The Kidney Project

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October 6, 2018

Webinar Moderator

Derek Forfang

Chair, Forum of ESRD Network's

Kidney Patient Advisory Council

(KPAC)

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The Kidney Project

Implantable Bioartificial Kidney for Treatment of End Stage Renal Disease

Webinar: Forum of ESRD Networks October 8, 2018

Disclosure: Silicon Kidney

Shuvo Roy, PhD
Professor
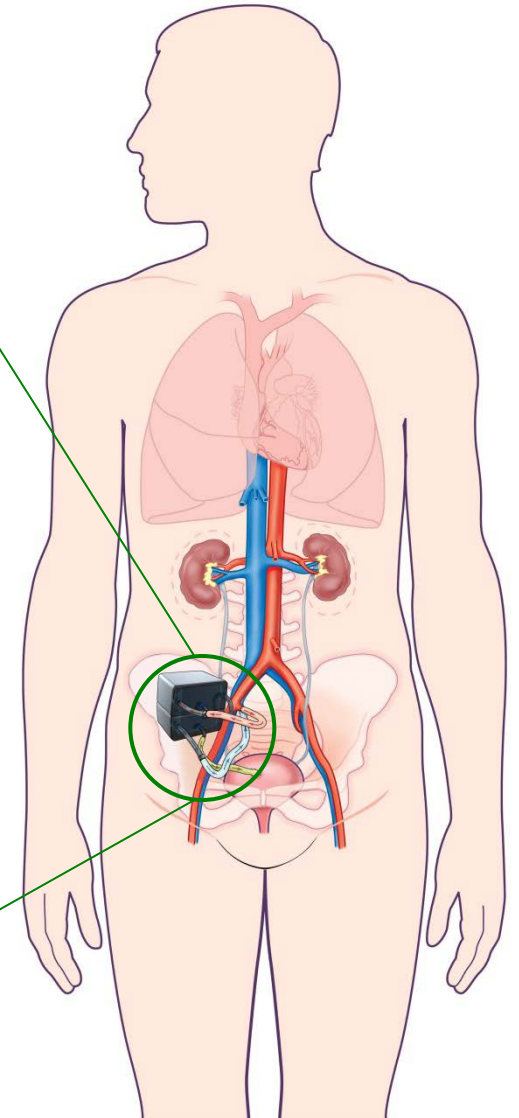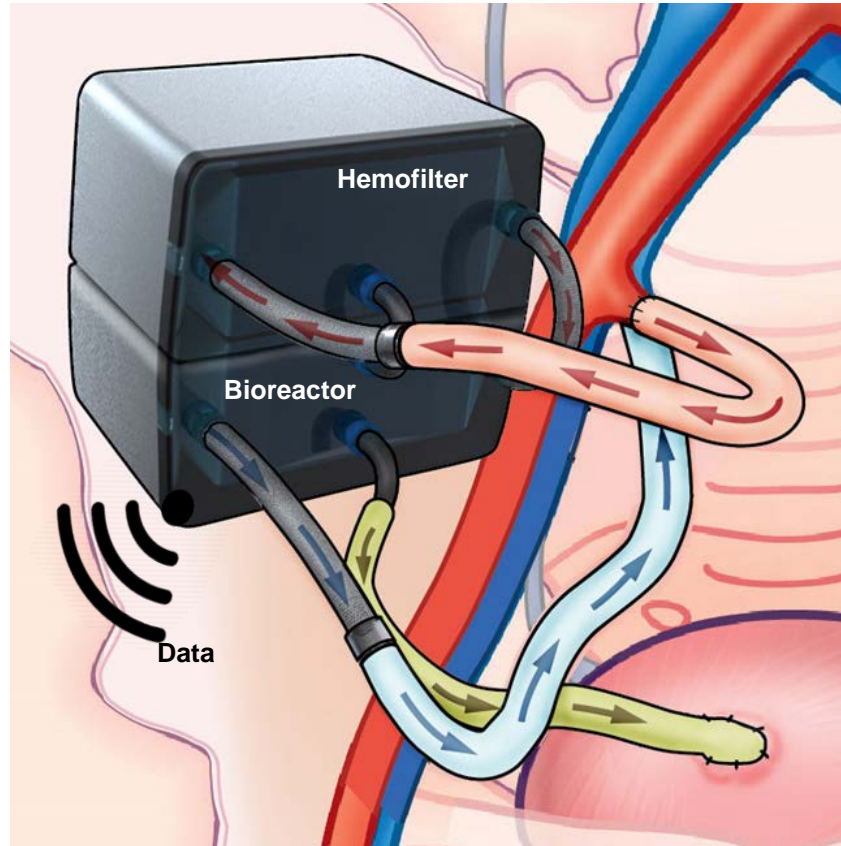Department of Bioengineering and Therapeutic Sciences

Schools of Pharmacy and Medicine

UC San Francisco

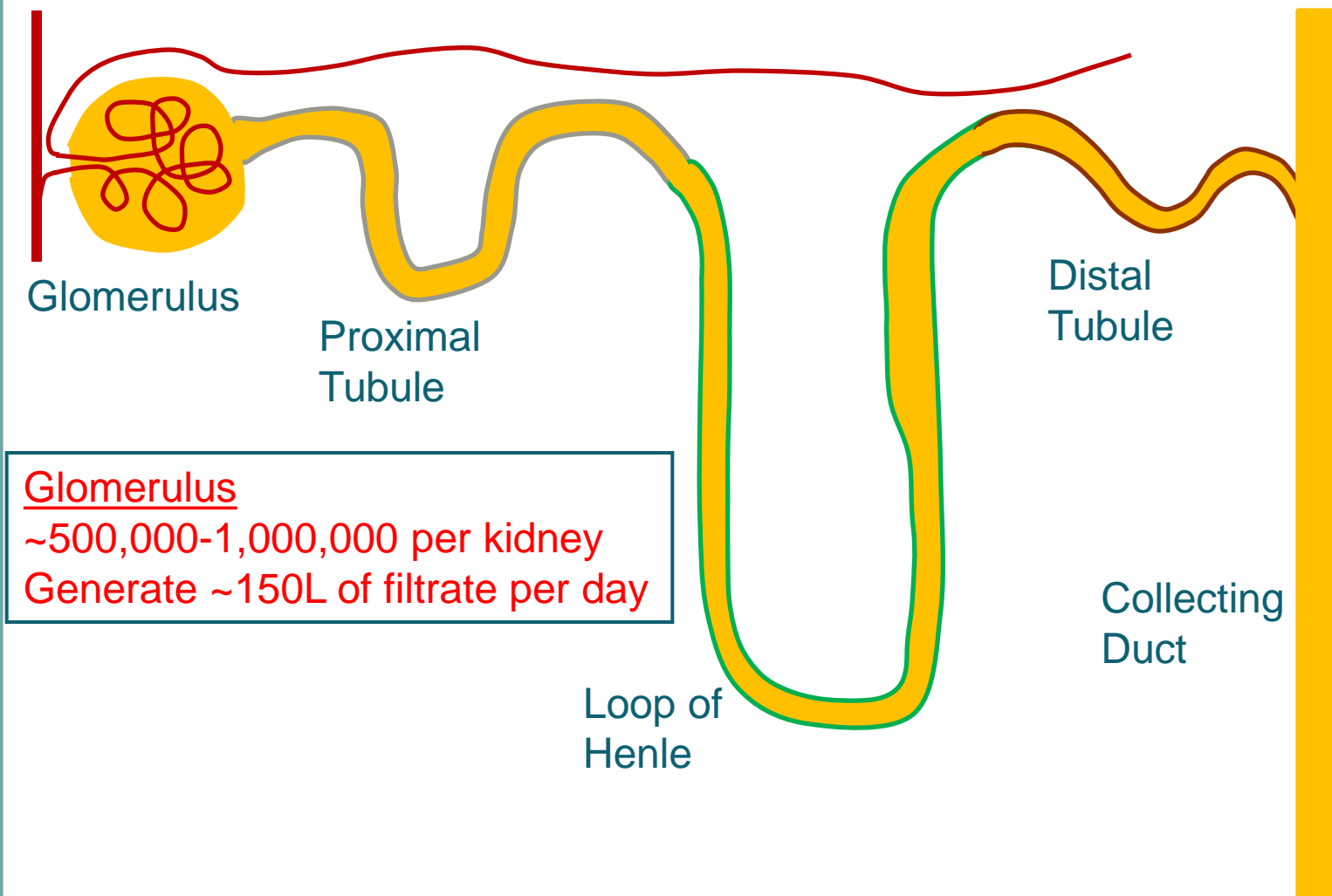# Implantable Bioartificial Kidney

Hemofilter

Bioreactor

Data

The Renal Filter Unit: the Nephron

Glomerulus

Proximal Tubule

Distal Tubule

Glomerulus
~500,000-1,000,000 per kidney
Generate ~150L of filtrate per day

Collecting Duct
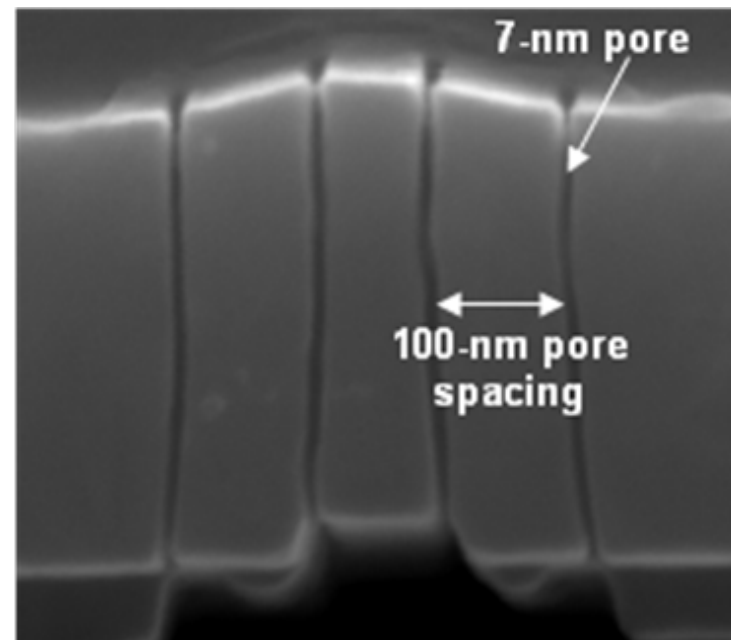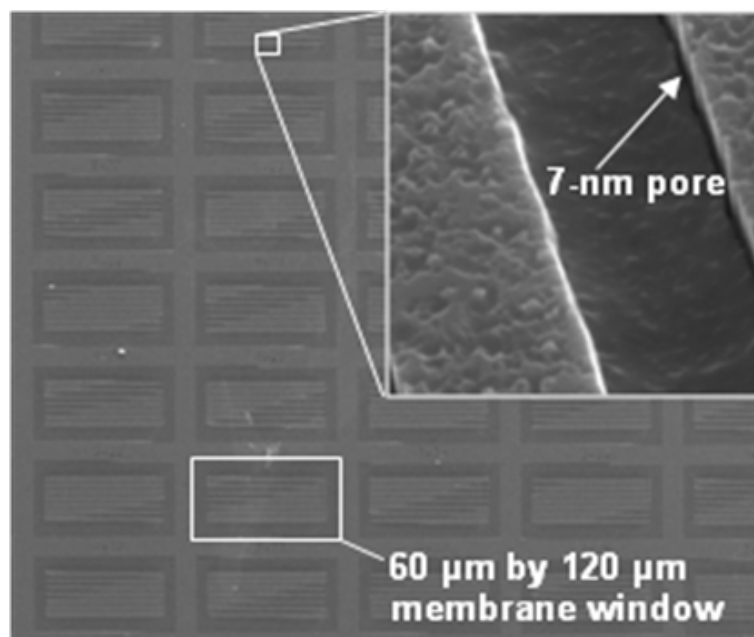
Loop of Henle

Silicon Membranes

- **High hydraulic permeability**

  – up to 600 ml/hr/mmHg/m^2

- **High permselectivity**

  – over 80% middle-molecule clearance
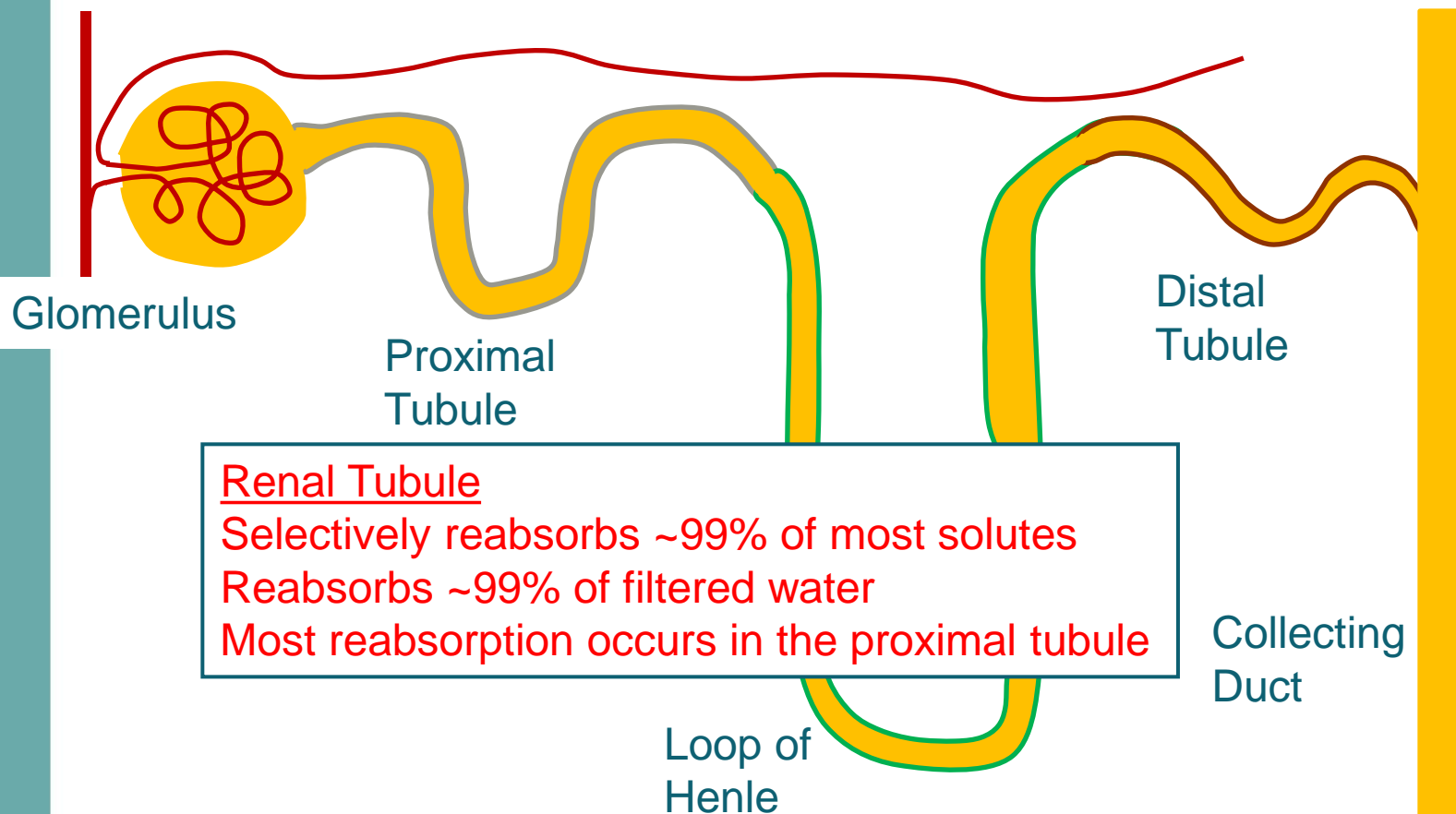
  – less than 0.1% albumin passage

No Pumps

Improved Clearance

SEM – Silicon Membranes

7-nm pore

60 μm by 120 μm membrane window

7-nm pore

100-nm pore spacing

The Renal Filter Unit: the Nephron

Glomerulus

Proximal
Tubule

Distal
Tubule

Renal Tubule
Selectively reabsorbs ~99% of most solutes
Reabsorbs ~99% of filtered water
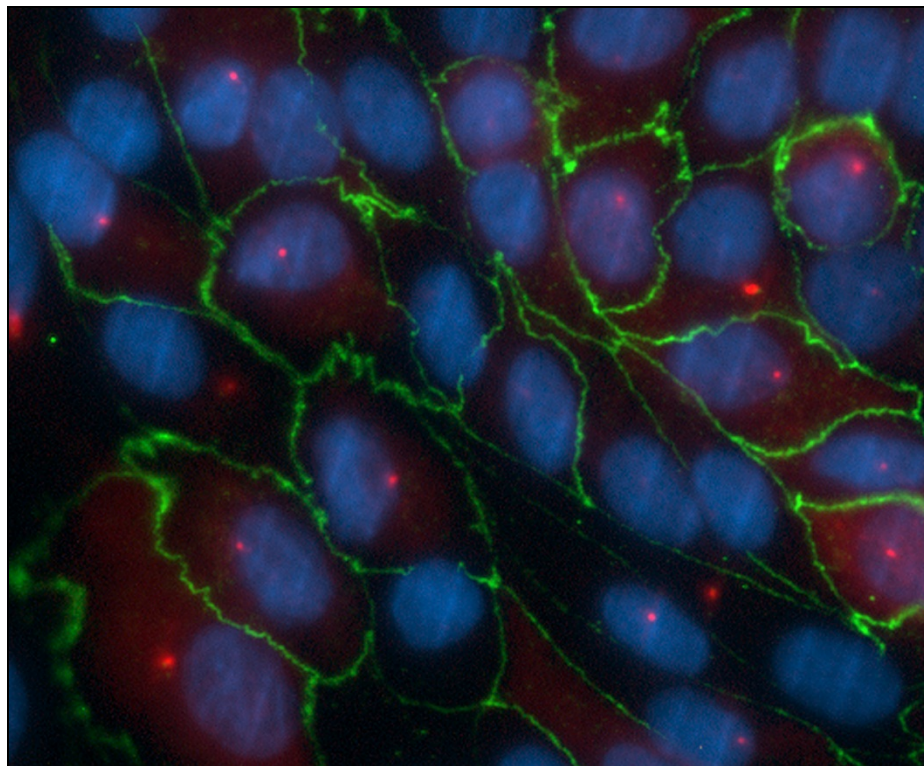Most reabsorption occurs in the proximal tubule

Collecting
Duct

Loop of
Henle

Cell Growth on Membranes

No Anti-Rejection
Drugs
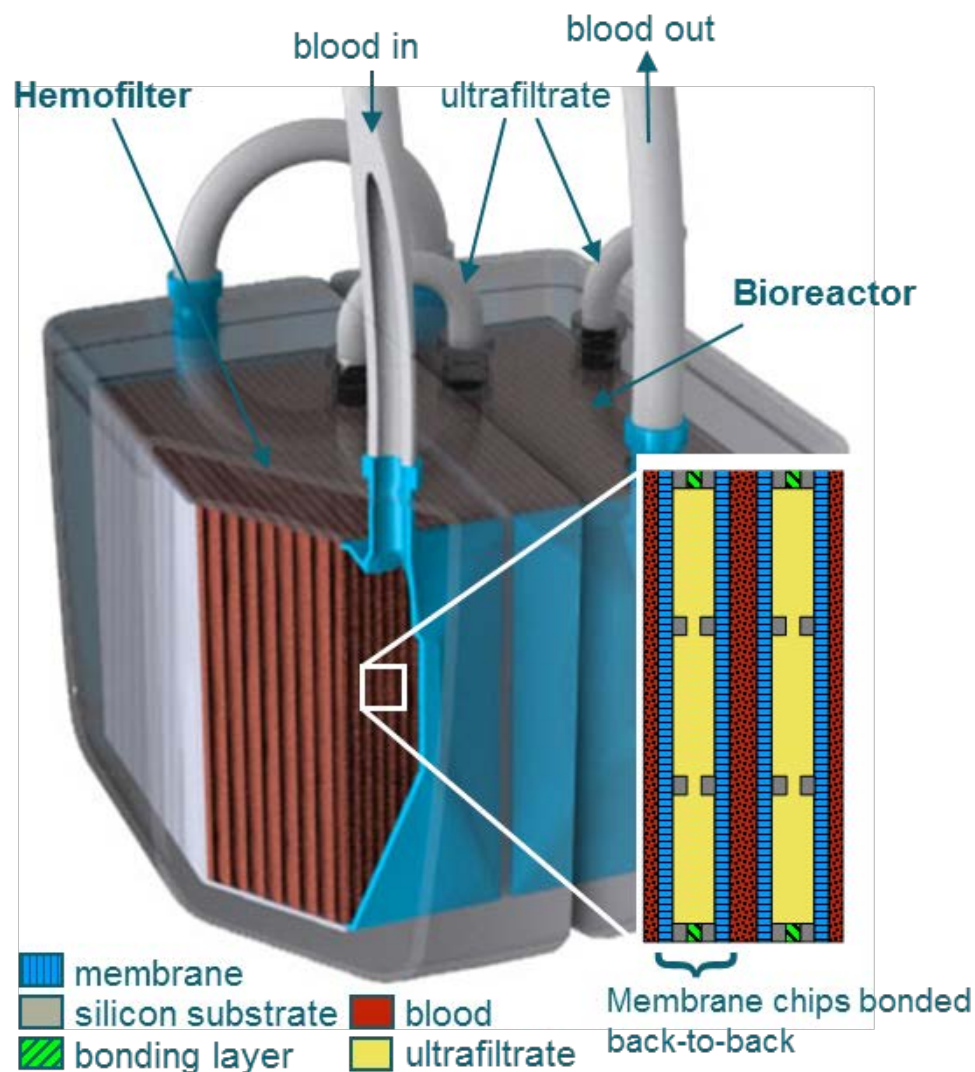
No Dialysate
or Fluids

- **Human renal tubule cells (HRTCs)**
  - isolated from transplant discards and expanded in vitro
  - demonstrate differentiated phenotype
  - membranes provide immunoprotection

Current Work: Scale-up and Integration

Acknowledgements

The Wildwood Foundation
Patterson-Barclay Memorial Foundation
Harry W. and Diana V. Hinds Distinguished Professorship

The Kidney Project Team
http://kidney.ucsf.edu

Questions & Answers

Use the "Question" box
on your GoToWebinar panel
to submit your questions

All unanswered questions will be reviewed by our co-chairs and speakers; they will be summarized in a Q & A document which will be posted to the Forum website after the webinar.

http://esrdnetworks.org/

Thank you for joining us!

This webinar has been recorded
and will be available on the Forum website
later this week.

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