

Beyond the Bench: Eating Disorders in Children and Adolescents

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It's been a wild week...

- You've seen Sarah, whose foster mother noted that Sarah has missed her period the past 2 months
- Bob, who hasn't been eating as much since an episode of gastroenteritis 2 mo ago
- Martin, who has been losing weight since becoming a vegetarian 4 mo ago
- Madeline, who's finally losing some of that extra weight she's been carrying around for so many years
- And Samantha, whose height is the same as it was at her WCC a year ago

Could any of these youth have an eating disorder?

Eating disorders are serious and lethal

- Highest mortality rate of any mental illness -- up to 20%
- Mortality rate is 12 times greater than general death rate for women aged 15-24
- High rate of medical complications, both short and long-term, in teens with eating disorders

Disordered Eating in Youth

- 40-60% of high school girls diet
- 40% of 9-year-old girls have dieted
- 13% of high school girls purge
- Boys and girls from all ethnic, social, and economic backgrounds are susceptible

How Common Are Eating Disorders In Children & Adolescents?

- Percentage of teens with eating disorders:
 - 0.5-1% teens have anorexia nervosa
 - 2-3% teens have bulimia nervosa
- Average age of onset:
 - Anorexia 12-14 years
 - Bulimia 14-16 years

**Diagnosis:
Recognizing
Eating Disorders**

Spectrum of Disease:

Is it normal or is it an eating disorder?

- Vegetarianism, food fads
- Transient illness, vomiting, weight loss
- Intentional weight loss in an overweight adolescent
- No significant weight gain on annual physical
- Skipped meals, loss of appetite
- Loss of menses in an athletic adolescent

What is an Eating Disorder?

- Abnormal eating patterns that compromise physical health and emotional well-being.
- Spectrum of disordered eating, from food restriction to overeating.
- Psychiatric diagnostic manual (DSM-IV) recognizes:
 - Restrictive Anorexia
 - Bulimia
 - Eating Disorder Not Otherwise Specified (EDO NOS)

Definition of Anorexia Nervosa

(DSM-IV)

- Weight loss: loss of $> 15\%$ ideal body weight, or failure to maintain 85% of expected weight during growth periods
- Fear of weight gain or of becoming fat, even when underweight
- Distorted body image: weight, size, or shape, or denial of the seriousness of the current low body weight
- Loss of menses for three consecutive months, or failure to have first menses at expected age



Definition of Bulimia Nervosa

(DSM-IV)

- Binge eating: Recurrent episodes of rapidly eating large amounts of food in a discrete time period, usually < two hours
- Lack of control felt during the binge (i.e., unable to stop)
- Attempts to counter-act binge: Self-induced vomiting, use of laxatives, or rigorous dieting, fasting, or exercise
- Frequency: Minimum average two episodes a week x three months

Eating Disorder, Not Otherwise Specified (EDO-NOS)

- Also called “Atypical Eating Disorder”
- Most common type of eating disorder.
- Patient does not meet strict criteria of either anorexia or bulimia, e.g.
 - Meets other criteria for anorexia nervosa except menses still present, or overweight and lost to within normal range.
 - Purges after small amount of food, frequency of binge/purge less than specified for bulimia nervosa, or binges without purging (may be separate diagnostic category).
- **May be just as serious as anorexia or bulimia!**

But Wait – There's More !!

- The Psychiatric Diagnostic Manual (DSM-IV) recognizes only a limited range of eating disorders
- Definitions flawed, do not adequately reflect full spectrum of EDOs seen in childhood and adolescence
- Remember:
 - An eating disorder is an abnormal eating pattern that compromises physical health and emotional well-being
- Many patterns of disordered eating → nutritional deficits and associated medical complications
- **Go with your gut:**
 - If a child or adolescent is not eating an adequate amount or range of foods on a regular basis, or is exercising excessively or vomiting

You've got a problem !

Gathering Clues: Focused History



- Are you concerned about your weight?
- Are you concerned about your appearance?
- How do you handle these concerns?
- How much do you want to weigh?
- How often do you weigh yourself?



Focused History

- Anything about your body you want to change?
- Ever use any medications, laxatives, diuretics/water pills, ipecac, herbs, or supplements to lose weight?
- Do you ever vomit to lose weight or eat so much you throw up?

Focused History



- Maximum / minimum weights
- Dietary history
 - Counting calories / fats
 - Dietary restrictions – vegetarian, vegan, etc.
- Exercise
- Signs of pituitary/hypothalamic suppression:
 - Girls – menstrual history
 - Boys – morning erections / nocturnal emissions

Anorexia Nervosa: Clues by History

■ Food Behaviors:

- Restricts types of food, calories, fats
- “Healthy eating”, food fads
- Rituals around food consumption
- Often secretive about eating and food behaviors

Anorexia Nervosa: Clues by History

■ Activities

- Increased social isolation
- Frequent, prolonged exercise
- Wearing bulky clothes
- Interest in food preparation for others
- School performance generally excellent

Anorexia Nervosa: Clues by History

- Body Image
 - Elusive weight goal
 - Weight loss, secondary amenorrhea
 - Does not view self as thin, even when underweight

Anorexia Nervosa: Clues by History

- Associated symptoms
 - Abdominal pain, constipation, bloating
 - Cold intolerance, dizziness, fatigue
 - Lack of concern by patient
 - Food as battleground
 - Denial, hostility to intervention common

Bulimia Nervosa: Clues by History

- Food Behaviors:
 - Binge eating associated with stress, anxiety
 - Guilt associated with eating
 - Secretive eating, hiding or stealing food
 - Obsessive dieting followed by binges

Bulimia Nervosa: Clues by History

■ Activities

- Use of bathroom after meals
- Evidence of vomiting, laxative use, diuretic use
- Compulsive exercise

Bulimia Nervosa: Clues by History

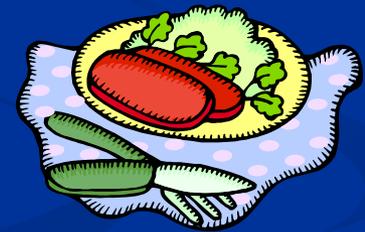
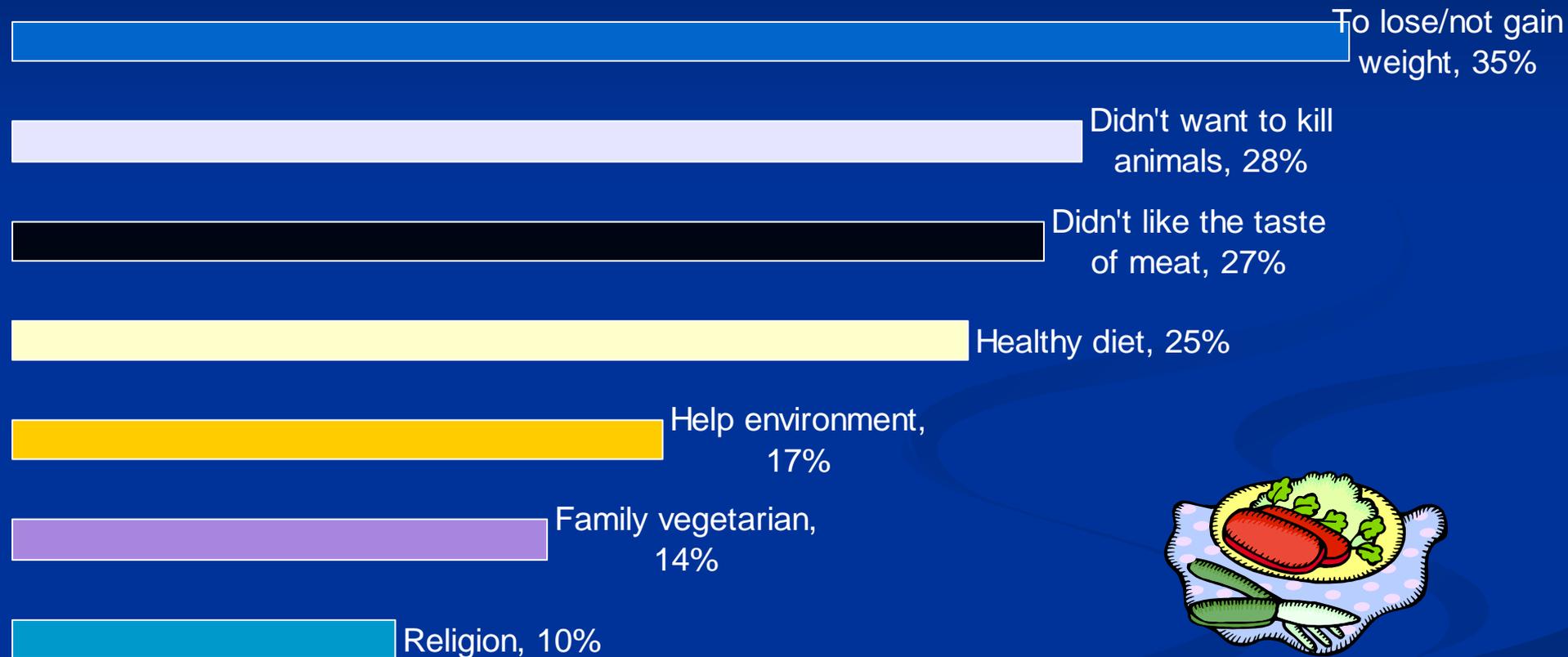
- Body Image
 - Measures self-worth in terms of weight, shape
 - Weight preoccupation
 - Rapid weight fluctuations
- Associated symptoms
 - Impaired concentration
 - Depression



Red Flags: Vegetarianism, food fads

- Classic EDO history: “I just decided to start eating more healthy foods.”
- Higher incidence of vegetarianism in eating disordered adolescents. In a retrospective study of patients with RAN: (O'Connor, 1987)
 - > 50% patients currently avoid red meat.
 - <10% avoided meat prior to the onset of anorexia nervosa
- May adopt a vegetarian diet as a weight-loss method because it is a socially acceptable way to avoid eating certain food groups

Top Reasons Teens Become Vegetarians



(Could endorse multiple reasons.
Study of 262 self-reported adolescent vegetarians)



Vegetarianism & EDOs

- Vegetarians more likely than peers to consume a diet high in fruits and vegetables, low in energy density
- Adolescent female vegetarians far more likely than nonvegetarians to report dieting to lose weight (86% vs 44%) (Greene-Finestone, 2008)
- Twice as many current and former vegetarians report h/o unhealthful weight-control behaviors, compared to never vegetarians (20% vs. 10%) (Robinson-O'Brien, 2009)
- Periods of restriction can trigger binge eating:
Low caloric density of vegetarian diets may → Binge eating → Purging



Red Flags: Transient illness, vomiting, weight loss

- Watch for weight loss or vomiting that continues after usual 1-2 week duration for viral illness
- EDO may develop after acute illness or in association w/ chronic illness (e.g. celiac dz, inflammatory bowel dz)
 - Illness → weight loss, decreased appetite
 - May be followed by intentional restriction, wt loss
- Phobia: conditioned excessive fear, resulting in avoidance of certain objects or situations
 - Food phobias may be initiated by event such as vomiting or choking
 - Decreased intake in amount or types of foods

EDO vs. Food Phobia

	Intake	Foods Avoided	Perception of Body Shape & Wt
EDO	↓	Fats, high calorie	Distorted
PHOBIA	↓	Certain textures, types	Normal cognition



Red Flags: Intentional wt loss in overweight Teen

- 35-40 % of adolescents who develop eating disorders were once overweight
- Dieting for weight loss often → binge-eating → further weight gain (Field, 2003; Stice, 1999)
- In overweight adolescents, watch for:
 - Elusive weight loss goals
 - Secondary amenorrhea
 - Unhealthy weight loss practices (e.g. vomiting, diet pills, laxatives)
 - Rapid weight loss
 - Large weight fluctuations



Red Flags: No Weight Gain, Slowing in Height Velocity

- May be normal if postpubertal
- Growth charts helpful in tracking expected gains:
 - With EDOs or other causes of malnutrition:
Weight drops off first → stunting in height may follow
 - Endocrine disorders (e.g. thyroid disorder):
Drop in height percentile, weight usually increased relative to height
- Skipped meals, loss of appetite
 - May be sign of physical illness, stress, depression
 - Common history in eating disordered adolescents



Red Flag: Loss of Regular Menstrual Cycles

- Female Athletic Triad: Disordered eating, loss of menstrual periods, osteoporosis
- Loss of menstrual cycles in athletes is never normal
- Imbalance between energy intake and output
- More common in sports emphasizing weight or lean appearance: dancers, gymnasts, models, wrestlers, runners



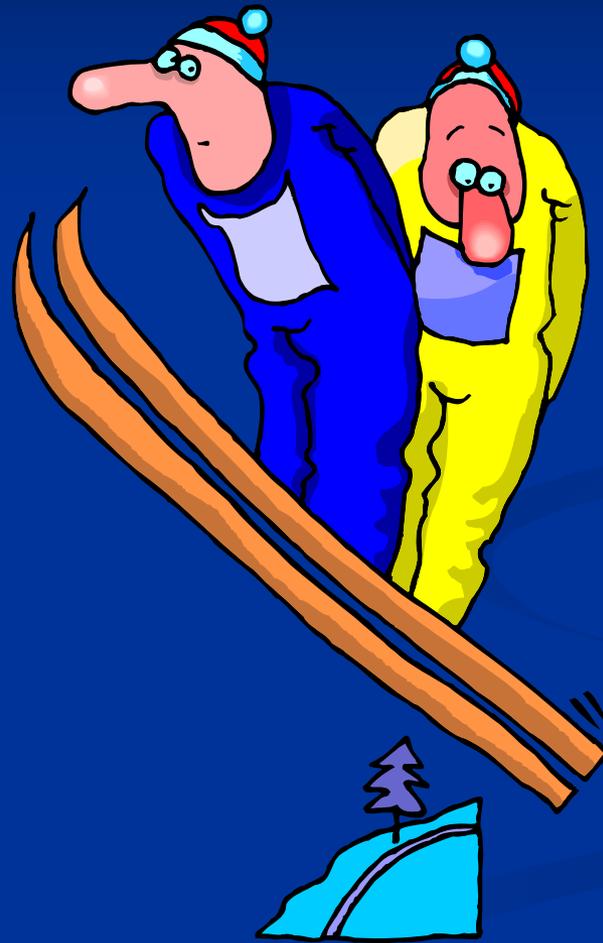


Red Flags:

Other risk factors & populations

- Chronic medical problem altering self-image, e.g. cystic fibrosis, “diabulimia” – misuse of insulin by diabetics, to cause weight loss
- Family history of eating disorders, over emphasis on weight, fitness
- Family stress, illness, substance abuse
- Personality factors:
 - Anorexia: perfectionist, high anxiety, low self-esteem
 - Bulimia: impulsive, risk-taking

The Slippery Slope



The Snowball Effect

- Rapid weight loss common in eating disorders
- Risk of medical instability increases with amount and rapidity of weight loss



Keys to Not Missing a Big Slide Downhill



- Remain open to the possibility of an eating disorder
 - Denial is an eating disorder's best friend
- If suspicious, seek early and complete evaluation from providers experienced in treating teens who have eating disorders
 - Medical doctor
 - Psychiatrist/psychologist
 - Dietitian
- Close medical follow-up is **ESSENTIAL**

**Recognizing
Medical
Complications
of Eating Disorders**

Goals of Initial Medical Evaluation

- Is there another underlying medical or psychiatric illness?
- Are there already serious medical complications?
- Is it safe to continue evaluation in an outpatient setting or is immediate hospitalization required?

Younger patients require intense and aggressive treatment

"Because of the potentially irreversible effects of an eating disorder on physical and emotional growth and development in adolescents, because of the risk of death, and because of the evidence suggesting improved outcome with early treatment, the threshold for intervention in adolescents should be lower than in adults."

Society for Adolescent Medicine (1995)

Medical Complications

- Eating disorders are multisystem diseases – all organs may be affected
- Changes in heart rate, blood pressure, and temperature are due to malnutrition and/or weight loss (normal or overweight patients may develop the same manifestations as underweight patients!)
- “Hibernation” response to minimize energy output

Hibernation Response

- Body adjusts to conserve energy when nutrition is inadequate
 - Low heart rate
 - Low temperature
 - Low blood pressure
- Survival mode
 - Blood flow primarily to heart / brain
 - Other organs neglected
 - Cool hands / feet
 - Growth /development put on hold



Indications for Hospitalization (1 or more of the following)

1. Severe Malnutrition (weight < 75% ideal body weight)
2. Dehydration
3. Electrolyte Abnormalities (e.g. potassium, phosphorous, sodium)
4. Heart rhythm abnormalities



Indications for Hospitalization (cont.)

5. Physiologic Instability

- Bradycardia: low pulse ($P < 50$ day or < 46 night)
- Hypotension: low blood pressure (BP $< 90/45$ abnormal)
- Hypothermia: low temperature ($T < 36.3$ day or 36.0 night)
- Orthostasis: change in pulse or blood pressure with standing (P rise > 35 or BP drop > 10)

Indications for Hospitalization (cont.)

6. Acute Medical Complications of Malnutrition:
e.g., Syncope, Cardiac Failure, Seizures,
Pancreatitis, etc.
7. Arrested Growth or Development
8. Acute Food Refusal



Indications for Hospitalization (cont.)

9. Binge/Purge Out-of-Control

10. Failure of Outpatient Treatment

11. Acute Psychiatric Emergencies, e.g., suicidal ideation, acute psychosis

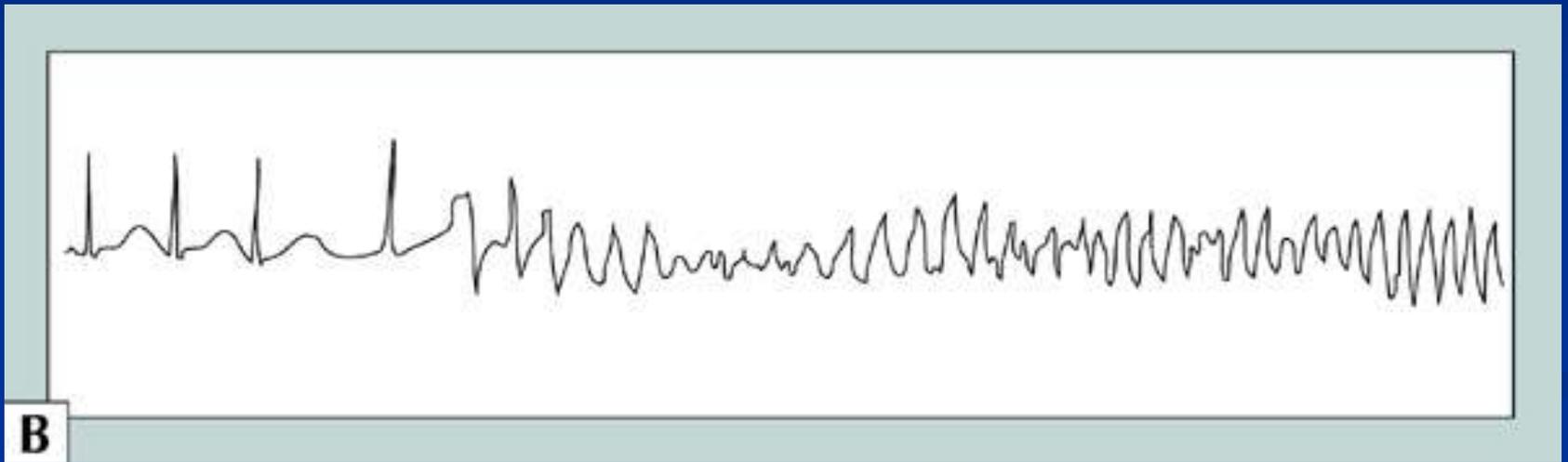
12. Co-Morbid Diagnosis Interfering with Treatment of the Eating Disorder: e.g., Severe Depression, Obsessive-Compulsive Disorder, Severe Family Dysfunction

Effects on the Heart



- Potentially the most serious, lethal complication in short term
- Low heart rate: not a sign of fitness!
- Low blood pressure, drop in blood pressure with standing, dizziness
- Abnormal heart rhythms can be fatal
- Heart failure

Prolonged QTc Interval

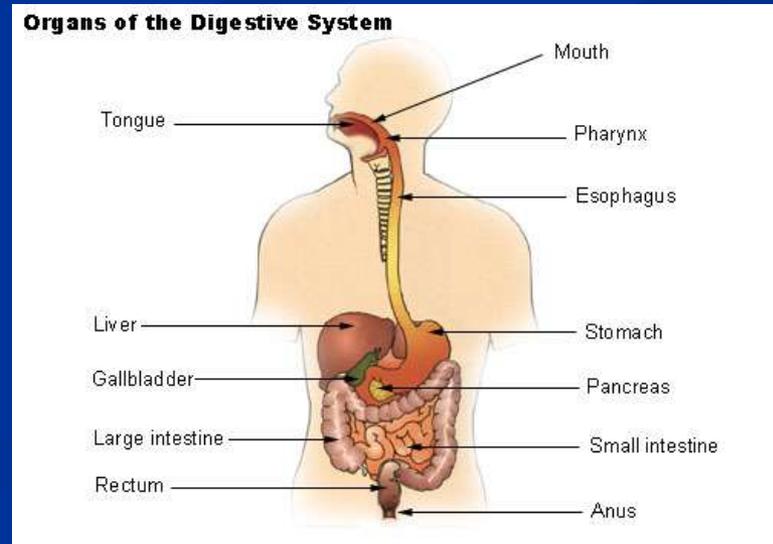


EKG from 11 yo with prolonged QTc,
progressing to torsades de pointes
and sudden cardiac death

Ref: [Atlas of Heart Diseases: Arrhythmias: Electrophysiologic Principles](#). Edited by Eugene Braunwald (series editor), Melvin Scheinman. ©1996 [Current Medicine, Inc.](#)

Gastrointestinal Complications from Anorexia Nervosa

- Movement of food through gut slows down
 - Constipation
 - Bloating / abdominal discomfort
- Liver effects from starvation / refeeding



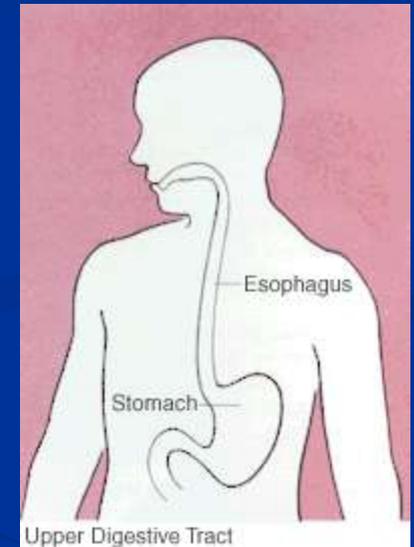
Gastrointestinal Complications



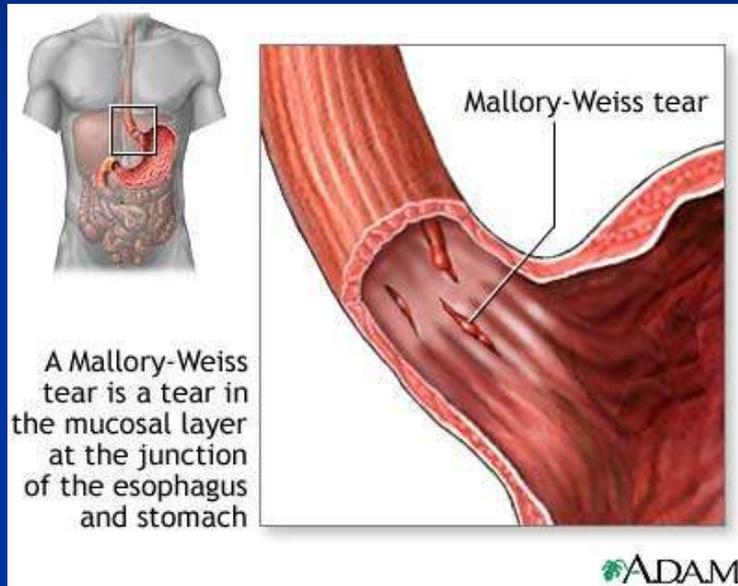
With Bulimia Nervosa



- Stomach produces lots of acid to digest food
- Only lower digestive tract designed to withstand acid exposure
- Acid in upper digestive tract → damage
- Esophagus:
 - Bleeding / ulcers / tears / rupture
- Mouth:
 - Tooth decay
 - Parotid gland enlargement

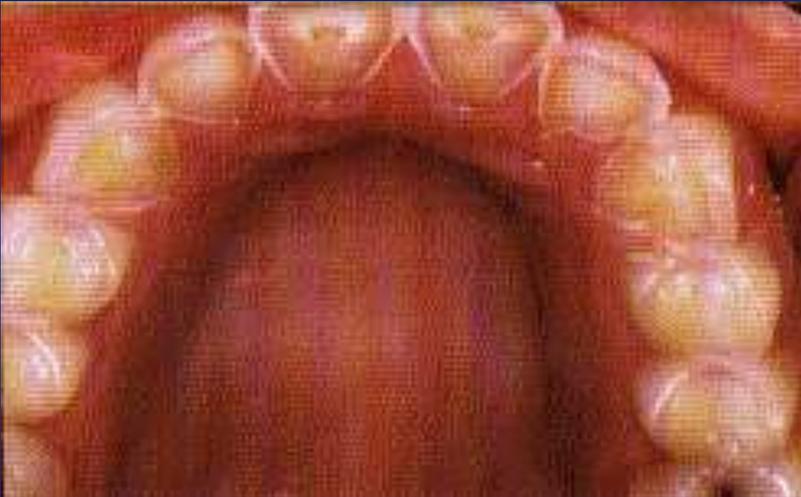


Esophageal Injury in Bulimia



Refs: www.emedicine.com/med/images
www.gihealth.com/images, www.nlm.nih.gov

Oral Effects of Purging



Eroded Tooth Enamel



Parotid gland enlargement



Photos from: www.UME.maine.edu,
[www:members.xoom.virgilio.it](http://www.members.xoom.virgilio.it)

Chemical Effects of Purging

Purging doesn't just get rid of food – eventually it depletes the body of other elements essential for life, including:

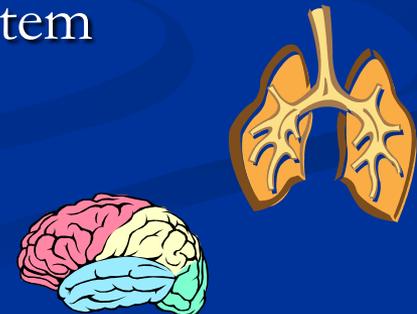
- Potassium – the main element used by the heart
 - Low potassium → heart stops beating → sudden death



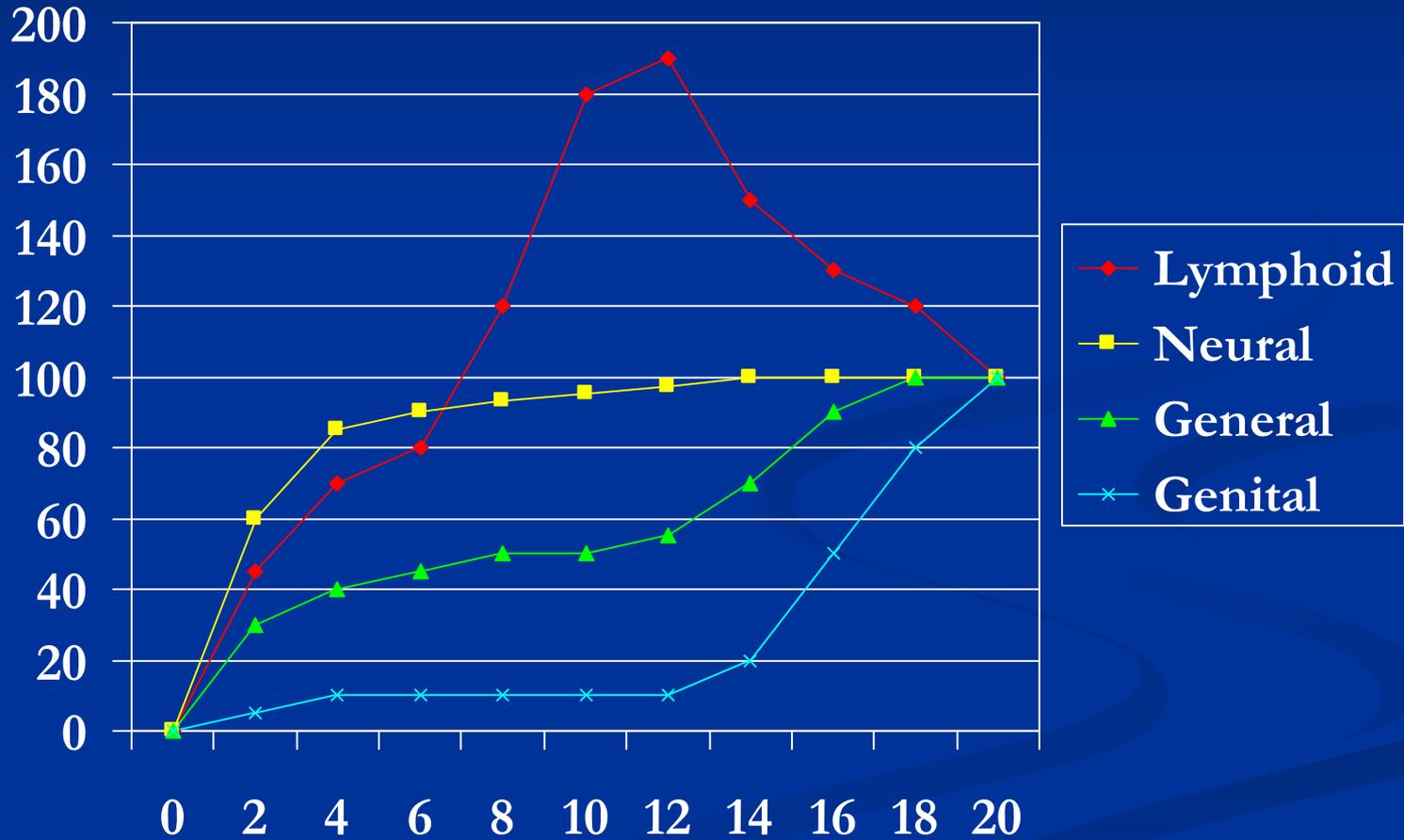


Chemical Effects

- Phosphorous can become low in teens who purge and also severely malnourished adolescents
- Phosphorous – the element used to make ATP, the body's main energy supply
 - Low phosphorous → failure of body functions that requiring energy, including:
 - Heart – heart failure, abnormal heart beat, sudden death
 - Diaphragm – failure of the breathing system
 - Brain – confusion, seizures, coma
 - Other muscles – weakness



“Second Major Growth Spurt” During Adolescence: Implications for Long-Term Complications of EDOs



Growth During Adolescence

- Nearly 25% of final adult height occurs during puberty
- Heart weight doubles during puberty
- Bone mass increases by 45%
- % body fat normally increases from average of 16% before puberty in girls to 27% as adult – important for normal hormonal function
- Brain has achieved nearly final adult mass by early adolescents, though continues to change in function



Effects on Hormones, The Body's "Chemical Messengers"

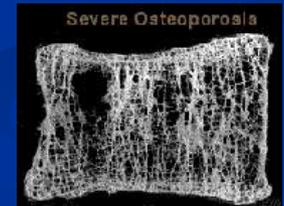
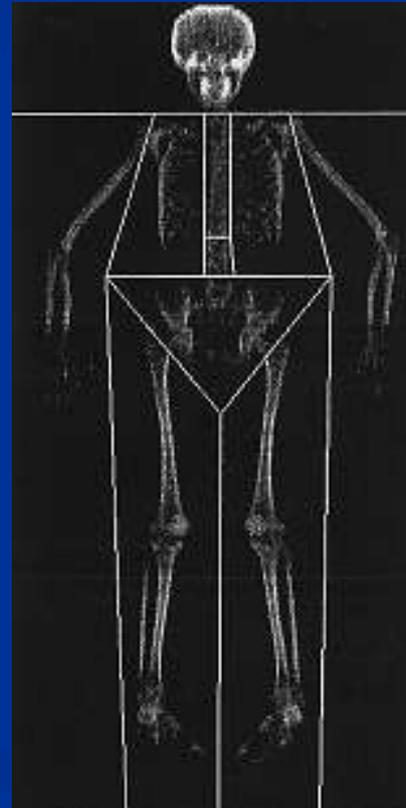
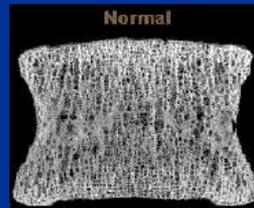
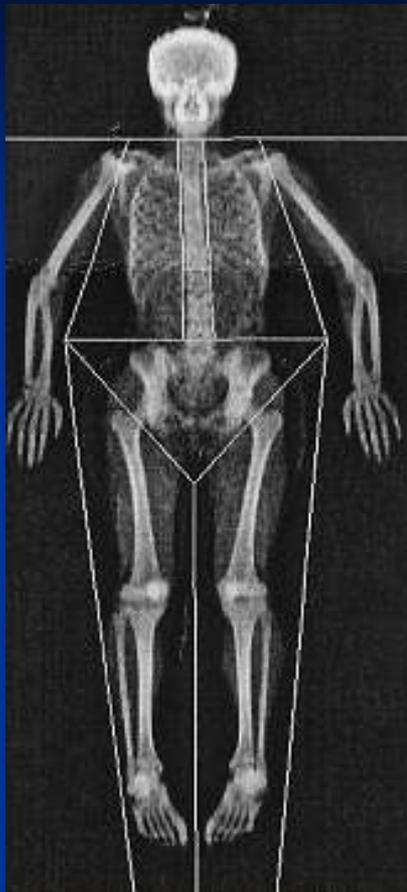
- Eating disorders suppress hormones needed for growth and development
- Pubertal delay / arrest
- Girls: Ovaries shrink → Loss of menstrual cycles
- Boys: Testicles shrink → Loss of erections / wet dreams
- Potentially irreversible risks include:
 - Unable to build up bone mass / strength → Increased risk of osteoporosis, bone fractures
 - Growth retardation, short height

Eating Disorders & Bone Health

- Nearly 40% of peak bone mass is accumulated during adolescence
- At end of growth spurt (~17yo), 90% of adult bone mass is established → “bone bank”
- 50% of eating disordered patients have decrease in bone density
 - Girls **and** boys
 - Occurs in normal weight teens w/ disordered eating as well
 - Inability to deposit calcium
 - Lack of dietary calcium



Osteoporosis



Pop quiz!

What organ
contains the
highest % fat?

YOUR BRAIN!!

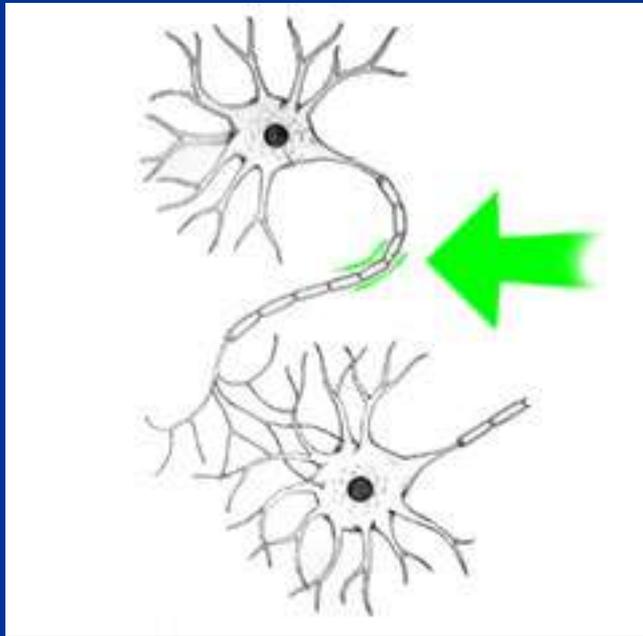


Your brain is 60% fat!

YOUR BRAIN

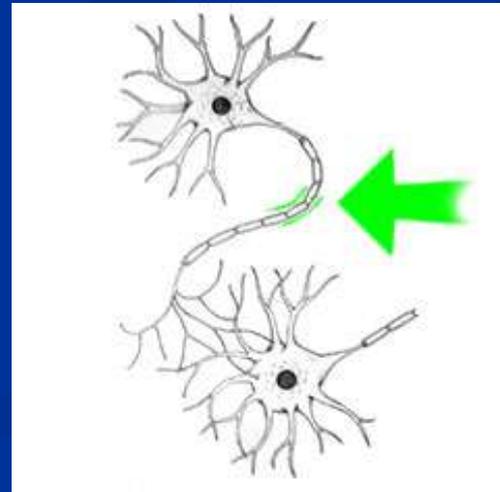
- Brain consists of gray matter and white matter
- Gray matter consists mostly of the cell bodies of the neurons (nerves)
- White matter consists mostly of the fibers (axons) which connect neurons

What do your brain and an electrical cord have in common?



INSULATION!!!

- Myelin sheath around neuron acts like coating on electric cord, to make electrical impulses in your brain travel faster
- 70% of myelin sheath is fat



Importance of Dietary Fats

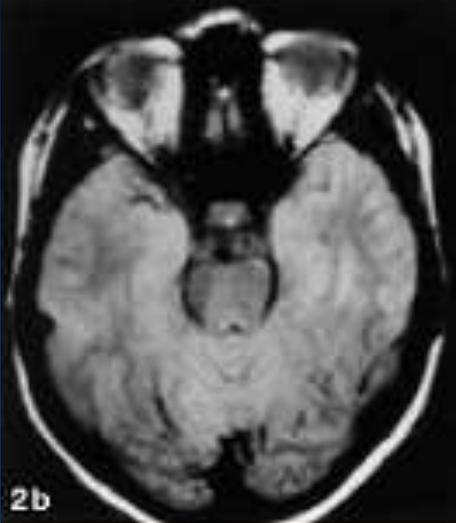
- Provide structure for all cell membranes
- Used for insulating layer around nerves
- Form base structure of many hormones, the chemical messengers of the body
- An important fuel for muscles
- Dietary fats are also important because they deliver fat soluble Vitamins: A, D, E, K

Essential Fatty Acids (EFAs)

- The name says it all: *They are essential!*
- Includes omega-3 & omega-6 fatty acids
- Essential fatty acid deficiency can lead to slowing of brain function, shrinkage of brain tissue, dry skin, hair loss, skin rashes, growth retardation

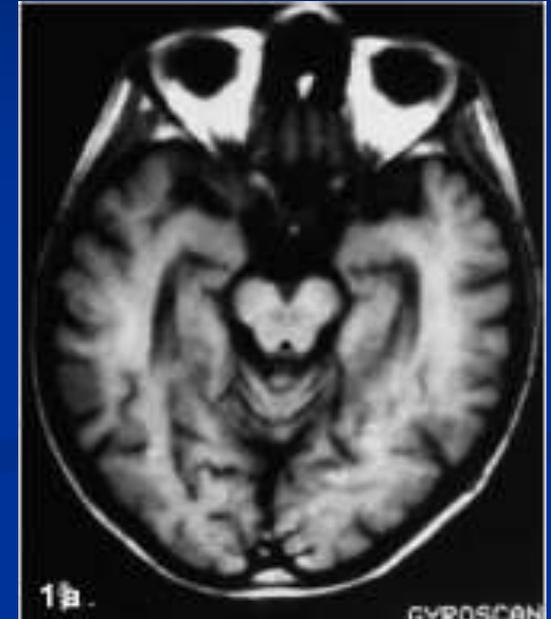
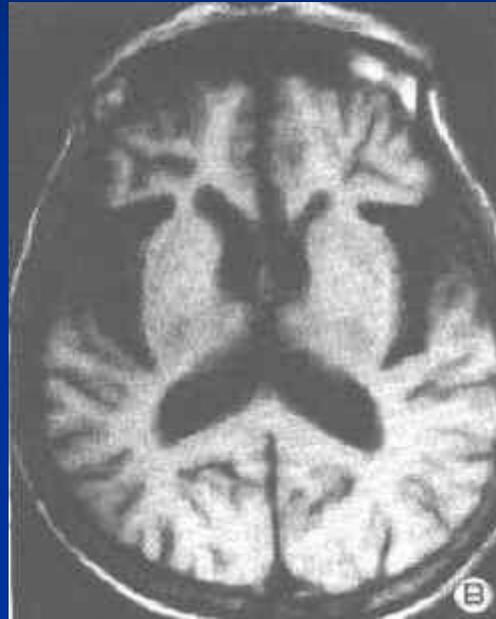


Cerebral Atrophy



Normal Brain:

Normal neuronal density & brain volume, rich network of connections



Malnourished Brain:

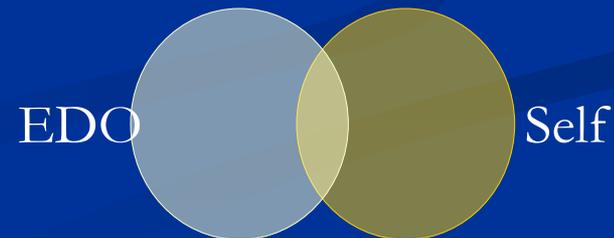
Shrinkage of brain tissue,
Expansion of fluid filled spaces,
Loss of neuronal connections

Cognitive Changes with Severe Malnutrition

- Organic Brain Syndrome
 - Slowed thinking, “stuck”
 - Rumination, obsessions, distortions in thinking
 - Difficulty with basic decision making
 - Short term memory losses
- Distortions in self-assessment of weight / shape



- Eclipsing of self by EDO



Dermatologic Manifestations



Lanugo



Russell's Sign



Alopecia

Treatment
Goals
&
Prognosis

Treatment

- Comprehensive treatment required – mind and body
- Establish experienced team, including:
 - Medical provider
 - Therapist
 - Dietitian
- Ensure close follow-up and support, until full recovery
- Family or guardians involved in providing support during and after meals

Goals of Treatment

- Weight normalization
- Normalization of eating patterns
- Return of menses
- Prevention of short-term and long-term medical complications
- Helping patient and family cope with disorder

Prognosis

- Up to 65% cure, with comprehensive treatment
- ~20% improve but not cured
- ~15% with chronic course
- Average treatment time 3-5 years

Prognosis

- Probability of survival and recovery increases when eating disorders are treated:
 - Early
 - Aggressively
 - In a specialized setting
 - In a manner that enlists support of family or guardians

Resources at Lucile Packard Children's Hospital

Out-patient Eating Disorder Program

- New Patient Evaluations:
 - Individual psychiatric evaluation
 - Family psychiatric evaluation
 - Nutritional assessment
 - Adolescent medicine assessment
- May be provided as one-time consultation to treatment team or to initiate on-going care through eating disorders clinic and/or psychiatry department
- Intake coordinator: (650) 498-4468



Resources at Packard Children's Hospital

- Outpatient Eating Disorder Clinic
 - Adolescent medicine follow-up
 - Nutritional follow-up

- Child Psychiatry Department
 - Family-based psychotherapy
 - Individual psychotherapy
 - Cognitive behavioral therapy
 - Cognitive remediation therapy

Resources at Packard Children's Hospital



- Inpatient Medical/Psychiatric Unit
 - Comprehensive inpatient treatment of eating disorder patients who are acutely medically unstable
 - Average length of stay 12-14 days
 - Focus on medical stabilization
 - Psychiatric care milieu based, crisis and supportive treatment
 - Parent education and support program (PESP)
- Intake coordinator: (650) 498-4468

Resources

- Lucile Packard Children's Hospital, Eating Disorders Program
 - Intake coordinator: (650) 498-4468
- National Eating Disorders Association (NEDA)
www.nationaleatingdisorders.org
- Something Fishy - www.something-fishy.org
- Eating Disorders Resource Center (EDRC)
www.edrcsv.org
- Books for parents:
 - *Help Your Teenager Beat an Eating Disorder*, by James Lock, MD, PhD
 - *Taking Charge of Your Child's Eating Disorder*, by Pamela Carlton, MD

