



Caring for Kidney Transplant Patients

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THE OHIO STATE
UNIVERSITY
WEXNER MEDICAL CENTER

Why this Talk is Important...

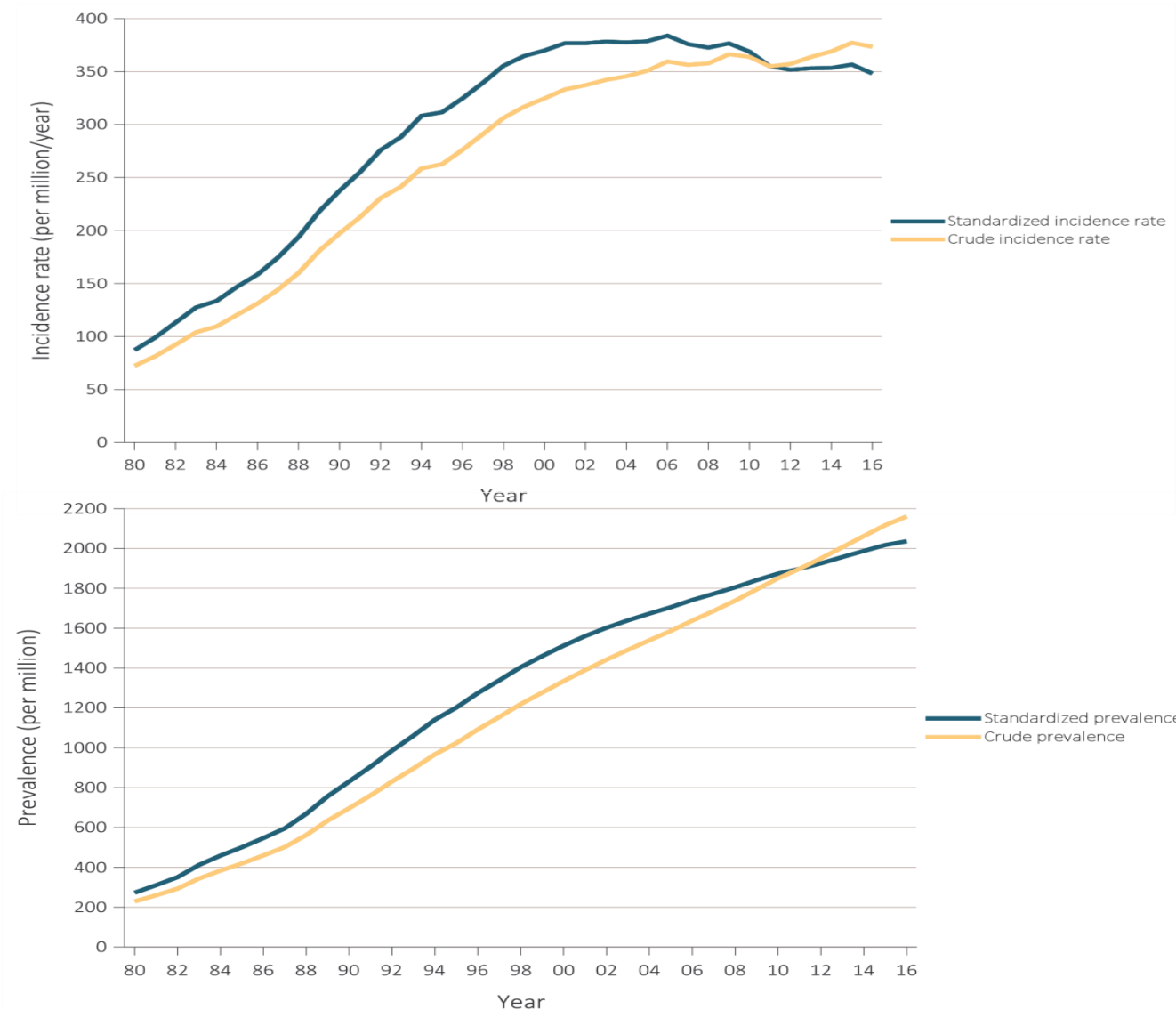
Renal transplants have become more common.

The number renal transplant recipients continues to grow.

As healthcare providers, we will care for a transplant patient at some point of our career.

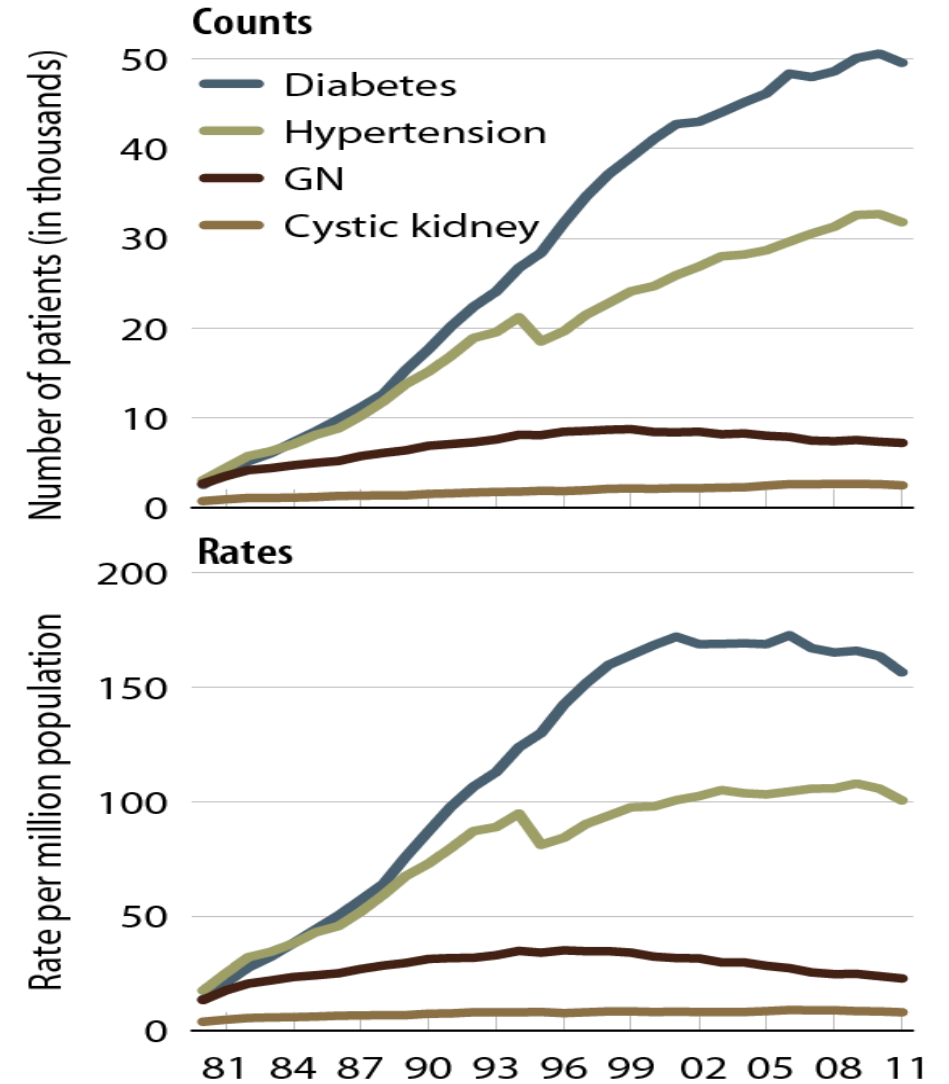
Increasing Progression to ESRD...

Incident & Prevalent Rates of ESRD



Etiology of ESRD: The Usual Suspects

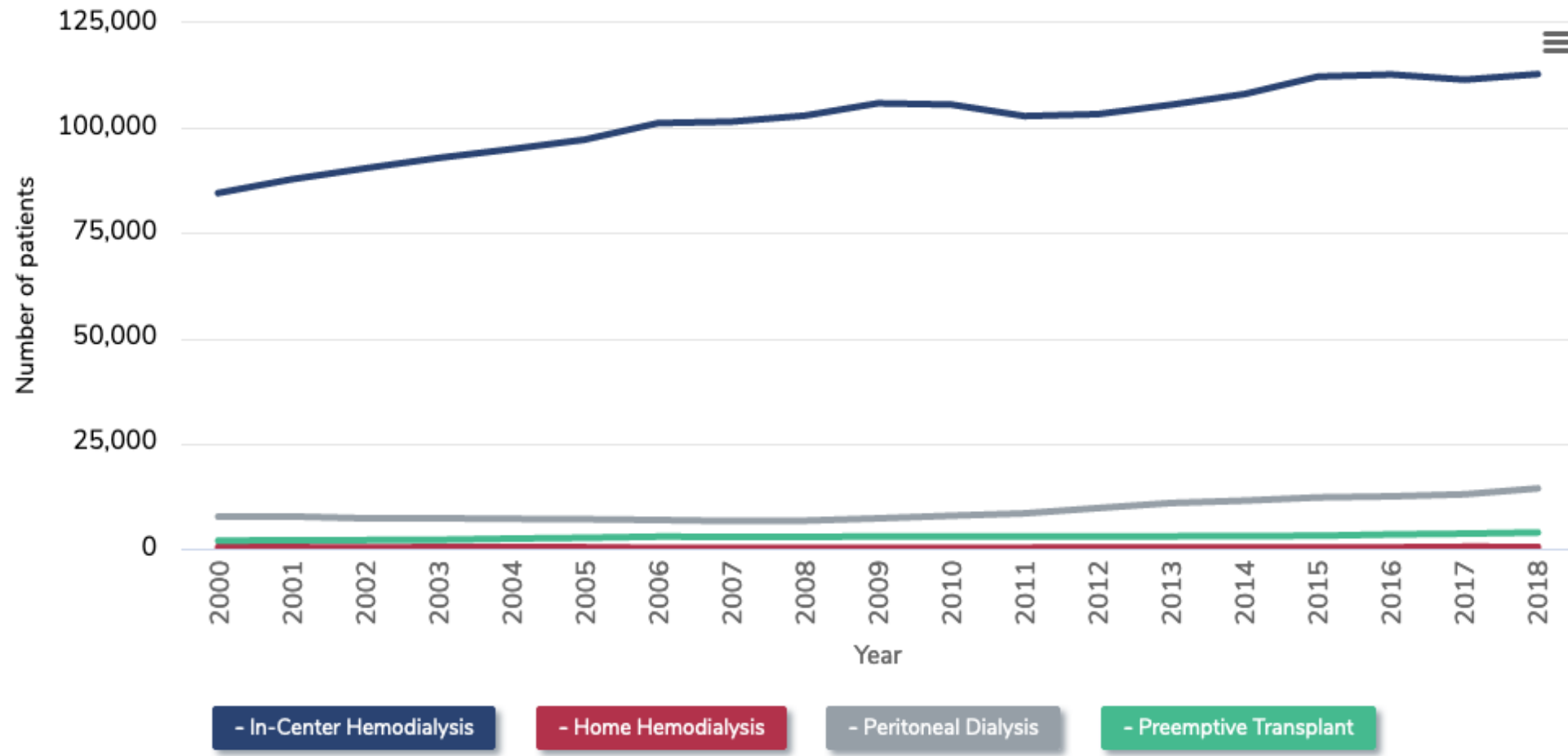
Incident counts & adjusted rates of ESRD, by primary diagnosis



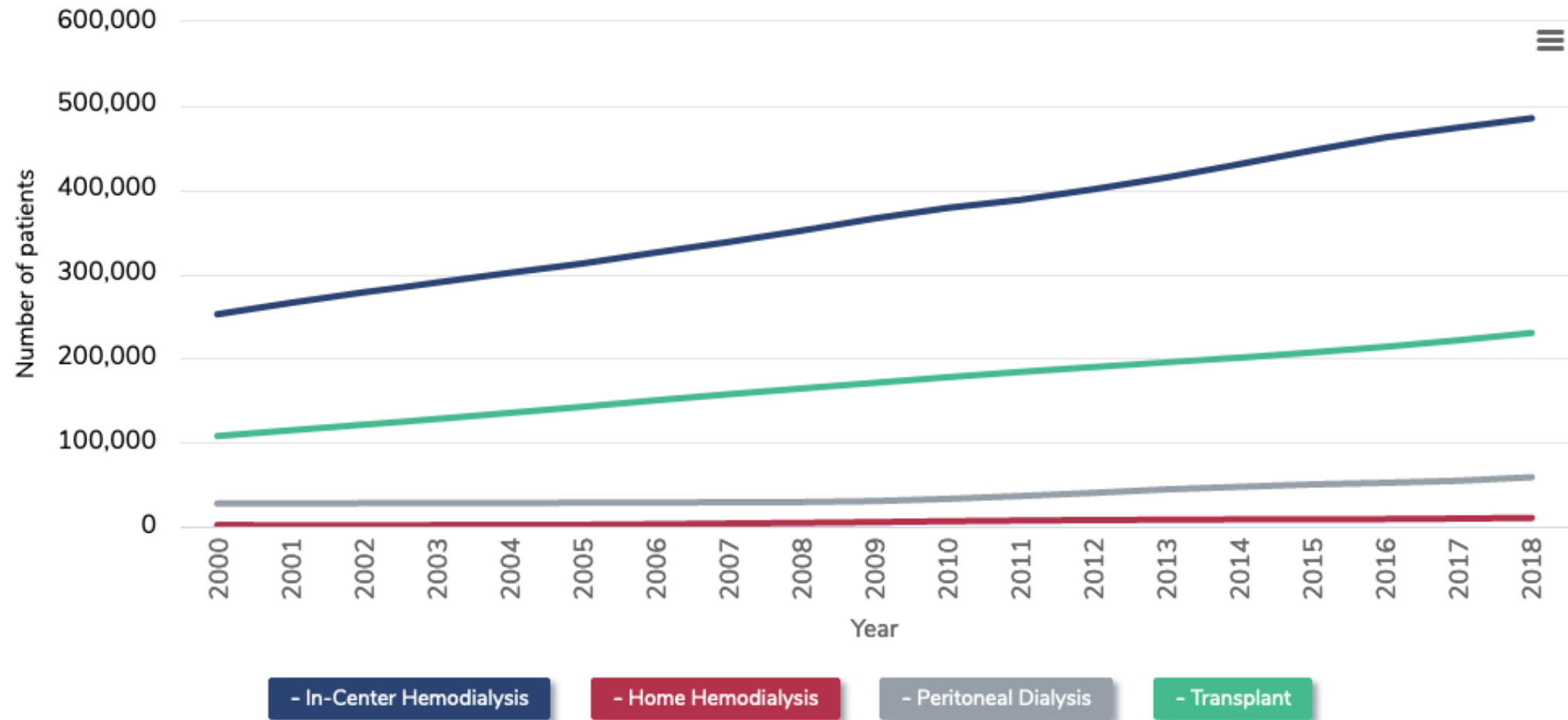
Etiology of ESRD: Etiology of the Etiology



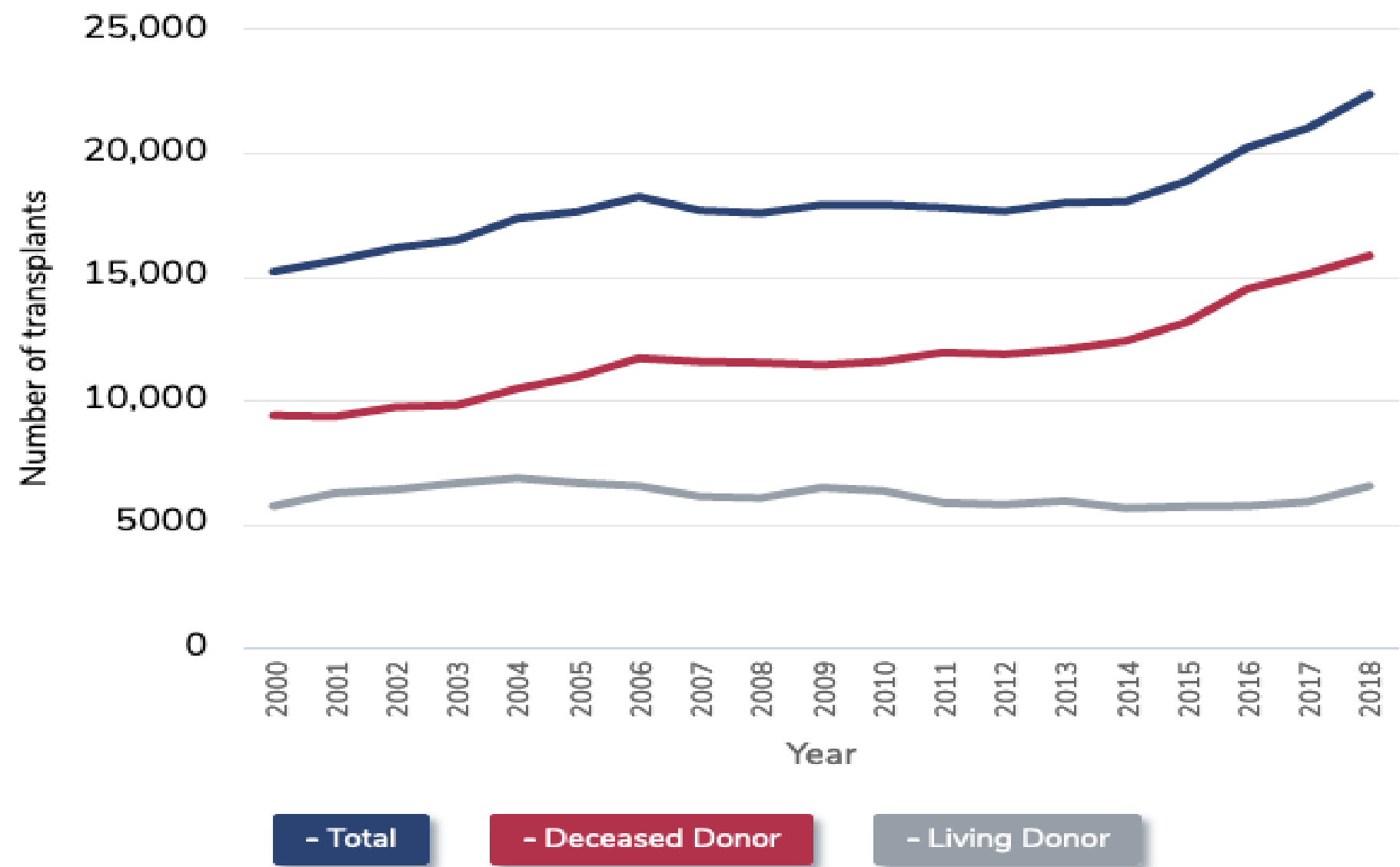
Incident ESRD Treatment Modality



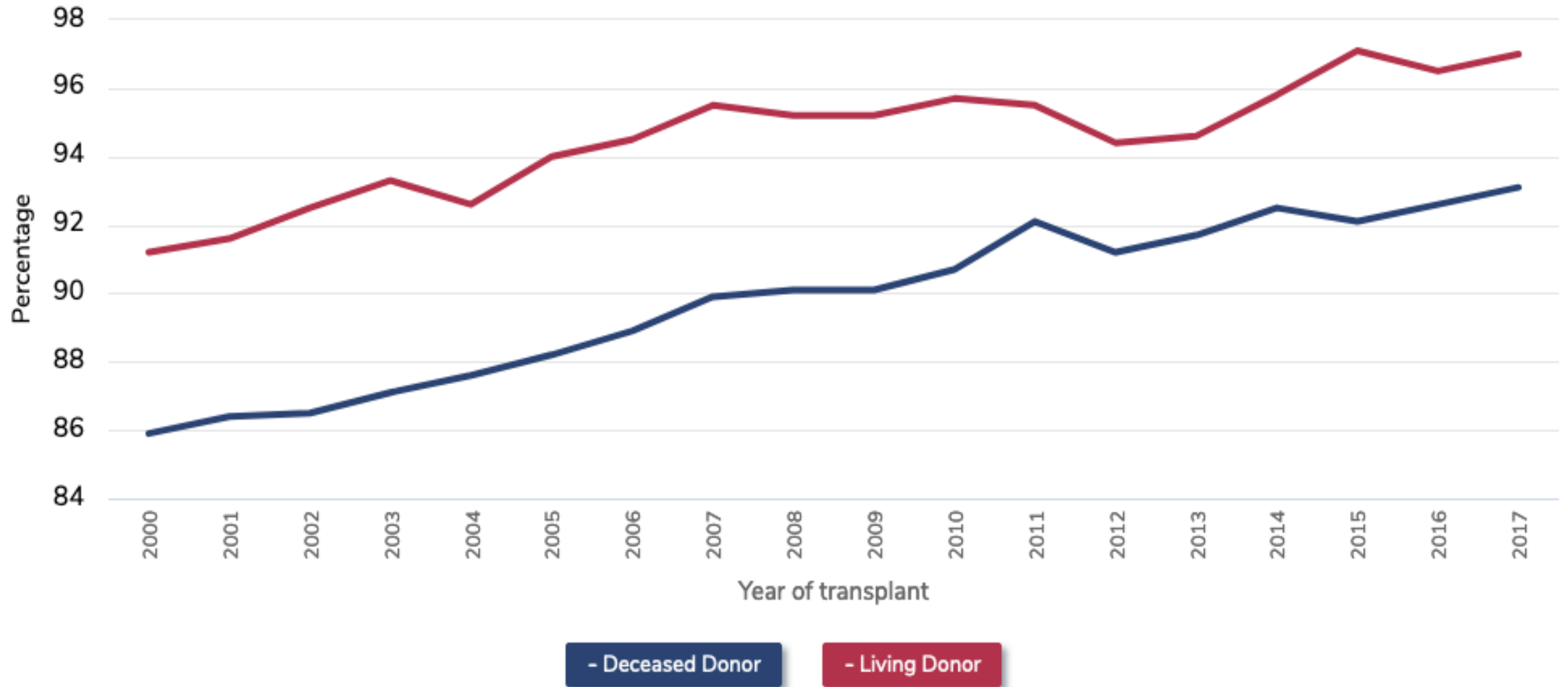
Prevalent ESRD Treatment Modality



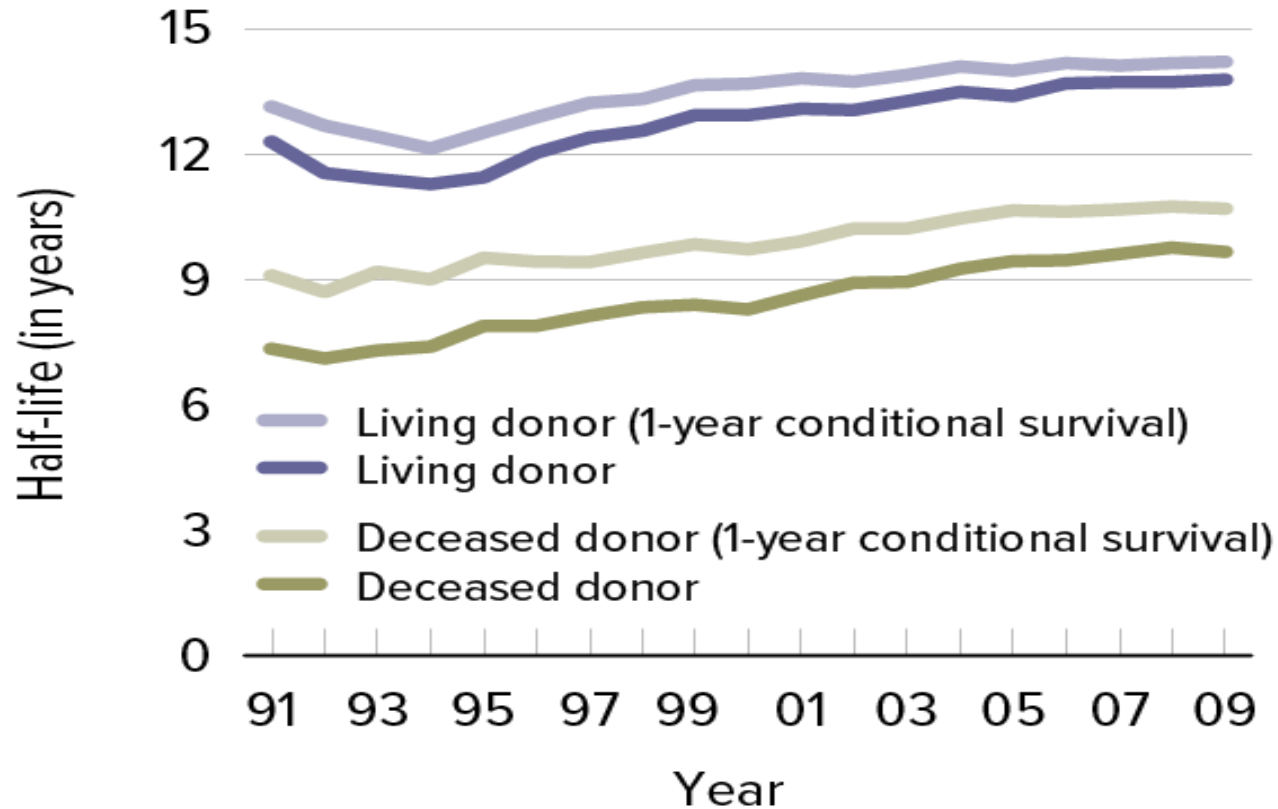
Incidence of Renal Transplants in the U.S.



One-Year Graft Survival



Long-Term Graft Survival



Half-lives for adult kidney transplant recipients

LDKT: 12 Years

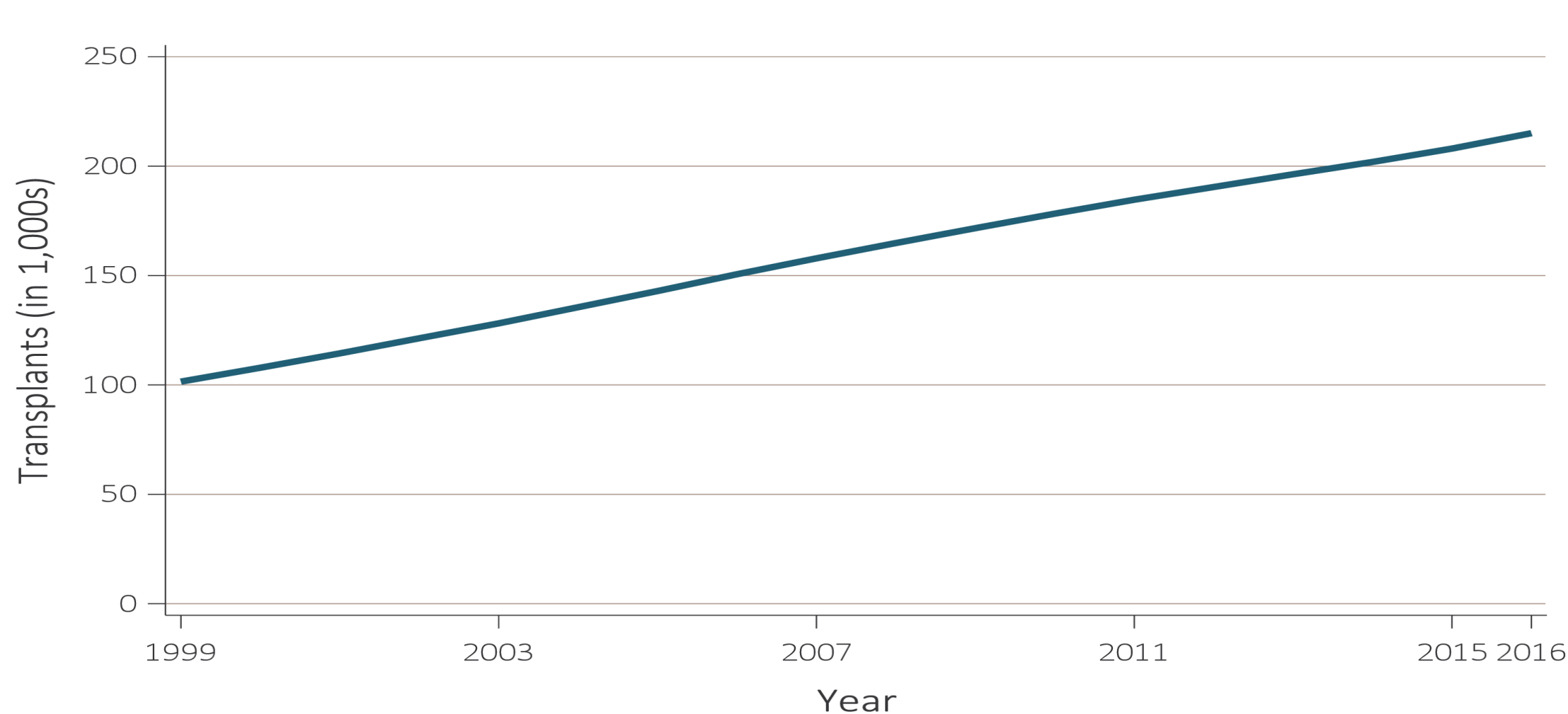
DDKT: 8 Years

Source:

2011 OPTN/SRTR Annual Report

Solez K, Colvin RB, Racusen LC, et al. Banff '05 Meeting Report: differential diagnosis of chronic allograft injury and elimination of chronic allograft nephropathy ('CAN'). Am J Transplant. 2007;7:518-526

Prevalence of Renal Transplants in the U.S.



Renal transplantation is the treatment of choice for patients with ESRD

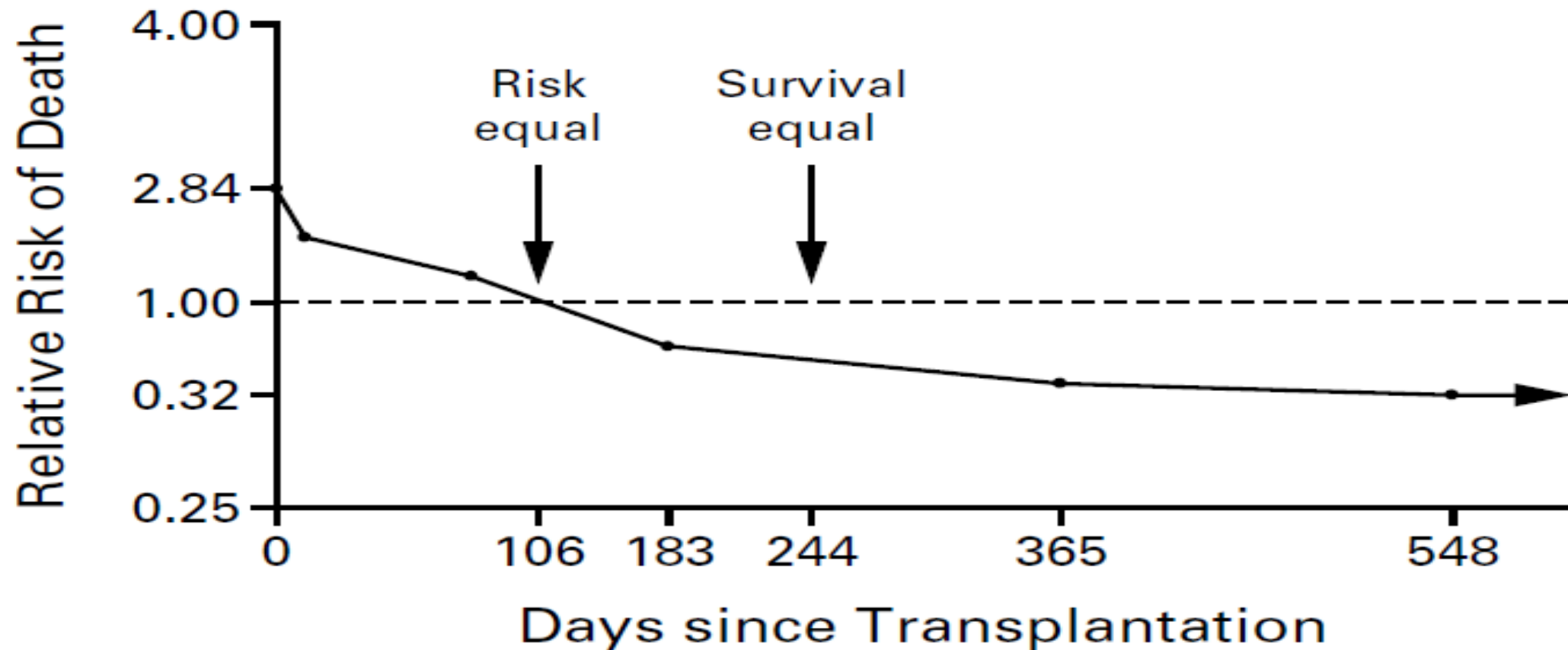
Improved survival

Improved quality of life

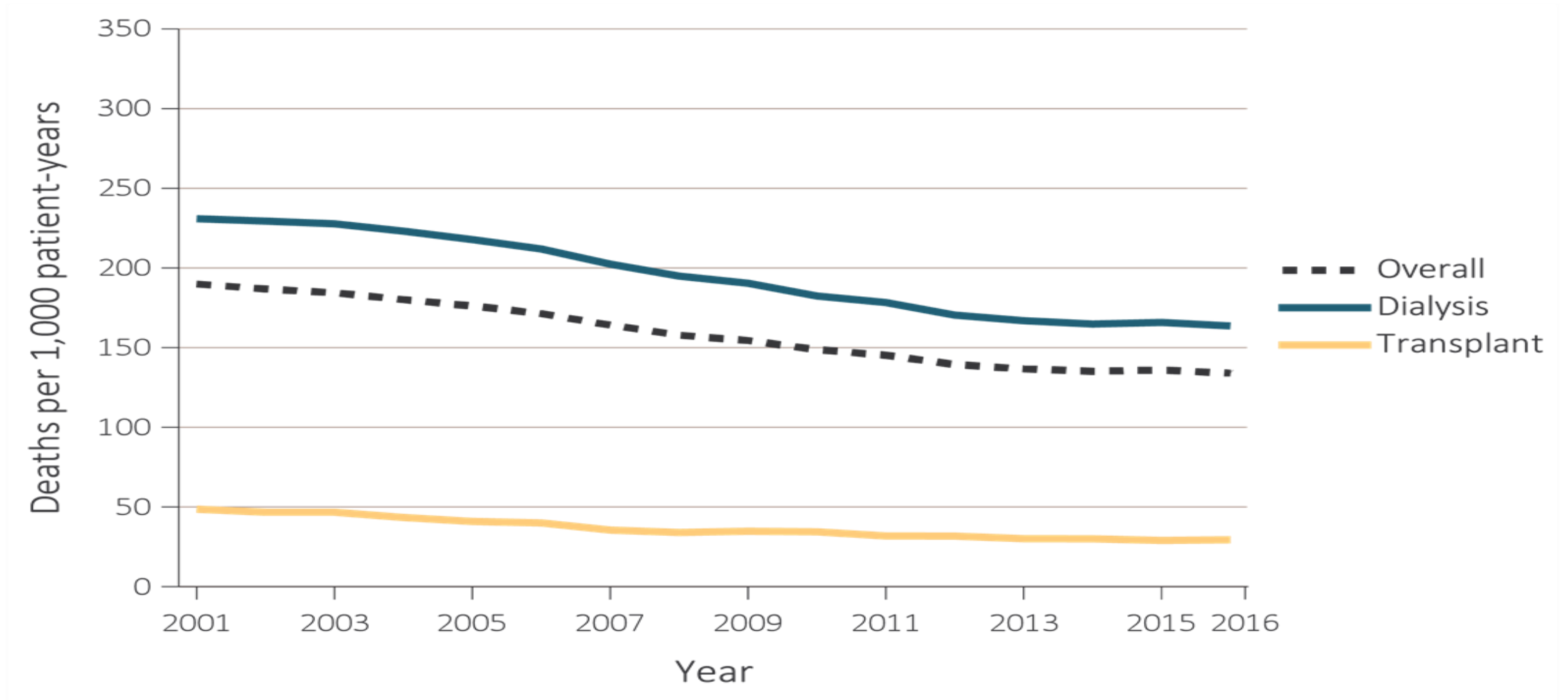
Decreased cost over traditional renal replacement therapy

COMPARISON OF MORTALITY IN ALL PATIENTS ON DIALYSIS, PATIENTS ON DIALYSIS AWAITING TRANSPLANTATION, AND RECIPIENTS OF A FIRST CADAVERIC TRANSPLANT

ROBERT A. WOLFE, PH.D., VALARIE B. ASHBY, M.A., EDGAR L. MILFORD, M.D., AKINLOLU O. OJO, M.D., PH.D., ROBERT E. ETTINGER, M.D., LAWRENCE Y.C. AGODOA, M.D., PHILIP J. HELD, PH.D., AND FRIEDRICH K. PORT, M.D.



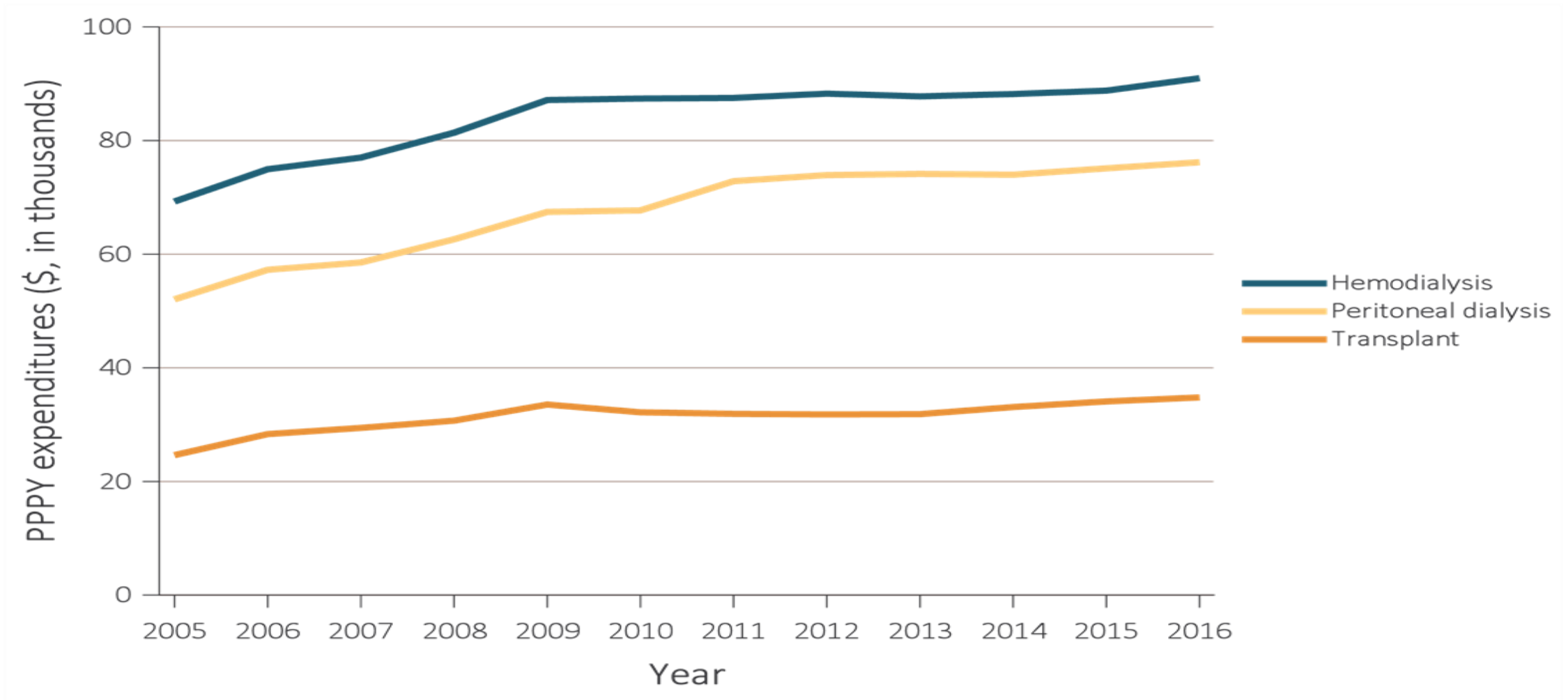
Adjusted all-cause mortality in the ESRD 2001 - 2016



Transplant-Related Quality-of-Life Benefits

- Maintenance of employment
- Relatively unrestricted diet
- Freedom to travel
- Ability to become pregnant and bear children
- Can engage in athletic training
- Lifestyle free of dialysis constraints

Total Medicare ESRD expenditures per person per year, by modality



Clinical Pearl:

- What is the preferred method for renal replacement:
 - A. In-Center Hemodialysis
 - B. Home Hemodialysis
 - C. Peritoneal Dialysis
 - D. Transplantation

2020 Transplantation Statistics: United States



Kidney: 22,817

Pancreas: 135

Kidney/Pancreas: 827

2020 Transplantation Statistics: Ohio



Kidney: 1138

Pancreas: 10

Kidney/Pancreas: 31

2020 Adult Transplantation Statistics: Ohio



Newark Geographic Catchment Area



Newark Geographic Catchment Area

Cleveland Clinic

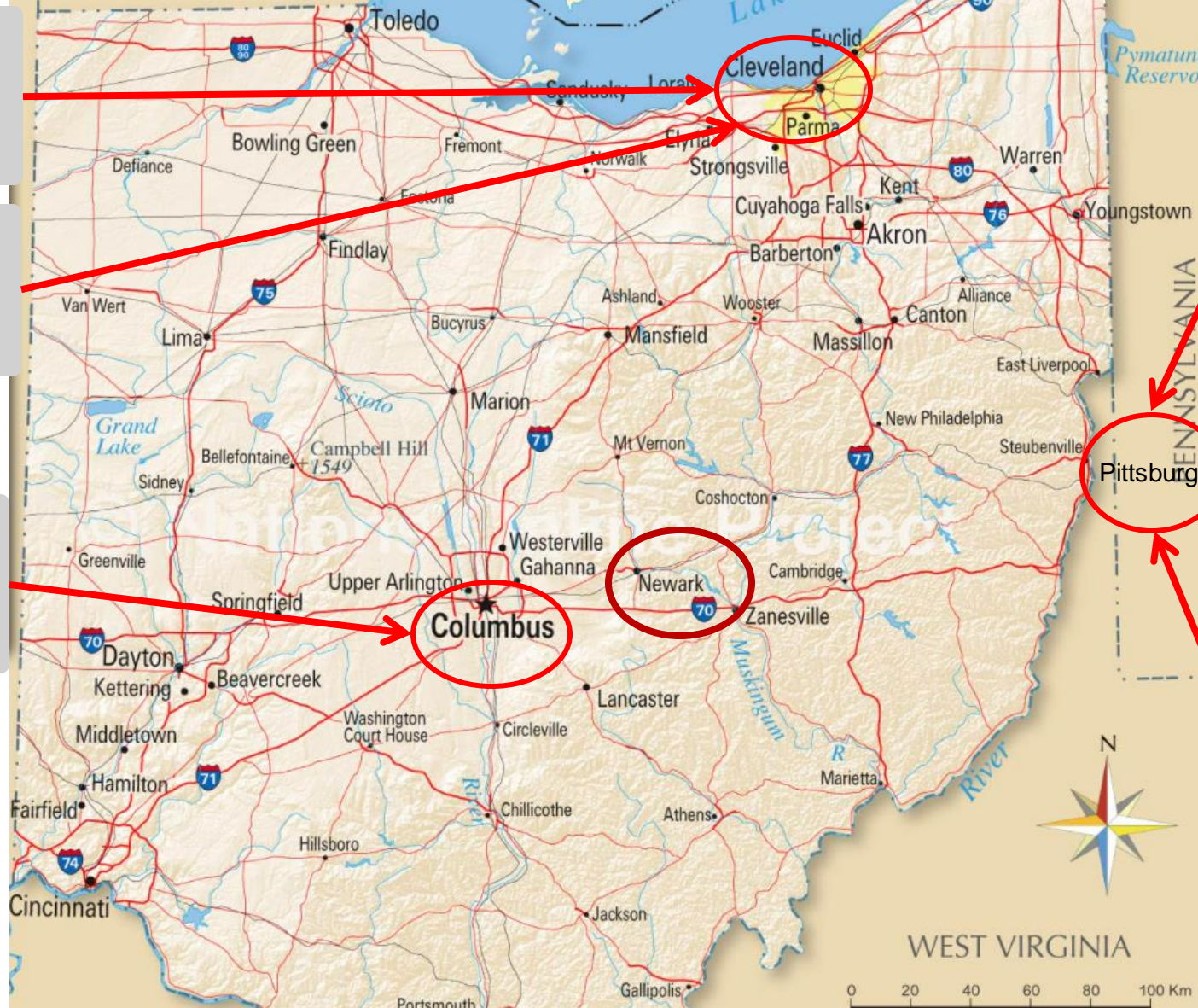
Kidney: 260
Pancreas: 4
Kidney Pancreas: 6

University Hospital (CWR)

Kidney: 194
Pancreas: 0
Kidney Pancreas: 3

Ohio State University

Kidney: 342
Pancreas: 0
Kidney Pancreas: 11



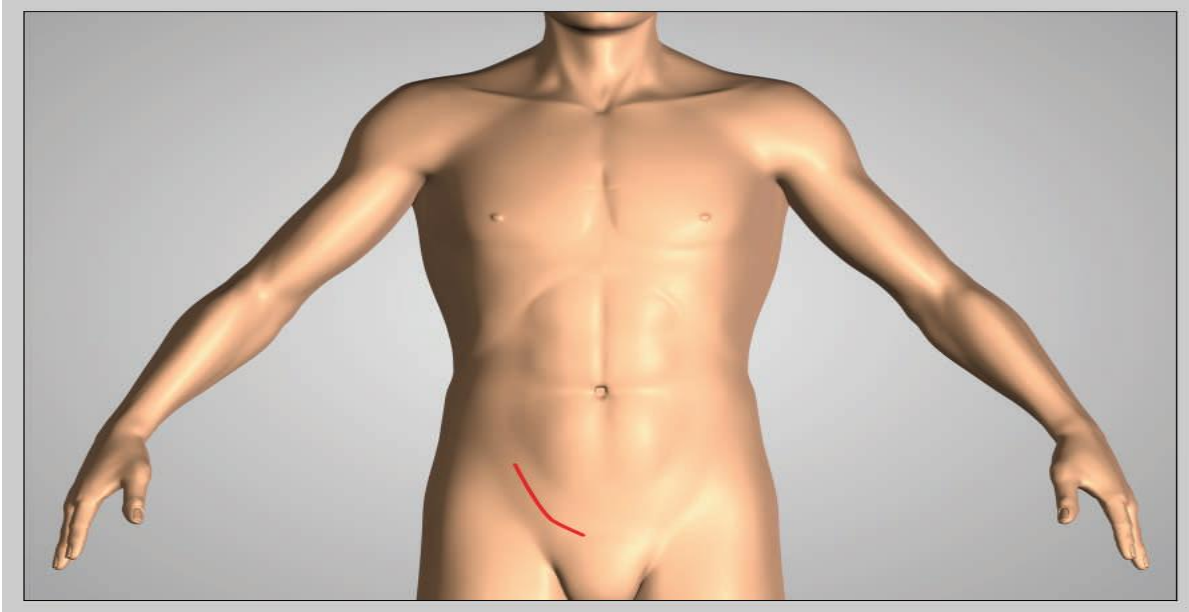
University of Pittsburgh

Kidney: 224
Pancreas: 1
Kidney Pancreas: 5

Alleghany General

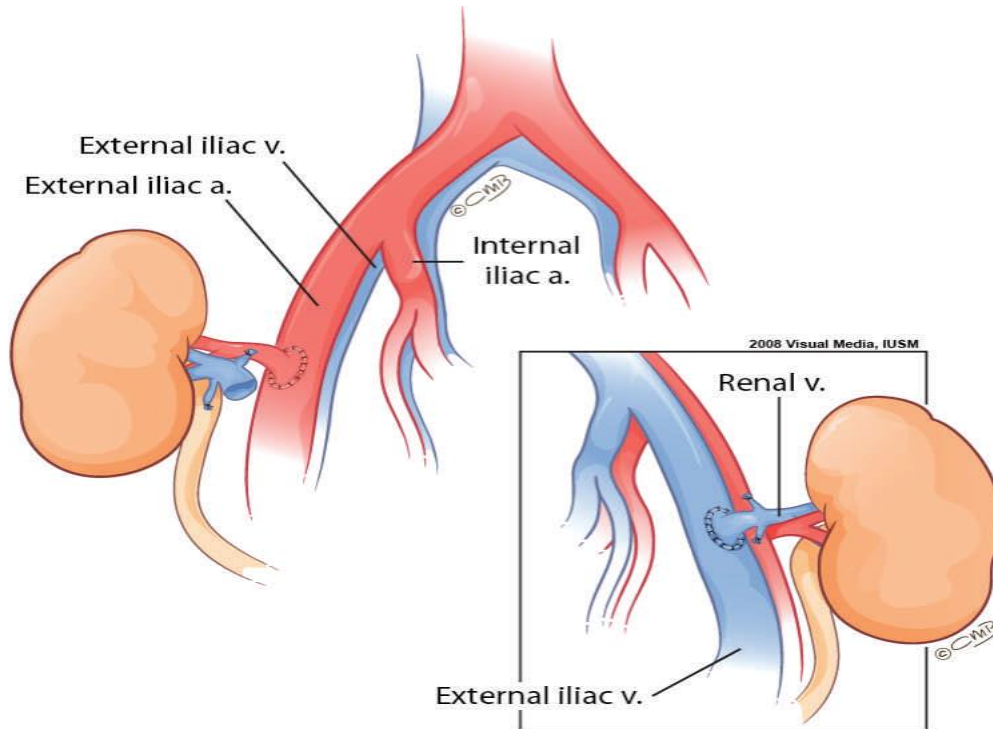
Kidney: 112
Pancreas: 0
Kidney Pancreas: 2

Transplanting a Kidney: The Nut and Bolts



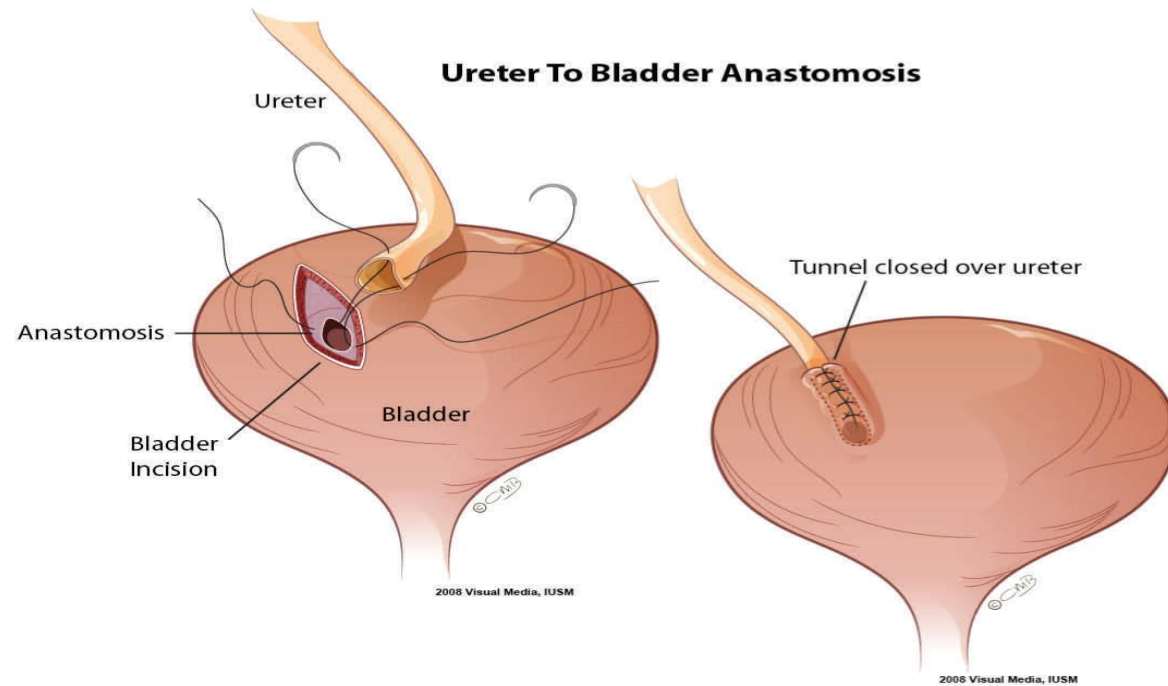
- *Incision is in the right or left lower quadrant.*
- *Generally, the best lie will be left donor kidney to right and vice versa;*
- *The native kidneys are generally left in place.*

Transplanting a Kidney: The Nut and Bolts



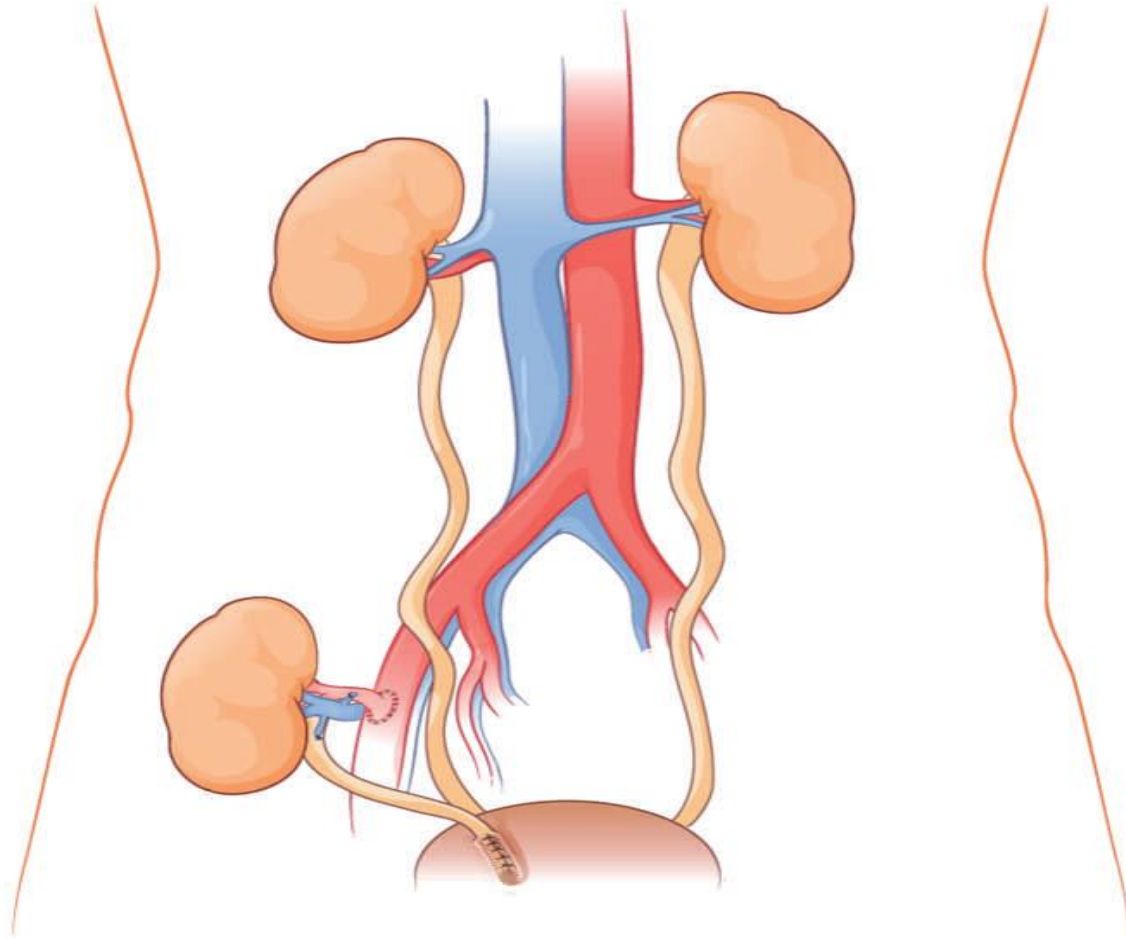
- *The transplanted artery and vein are anastomosed to the recipient's external iliacs.*

Transplanting a Kidney: The Nut and Bolts



- *The transplanted ureter is anastomosed to the bladder*

Transplanting a Kidney: The Nut and Bolts



- The Finished Product

Transplantation: The Ultimate Team Sport

Physician

- Transplant Physicians
- Transplant Surgeons

Nursing

- Advanced Practice Providers
- Inpatient Acute Care Nurses
- Outpatient Transplant Nurse Coordinators

Transplant Specialists

- Psychology
- Infectious Disease
- Endocrinology
- Cardiology
- Pulmonology
- Dermatology
- Urology

Ancillary Specialists

- Social Worker
- Finance
- Pharmacists
- Nutritionists
- Case Management

TRANSPLANT BEING A TEAM SPORT...



TRANSPLANT BEING A TEAM SPORT...



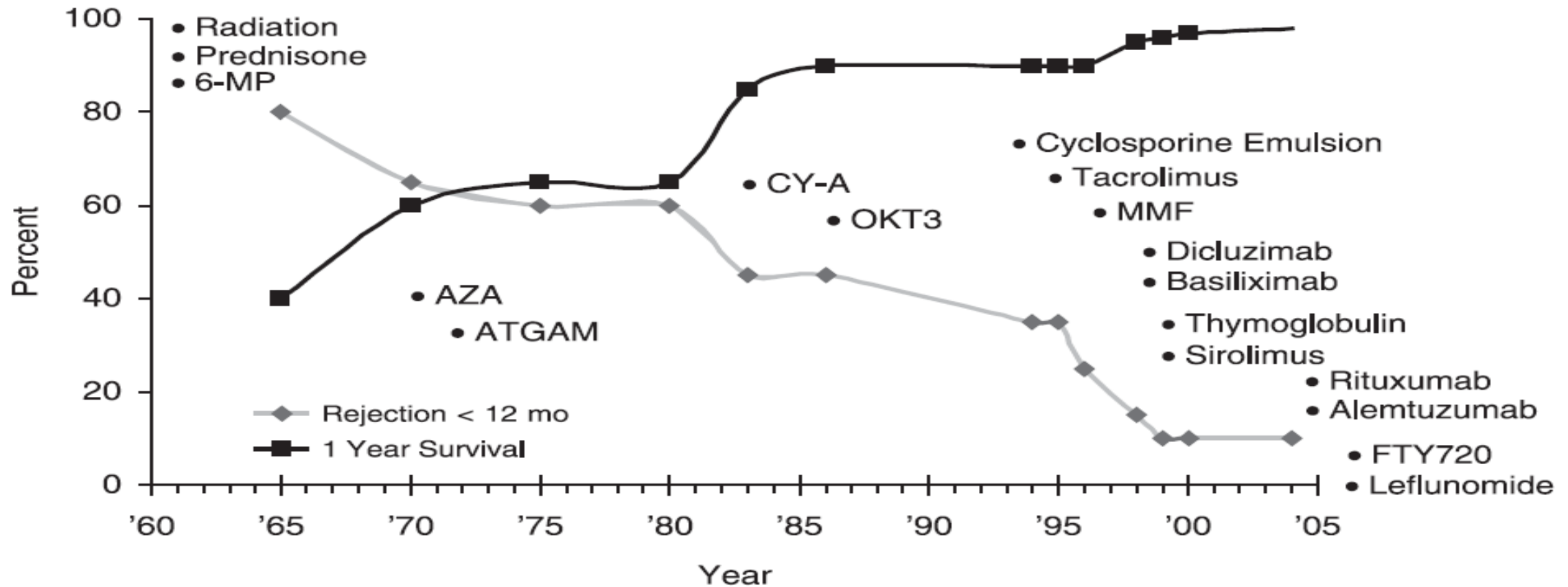
TRANSPLANT BEING A TEAM SPORT...



Implanting a Kidney is the First Step

Immunosuppression Medications Keep Things
Going...

Advances in Immunosuppression Have Increased Early Graft Survival



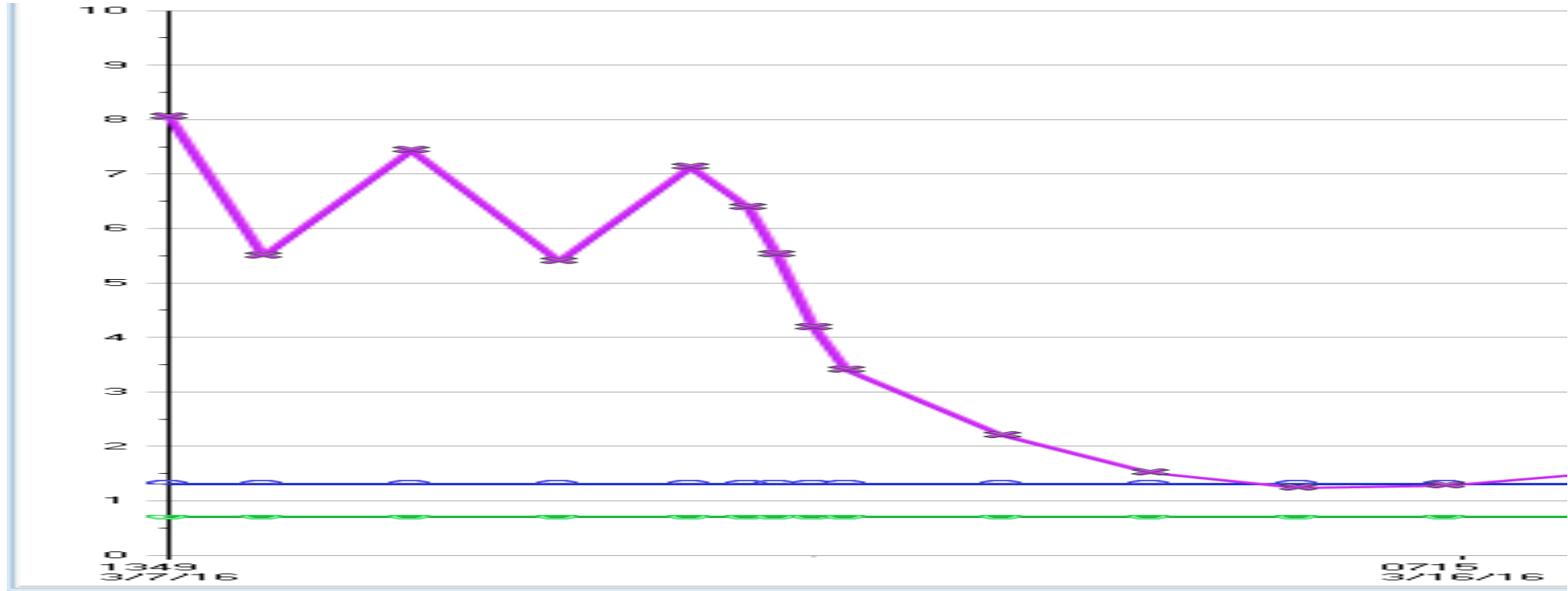
Maintenance Therapy

- Calcineurin Inhibitors
 - Cyclosporin (Sandimmune* / Neoral*)
 - Tacrolimus (Prograf / FK 506)
- Antimetabolites
 - Azathioprine (Imuran)
 - Mycophenolate Mofetil (Cellcept)
 - Enteric-Coated Mycophenolic Acid (Myfortic)
- mTOR Inhibitors
 - Rapamycin (Sirolimus)
 - Zortress (Everolimus)
- Steroids

OSU Maintenance Therapy

- Calcineurin Inhibitors
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What we like to see...

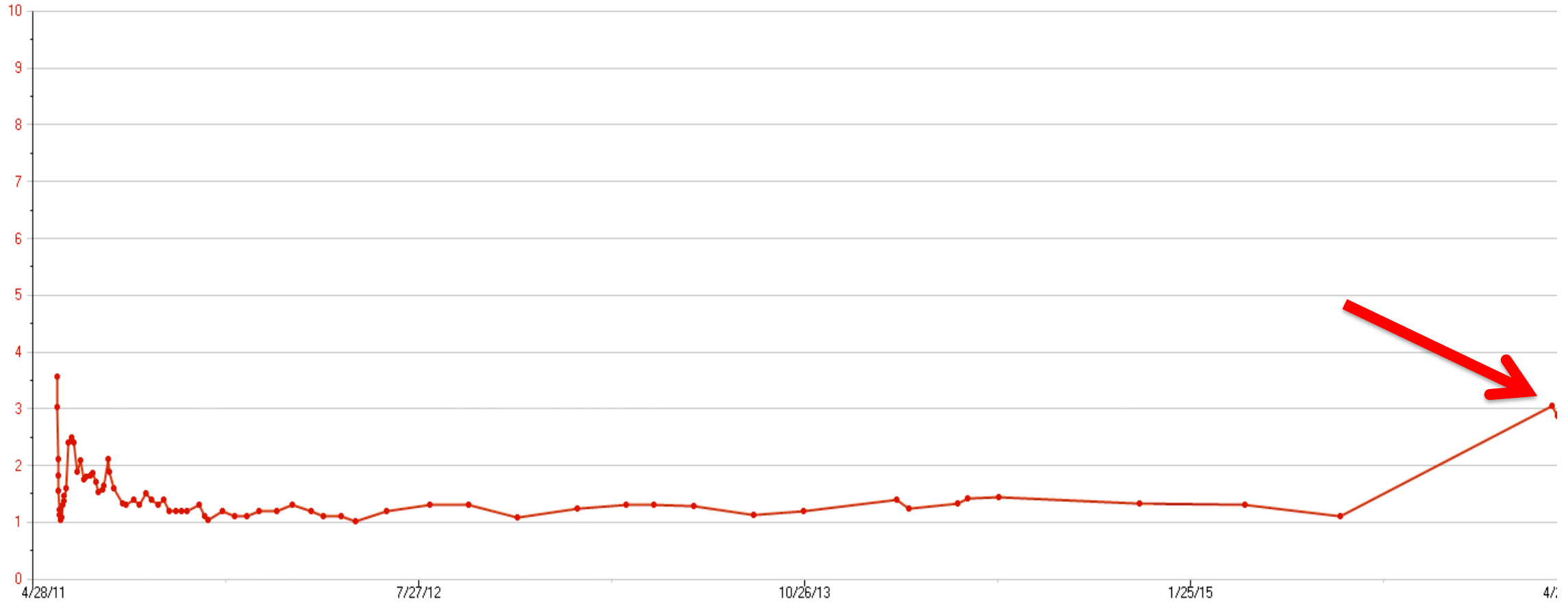


What we really like to see...



What we would rather not see...

• CREATININE, POC



What's Next?

Initial Work-up for Increased Creatinine in a Renal Transplant Patient

SCARRI

Initial Work-up for Increased Creatinine in a Renal Transplant Patient

- S
- C
- A
- R
- R
- I

Initial Work-up for Increased Creatinine in a Renal Transplant Patient

- Structural Abnormalities
- Calcineurin Toxicity
- Allograft Glomerulopathy
- Renal Issues
- Rejection
- Infection

Structural Abnormalities

We Order:

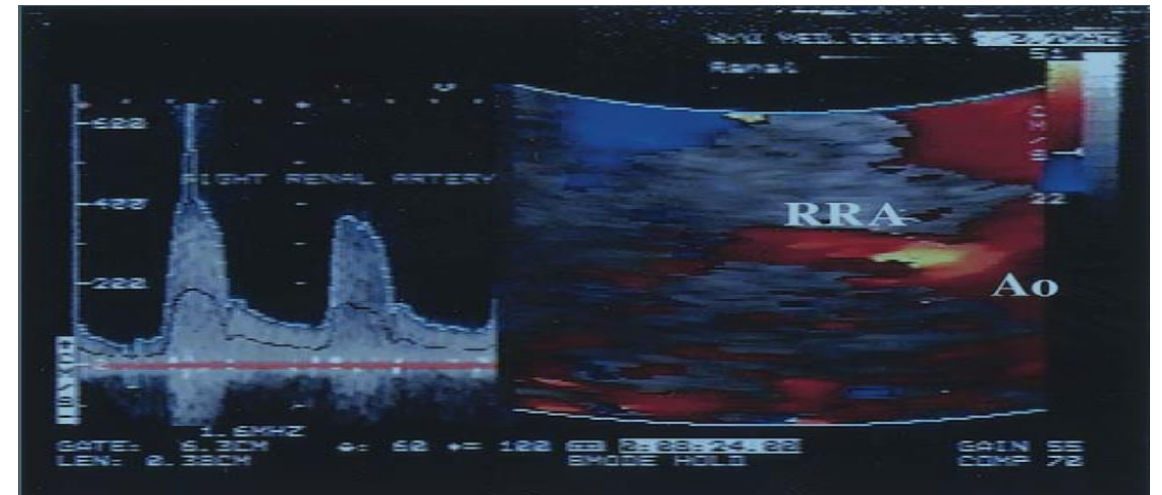
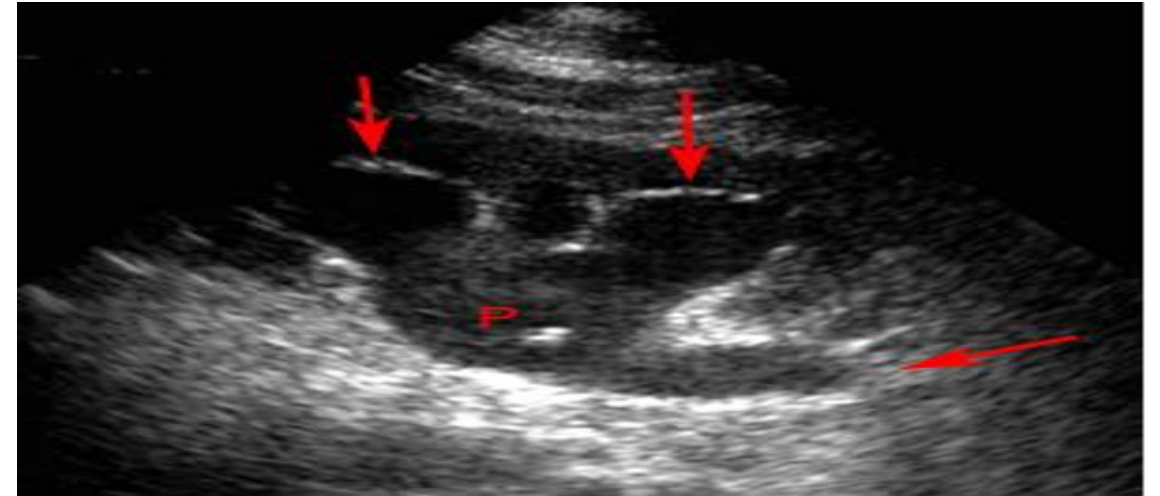
Renal Ultrasound With Dopplers

Reason:

Vascular Anastomosis Strictures

Collections (Urinomas / Seromas / Hematomas)

Blockages (Hydronephrosis)



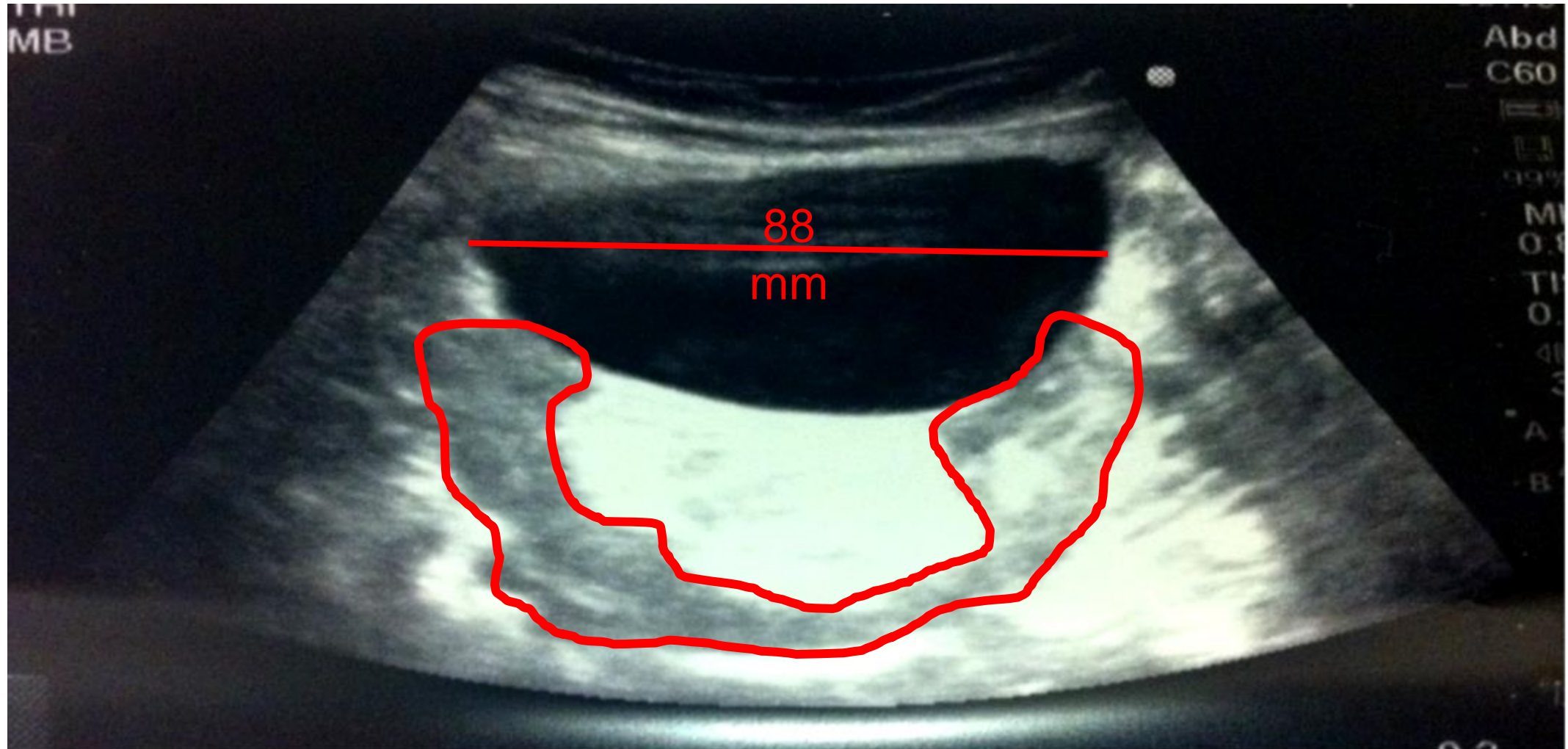
Structural Abnormalities



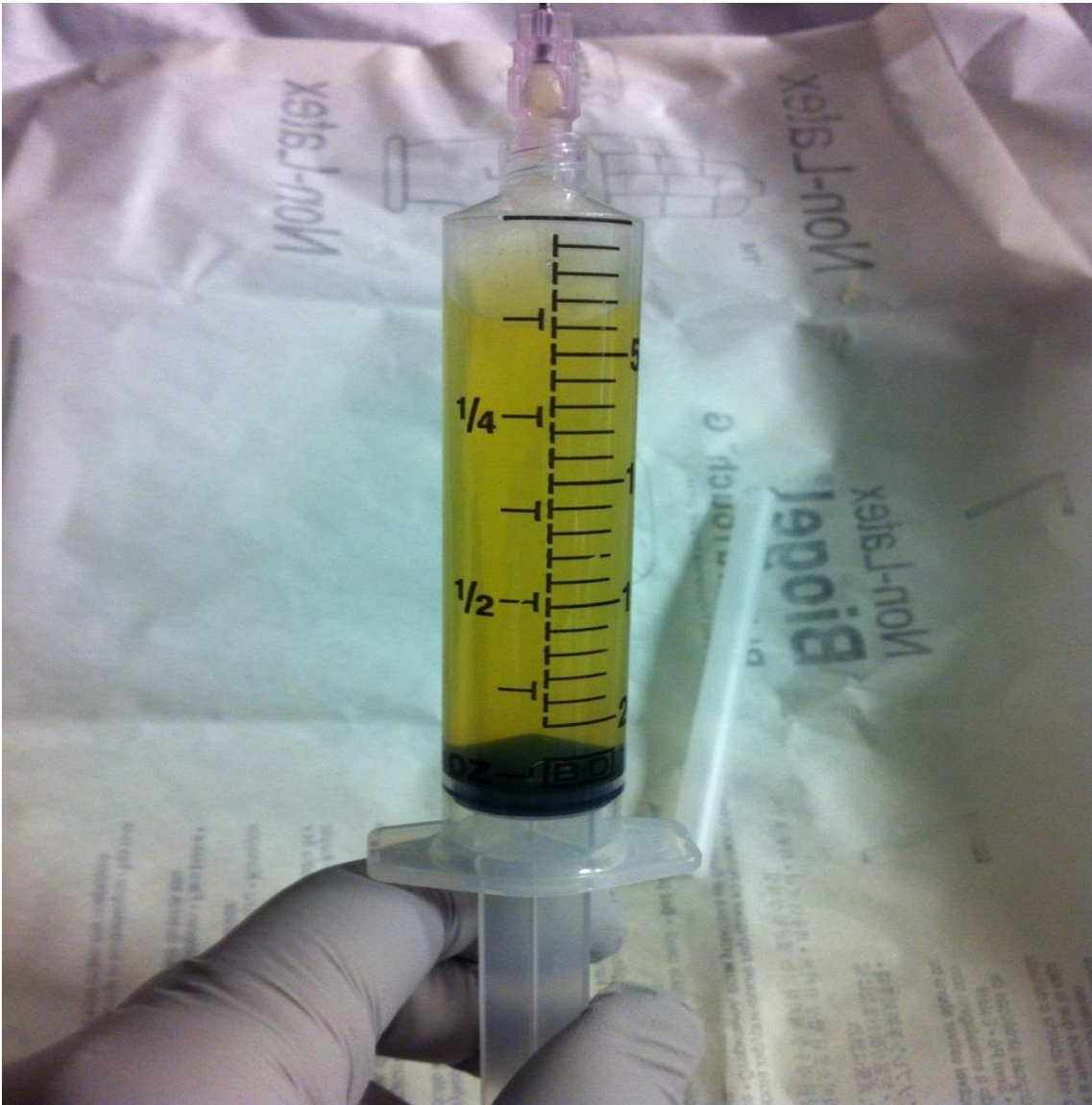
Structural Abnormalities



Structural Abnormalities



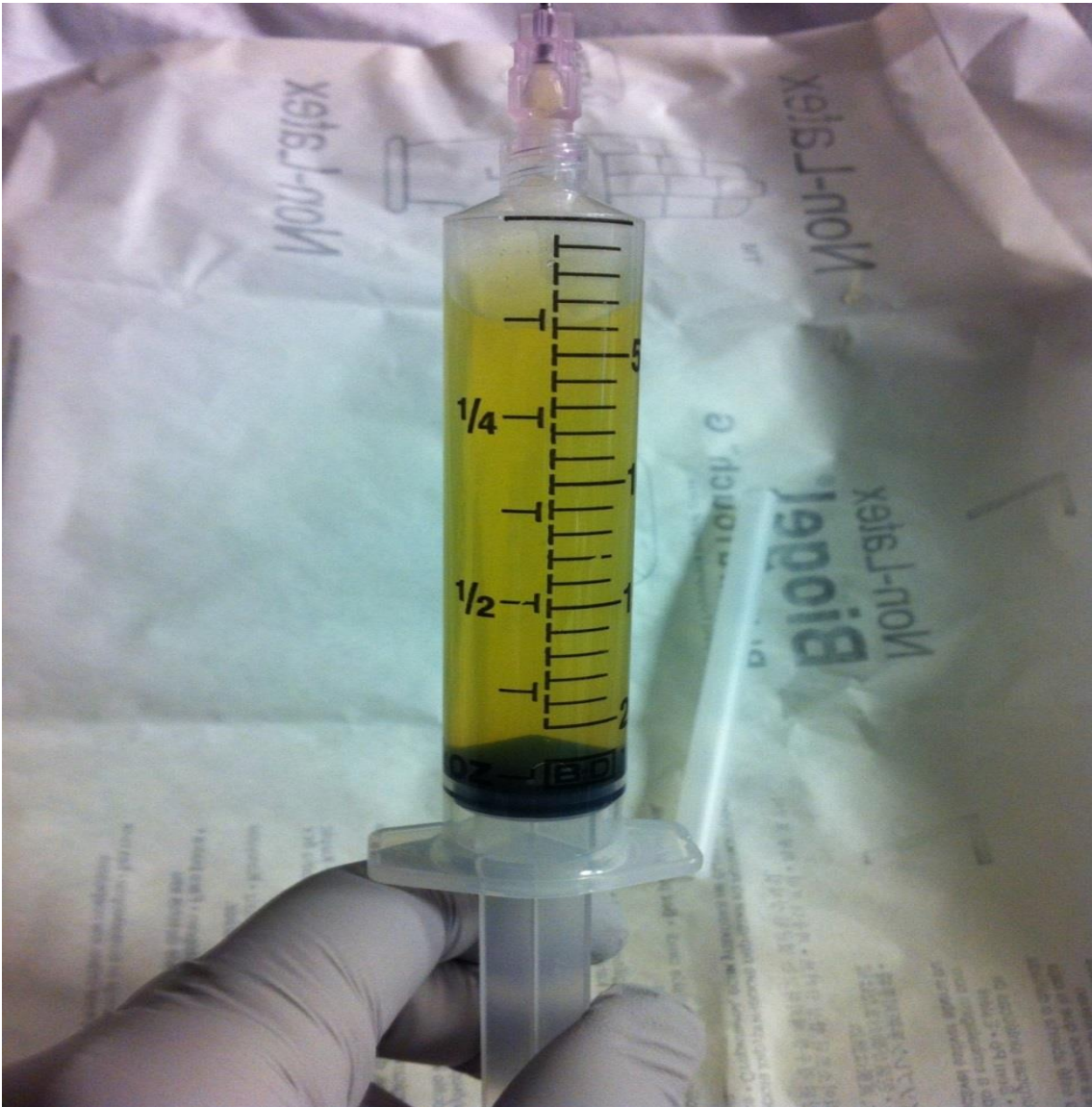
Structural Abnormalities



Differential Diagnosis:

What to Order:

Structural Abnormalities



We Order:

CBC / Cell Count

Creatinine (Fluid / Serum)

Urea (Fluid / Serum)

Reason:

Hematoma

Seroma

Urinoma

Calcineurin Toxicity

We Order:

Drug Levels (Random)

Calcineurin Levels

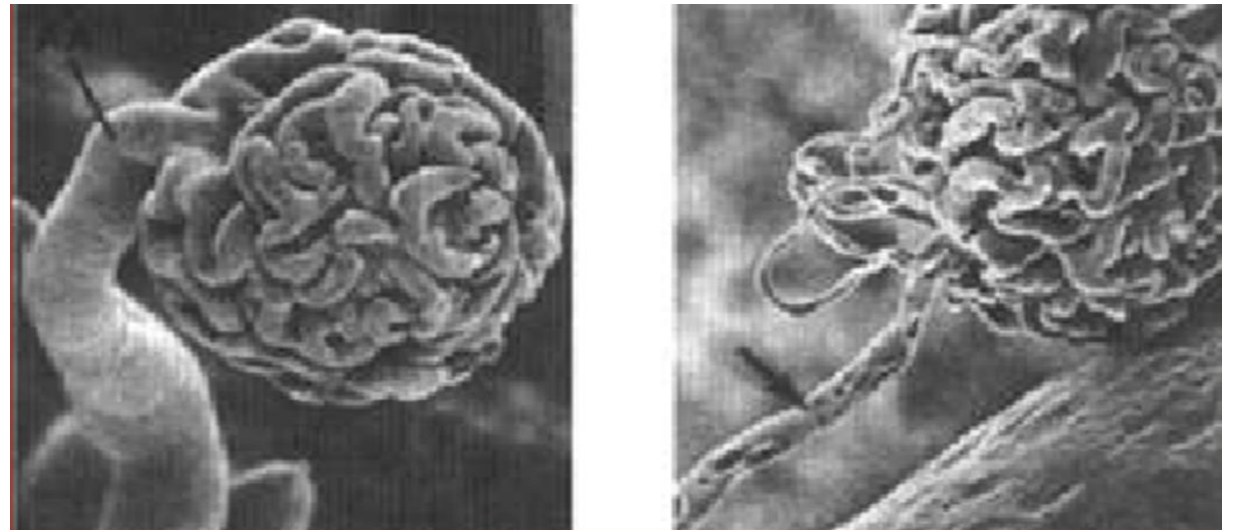
Cyclosporin

Tacrolimus

Reason:

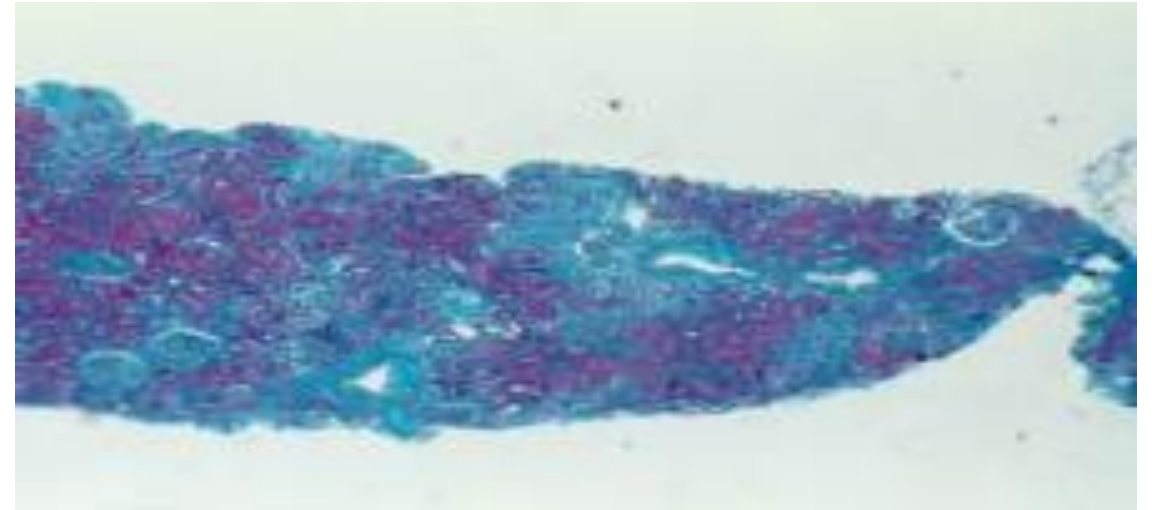
If too high: Toxicity ?

If too low: Rejection ?



Allograft (Transplant) Glomerulopathy

- Chronic “Burning Out” of the transplanted kidney
- Biopsy
 - Imaging
 - Clinical
 - T1/2 DDKT: 8 LDKT: 12*



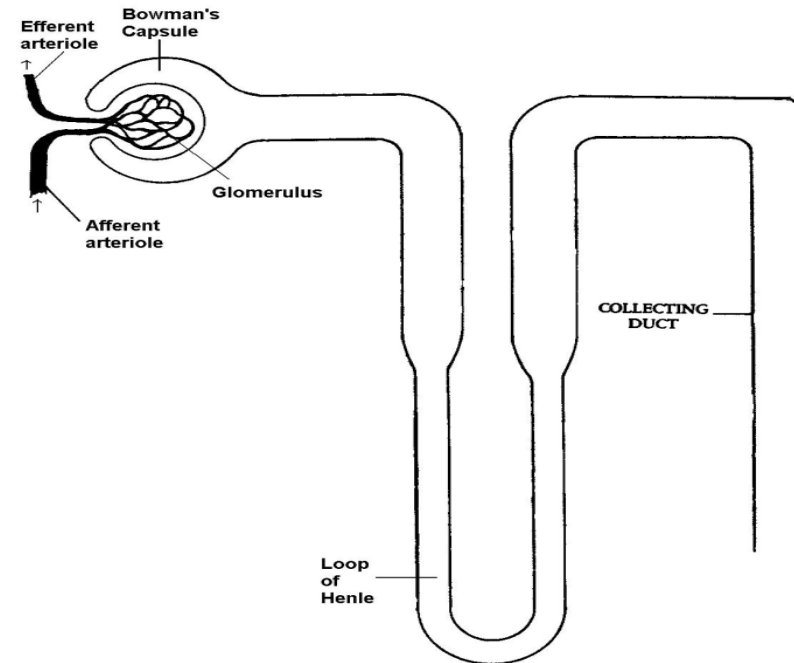
*Solez K, Colvin RB, Racusen LC, et al. Am J Transplant. 2007;7:518-526.

Renal Causes

Pre-Renal

Renal

Post Renal



Renal Causes

Pre-Renal

Volume Status

Medications

Ineffective Arterial Flow

Arterial Stenosis

Hypotension (Relative)

Renal (Intrinsic)

Glomerular: GN

Tubular : ATN

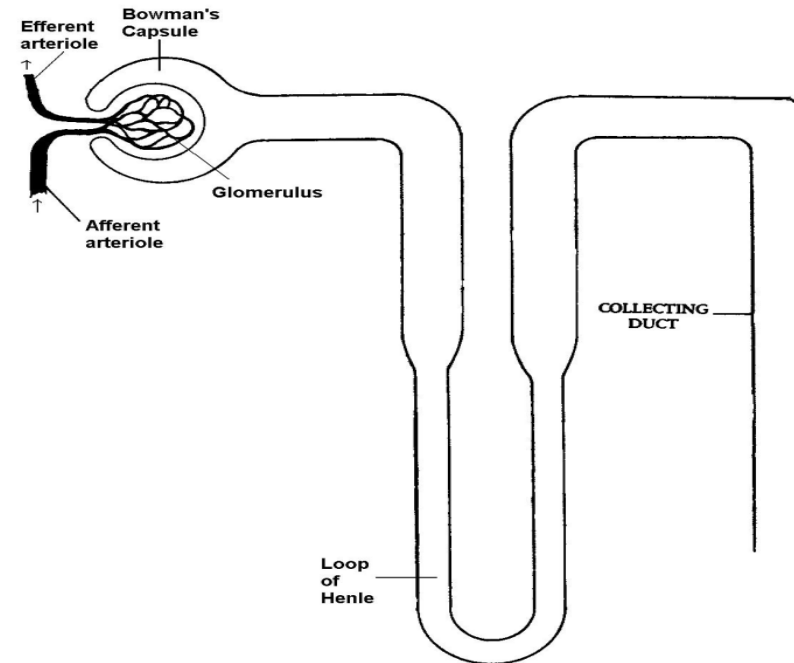
Interstitium: AIN

Post Renal

Obstructions

Men

Women



Work-Up Renal Causes

Pre-Renal

FENA*

Orthostatics

Renal

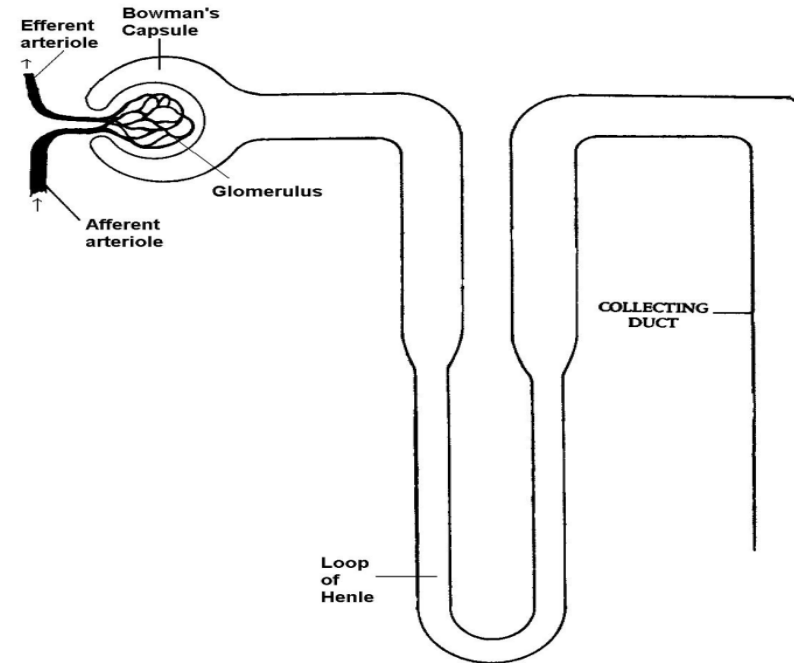
Urine Protein

Casts

Urine Eosinophils

Post Renal

Renal Ultrasound / PVR



Fractional Excretion Sodium (FENa)

We Order:

Urine Na / Creat

Serum Na / Creat

Interpretation:

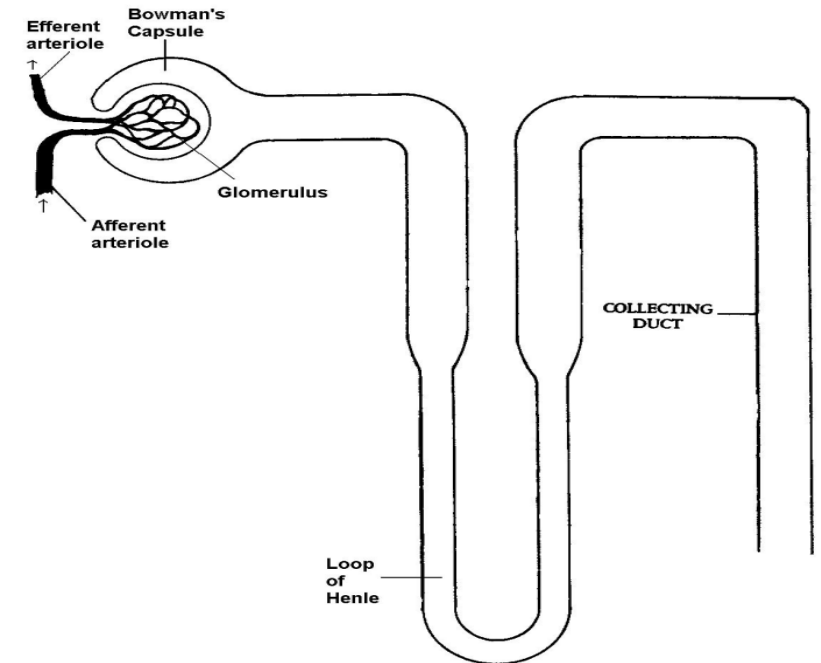
If $< 1\%$, then Pre-Renal***

Caution:

Diuretics (Furosemide)

Cardiac / Liver Failure

Bladder Drained Pancreas



Urine Protein (Random)

We Order:

Urine Protein

Urine Creatinine

Not a Urinalysis!



Leukocytes 2 minutes	Negative	trace	small	mod.	Large
		+	++	+++	
Nitrite 60 seconds	Negative	Positive	Positive	(Any degree of uniform pink colour is positive)	
Urobilinogen 60 seconds	Normal	Normal	mg/dl	4	8
	0.2	1	2		(1mg = approx. 1EU)
Protein 60 seconds	Negative	trace	mg/dl	100	300
			30	++	+++
			+		++++
pH 60 seconds	5.0	6.0	6.5	7.0	7.5
					8.0
					8.5
Blood 60 seconds	Negative	Non-hemo-lyzed	Non-hemo-lyzed	hemo-lyzed	small
		trace	mod.	trace	+
					mod.
					++
					Large
					+++
Sp. Gr. 45 seconds	1000	1005	1010	1015	1020
					1025
					1030
Ketone 40 seconds	Negative	mg/dl	trace	small	mod.
			5	15	40
					large
					80
					large
					160
Bilirubin 30 seconds	Negative	Small	Moderate	Large	
		+	++	+++	
Glucose 30 seconds	Negative	g/dl (%)	1/10 (tr.)	1/4	1/2
		mg/dl	100	250	500
					1000
					>=2000
					>=2

Rejection

We Order:

Biopsy

Alloscreen / Luminex

ddDNA (Natera / Allosure)

Reason:

Biopsy:

Gold Standard

Rejection Yes / No / Other

Severity Of Rejection

Guides Treatment

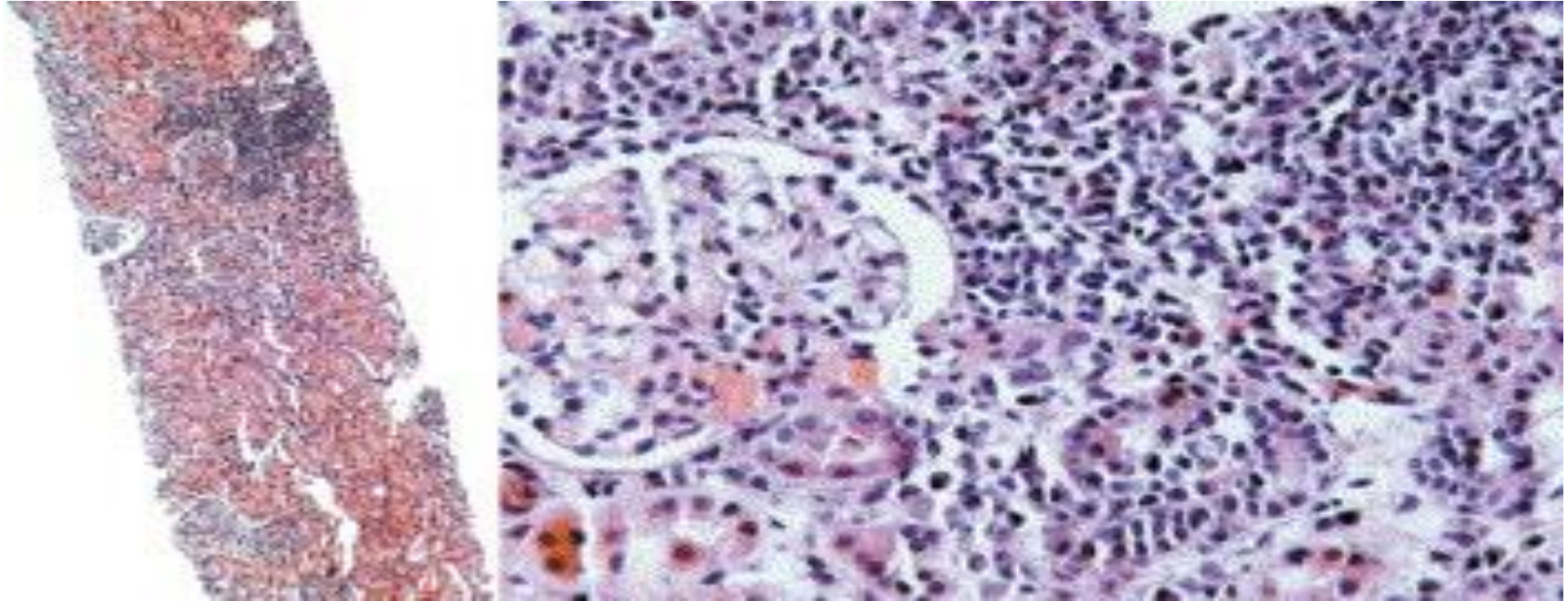
Alloscreen

Are there anti-HLA Antibodies?

ddDNA:

Good Negative Predictive Value

Rejection



Infection

We Order:

Urinalysis

Urine Cultures

Blood Cultures

BK PCR

CMV PCR

We Look For:

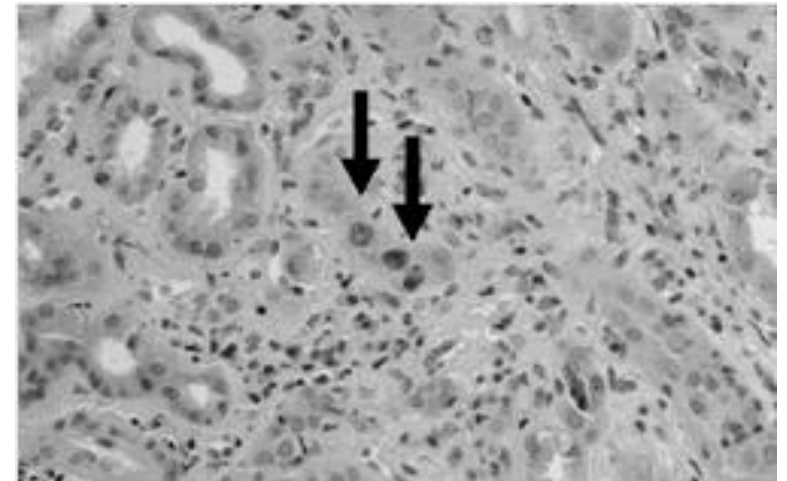
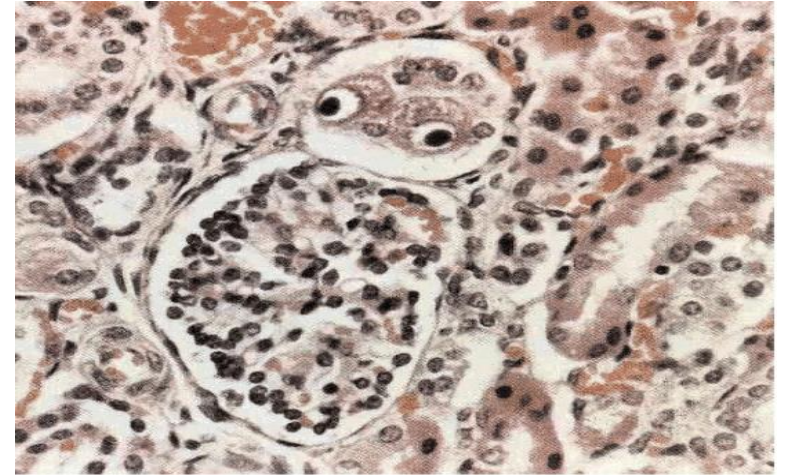
The usual suspects

Bacteremia et al

Opportunistic Infections

Sepsis

CMV
BK





**KEEP
CALM
AND**

**CHECK THE
LABS**



From Our Team To Your Team: Thank You

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