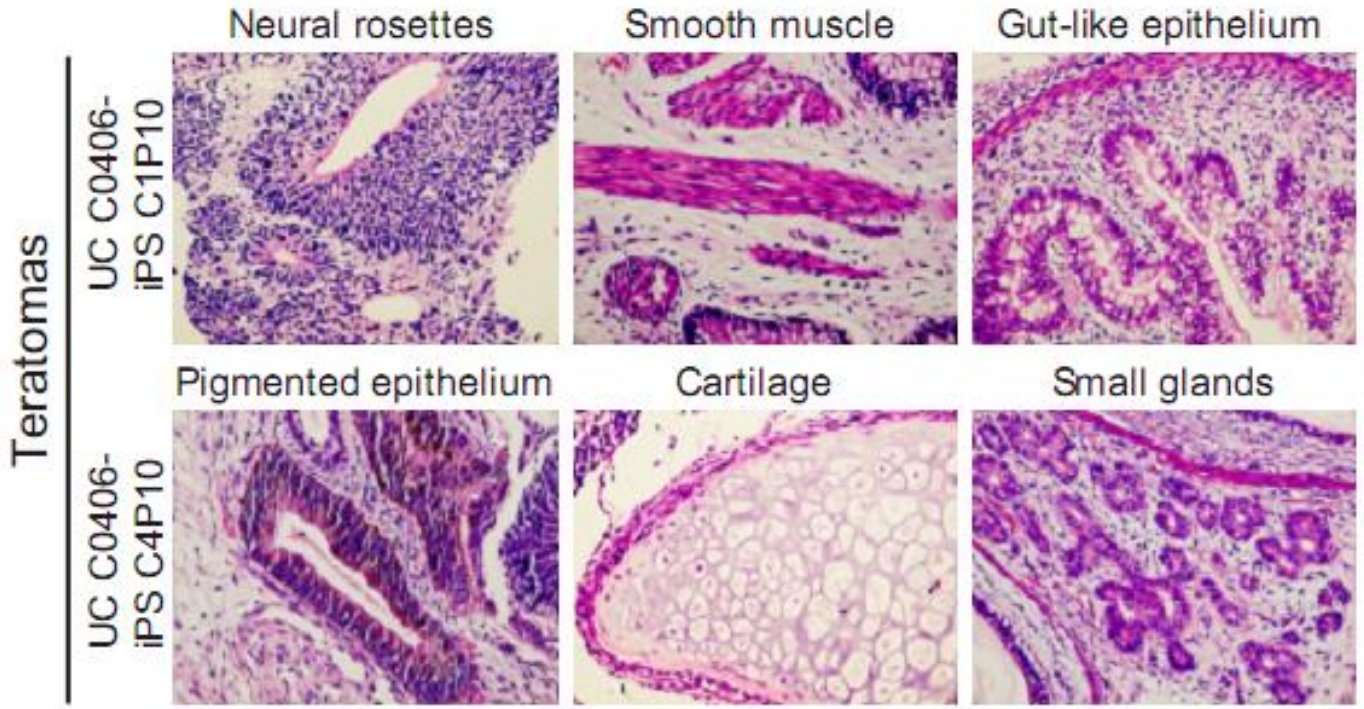




Urine-derived iPSCs can be induced to differentiate towards neuronal cells, cardiomyocytes and hepatocyte like cells.

Zhou T, JASN 2011

Key characteristics
Teratoma formation



Injection of urine-derived iPSCs into nude mice induces the formation of teratocarcinomas with tissues from the three germ layers.

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Summary / conclusion

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- Urine is a non invasive, universal cell source for the generation of induced pluripotent stem cells that
  - allows the establishment of differentiated cells from any consenting individual
  - expands the availability of human cells, virtually to all differentiated cells

Expertise and enthusiasm for your aims!

Contact
Regina Grillari, CTO and Co-founder
Evercyte GmbH, Muthgasse 18, 1190 Vienna, Austria
FN 358620 h, HG Wien, UID/VAT: ATU66244913

regina.grillari@evercyte.com