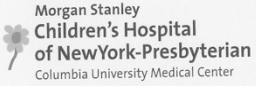



**UROGENITAL TRACT**

RICHARD SCHLUSSEL, M.D.  
DEPARTMENT OF UROLOGY  
DIVISION OF PEDIATRIC UROLOGY

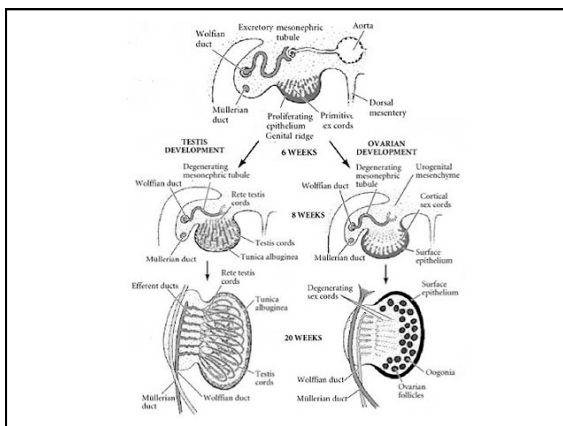
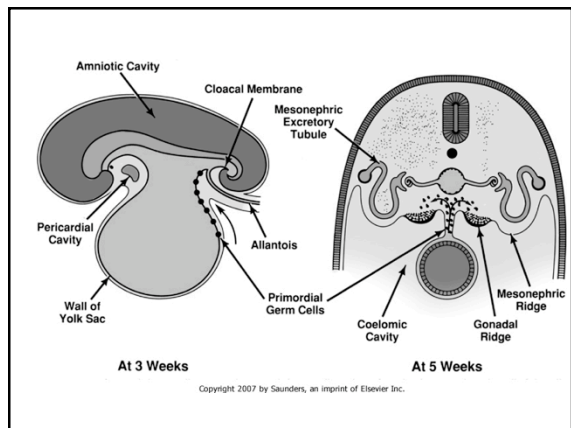
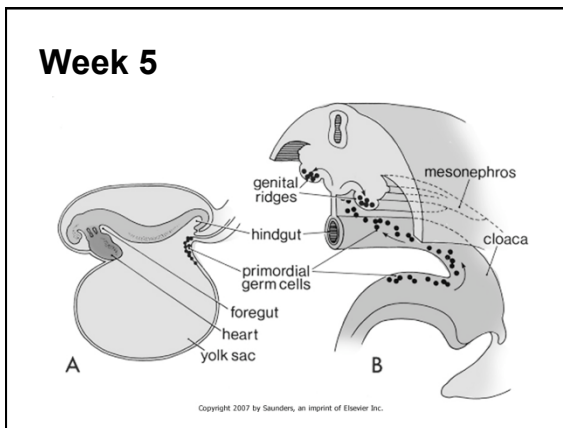


Morgan Stanley  
Children's Hospital  
of New York-Presbyterian  
Columbia University Medical Center

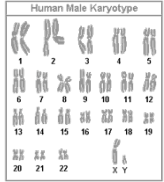


## Genital Development

- Chromosomal sex
- Gonadal sex
- Phenotypic sex



- Chromosomal sex
- Gonadal sex
- Phenotypic sex



Human Male Karyotype

### Chromosomal sex

- **SRY gene**  
Sex determining  
Region of the  
**Y chromosome**

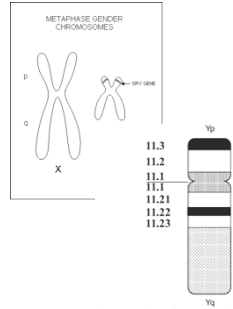
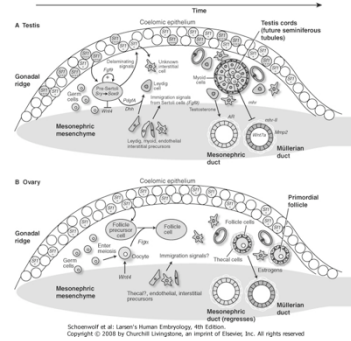


Figure 1 - Schematic representation of Y chromosome showing gene sequences studied by PCR<sup>[4]</sup>

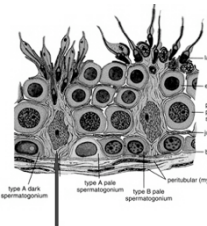
### Gonadal sex



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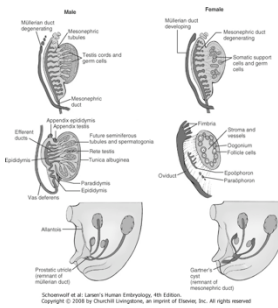
### Gonadal sex

- **Sertoli cells**
  - Forms week 6
  - Organizes testis into cords
  - Secrete AMH week 8
- Anti Mullerian Hormone**
- Leydig cell development

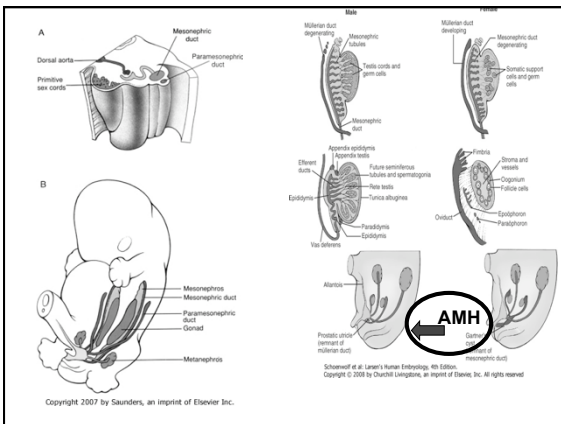


### Gonadal sex

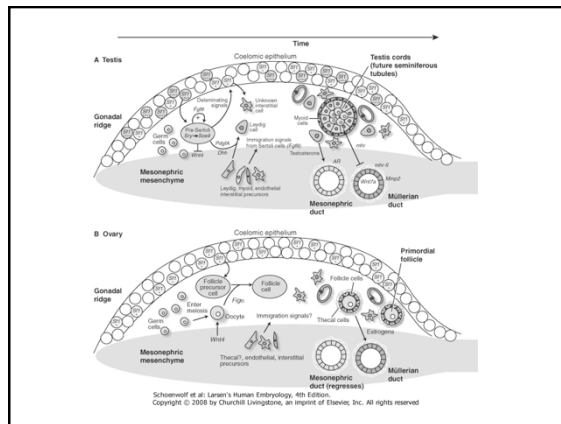
- **Sertoli cells**
  - Forms week 6
  - Organizes testis into cords
  - Secrete AMH week 8
- Anti Mullerian Hormone**
- Leydig cell development



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## Gonadal sex

- **Leydig cells**
  - Secrete Testosterone
    - Week 9-10
  - Preserve mesonephric ducts
  - Regulated by chorionic gonadotropin
    - Placenta
    - Pituitary

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- **Chromosomal sex**
- **Gonadal sex**
- **Phenotypic sex**
  - Internal genitalia (T)
  - External genitalia (DHT)

## Phenotypic sex

- **Androgens**
  - Testosterone (T)
  - Dihydrotestosterone (DHT)
- **Androgen receptors**

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## Normal Male Genitalia

Male Genitals

### Disordered development

- Klinefelter's syndrome
- XX males
- Male pseudohermaphrodite
- Testicular feminization
- Persistent Mullerian duct syndrome
- Hypospadias
- Undescended testes

### Klinefelter's syndrome

- Chromosomal sex
  - Failure meiosis
  - Disjunction
  - XXY
- Gonadal sex
- Phenotypic sex

### Klinefelter's syndrome XXY

- Small firm testes
- Gynecomastia
- Seminiferous tubular sclerosis
- High gonadotropins FSH
- 1 of 600 males

### XX males

- small firm testes
- gynecomastia
- small to normal-sized penises
- azoospermia

### Male pseudohermaphrodite

- Chromosomal sex
- Gonadal sex
- Phenotypic sex

### Male pseudohermaphrodite

5α-reductase deficiency

XY chromosomes!!

### Testicular feminization (Androgen insensitivity)

- Chromosomal sex
- Gonadal sex
- Phenotypic sex

### Testicular feminization (Androgen insensitivity)

XY chromosomes!!

### Hypospadias

- Abnormal androgen production
- Abnormal androgen sensitivity
- Arrested development
- Estrogen exposure

### Hypospadias

### Hypospadias

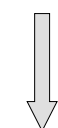
### Hypospadias

### Undescended Testes

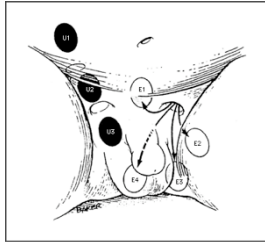
3 MONTHS



7 MONTHS



9 MONTHS

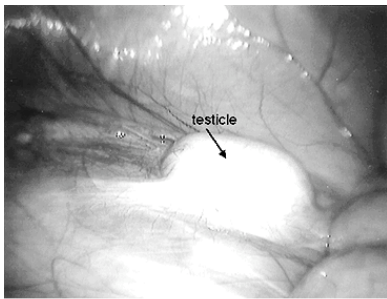


- Gubernaculum
- Endocrine
- Genitofem nerve
- CGRP (calcitonin gene Related Protein)

**Ectopic testes** Locations of undescended (U) and ectopic (E) testes: U1: intra-abdominal, U2: intracanalicular, U3: suprascrotal, E1: suprapubic, E2: femoral, E3: perineal, E4: contralateral. Reproduced with permission from Pillai, SB, Basner, GE. Pediatric testicular problems. Pediatr Clin North Am 1996; 45:813. Copyright © 1998 Pediatric Clinics of North America

### Undescended Testes

- Infertility
- Neoplasia
- Cosmesis
- Testis torsion



**Undescended testicle** Laparoscopic view of intra-abdominal right-sided undescended testicle. Courtesy of Christopher S Cooper, MD and Steven S Docimo, MD.

