The Urinary / Excretory System

The excretory system removes metabolic wastes and retains the proper amounts of water, salts, and nutrients in the body.

The excretory and urinary system is made up of the kidneys, bladder, urea, ureters, urethra, and the skin.

The system helps control the amount of waste in the body.

The removal of waste is important in keeping the body functioning properly as toxic waste buildup can lead to sickness or death.

Excretion

- Extracellular fluids
- Urea
- Ureters
- Urethra
- Nephron
- ADH
- Sphincter
- Glomerulus

Terms to Know:

- Excretion
- Extracellular fluids
- Urea
- Ureters
- Urethra
- Nephron
- ADH
- Sphincter
- Glomerulus

Functions

- 1. Collect water and filter body fluids
- 2. Regulate amount of water and ions in body fluids
- 3. Eliminate excretory products that the body takes in when it eats or drinks something

Organs involved

- Kidneys
- Nephrons
- Urea
- Ureters
- Urethra
- Sphincter muscles

Kidneys

- Processes about 200 quarts of blood to sift out about 2 quarts of waste products and excess water = urine
- As blood enters the kidneys, the blood is filtered through several organs and tubes in the kidney. During this filtration process, water and other good molecules are reabsorbed into the body while other waste products are added to the urine.
Nephrons

- A cup-shaped capsule that contains capillaries and the glomerulus (cluster of capillaries that help filter blood to form urine)
- 3 Functions:
  1. Glomerular filtration of water and solutes from the blood
  2. Tubular reabsorption of water and conserved molecules back into the blood
  3. Tubular secretion of ions and other waste products from surrounding capillaries into the distal tubule
- Nephrons filter 125 ml of body fluid per minute

Ureters

- Tubular organs that run from the renal pelvis to the base of the bladder that carry urine from the kidneys to the bladder
- Lined with transitional epithelium and consists of layers of smooth muscle, thus being under involuntary control
- Urine is transported through the ureters by muscular movements of the urinay tract's peristaltic muscular waves, which create a pressure force that moves urine through the ureters and into the bladder in small spurts

Urethra

- Tubular canal responsible for the transport of urine from the bladder to the outside of the body; the body's exit tube for liquid wastes
- Inner lining is made up of mucous membranes and surrounded by involuntary smooth muscles
- In females, the urethra's only function is to transport urine out of the body while in males, the urethra is also a part of the reproductive system

Sphincter Muscles

- A ringlike muscle that contracts or closes body passages or openings
- The sphincter ani externus keeps the anal opening closed and the sphincter urethrae is important in the voluntary control of urination
- The function of the sphincter urethrae is controlled by the pudendal nerve, which acts to constrict the urethra
- There are two urethral sphincters in the body:
  1. Internal sphincter muscle: made of smooth muscle and under involuntary control; primary muscle for the release of urine
  2. External sphincter muscle: secondary sphincter to control the flow of urine through the urethra; made of skeletal muscle and under voluntary control

Regulating Water and Salt Levels

- Water reabsorption is controlled by the antidiuretic hormone (ADH)
- ADH is released from the pituitary gland in the brain, which is signaled by the hypothalamus due to dropping levels in the blood
- ADH acts to increase water absorption in the kidneys, which puts more water back in the blood, increasing the concentration of the urine
- When too much fluid is in the blood, sensors in the heart signal the hypothalamus to reduce the amounts of ADH in the blood, which decreases water absorption by the kidneys, producing large amounts of more diluted urine.
**The Urinary Cycle: Spark Notes Version**

- Waste is filtered from the blood and collected as urine in each kidney.
- Urine leaves the kidneys through the ureters, and collects in the bladder.
- The bladder can expand to store the urine. Once it is full, nerve endings in the bladder wall send a message to the brain that you need to pee.
- The bladder walls contract and the sphincter muscle relaxes.
- The urine leaves through the urethra, found in both sexes.

**Digestive System and the Excretory System**

- The digestive system turns food into fuel for the body while the excretory system removes waste food from the body.
- The digestive system absorbs needed nutrients from the food, and the food that cannot be absorbed enters the colon and becomes waste.

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**What is Your Urine Telling You About Your Health?**

- The appearance of your urine can provide clues as to what is going on in your body.
- Clear: Hydrated; kidney is producing more diluted urine.
- Bright Yellow: Dehydrated; kidney is producing more concentrated urine.
- Burning Sensation: Could be signs of Urinary Tract Infection.

**What is Your Stool Telling You?**

- Hard and Dry: Dehydration, if food stays in GI tract for longer than a certain amount of time (~40 hrs), fluid is reabsorbed into the body and the stool becomes harder and dryer. Constipation -> going less often so the stool will stay in the system and the fluid will be reabsorbed.
- Little Lumps: Slow moving stool will lose fluid; lack of fiber in diet (fiber holds fluid).
- Too liquid: Under healthy conditions, the majority of fluid is absorbed through the digestive system. If food passes through too quickly, then there isn't enough time for the liquid to absorb and the stool becomes too soft.

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**Bristol Stool Chart**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lumpy lumps, like run (toilet paper)</td>
<td>Indication of constipation</td>
</tr>
<tr>
<td>2</td>
<td>Sausage-shaped but lumpy</td>
<td>Poor consistency of stool</td>
</tr>
<tr>
<td>3</td>
<td>Like a sausage but with cracks on top</td>
<td>Normal consistency of stool</td>
</tr>
<tr>
<td>4</td>
<td>Like a sausage or oval, smooth and soft</td>
<td>Indicates diarrhea</td>
</tr>
<tr>
<td>5</td>
<td>Soft stools with sides rounded (passed easily)</td>
<td>Indicates diarrhea</td>
</tr>
<tr>
<td>6</td>
<td>Fluffy pieces with ragged edges, a &quot;stretchy stool&quot;</td>
<td>Indicates diarrhea</td>
</tr>
<tr>
<td>7</td>
<td>Stringy noodle-like pieces. &quot;Kidney shaped&quot;</td>
<td>Indicates diarrhea</td>
</tr>
</tbody>
</table>

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**Activities:**

- [http://www.studystack.com/matching-111474](http://www.studystack.com/matching-111474)
Diseases of the Urinary & Excretory System

Urology is the department of medicine that focuses on the Urinary System, and the diseases that may present themselves within this body system.

This department of medicine focuses on both the urinary tract of both males and females.

In the U.S, almost 85,000 adults die every year due to kidney failure, and over 26 million people are effected by a urinary disease.

Here is some information on what these diseases are, and how they can effect us…

Bladder Cancer

- This type of cancer occurs when cancerous cells within the bladder continue to multiple and reproduce.
- In total, it is recorded that more men than women will be diagnosed as bladder cancer, and males in Caucasians almost twice as much as African Americans.
- Bladder cancer can form in many different ways, including:
  - Transitional cell Carcinoma: which begins in the cells of the lining of the bladder. This is the most common type of bladder cancer.
  - Squamous cell Carcinoma: This type of cancer occurs within the squamous cells lining the urinary tract.
  - Adenocarcinoma: Is a type of cancer that develops in the bladder. This type of cancer can expand in the lungs, pancreas, stomach, breast, prostate, and liver.

What Causes Bladder Cancer?

- What causes bladder cancer is not exactly known at this time.
- Some risk factors however include:
  - Cigarette Smoking
  - Exposure to certain chemicals and toxins (dyes, fumes)
  - Bladder Stones or Infections
  - Certain Parasites

- Other Facts:
  - People over the age of 65 are more likely to develop this cancer
  - Caucasians are twice as likely to develop the disease
  - Genetics may also play a role in family history

What are the Symptoms of Bladder Cancer?

- Some of the symptoms of bladder cancer include:
  - Blood in urine
  - Painful urination
  - Frequent Urination
  - Pelvic pains

Diagnosis + Treatment of Bladder Cancer

- The diagnosis for bladder cancer can be done by the use of various exams and tests, these include:
  - Rectal/Vagina Exam: Allows physician to check for tumor growth
  - Cystoscopy: This is an examination that uses a scope inserted into the urethra and allows doctors to search for tumors/stones.
  - IVP: Many different x-rays to the kidney, bladder, and ureters
  - After diagnosis, a “stage” of the disease is usually determined, and surgery, chemotherapy, and radiation is most commonly used to treat this
Bladder incontinence is usually a result of some sort of bodily change, and is most commonly represented in older people. This is usually a symptom of other possible illnesses, as well as use of medications. Over 15 million people may be affected with this disorder every year. Some types of urinary incontinence include: Urinary Incontinence: Occurs when an individual is not able to hold urine long enough to reach a restroom. Can be a result of diabetes, stroke, and MS. Overflow Incontinence: leakage when the amount of bladder over exceeds the bladder capacity. Stress Incontinence: Type of leakage that occurs during exercise, laughing, lifting, and many other movements.

Symptoms of this disorder include:

- Pain in the urinary tract/urinary organs
- Inability to urinate
- Increased urination
- Urine leakage
- Bladder infections

This disorder should be brought forth in a doctor’s visit if the patient is experiencing any symptoms included pain in the urinary tract or urine leakage. Treatment options can include:

- Diet changes
- Certain medications
- Muscle development exercises

This disease occurs in women, when the membrane division between the bladder and vagina weakens, causing the bladder to fall or drop into the vagina. There are many different grades of Cystocele, however much discomfort and urinary leakage is almost always present. Lifting, bowel movements, muscle strains during childbirth, and weakened muscles are all causes of the fallen bladder disease.

A physical examination is most commonly done to show the stage of the fallen bladder. A cystourethrogram is almost always done as well to x-ray the bladder to view any shape changes or obstructions. Treatment can include:

- Surgery
- “Pessary”: which holds the bladder in place
- Changes in daily life
- Medications to improve muscle strength

Other possible diseases can include:

- Kidney Stones
- Glomerulosclerosis
- Analgesic Nephropathy
- Hematuria
- Peyronie’s Disease
- Benign Prostatic Hyperplasia
