History of Kidney Transplantation

- First successful kidney transplant **1954**
- First kidney transplant at OHSU **1959**
More Than 50 Years of Transplant

Transplant Picnic
Kidney Transplant is not a cure

Kidney transplant is a treatment option

Other treatment options

- Hemodialysis
- Peritoneal dialysis
- No treatment

You have the right to refuse transplant at any time.
Benefits of Kidney Transplantation

► Quality of life
► Quantity of life
► More like your own kidney than dialysis
► Not as time consuming
► More freedom to travel
► Fewer dietary and fluid restrictions
► Return to work or school
► Growth in children
► Fertility
Risks of Kidney Transplantation

► Medications: life-long, many side effects, expensive
► Infections
► Rejection
► Cancer
► Coronary artery disease
► Diabetes
► Surgical complications
► Financial concerns
► Loss of dialysis support system
Current SRTR Data

See handout in class packet

Handout includes current data for kidney and pancreas on:

Patient survival:
- OHSU 1 year actual patient survival;
- OHSU 1 year expected patient survival;
- National 1 year patient survival.

Graft survival:
- OHSU 1 year actual graft survival;
- OHSU 1 year expected graft survival;
- National 1 year graft survival.
Medicare and Kidney Transplant

If the transplant is not done in a Medicare-approved transplant center, it could affect your ability to have your immunosuppressive (anti-rejection) medications paid for under Medicare Part B.

OHSU is a Medicare-approved transplant center.
General Transplant Recipient Evaluation

- History and Physical
- Laboratory
- Cardiac testing
- Chest X-ray
- Abdominal Ultrasound
- Dental Evaluation
- Dietary Evaluation
- Patient/Family Education
- Financial Evaluation
- Social Work Evaluation
- Pharmacy Evaluation
- Immunizations
- Pap/Pelvic/Mammogram
- Colonoscopy

Additional testing may be required
Compatibility Testing

- Blood type
- Crossmatch
- Panel Reactive Antibody (PRA)
ABO Blood Types

80-90% of all As are A1
# ABO Compatibility

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Living Donors</th>
<th>Waiting List</th>
</tr>
</thead>
<tbody>
<tr>
<td>O (46%)</td>
<td>O, ?_{non-A1}</td>
<td>O</td>
</tr>
<tr>
<td>A (40%)</td>
<td>A, O</td>
<td>A</td>
</tr>
<tr>
<td>B (10%)</td>
<td>B, O, ?_{non-A1}</td>
<td>B, ?_{non-A1}</td>
</tr>
<tr>
<td>AB (4%)</td>
<td>AB, O, A, B</td>
<td>AB, A</td>
</tr>
</tbody>
</table>
Definitions

► **Antigens.** Markers found on the surface of cells that identifies the cell as “self”.
  ► Six major antigens are important for transplant.
  ► Over 150 different antigens are present in humans.

► **Antibodies.** A immune defense response to “non-self” antigens.
Tissue Matching

- It’s nice to share antigens (markers) in common, but not necessary.

- A 0/6 match living donor transplant does better than a 6/6 match deceased donor transplant.
Tissue Matching

You: A2  A4  B8  B44  DR1  DR7
Dad: A1  A2  B8  B27  DR1  DR4
Mom: A3  A4  B7  B44  DR3  DR7
Brother: A1  A3  B7  B27  DR3  DR4
Sister: A1  A4  B27  B44  DR4  DR7
Crossmatch

Transplant in a test tube
Crossmatch

Transplant in a test tube

Negative (Compatible)

Positive (Incompatible)
What Can Cause Positive Crossmatches?

- Having antibodies
- PRA % = transplantability
How Do You Get Preformed Antibodies?

- Previous transplant
- Previous pregnancies
- Blood transfusions
  - Use White Blood Cell filter
  - No transfusions from potential donors

Be proactive by keeping your Hemoglobin in range pre-transplant.
Panel Reactive Antibody (PRA)

- Measure of transplantability
- 0-100%
- Lower percent is better
### How Long Do Transplants Last?

<table>
<thead>
<tr>
<th>Type of transplant</th>
<th>Half life</th>
</tr>
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<tbody>
<tr>
<td>Deceased donor</td>
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</tr>
<tr>
<td>• Full match</td>
<td>14 years</td>
</tr>
<tr>
<td>• KDPI &gt;85%</td>
<td>7 years</td>
</tr>
<tr>
<td>Living related</td>
<td></td>
</tr>
<tr>
<td>• Zero and half match</td>
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<td>• Full match</td>
<td>&gt; 30 years</td>
</tr>
<tr>
<td>Living non-related</td>
<td>18 years</td>
</tr>
<tr>
<td>Pancreas/Kidney</td>
<td>???</td>
</tr>
</tbody>
</table>
Why Do Transplants Fail?

► Noncompliance with medical treatment
► Need to decrease or stop antirejection medications because of other health issues
► Chronic rejection/changes over time
► Return of original disease
► Rarely, surgical complications
Cytomegalovirus (CMV)

- A common virus in the human population.
- The virus can be spread with the kidney.
- >50% have had the virus in the past (CMV +).
- May cause diarrhea, ulcers, infection, or rejection after transplant.
- Expensive medicine available to prevent/treat the virus.
- We try to match donor and recipient CMV status, but sometimes the benefits outweigh the risks.
Selection Conference

► Transplant team (physicians, coordinator, social worker, pharmacist, and dietitian)
► Review transplant evaluation results
► **Determine if you are a transplant candidate**
► Determine your risks with transplant
► Determine a “to do” list that needs to be completed before transplant
► Coordinator communicates plan (you, your doctor, your dialysis unit, and insurance company)

**It is your responsibility to keep us informed of your progress!**
When is Transplant Not Possible? (Absolute Contraindications)

► Active infection
► Active or recent malignancy
► High chance of dying with surgery
► Anatomy that makes transplant technically impossible
► BMI > 35
► Active drugs of abuse usage, alcoholism, or psychosis
► Medical noncompliance
Everyone must have a written plan before transplant!
When Do I Go on the List?

► Complete “to do” list

► Current blood sample

► Insurance authorization

► UNOS paperwork

Data at the time of listing and after transplant is reported to UNOS for regulatory purposes
OHSU Kidney Transplants 2015

Total # = 101
Deceased Donors
Potential Deceased Donor

- Brain dead or non-heart beating
- No known transmittable cancer
- No known communicable diseases
- Good kidney function

Thoroughly screened, but not risk free.
### The New Point System for Kidney Allocation

<table>
<thead>
<tr>
<th>Time Waiting</th>
<th>1/365 points for each day since qualifying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatrics (age 0-17)</td>
<td>1-4 points</td>
</tr>
<tr>
<td>Prior living donation</td>
<td>4 points</td>
</tr>
<tr>
<td>cPRA 0-100%</td>
<td>0-202 points</td>
</tr>
<tr>
<td>HLA Typing</td>
<td>1-2 points</td>
</tr>
</tbody>
</table>
Estimated Post Transplant Survival (EPTS)

- Calculation based on your
  - Age
  - Time on dialysis
  - Prior organ transplant
  - Diabetes status

- Calculated for everyone $\geq$ age 18
- Score represents the percent of candidates in the nation with a higher expected EPTS
- Lower score is better
Kidney Donor Profile Index (KDPI)

- Score is the percent of donors that have a risk score less than or equal to this donor’s risk score OR Score is a measure of how long a kidney is likely to function.
- Score is based on factors that can impact the kidney lifespan such as age, ethnicity, creatinine, history of hypertension or diabetes, cause of death, BMI, donation type, and Hepatitis C.
- Lower score is better.
- Higher scores require written consent.
The U.S. Donor Gap
Kidney Only

Source: OPTN/SRTR
United Network for Organ Sharing (UNOS) Options

- Multiple listing
- Transfer of waiting time
- KDPI > 85%
- PHS Increased Risk Donor
- Hepatitis C (not actively infected)

Donor risk factors may affect the success of the transplant or recipient health
KDPI > 85% Donor (formerly known as ECD)

- UNOS category of donor
- Must sign consent
  - If signed consent, will be eligible for regular and >85%.
  - All kidneys biopsied before accepting
  - Kidney is expected to function for a shorter time period
  - Wait time for these kidneys are expected to be shorter
Public Health Service (PHS) Increased Risk Donor (formerly CDC High Risk)

- Donors who are at higher risk for hepatitis B, Hepatitis C, and HIV
  - 20% of donor pool
- Some patients may have up to 10% better survival at 5 years
  - Shorter wait time
  - Average age of PHS donor = 31
  - Average age of SCD donor = 44

- Disease transmission risk (based on older testing methods)
  - 46/100,000 high risk
  - 2.4/100,000 standard donor
  - Being on dialysis is considered a PHS increased risk for transmission of Hepatitis C
  - Newer testing methods have reduced risk further
- Requires written consent
Hepatitis C: core antibody +, NAT-

- All donors are tested for infectious diseases, including Hepatitis C (Hep C)
- Lab testing:
  - Hep C core antibody (AB) tests for previous exposure
  - Nucleic acid testing (NAT) tests for active infection
- 20-40 % of people infected with Hep C are able to fight off the virus without treatment
  - These people are Hep C core AB + (previously exposed) but NAT – (not infected)
  - UNOS does not separate these donors from those who are NAT + (actively infected)
- Written consent required to be listed for these kidneys
- May shorten your wait time
Waiting Time

Average for ALL blood types in 2015:

4 years *

* Talk to your coordinator for additional details
What to Expect on the Waiting List

► You WAIT and it can be a difficult time

► Update testing done every 1-2 years to ensure:
  ► You are still a transplant candidate while waiting for a kidney
  ► Health issues are treated before a kidney becomes available
  ► Current testing available at time kidney is available
What to Expect on the Waiting List - 2

► Active status: PRA blood draw every 28 days. You must track this.
► Inactive status: Still accrue waiting time

► Inform Coordinator for any of the following:
  ► Insurance changes
  ► Contact phone number changes
  ► Antibiotics
  ► Hospital admissions
  ► Other medical issues
Living Donor

Got 2 Give 1
I'm a Living Kidney Donor
Living Donor Medical Criteria

Excellent health

- Age 21-70
- No high blood pressure or blood pressure meds
- Low surgical risk
- No diabetes
- BMI < 32
- No transmittable diseases
Living Donor Social Criteria

► Volunteer
  ► It is a federal crime to buy or sell organs in the US
► Informed decision
► Adequate support/finances
► Realistic expectations
► Donor and recipient comfortable with process

Separate Donor Coordinator/Advocate
Long Term Risks of Donation

► Decrease in renal function
► Slight increase in blood pressure over time
► No “spare” kidney
► Lifetime risk of renal disease less than 1%

Life-long commitment to healthy lifestyle
Surgical Risks of Donation

► Pain
► Rarely
► Infection
► Blood clots
► Wound complications
► GI problems
► Anesthesia reaction
The Living Donor Process

► Recipient Coordinator is still your Coordinator
  ► Call them with your donor names
  ► Call them with questions about the donor process

► Call first before using creative approaches to finding a donor (for example, social media)

► We cannot share information about your donor with you (HIPAA Law)

OHSU participates in national Paired Exchange or donor “swapping” programs
Donor testing

► Starts after recipient accepted for transplant
  ► Will screen two donors at a time
► Thorough physical exam
► Social Work evaluation
► Takes 2-3 months to complete
► Can be started locally but completed at OHSU
► Paid for by donor program
<table>
<thead>
<tr>
<th></th>
<th>Open Nephrectomy</th>
<th>Laproscopic Nephrectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 3-4 hr OR time</td>
<td></td>
<td>• 4-6 hr OR time</td>
</tr>
<tr>
<td>• 8 inch incision</td>
<td></td>
<td>• One 4-inch + two 1-inch incisions</td>
</tr>
<tr>
<td>• About 3-1/2 day hospital stay</td>
<td></td>
<td>• About 3 day hospital stay</td>
</tr>
<tr>
<td>• Desk job – ~3 weeks</td>
<td></td>
<td>• Desk job – ~3 weeks</td>
</tr>
<tr>
<td>• Manual job – 12 weeks</td>
<td></td>
<td>• Manual job – 6 weeks</td>
</tr>
</tbody>
</table>
Open Nephrectomy Scar
Laparoscopic Nephrectomy Scar
Recipient Benefits of Living Donor Transplant

► Planned surgery
► Avoid waiting list
► Optimize recipient health
► Improved Outcome

↑ Kidney and Patient Survival
Immediate Function
↓ Medication strength/doses?
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Recipient Hospital Course

- 2-4 hours in OR
- Incision about 6 inches
- ICU stay rare
- Usual post-op activity
- Bladder catheter, wound drains, central line, arm IV
- Dialysis, if needed
- Plan for a 4 day stay
- Education, education, education
Potential Surgical Risks

All surgeries have risks

- Anesthesia reaction
- Urine leak
- Urine blockage
- Fluid collection
- Bleeding
- Blood clot formation
- Infection, including wound infection and pneumonia
- Organ failure (may require re-transplant)

Less than 5% reoperation rate in the first month
Other Potential Risks

Psychosocial Risks

► Depression
► Post-Traumatic Stress Disorder (PTSD)
► Generalized anxiety, issues of dependence, & feelings of guilt

Rare Risks

► Heart issues
  ► Abnormal rhythms
  ► Sudden drop in blood pressure that impacts your circulation
► Multiple organ failure
► Death
Sleepy Kidney

- 22-34% of OHSU transplants are “sleepy”
- Can last days to weeks to months
- May require temporary dialysis, even after discharge
- Rare with living donor transplant
Acute Rejection

► Can be seen at any time
  ► Low rates
  ► Often no symptoms
  ► Self monitoring essential (labs, weight, blood pressure, temperature)

► Treatment available
  ► May require admission to hospital, biopsy, and IV meds
  ► May change immunosuppression medications
  ► Usually reversible
Chronic Rejection

- Can be seen early or late
- May change immunosuppression medications
- Not reversible
- May lead to eventual loss of transplant
Immunosuppressive Drugs

BALANCING ACT

Rejection  Side Effects

Drugs

Side effects of drugs are dose-dependent
Medication Guarantees

► You may need to take these medications for the rest of your life
► You will have some medication side effects.
► Some side effects decrease as doses decrease.
► Some side effects are life-long, even if the drug is stopped.
► Doses are higher the first three months.
► Medications need to be taken as directed.
► Adjusting your own medications can lead to loss of the kidney.
Side Effects

All immunosuppression increases your risk of:

► Cancer

► Infection

► Coronary artery disease

► Can also increase your cholesterol/lipids
Tacrolimus

**SIDE EFFECTS**
- Tremors
- Headache
- Diabetes
- High blood pressure
- GI problems
- Kidney damage

**CONSIDERATIONS**
- Timed drug level blood tests
- Take consistently with or without food
- Cost
- Drug-drug interactions
Mycophenolate / Myfortic

**SIDE EFFECTS**
- Stomach upset/diarrhea
- Anemia
- Low white blood cell count

**CONSIDERATIONS**
- Take with food
- Cost
- Women only: Use two forms of birth control
- Call us if considering pregnancy or if you become pregnant
SIDE EFFECTS

► Body image changes: weight gain, acne, moonface, edema, hair growth
► Diabetes
► Weak bones & muscles
► Delayed wound healing/thin skin
► Increased cholesterol
► Visual changes
► Mood swings
► Ulcers

CONSIDERATIONS

► Take with food
► Cost (cheap)
► May be stopped at one year if no rejection.
► Large doses used to treat acute rejection.
Your Responsibilities

► Follow lab/clinic schedules
► Follow own lab results
► Monitor temperature/blood pressure/weight/blood sugar
► Take medications exactly as prescribed
► Communicate concerns to the Transplant Team
► Be a proactive participant
<table>
<thead>
<tr>
<th>Month</th>
<th>Schedule</th>
<th>OHSU lab</th>
<th>Local lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M- Th</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2 and 3</td>
<td>M-Th</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4-6</td>
<td>M</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7-12</td>
<td>Every other week</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>13-18</td>
<td>Once a mo</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>19-24</td>
<td>Every 3 mos</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>25-36</td>
<td>Every 4 mos</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>After 37</td>
<td>Every 6 mos</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
## Clinic Schedule

<table>
<thead>
<tr>
<th>Months</th>
<th>OHSU MD</th>
<th>Local MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weekly</td>
<td></td>
</tr>
<tr>
<td>2 and 3</td>
<td>Every 2-3 weeks</td>
<td>See 3 months after transplant to reestablish care</td>
</tr>
<tr>
<td>4-6</td>
<td>At 6 months</td>
<td>Monthly</td>
</tr>
<tr>
<td>7-12</td>
<td>At 12 months</td>
<td>Every 2 mos</td>
</tr>
<tr>
<td>13-24</td>
<td>At 18 and 24 mo</td>
<td>Every 3 mos</td>
</tr>
<tr>
<td>25-72</td>
<td>Yearly anniversary, if possible</td>
<td>Every 4 mos</td>
</tr>
<tr>
<td>73-108</td>
<td>Every 1-2 years</td>
<td>Every 4-6 mos</td>
</tr>
<tr>
<td>Thereafter</td>
<td>Every two years</td>
<td>Every 4-6 mos</td>
</tr>
</tbody>
</table>
Biopsy Schedule

► 3 months

► 12 months

► As needed if concerned about rejection
Referring Back to MD

- At about three months if all is well
- We will continue to monitor kidney function
- We will act as consultants
- Regular visits with transplant team
Lifestyle after Transplant Cardiac

► Heart healthy diet
► Exercise
► Blood pressure & cholesterol control
► No smoking
► Healthy weight
► Testing as indicated
## Lifestyle after Transplant

### Cancer

#### Routine screening:
- Pap/Mammogram
- Colonoscopy
- PSA

#### Skin care:
- Sunscreen
- Regular checks
- Stay out of the sun
Lifestyle after Transplant Infection

USE COMMON SENSE!

► Wash your hands
► Take food precautions
► Don’t share food/utensils
► Use gloves when gardening
► Avoid people with contagious diseases
► Pet considerations
► Dental follow up
► Immunizations
WHY CHOOSE TRANSPLANT?

► Quality of life
► Quantity of life
► Freedom from dialysis
► More liberal diet