Objectives

- Understand hormonal changes with CKD/ESRD and following renal transplant
- Discuss options for contraception following kidney transplant
- Discuss post transplant pregnancy outcomes
- Identify immunosuppression medications that should be avoided in patients seeking pregnancy
- Understand the risks and benefits of hormone replacement therapy in post menopausal transplant recipients
Hormonal Changes of CKD/ESRD

- Loss of sensitivity to dopaminergic activity due to CKD
- Renal Clearance of Prolactin
- Reduced in CKD

Inhibition of high estradiol-mediated pulsatile secretion of GnRH due to CKD

- Inhibition of high estradiol-mediated LH and FSH surge due to CKD

Hormonal Changes of CKD/ESRD

Amennorheic on dialysis – may think they are menopausal

After Kidney Transplant

- **Assuming good graft function**


- **Other studies have shown only 40-80% resume normal ovulatory cycles**
  - Lower estrogen, progesterone and LH with higher FSH than matched controls


---

### Table 2: Serum pituitary-gonadal hormone levels before and after transplantation in the 32 female ESRD patients and 15 female controls.

<table>
<thead>
<tr>
<th>Item</th>
<th>n</th>
<th>PRL (ug/L)</th>
<th>LH (IU/L)</th>
<th>FSH (IU/L)</th>
<th>E2 (pmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>15</td>
<td>15.10 ± 3.02</td>
<td>12.01 ± 3.84</td>
<td>8.42 ± 3.80</td>
<td>131.5 ± 22.30</td>
</tr>
<tr>
<td>Preop.</td>
<td>32</td>
<td>24.60 ± 3.80*</td>
<td>37.23 ± 4.56*</td>
<td>16.92 ± 11.30*</td>
<td>76.0 ± 6.30*</td>
</tr>
<tr>
<td>1-2 months postop.</td>
<td>32</td>
<td>15.68 ± 2.04</td>
<td>21.61 ± 9.04</td>
<td>12.45 ± 6.30</td>
<td>242.35 ± 4.08</td>
</tr>
<tr>
<td>3-4 months postop.</td>
<td>32</td>
<td>16.30 ± 1.42†</td>
<td>13.04 ± 2.62†</td>
<td>10.10 ± 7.60†</td>
<td>124.50 ± 27.23†</td>
</tr>
</tbody>
</table>

*P < .01 versus control group; †P < .01 versus preoperation.
Resumption of Menstrual Cycles

- Shorter duration of dialysis pre transplant
- Better serum creatinine at 12 months
- Prednisone dose at 6 and 12 months
- Younger age
- Higher hemoglobin

Contraception
### Unplanned Pregnancies

<table>
<thead>
<tr>
<th></th>
<th>All Recipients</th>
<th>Kidney</th>
<th>Liver</th>
<th>K-P</th>
<th>Heart</th>
<th>Lung</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnancies</strong></td>
<td>2131</td>
<td>1484</td>
<td>395</td>
<td>103</td>
<td>112</td>
<td>37</td>
</tr>
<tr>
<td><strong>Unplanned</strong></td>
<td>40%</td>
<td>38.9%</td>
<td>42.5%</td>
<td>35.5%</td>
<td>44.6%</td>
<td>59.5%</td>
</tr>
</tbody>
</table>

- **General US population – 49%**
- **Before transplantation 44% of women were not aware that pregnancy is possible after transplantation**

Ideal Contraception

• Long acting and reversible
• Little or no drug interaction
• Minimal risk to the patient
• High efficacy
<table>
<thead>
<tr>
<th>Method</th>
<th>Typical Use</th>
<th>Correct Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Most Effective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IUD (copper or progestin)</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Progestin implant</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Tubal ligation/vasectomy</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
</tr>
<tr>
<td><strong>Effective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depo-provera injection</td>
<td>6</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Contraceptive pills, patch, ring</td>
<td>9</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Diaphragms</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td><strong>Least effective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condom</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>Sponge</td>
<td>12-24</td>
<td>9-20</td>
</tr>
<tr>
<td>Cervical cap</td>
<td>14-29</td>
<td>N/A</td>
</tr>
<tr>
<td>Fertility awareness – based methods</td>
<td>24</td>
<td>0.4-5</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>Spermicides</td>
<td>28</td>
<td>18</td>
</tr>
<tr>
<td><strong>NO METHOD</strong></td>
<td>85</td>
<td>85</td>
</tr>
</tbody>
</table>
Post Transplant Contraception

- Medical Eligibility Criteria for Contraceptive Use in Solid Organ Transplant Recipients
  - Established by CDC in 2010
- 1 = **No restriction** for use of contraceptive method
  - Condom, barrier methods
- 2 = **Advantages of using the method outweigh the theoretical or proven risks**
  - IUDs, hormonal methods
- 3 = **Theoretical or proven risks outweigh the benefits of using the method**
  - IUDs in complicated SOT
- 4 = **Unacceptable health risks** if the method is used
  - Estrogen containing methods in complicated SOT
Estrogen-containing Contraception

• **Benefits**
  » Decreased menstrual bleeding
  » Dysmenorrhea
  » Acne

• **Problems**
  » Thrombogenesis
  » Increased blood pressure
  » ? Liver toxicity

• **Transplant contraindications**
  » Cardiac allograft vasculopathy
  » Active liver disease
Progesterone-only Contraception

• **Progestin implant (etonogestrel, Nexplanon)**
  » Inserted every 3 years
  » Irregular bleeding
  » No decrease in BMD

• **Depo provera injection**
  » Every 3 months
  » Irregular bleeding
  » **Decrease in BMD**

• **Progestin-only pill**
  » Less effective than estrogen containing pill
  » First pass liver metabolism – avoid in active liver disease

• **Category 2 for all**
Intrauterine Devices

- **Copper IUD**
  - Effective, long acting
  - Heavy menses
  - Have not seen increased infection in transplant patients
  - Concern that immunosuppression would decrease effectiveness – has not been shown

- **Progestin IUD**
  - Effective and long acting
  - Irregular bleeding
  - No increased infection

- **Category 2 except for complicated SOT, then category 3**
Emergency Contraception

- Safe for transplant patients
- Progestin levonorgestrel (Plan B)
- Antiprogestin ulipristal (Ella)
- Category 1 for all patients
Ideal Contraception

- Long acting and reversible
- Little or no drug interaction
- Minimal risk to the patient
- High efficacy

IUD or Subdermal implant
Pregnancy
Questions to Answer

- Can I get pregnant?
- When should I get pregnant?
- What are the risks to me/my kidney?
- What are the risks to my baby?
Pregnancy on Dialysis

- **1–7%** on conventional dialysis
- **15.6%** of 45 women on nocturnal home hemodialysis
- **2-3 times** more common in patients on HD vs. PD

Timing of Pregnancy

- Historically have recommended 2 year wait
  - Stabilization of graft function
  - Lower doses of immunosuppression
- Pressure to be less conservative
  - Longer waits for deceased donor kidneys
  - Transplant list is aging
Timing of Pregnancy

A All Cause Graft Loss

Year 1 Model

Probability of remaining event free

Time from transplantation (years)

Log-Rank: p<0.001

Year 2 Model

Probability of remaining event free

Time from transplantation (years)

Log-Rank: p=0.075

Year 3 Model

Probability of remaining event free

Time from transplantation (years)

Log-Rank: p=0.472

B Death Censored Graft Loss

Year 1 Model

Probability of remaining event free

Time from transplantation (years)

Log-Rank: p<0.001

Year 2 Model

Probability of remaining event free

Time from transplantation (years)

Log-Rank: p<0.001

Year 3 Model

Probability of remaining event free

Time from transplantation (years)

Log-Rank: p<0.001

Rose et al. AJT 2016;16:2360-2367.
AST Consensus Opinion

• Adequate and stable renal function (Cr < 1.5 mg/dL) and no/minimal proteinuria
• Well controlled blood pressure
• Stable on non-teratogenic maintenance immunosuppression
• No rejection in the previous year
• No acute fetotoxic infections (i.e., CMV)
• Consider additional factors
  » Maternal age
  » Comorbidities that may affect pregnancy and graft outcome
  » Medical noncompliance
Risk of Graft Loss

- 120 recipients
- Matched
  - Graft vintage
  - Age
  - Graft function
- No difference in graft loss over 20 years

Risk of Graft Loss

- 48 recipients
  - 74 pregnancies
- 187 non pregnant
- 9 patients with graft loss
  - 6 had Cr > 1.5 mg/dL

Who Is At Risk For Graft Loss?

- Increased creatinine before and after pregnancy
- Increased rates of hypertension
- African Americans
- Recent acute rejection episodes
- Shorter transplant to conception interval
- Pregnancy complication – pre-eclampsia
Pregnancy Outcomes

• National Transplantation Pregnancy Registry (NTPR) 2010
  » Patient reported questionnaire
  » About 2000 patients

• UK Transplant Pregnancy Registry 2013
  » Physician reported
  » About 200 patients

• ANZDATA Transplant Registry 2013
  » Government funded
  » About 700 patients
### Pregnancy Outcomes

<table>
<thead>
<tr>
<th></th>
<th>NTPR</th>
<th>UK</th>
<th>ANZDATA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Live Births</strong></td>
<td>75%</td>
<td>79%</td>
<td>76%</td>
</tr>
<tr>
<td><strong>Spontaneous Abortions</strong></td>
<td>18%</td>
<td>11%</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Stillbirths</strong></td>
<td>2%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Mean Gestational Age (weeks)</strong></td>
<td>35.9 ± 3.4</td>
<td>35.6 ± 0.3</td>
<td>35 ± 5</td>
</tr>
<tr>
<td><strong>Birth Weight (g)</strong></td>
<td>2668 ± 784</td>
<td>2316 ± 800</td>
<td>2485 ± 783</td>
</tr>
<tr>
<td><strong>Pre-term (&lt; 37w)</strong></td>
<td>51%</td>
<td>52%</td>
<td>54%</td>
</tr>
<tr>
<td><strong>Low Birth Weight (&lt;2.5 kg)</strong></td>
<td>42%</td>
<td>52%</td>
<td>54%</td>
</tr>
<tr>
<td><strong>Pre-eclampsia</strong></td>
<td>30%</td>
<td>24%</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Rejection</strong></td>
<td>0.8%</td>
<td>2%</td>
<td>N/A</td>
</tr>
</tbody>
</table>
**Pregnancy Outcomes**

- 4706 pregnancies
  - 3750 recipients

<table>
<thead>
<tr>
<th>Maternal demographics</th>
<th>Mean</th>
<th>USA, 2006²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at pregnancy</td>
<td>29.0 years (28.9–29.1)</td>
<td>NA</td>
</tr>
<tr>
<td>Transplant-pregnancy interval</td>
<td>3.2 years (3.1–3.3)</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pregnancy outcome</th>
<th>Pooled incidence</th>
<th>USA, 2006³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live birth</td>
<td>73.5% (72.1–74.9)</td>
<td>66.7%</td>
</tr>
<tr>
<td>Miscarriage</td>
<td>14.0% (12.9–15.1)</td>
<td>17.1%</td>
</tr>
<tr>
<td>Abortion</td>
<td>9.5% (8.6–10.4)</td>
<td>NA</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>2.5% (2.0–3.0)</td>
<td>NA</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>0.6% (0.4–0.9)</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Obstetric complication</th>
<th>Pooled incidence</th>
<th>USA, 2006³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>54.2% (52.0–56.4)</td>
<td>NA</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>27.0% (25.2–28.9)</td>
<td>3.8%</td>
</tr>
<tr>
<td>Gestational diabetes</td>
<td>8.0% (6.7–9.4)</td>
<td>3.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Delivery outcome</th>
<th>Mean/Pooled incidence</th>
<th>USA, 2006³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cesarean section</td>
<td>56.9% (54.9–58.9)</td>
<td>31.9%</td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>45.6% (43.7–47.5)</td>
<td>12.5%</td>
</tr>
<tr>
<td>Gestational age</td>
<td>35.6 weeks (35.5–35.7)</td>
<td>38.7 weeks</td>
</tr>
<tr>
<td>Birth weight</td>
<td>2420 grams (2396–2445)</td>
<td>3298 grams</td>
</tr>
</tbody>
</table>

Deshpande NA et al. AJT 2011;11:2388-2404.
### Table 3. Pregnancy complications in women with a renal transplant and an ongoing pregnancy in the third trimester compared with the comparison cohort

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Renal Transplant Recipients (n=95)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Comparison Cohort (n=1360)</th>
<th>Unadjusted Odds Ratio</th>
<th>Adjusted Odds Ratio&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preeclampsia in this pregnancy&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23 (24)</td>
<td>17 (4)</td>
<td>7.59 (3.87–14.9)</td>
<td>6.31 (2.97–13.4)</td>
</tr>
<tr>
<td>No</td>
<td>72 (76)</td>
<td>460 (96)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Gestational diabetes in this pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3 (3)</td>
<td>26 (2)</td>
<td>1.5 (0.45–5.04)</td>
<td>1.21 (0.35–4.25)</td>
</tr>
<tr>
<td>No</td>
<td>91 (97)</td>
<td>1324 (98)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Induced delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>42 (44)</td>
<td>300 (22)</td>
<td>2.79 (1.82–4.29)</td>
<td>2.67 (1.73–4.13)</td>
</tr>
<tr>
<td>No</td>
<td>53 (56)</td>
<td>1057 (78)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Delivery by caesarean section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>61 (64)</td>
<td>326 (24)</td>
<td>5.69 (3.64–8.89)</td>
<td>4.57 (2.83–7.35)</td>
</tr>
<tr>
<td>No</td>
<td>34 (36)</td>
<td>1034 (76)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Data are shown as n (%) or odds ratios (95% confidence intervals).

<sup>a</sup>Ten women whose pregnancies did not continue into the third trimester are excluded from this table.

<sup>b</sup>Adjusted for woman’s age, parity, and smoking status. Woman’s age and parity are treated as continuous linear terms in the model.

<sup>c</sup>Including only a subset of the comparison group with data about preeclampsia.
Who Is At Risk for Poor Pregnancy Outcomes?

- Poor graft function pre-pregnancy
- Urine protein > 500 mg/day
- Hypertension on more than a single agent
- Comorbid illnesses
  - Diabetes mellitus
- Recent acute rejection episode
- Need for IVF

Bramham K et al. CJASN 2013;8:290-298.
Tailoring Immunosuppression

• Pregnancy is not thought to cause acute rejection

• There are safe options in pregnancy
  » Prednisone
  » Azathioprine
  » Tacrolimus/Cyclosporine
  » All pregnancy class B or C

• Also safe in breastfeeding
Prednisone

- Crosses the placenta
  - Maternal to cord blood ratio 10:1
- > 20 mg/day
  - 3/1000 risk cleft lip/palate
    - 3.4 fold
      - Avoid in first trimester if possible
  - Increased gestational diabetes
  - Acceleration of maternal hypertension
  - Maternal infection
  - Stress dosing during maternal distress and in labor
Azathioprine

• Crosses the placenta
• Fetal liver lacks the enzyme (inosinatopyrophosphorylase) for conversion to its active metabolite
• Maternal effects
  » Dose related myelosuppression
    • Watch maternal wbc
    • Consider thiopurine methyltransferase (TPMT) screening
Calcineurin Inhibitors

- Crosses the placenta
- Rate of birth defects
  - Sandimmune – 4.9%
  - Neoral – 2.8%
  - Tacrolimus – 4.2%
  - Population background rate 3-4%
- Increased gestational diabetes
- Maternal infection
- Nephrotoxicity
- Accelerated maternal hypertension
# NTPR Data

<table>
<thead>
<tr>
<th></th>
<th>Azathioprine and/or Prednisone</th>
<th>Cyclosporine</th>
<th>Tacrolimus</th>
</tr>
</thead>
<tbody>
<tr>
<td># of pregnancies</td>
<td>448</td>
<td>822</td>
<td>427</td>
</tr>
<tr>
<td>Live births</td>
<td>81%</td>
<td>76%</td>
<td>71.5%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>25%</td>
<td>60%</td>
<td>53%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5%</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Infection</td>
<td>16%</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>22%</td>
<td>32%</td>
<td>35%</td>
</tr>
<tr>
<td>Rejection</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Graft loss at 2y</td>
<td>4%</td>
<td>7%</td>
<td>9%</td>
</tr>
</tbody>
</table>
Drug Monitoring

• Levels will fluctuate during (and after) pregnancy
• First and second trimester
  » q 2-4 weeks
• Third trimester
  » Weekly
• Within a week postpartum
Mycophenolic Acid

• Increased first trimester pregnancy loss
• Highly teratogenic
  » Facial deformities
    • Cleft lip/palate
    • Microtia
    • Absent auditory canals
  » Limb anomalies
• Discontinue at least 6 weeks prior to pregnancy
Unplanned Pregnancies

- Stop Cellcept/Myfortic IMMEDIATELY
- Counseling
  - Increased miscarriage rate
    - 33% manufacturer data
    - 42% NTPR data
  - Birth defects
    - 22% manufacturer data
    - 27% NTPR
Menopause
Menopause

- Permanent cessation of menstrual periods
  - > 12 months of amenorrhea without another pathological or physiological cause
- Complete/near complete ovarian follicular depletion
- Hormonal changes
  - Hypoestrogenemia
  - High FSH
Perimenopause

• Onset approximately 4 years before final menstrual period (FMP)
• Can be very symptomatic
  » Irregular menstrual cycles
  » Hot flashes
  » Sleep disturbance
  » Mood symptoms
  » Vaginal dryness
  » Dyspareunia
Diagnosing Menopause

- Cycle history and symptoms
- FSH levels
  - Vary widely in the early menopausal transition
    - May be normal
  - > 25 IU/mL in late transition
  - 70-100 IU/mL postmenopause
- Differential diagnosis
  - Thyroid disease
  - Cycle changes
    - Pregnancy, hyperprolactinemia
  - Vasomotor symptoms
    - Meds, carcinoid, pheo, malignancy
Menopause in CKD/ESRD

- Age of onset
  - 51 in general population
  - 46 in ESRD

Loss of “Premenopausal Advantage”

A. All-cause

B. Cardiovascular

C. Non-cardiovascular

Benefits of Hormone Replacement Therapy (HRT)

Kathy’s hot flashes were becoming severe.
Symptom Relief

- 54 transplant pts
- Mean age 45.9 yo
- 3 m – 13 y from transplant
- Mean creatinine 1.6 mg/dL
- Transdermal estradiol with oral progestin

76% had total regression of climacteric symptoms

Lipid Profile


Increased Bone Density

HRT in the General Population

- Prior to 2002 38% of postmenopausal women were on HRT
- FDA indications
  - Relief of menopausal symptoms
  - Prevention of osteoporosis
- Also used to prevent chronic conditions such as heart disease
Risks and Benefits of Estrogen Plus Progestin in Healthy Postmenopausal Women
Principal Results From the Women's Health Initiative Randomized Controlled Trial

JAMA, July 17, 2002—Vol 288, No. 3
“Do not use estrogen/progestin to prevent chronic disease.”

Postmenopausal Hormone Therapy and Risk of Cardiovascular Disease by Age and Years Since Menopause

JAMA, April 4, 2007—Vol 297, No. 13

In WHI cohort:
Average age 63 years at initiation of treatment
Approximately 12 years postmenopausal
Risk Based on Age

HR for CHD:

50-59: **0.93** (-2 per 10,000 p-y)
60-69: **0.98** (-1 per 10,000 p-y)
70-79: **1.26** (19 per 10,000 p-y)

p for trend = 0.16

Risk Based on Years Since Menopause

HR for CHD:

< 10: **0.76** (-6 per 10,000 p-y)
10-19: **1.1** (4 per 10,000 p-y)
≥20: **1.28** (17 per 10,000 p-y)

p for trend = 0.02

Timing Is Everything

- Women who initiated hormone therapy closer to menopause tended to have **reduced** CHD risk compared with the **increase** in CHD risk among women more distant from menopause.
- Similar nonsignificant trend for total mortality.
- Risk of CVA remained elevated:
  - Regardless of age or time since menopause
  - HR 1.32

- **Timing hypothesis**
  - Estrogen reduces atherosclerosis if started soon after menopause, but once atherosclerosis develops, HRT is not protective and risk of thromboembolism may increase risk of cardiac events.
Risks of HRT in Transplant Patients

Deterioration of liver function
- Therapy discontinued

Abnormal uterine bleedings
- No pre or malignant lesions
- 11

Mastalgia
- No breast cancer
- Subsided after 6 mos
- 10

Excessive weight gain
- Majority in the first year
- 6

Profound thrombophlebitis
- Therapy discontinued
- 1

Fig 2. Side effects of HRT observed in female kidney transplant recipients.

Risks of HRT in Transplant Patients

Fig. 2. Side-effects of HRT observed in kidney transplanted women

Route of Administration

Oral

Transdermal

Topical

 +/- progestin in women with a uterus
Route of Administration

Conclusions

• Not much data on hormone replacement in transplant
• Therapy must include a thorough discussion of risks and benefits
• Generally, vaginal estrogen is minimally absorbed
  » Patients experiencing GU complaints
• Women > 10 years from menopause or > 60 years of age should probably not be offered systemic HRT
• Very symptomatic and recently menopausal may benefit
  » No current atherosclerotic disease
  » No history of clot/clotting disorder
Conclusions

• Benefits
  » Climacteric symptoms
  » Osteopenia/fractures
  » Lower risk of colon cancer
  » Possible lower risk of CV disease

• Risks
  » Thromboembolic phenomena
  » Possible increase in breast cancer risk
  » Abnormal liver function tests

• Transdermal therapy should be first line
• Progesterone in women with a uterus to avoid endometrial cancer
Conclusions

• Monitoring while on HRT
  » Periodic liver function tests
  » Routine screening
    • Mammogram
    • Colonoscopy
  » Dysfunctional uterine bleeding
    • Endometrial biopsy
Take Home Points

- Hypothalamic-pituitary-ovarian axis is negatively affected by CKD/ESRD
- Hormonal dysregulation and fertility can improve with transplant
- Unplanned pregnancies are common after transplant
  - Important to counsel patients about contraception and pregnancy post transplant
- Pregnancy has higher risk of pre-eclampsia, low birth weight and preterm delivery
- Mycophenolic acid (Cellcept/Myfortic) is teratogenic and contraindicated in pregnancy
- HRT is appropriate in carefully selected patients
Questions?

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