Goals & Objectives
- Learn the Facts
- Physical growth, growth hormones, nutrition
- Puberty!
- Apply what you’ve learned
- The “Fast Food Debate.”
- Evaluate
- Popular Diets.

By the Numbers

Features of Human Growth
- Not steady but in spurts
  - 1st year huge! 3x weight
  - Then 3 inches and 7 to 8 pounds…
  - Until 10-12 when 4 inches, 16-17 pounds.

Cephalocaudal
- Grow from head to toe!
- Toddlers are top heavy.
- And inside-out!
- Proximodistal

Skull bones are separated by six fontanelles (soft spots) at birth; will be solid by age 2

Skeletal Development
- Prenatal skeletal structures are initially cartilage that will ossify
- Skull bones are separated by six fontanelles (soft spots) at birth; will be solid by age 2
- Ankles, feet, wrists, and hands develop more bones as child matures
- Bones develop both from center and ends (epiphyses).
Muscular Development

- No New Muscles! - Longer, Stronger!
- At birth, muscle tissue is 35% water.
- At birth, muscle tissue accounts for 18% to 24% of baby’s body weight.
- By red-20s, skeletal muscle accounts for 40% of male body weight and 24% of female body weight.

Adolescent Growth Spurt

- 10-16 years: Something’s a changing!
- 20-25lbs in one year!
- Puberty! Primary and Secondary sex characteristics.
- Ladies first (10-12)
  - Breasts
  - Pubic hair
  - Menarche (+13)

Boys (12-13)
- Testes, scrotum
- Pubic Hair
- Growth Spurt
- Voice lowers.
- First Ejaculation (spermarche).

Puberty

- Early maturation appears to be
  - Good for boys (athletics?)
  - Bad for girls
  - Initially good self esteem
  - But fewer friends and sometimes seek out older boys.

Maturing Varies
Cultural Variations

- Industrialized countries tend to mature faster than non-industrialized.
- People from Asia, South America, and Africa tend to be smaller than people from North America, Northern Europe, and Australia.

Secular Growth Trends

What makes us grow?

- Three things:
  - HHN
  - Heredity
  - Hormones
  - Nutrition

Mechanisms of Physical Growth

- Heredity—timing and end product is in the genes (Identical Twin = .9)
- Hormones—during sleep (80%) and exercise, the pituitary secretes GH
  - Acts on the liver and triggers another hormone, somatomedin to make muscles and bones grow.
- Thyroxine (thyroid) - nerve development.

All about the hormones

Nutrition

- Growth is hard work, so the body needs calories to grow.
- 40% of calories are devoted to growth in a 2-month-old!
- By preschool only need 40 calories/lb.
- 1,500 to 1,700 calories a day.
- Adults only need 2000!
Breast Advantage

- Can't be contaminated!
- Antibodies
- Less bowel problems
  - (no diarrheas).
- Tasty (varies in taste).

Formula is good too!

- Avoid putting the bottle in bed
- propping the bottle.
- putting cereal in the bottle.
- feeding honey.
- heating bottles in the microwave.
- or feeding past milk.

Some important minerals

- Iron
  - If don't get enough—permanent brain damage.
  - Absorbed via Vitamin C.
- Iodine
  - Gesters.
  - Birth defects.
- Selenium, Zinc, Magnesium - usually ok.
  - And one other important mineral first in the next section, which talks about...

Watch out! Osteoporosis

- Brittle bones.
- 10 million Americans, 80% Women over 50.
- Caused by lack of calcium in childhood.
- 1,300 milligrams of calcium a day
- Prevented by Weight bearing Exercise.
- National Bone Health Campaign

Become Obese.

- Refers to individuals who are at least 20% over their body weight.
- Reflects heredity (activity level, basal metabolic rate) and environment (eating cues).
- Helped by: changing habits, monitoring, and parental involvement.

The Fast Food Debate

- 61% Weigh too much, 26% obese.
- A National Crisis!
- Causes!
  - The food pyramid and HIGH CARBS!
  - NO EXERCISE!
  - Modern civilization!
  - McDonald's and the Super Size?
- What do you think?
How should we eat?

- What should we eat?
  - USDA: 6 grains, 5 f&v, 2 milk, 2 meat.
  - Harvard: Whole grains.
  - Atkins: 0 grains, 2 v, unlimited m&m.
  - Others: 2 grain, 4 f & v, 6 m&m. No Sugar!
  - French Paradox: Eat whatever you want.

Opponent Processes

Effects

- Westlaw.
- Dynamic systems maintain equilibrium
- Your body will compensate over time
- Sleeping pills lead to sleeplessness.
- Diets can lead to weight gain.
- Low portions can kill your basal metabolic rate.
- Body will find a balance.

Moral of the story

Be careful of unintended opposite effects.

- Every action has a reaction.
- Make sure the reaction is what you want.
- Yelling at kids can make them rebel.
- Diets can make you fat.

Effective Weight Loss

- Parental Involvement.
- Monitoring.
  - Write it down (become aware).
- Change.
  - Establish goals and rewards (alternative reinforcement).
  - Get rid of environmental eating cues
  - Exercise (even a little is good).

Anorexia and Bulimia

- **Anorexia**--persistent refusal to eat and irrational fear of being overweight.
- **Bulimia**--uncontrolled eating and purging.
- Both primarily affect adolescent girls (10X) and are influenced by experience (cultural standards for appropriate body weight), family dynamics and heredity.

Watch out for Disease

- 11 million kids per year.
- Top 5 killers of children worldwide: pneumonia, diarrhea, measles, malaria, and malnutrition.
- Many diseases that kill young children are preventable with
  - Vaccines.
  - Improved health care
  - and changing habits (e.g., mosquito netting).
Childhood diseases

- Some suspect that avoidance in childhood can be bad.
- Shingles.
- Antibacterial Soap.
- Acquired resistance.

Malnutrition

- Defined as being small for one’s age
- Wide ranging developmental effects.
- Malnourished children frequently inactive and listless.
- Makes parents less likely to feed them.
- And the cycle continues.
- Not just a problem in 3rd World countries
  - 10% of US kids - linked to absenteeism
  - 20% have significant iron or iodine deficits.

Watch out for Accidents

- In the US, car accidents are most common causes death in children over age 1 year
- Parents can help by enforcing use of seat belts, car seats, and bike helmets and by being realistic about child’s abilities.
- Firearms are a leading cause of death among teenage boys.

- Start by getting on your hands and knees and looking around your home from a baby’s eye view.
- Watch out for small or sharp things.
- Anything a baby can reach will go into her mouth.
  - Coins, cigarettes, dust balls, paper clips, staples, etc.
  - Knobs on your television or stereo.
- Keep knives, scissors and razor blades out of the baby’s reach.
- Throw out broken glass and other sharp objects.

Watch out for Electrical things.

- Cover unused electrical outlets with plastic plugs you can buy at the hardware store.
- Keep lamp cords out of the way behind furniture. Move fans up high.
- In the kitchen, don’t leave cords dangling.

Watch out for Poisons.

- Cleaning supplies.
- Some house plants.
- Alcohol.
- Cigarettes.
- Medicine.
  - Don’t take medicine in front of your child.
  - Never tell baby medicine is “candy.”
  - Keep the Poison Control number nearby.
  - Keep ipecac. Read the directions.
More things

- Watch out for Hot Food.
- Watch out for Plastic Bags & Balloons, except the shiny Mylar kind.
- Watch out for Stairs.
- Watch out for Valuables.

Exercise! Hazard Inspector

- How could we child-proof this room?
- What is dangerous?
  - Floor!
  - Edges!
  - Edibles!
  - Noise!

WATCH OUT! KIDS ARE KIDS

- Many bad things
- Lots of trouble to get into:
  - Obesity.
  - Malnutrition.
  - Anorexia.
  - Diseases
  - Household
  - Accidents

Getting on your nerves?

- What are the parts of a nerve cell?
- What are the parts of the Brain?
- When do different regions function?

The Nervous System

- No, it isn’t paranoid.
- It is your body’s way of sending instantaneous messages.
  - “Hey you just touched something hot!”
- REFLEXES
- The internet for your body (really electrical and chemical).
- Basic wiring is the neuron.

The Neuron

That’s the way it goes!
Emerging Brain Structures

- Brain and nervous system originates in neural plate.
- Rolls like a manicotti to a tube.
- Neurons produced inside tube 10 weeks after conception.
- 4,000 neurons per second.
- By 28 weeks, all done.

Migratory Neurons

- For the next 7 months, the neurons migrate into place.
- Myelin added in prenatal and postnatal development (4 month mark).
- 100 billion neurons at birth.
- Like topiary.
- Unused synapses disappear—synaptic pruning.

Brain Plasticity

- "Flexible" brain organization shown by children who recover from brain damage.
- Adults have a harder time.
- Brain organization is neither completely plastic nor completely rigid.

Structure and Function

- Brain structure and function revealed from studies of adults with brain damage, from electrical activity (EEG), and from imaging studies (PET and fMRI).
- Brain regions specialize early (e.g., left hemisphere for verbal functioning, frontal cortex for emotion) 7 months: adult levels for frontal cortex.

Da Brain

- Sensory Cortex
- Hemispheres
- Visual Cortex
- Corpus Callosum (inside)
- Frontal Cortex
- Motor Cortex
- Auditory Cortex