Disordered Eating & Diabetes: Tears, Missed Testing, High Numbers

Goals
1. Describe basic physiology in diabetes (type 1 & 2)
   Treatment plan, risks, timing, lapses, missed dose/meal
2. Explore eating disorder by type, symptoms, early detection, treatment
   Diabulimia, anorexia/bulimia, body dysmorphic disorder
3. Compare case studies: individuals with DE or not?
   Case 1: Pump manipulation in child, 8 YO male,
   Case 2: 14 YO female, mismanage insulin to control weight,
   Case 3: 20 YO female, body perception, otherwise non-specified
4. Other: Growth charts tell many stories

Type 1 Incidence
- 5-10% of total population with diabetes is type 1
- Most common auto-immune condition in children
- 85% peds T1DM
- 30% are overweight at diagnosis
- 1 in 1000 youth
- Can occur at any age
- Equal incidence: gender, socioeconomic status
- T1D 30,000 per year nationally 24/100,000
- Increased incidence of 2-3% per year
- Age of onset is getting younger
Type 1 pathology

- Loss of insulin production from islet cells of pancreas
- Associated with ketone production and diabetic keto-acidosis (DKA): unique “purging” system
- Db development is a chronic process: genetics + environment
  - Presence of ICA 512, GAD 65, insulin AB, Zinc transport
  - If genetic positive: 2% of susceptible develop T1DM
    - Need AB & conversion (inflammation)

Emergencies

- Low blood sugar
  - (treated with quick acting carbohydrate)
  - Less than 80 mg/dl with symptoms
  - Less than 70
- Diabetic Keto-acidosis: not enough insulin
  - (treated with insulin and hydration)
  - The body uses alternate fuel (fatty acids, proteins)
  - The waste product of this is ketones (poisons)
    - Ketones make the body more acidic

DKA problem: not enough insulin

Normal Biology: (Green Zone)
- Blood sugar > 250
- Insulin available
- Cells need fuel
- Liver - hold
- BS → decreases

Acidosis Biology: (Yellow & red zone)
- Blood sugar > 250
- Low insulin
- Cells need fuel
- Liver → secretes more sugar
- FFA → Ketones → poisons: lower pH, more insulin needed
- Blood sugar → increases
17 yo Female - diagnosis, current

8 yo Male

8 yo Male

Saved by school

BMI jumped to >14
Repeat DKA
Not ED→Family disorder?
DKA episode
Summer break- 2nd year
Followed DKA care
Worked with primary care
Supervision?: mom working
Sibling was to supervise
Really on his own
School is a blessing
Inadequate insulin

- Outgrow dose
- Do not increase when ill
- Stress → physical, emotional, etc.
- Purposeful
  - Dose reduced to save $$$
  - Busy, priorities, time management - missed care
- Poor insight into impact of missing insulin
- Weight management***

16.5 yo female DE growth charts

- Deliberate under dose → unique “purging” behavior
- 1980s in literature: disordered eating & DE in diabetes
- Diabetes specific risks
  - DKA,
  - Retinopathy accelerator
  - Triple retinopathy 4 years after
  - Rydall, 2008
Inadequate insulin, cont.

- Psychological reasons
  - Insulin omitted for weight control (10-15 year olds, up to 36% report insulin misuse)
  - Psychological problems complicated by eating disorder
  - Insulin omitted to avoid hypoglycemia (fear of low)
  - Avoid injecting in public
  - Needle issues

- Study n = 126 female, over 7 yrs
  - Start age mean 11.8, end 23.7
  - Mean age Disordered Eating onset 22.6 years
  - Probability of onset by age 25
  - By time 7 =
    - 32.4% met DE criteria +
    - 8.5% sub threshold DE

Cotter, 2014

Peds developmental concerns

- Insulin sensitivity
  - Physical growth
  - Sexual maturity
- Developmental stage
- Risks to cognitive development
- Family dynamics
  - Adult supervision vs self care
  - Physical ability
  - Emotionally able
  - Psychological needs
  - Schools
  - Autonomy: insulin pump - lows??

ADA: Diabetes + DE

Common female, young women
- Girl T1DM 2x risk than non T1DM peers
- Insulin: weight changes, good control, count food
- Anemia: restrict intake, distorted image
- Bulimia: secrecy eating, purge, laxative use

Common for T1DM
- Dissatisfied with
  - Weight
  - Shape
  - Desire to be thinner
- Dieting
- Manipulating insulin dose for weight
- Binge eating

[ADA Diabetes Spectrum/Patient Info.]
Disordered eating

- Screen when high BS & wt loss unexplained
- T1DM insulin omission → glycosuria = most common disordered eating
- T2DM (frequent sugar intake w/wh of loss of control)
- ED + DM have high rate if co morbidity psych
- T1DM + ED = high rate Db distress, fear of lows
- Consider etiology, motivation

Per Dlife:

- we teach to measure food → preoccupation → obsession → builds momentum if food viewed as ‘dangerous’
- high = increase complication
- risks low self esteem,
- anxiety
- anxiety
- feel can control food; weight to manage emotions

Ismail, Khalida 2008

Figure 1

Theoretical model of potential pathways to disordered eating in type 1 diabetes

Figure 2

Theoretical model of potential pathways to disordered eating in type 2 diabetes
Modified Dual pathway model

Diabetes & Disordered Eating DE
- Overeating seen in young women with T1DM about 12-58%
- Teens 11.5-27.5% meet dx criteria for DE
  - most often bulimia or binge eating disorder
- T1DM misuse insulin
- T2DM most common binge eating
- 1 in 5 report binges, compulsive overeating or excess food intake
  - Gagnon, et al 2012

Warning signs ED/T1DM
- High A1C
- Frequent hosp, poor control (DKA)
- Anxiety about weight
- Frequent request to switch meal plan approach
- Frequent low BS, polys
- Wide fluctuation BS
- Growth arrest, delay
- Rapid weight loss
- Delay puberty,
  - irregular or no menses (less reliable per Joy et al 2010)
  - Binging with food (or alcohol) min 2x/week for 3 months
  - (1x/week per Joy et al 2010)
- Exercise more than needed
- Severe family stress

*Be nonjudgmental & supportive, refer ASAP

ADA Diabetes Spectrum/Patient info.
DE Concerns

Disturbed eating behavior DEB & DE

Cross sectional: 103 girls 9-14 yo

& 303 age-matched non Db

Insulin omission most common

Purging behavior:

In this study:

Pre teen 2%

Teen 14%

Young women 34%

Colton, P. et al. 2004

Binging → worse metabolic control

occurs later in T1DM & non Db

Not seen in this study

DEB associated with increased BMI

not poorer Db control

Insulin restriction = increased rate of

Db comp. & increased mortality

Mortality with insulin restriction

occur in context of ED symptoms

rather than other psychological

distress

Goebel-Fabbri, et al. 2008

Treasure et al. 2015

Interpersonal conflict

Mood dysregulation

Focus on weight &

eating in Db mgmt

Maintenance model for disordered eating in type 1 diabetes

Treasure et al 2015
Types of Disordered Eating

Anorexia-almost of appetite
Bulimia nervosa-binge & purge
Binge eating disorder
Diabulimia

Anorexia- absence of appetite
- Genetic – 8x more with relative
- Twins share specific eating disorders (AN, BN, Obesity)
- Low body weight (15-60% weight loss)
- Denial of the problem
- Refuse to maintain weight
- BMI < 17.5
- Intense fear of gaining weight
- Often with anxiety, OCD, depression
- Anorexia & depression – high suicide risk
- 1. Restricting type
- 2. Binging/purging type—
  - in T1DM do with minimizing insulin

Crego, Crow, Kendall, Parkin 2009

Bulimic Nervosa- binging & purging
- Recurrent binge
- Discrete period of time, consume amount larger than most &
  sense lack of control over eating during episode
- Recurrent compensatory behavior to prevent weight gain:
  - vomit,
  - laxative, diuretics, enema,
  - excess exercise,
  - meds, insulin
- Types: purging, non-purging

- 80-95% female
- Risks
- Hormonal change
- Heart problems, rhythm
- Lytes
- Fertility
- Bone density
- Anemia
- Neurological

- Emaciation maintained by purging
  is more damaging
  - purging increases stress to undernourished body
  - Tooth erosion
  - Sore throat
Binge eating disorder & NOS

**Binge without purging**
- Overeating leads to overweight
- Typically
  - Consumes 5000-15,000 calories in a setting
  - Eats 3 meals, plus frequent snacks
  - Overeats continually throughout the day

**Eating disorder NOS**
- Often older at Dx
- Infrequent binge-purge episodes (<2x/week, or less than 3 months)
- Repeated chewing & spitting w/o realizing large amounts of food
- Normal weight + anorexic behavior

Diabulimia (2007 in journals)

**Dx with T1DM**
- Deliberately give less insulin than needed
- Goal: weight loss
- Calories purged through glucosuria
- Manipulate insulin to lose weight
- Preferred label ED-DMT1

**Weight gain**
- Mad, sad, depressed
- Is a criteria of bulimia nervosa

Frequency & duration of omission not defined
- Proposed:
  - Reduce or omit dose 2x per week
  - Reduce by over ¼ or more for over 3 months

Diabulimia

Intentionally skip insulin to keep BS elevated for weight loss
- Recurrent cycle of binging and compensatory behaviors meant to cancel out the binge
- Med misuse insulin
- Vomiting, diuretic, laxative
- Food ingested “felt forbidden”
- Often feel loss of control, distress

- Overeating in 17-27% young women with T1DM
- 11-27% teen with T1DM
- Insulin misuse 10.7-42%
- Perfectionist eating attitude, External food rules, psychological, physiological deprivation → overeating
Symptoms to watch for

• Depressed
• Anxious mood
• Deterioration in academic, work performance
• Fail to attend visits
• Hoarding, hiding food
• Eat alone
• Secretive around meals, exercise, insulin admin.

• OCD
• Intentional behaviors, self injury, suicidal risk
• Non-intentional behaviors
  • Harm from hypoglycemia
  • Damage to kidneys, heart, retina, peripheral nerves

DEB & Insulin Omission in teens

Wisting, et al 2013 study intensive insulin treatment
N = 770 youth, 11-19 yr with T1DM
Diabetes Eating problem survey-revised – DEPS-R
27.7% female, 8.6% male scored above cut off
Had sig. higher A1c (9.2%)
Both disturbed eating behavior (DEB) and insulin restriction associated with poorer control

Presence of DEB increased sig. with age and weight
• 3.7% in underweight group
• 35.7% in obese group
• 8.8% in youngest age (11-13)
• 38.1% in oldest age (17-19)
Those reporting Insulin restriction had higher A1c (9% vs 8.3%)

Consequences of Diabulimia

• DKA and death
• Mortality rate triples
• Vitamin and trace element deficiency
• Bone health
• Delayed puberty,
• Growth retardation
• Retinopathy advances 3x faster
• Nephropathy 2-3 times
• Neuropathy
  • Peripheral neuropathy
  • Nerve damage, limb amputation
  • Movement: Motor nerves
  • Sensations: sensory nerves
  • GI system
• Peripheral: Tingle, numb, burn, pain
• Proximal: pain in thigh, hips butt, leg, weakness

Huifeng Shih, 2011
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Risk Factors
- Female
- Teen, young, older adult
- Poverty
- Low social support
- Stressful life events
- Poor control, frequent low
- Longer Db duration
- Long term complications

Action
- T1DM DE risk: (female) through insulin omission
- T2DM with depression = increased Night eating syndrome NOS (>25% daily calories at night after evening meal 3x/week)

Disordered Eating Warning Signs
1. Consistent high A1c BS over 200, Ac over 10.5%
   - Depression
   - Poor Db self care
2. Body image concerns
3. Irregular eating behaviors
   - On/off dieting
   - Discomfort eating around others
   - Hoarding food
   - Reading labels, counting calories & fats
   - Fluctuating weight or acute weight loss

Vicious eating cycle
- Rest with intent to lose weight
- Followed by intense over eating
- May lose initially
- Irregular eating pattern slows metabolism
- Weight loss not lasting
- Missed insulin → caloric purging
- Triggers more eating deprivation &/or insulin avoidance
Warning signs, cont.

4. Excess exercising (compulsively)
5. Irregular/nonexistent menses, amenorrhea
   May have slowed growth velocity, delayed dev.
6. Repeat DKA
7. Follow through less than goal
8. Doubtful BS monitoring
   Huifeng Shih 2011
   Goebel-Fabbri, et al 2011
   Studied characteristics of women who report stopping insulin restriction
   At 11 years follow up
   Fear of weight gain associated with improved BS and problems with diabetes self-care are core issues R/T both the emergence and resolution of insulin restriction
   Early recognition and attention to these concerns may help

19 yo Male weight & BMI

Athlete
- Male & female at risk
- low body weight/lean
- "competitive" edge
- DE more in athletes non--
  - athletes achieve/pleasure of DE
  - Higher in sport with weight class (rowing), aesthetic (gymnastics, dance, skate), & low BMI advantage (X country, cycling)
  - Higher in college age sports
  - Male: Higher rate pathological eating (binge/purrit)
  - Male with lean sports more likely
  - Antigravitation sports 20%
  - Endurance 9%
  - Ball game sports 5%
  - Overall general population with increased rate of ED (15-19 yo age group)

Joy, Kusmery, Nattiv 2016

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Joy, Kusmery, Nattiv 2016
Changes in dx Athlete, 2016

- Anorexia: No longer need to explicitly endorse fear of weight gain - inferred from behaviors
- Symptoms denied to compete
- Amenorrhea: no longer diagnostic - can have regular menses
- The new guidelines help in Dx AN in:
  - males,
  - post-menarcheal, &
  - delayed menarche females

Joy, 2016

Other comorbidities with athlete ED

- Depression
- Anxiety
- OCD
- Substance use
- (up to 50% with mood/anxiety)
- Bulimia + psych+ Increased suicide risk, attempt

- Bing eating: significant co-occur with depression, bi polar, anxiety, bulimia, kleptomania, and body dyssomorphic disorder
- For athlete -
  - found risk of depressive symptoms 6 mo post eating psychopathology

TuDM: higher risk ED later in life
- 1 in 3 female, 1 in 6 male with disordered eating & insulin restriction

ED athlete, cont.

- Health & Performance consequences.
  - Evaluate overall function
- Clearance to play: assessment tools

Ask:
- Do you worry about weight?
- Are you trying to, or been recommended to lose or gain weight?
- Are you on a special diet?
- Do you avoid certain foods?
- Have you ever had DE?
- Have you taken any supplements to help gain or lose weight, or impact performance?
Prevention of DE

- Focus on food choices, not restrictions
- Avoid emotional label for foods or eating behaviors
- Make exercise a part of life, not just for burning calories
- Open communication:
  - discuss stressors,
  - help solve problems,
  - stay connected,
  - less isolated,
  - talk about it

Merain et al. 2015
- Help respond to heightened negative effect (anxiety, guilt)
- Encourage to take less rigid, punitive approach to diabetes mgmt.

Assessing clues & responses

1. How much do you weigh?
   - Most, just weighed, or staff just did it
   - ED, may answer to decimal, ask if scale is right
2. How much do you think you should weigh?
   - Normal: 15# over / barb2right I would like to be ___
   - Depression: I don’t know/care
   - ED / barb2right state need to be far less than current weight-less than healthy weight for them

Huifeng Shih, 2011

Responses to questions...

To identify irregular eating patterns ask:
1. How many meals & snacks/day?
2. Have you been or are you on a diet?
3. Do you follow a meal plan?
4. Do you eat at your family at dinner time?
5. Do you eat at your friends at lunch?
6. What is of my diet?

How many calories in an apple?
- ED know exact calories
- Depression: eat w/o knowing calories, only small amount
- Uncontrolled DB: don’t think about calories

Huifeng Shih, 2011
Dual diagnosis

5 things pertinent to dual dx

1. Feeling different * 100%
   - Trigger: want to be like someone else

2. Difficulty with control/coping * 88%
   - Perception of loss of control
   - Efforts to gain control: focus on weight - get it perfect

3. Body image* 81%
   - Body shape, size or weight
     (coaches put on pedestal when losing)
   - More global focus on overall appearance (obesity = being perfect)
     (burden of DB: supplies, testing BS, aim for good #, measure food, manage weight)

Powers, Richter, Ackard, & Cronemeyer, 2016

Dual dx, cont.

4. Feelings*69%
   - Feelings, mood, overall emotional state (high stress, mood swings, depression, low SE)
   - Feelings related to DB or DE (heightened awareness of comments related to eating, body care)
   - Daily focus: "when can I next binge, when can I vomit" = shame, felt like drug addiction
   - Mood changes

5. Quality of life 44%
   - Physical: hair loss, amenorrhea, high BS, thirst, urine - associate the symptoms as part of ED
   - Emotional: try to hide ED symptoms & worsening of DB; "felt worthwhile b/c skinny, now feel fat, good for nothing"
   - Functional: DE demands overwhelm daily life, disruption in school, work, loss of family, social activities

* 4 of 5 relevant to DE development
* Link to DE: language used to instruct/manage focuses on numbers may influence, mask DE
* Perfectionism of decision-making, being in control, and goal attainment

Powers, Richter, Ackard, & Cronemeyer, 2016

Early intervention of at risk

- Be alert to family comments, incongruence's r/t 5 themes noted
- Take time to inquire in non-judgmental way
- Avoid terms, expectations for thinness, perfectionism
- Create a tone that focuses on overall well being including unconditional acceptance of current state of health
  - With TsDB, burden of chronic care can impair delicate self esteem
  - Be sensitive when initiate subject of eating & weight concerns
  - Ask about obsessions with food
  - Watch for comments on feeling different, diff. with control & coping, body image & feelings
  - Our responsibility as concerned adults to identify early signs, factors

Powers, Richter, Ackard, & Cronemeyer, 2016
Treatment

- PEDS
- http://www.lwpes.org/patientandfamilies/
- www.aace.com
- www.eatright.org
- Team approach
- Handle DB, BS, insulin regimen, food intake compassionately
- Weight checks: ED person may not know weight, psychotherapist and RD work together to reveal or not
- Routine clinic visits
- Medical history/meds
- Physical exam: VS, eye, thyroid
- Lab: A1c, micro/creat, celiac, cholesterol, BP
- Referral as needed
- Depression screening starting age 10

Huifeng Shih, 2011

Purpose: change destructive behaviors

Psychotherapist skilled in condition
- Weekly or bi weekly
- Cognitive behavioral therapy (CBT) enhanced for ED: thinking, actions or reintroducing regular eating, weight exposure, treat body image concerns
- Dialectical behavioral therapy (DBT & emotional regulation) is often group
- Family based therapy (FBT) family a resource to youth
- Recognize thinking behind ED & replace with healthy thinking
- Distorted perception of body image, CBT
- How family perceives, deals with ED, FBT important to prevent counterproductive

Huifeng Shih, 2011

If hospitalized: criteria

- DKA
- Dehydration
- Lyte imbalance K <3, Mg < .8
- Hypothermia <96.3
- Orthostatic (pulse up >35, systolic down >10)
- Bradycardia <90/day, 45 night
- Prolonged QTC
- Severe malnutrition (<75% median body weight/age)
- Stabilize
- Multi team care
- Medical consequences
- Long standing DB (>4 post pubertal years)
- Amenorrhea, bone density, etc
- Mental health risks
- Nutrition assessment
- monitor and educate
- Realistic BS goals: gradual decrease in overall average
- Monitoring schedule for BS
- Take responsibility away
- Give responsibility back
- Pumps

Huifeng Shih, 2011
ED-DMT1 Eating Recovery Center

“assume then resume”
1. Treatment team takes over responsibility for all diabetes care
2. The control is gradually transferred to the patient once demonstrated willing & able to manage these well and consistently

• If has other mental health illness (depression/anxiety): evaluate & treat
• If has damaging behaviors (excess exercise, purging) addressed in treatment
• When ready, return to local endo team
• Lapse, relapse occur
• Ongoing family support, friends
• Collaborate with ED professions and diabetes care experts
• (Ovidio Bermudez, 2016)

Responsibility

• Nurse staff takes: soon after metabolic and VS stable
• Pts/staff share: when team agrees pt is ready, supervise self-care
• Patient takes back: prior to d/c, re-educate as needed, take back self care, supervision after discharge individualized
• Involve school nurse: youth need to feel they are in control, follow orders, school nurse: self care with supervision, target behavioral antecedents
• Discuss nutritious foods,
• Healthy body image: talk + about what bodies do for them
• Discuss Db in terms of health, pleasure, satisfaction
• Daily schedule, communicate concerns, trained staff, refer, checklist of expectations with realistic goals, meet to discuss question, supervised eating by nurse,
• Remain vigilant for signs, early referral, support is key
• Fanik, Roulla 2014

Mental Health

• Depression worsens Db outcomes,
  • Lethargy lowers motivation
  • Lower fitness
  • More cardio mortality
• Anxiety
• Schizophrenia
• ED share similar personality type
• Low self-esteem
• Dependency
• Problems with self-direction
• OCD – 2/3 of people with anorexia, 1/3 with bulimia
• Phobias often precede onset of DE
• Panic disorder may follow onset of DE
• PTSD – some with DE also past traumatic event
• Robinson, Luthra, Vallis, 2013
Mental health & diabetes

- Psych disorders occur more in diabetes than general population
- Major depressive disorder (MDD)
- Anxiety
- Eating disorder

Also, MDD, bipolar, schizophrenia have higher risk to dev. T2DM

Db & mental health co-morbidity

- less medical adherence,
- Less compliance with Db care,

Risk factors in developing Db with depression:

- Inactivity, obesity, insulin resistance
- Stress chronic hypothalamic-pituitary-adrenal activation: cortisol release

Hypothalamus Pituitary Axis: HPA

Hypothalamus: control behaviors: eat, sex, sleep, temperature, hunger, thirst, hormones

Amygdala: control emotions: anxiety, depression, aggression, affection

Serotonin: well being, anxiety, appetite

Norepinephrine – stress hormone

Dopamine – reward seeking behaviors

Imbalance serotonin, dopamine - anorexia no pleasure from food; other comforts

Personality disorders

- Avoidant personality disorder
- Perfectionist
- Emotionally, sexually inhibited
- Want to be seen as “good”
- Terrified of criticism,
- OCD - rigid, rule follower
- Borderline personality BPD - self destruction, impulsive
- Narcissistic PD - inability to soothe self, empathize with others, need admiration, avoid criticism
Energy expenditure / 24 hours

Heart beats 103,689 times
- Use 7 million brain cells
- Breathe 23,040 times
- Move 750 major muscles
- Blood travels 168,000 miles
- Speak 48,000 words

- Body digests 3.5 lbs of food
- Process 2.9 lbs liquids
Huifeng Shih, 2011

Behavioral

- Aggression, antisocial conduct adversely associate with poorer control
- Anxiety, depression
- Low socioeconomic, supply availability = less control
- Less control, higher psych issues than general population
- Db out of control—increased risks of psych morbidity

Anxious children-more diligent with self care

16 yo female: Graves
References

• ADA Diabetes & Eating Disorders Diabetes Spectrum/patient information 2002
• Bermudez. O. 2016 Eating Disorders & Type 1 Diabetes; Eating Recovery Center.
• Goebel-Fabbri, et al. 2010. Improvement & Emergence of Insulin restriction in women with T1DM. Diabetes Care 33:545-550.

References, cont.

ED questions, cont. & Female triad

Joy, Kussman, & Nattiv, 2015

Table 1: Presenting signs and symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Presenting sign(s)</th>
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<tbody>
<tr>
<td>Eating disturbance</td>
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<tr>
<td>Emotional disturbance</td>
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<tr>
<td>Medical disturbance</td>
<td></td>
</tr>
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<td>Social disturbance</td>
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Joy, Kussman, & Nattiv, 2016

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Cumulative risk, female triad

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<th>Measurement</th>
<th>Units</th>
<th>Average</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
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<td>Body weight</td>
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<td>5</td>
<td>45</td>
<td>55</td>
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<tr>
<td>Height</td>
<td>cm</td>
<td>160</td>
<td>5</td>
<td>155</td>
<td>165</td>
</tr>
<tr>
<td>Body mass index</td>
<td></td>
<td>20</td>
<td>3</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

Joy, Kussman, & Nattiv, 2016
**Nutrients**

- **Protein**: Life span of cells = 2-3 weeks, it takes 55-75 grams protein per day to build.
- **Fats**: Your brain needs them, needed for growth & puberty.
- **Fats slow absorption of carbs**: delays BS peak.
- **Blame fat calories for gains**: It's total calories that impacts weight, not the type.

Huifeng Shih, 2011

- **Carbs**: Breaks into glucose—the fuel for the body, absolute energy source for the brain.
- **Fiber**: Constipation prevention, reduces LDL, enhances HDL. 25-35 grams per day (3 fruit, 1 c veggie, & ½ c whole grain).

Huifeng Shih, 2011

**Low carb danger**

- ADA >130 grams/day
- May lose weight initially fluid loss,
- Low carb diet over 6 months =
- LDL cholesterol
- T1DM
  - Low blood sugar: confusion, seizure risk, unconscious, shake, sweat
  - On the edge of DKA
Eating disorder-related emotions/behaviors

- Overeating, binging
- Fear losing control over eating
- Purging (self induce vomit, misuse of laxatives, diuretics, thyroid meds, insulin)
- Fasting, skipping, picking, nibbling, avoidance, extreme dietary restrictions, rituals, driven exercise, splitting, suppressant pills
- Eating in secret, guilt about eating
- Concerns about eating in front of others
- Obsessively weighing self
- Dissatisfaction with weight, body shape, sensitive RE weight

Gagnon, Aime', Belanger, Tuttman-Markowitz, 2012