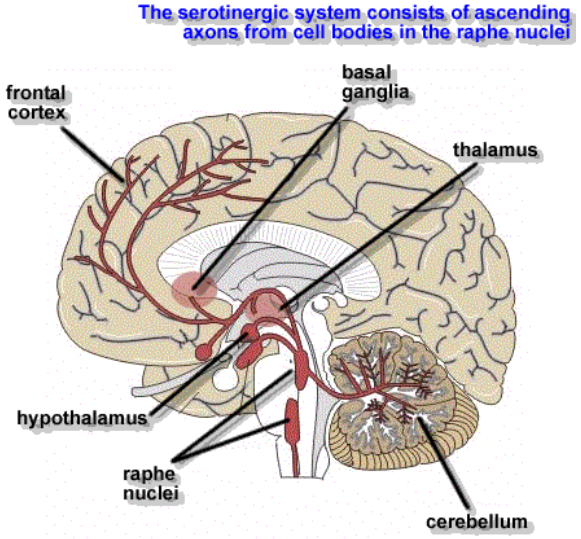
Homeostasis, Feeding (Ch.13) III

- Serotonin regulation of feeding
- Problematic feeding behaviour
  - Anorexia
  - Obesity

Neurochemistry of Hunger and Satiety

- **Serotonin (5-HT):** a major brain satiety signal
- 5-HT agonists or releasers (e.g. Prozac) in humans and animals can:



↓ feeding, even with cafeteria diets

↓ amount of food consumed per meal but ***not*** number of meals per day

-Increased 5-HT activity shifts food preference ***away*** from fatty foods
-5-HT acts as short term satiety signals associated with meal consumption

Brain regions: 5-HT **inhibits release of NPY in the PVN** of hypothalamus, which then disinhibits PVN neurons to promote satiety

Anorexia Nervosa (I)

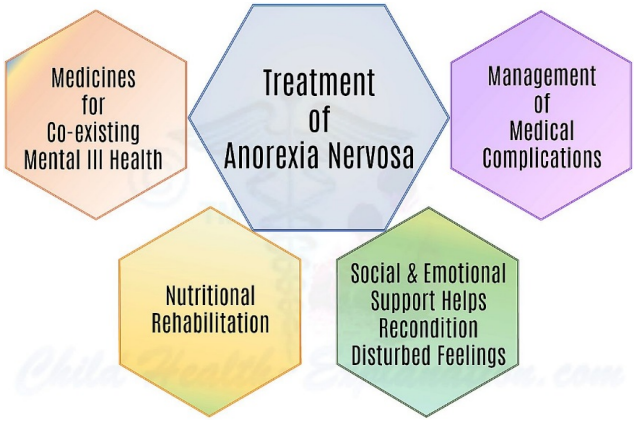
- **What is it?:** Obsession with body weight/image and food; ~1% of population, mostly women
  - Characterized by self-induced starvation
  - Body weight less than 75% expected weight
  - Intense fear of gaining weight.
  - Distorted view of one's body weight or shape.
  - Many individual with anorexia are obsessed with food, show a higher than normal insulin release to anticipation of food, but are often disgusted by a sweet/fatty meal

•**Social Causes?** commonly attributed to society's views on female body image.

-However, during other time periods, heavier body image was norm, yet women still fasted and starved themselves

Anorexia Nervosa (II)

- **Treatments**: very few effective treatments
  - Less than 30% show long term recovery
  - ~ 10% die of starvation or suicide

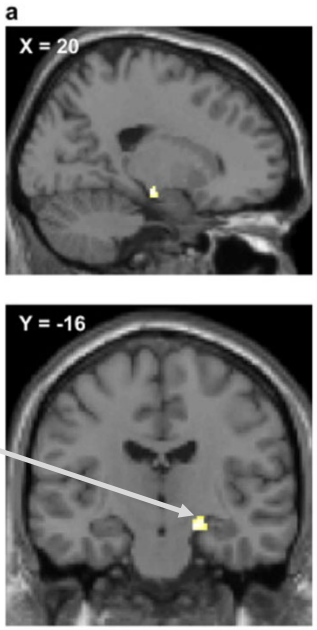


➢ **Underlying Causes**

- **Psychological theory:**
  - Positive-incentive value for food goes up during starvation
  - Meals are a disruptive event on the body, intensified during starvation
  - Meals forced on anorexic patient may lead to conditioned taste aversions; even though they think about the food, competing factors cause them to avoid it

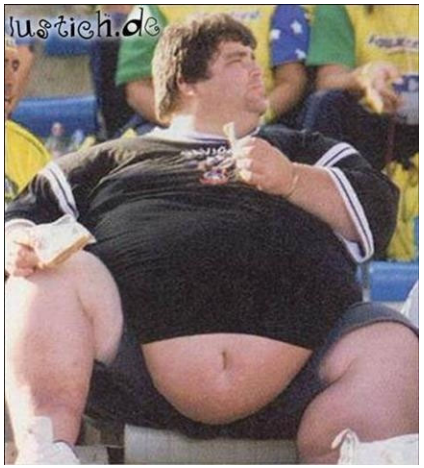
Anorexia Nervosa (III)

- **Biological Mechanisms**
  - Information processed by certain brain regions is altered in subjects with anorexia.
    - Abnormal patterns of frontal activation to food-related stimuli
    - Palatable tastes (e.g. chocolate milk) can cause abnormal increases in **amygdala** activity, which is be involved in the recognition, evaluation and response to aversive stimuli.
  - Certain feeding hormone/transmitter levels are reduced (AgRP, NPY, leptin) [latter may be compensatory changes to the loss of weight]
  - 5-HT abnormalities have also been linked to anorexia (often co-morbid with depression) .



Hunger condition:
Anorexia nervosa > controls

Obesity

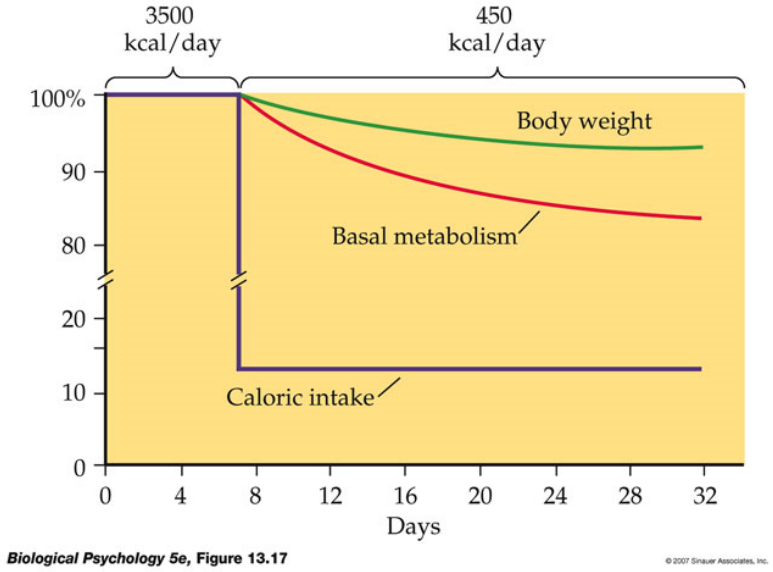


- **What is it?:** Characterized by excessive adipose tissue.
- Adult males = >25%, Females = >30% fat content.
- 1 in 4 Canadian adults and 1 in 10 children are obese
- Body Mass Index: (mass/height^2): Obesity = BMI >30

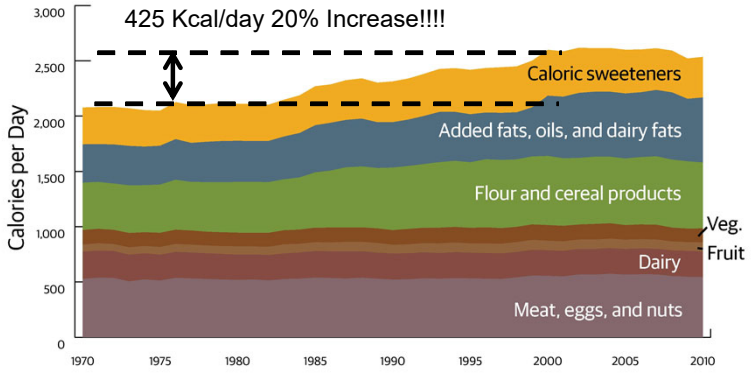
- **Causes:** U.S. twin study: environmental and genetic factors equally responsible for obesity.
- Obese individuals have larger insulin response to sight, sound and smell of food
- **Treatments:**
  - Exercise and proper diet.
  - Low calorie diets (often give immediate results, then but then weight comes back on)
  - Appetite suppressants, surgical procedures (drastic, last resort)
  - **GLP-1 agonists (e.g. Ozempic ®)**

Why is it so freakin' hard to lose weight?

- Our metabolisms are geared to prepare for times of starvation
  - Reduce food intake, metabolism slows down
- Many diets work, but for most, weight is put back on diet is stopped
- **Low fat diets**- problem is people eat more carbs instead.
- Exercise helps, but you have to do a lot to make a dent in the calories in/calories out equation
  - 1 pound of human fat = ~3500 calories!!
  - We tend to eat more when we're more active
  - So many factors can trigger hunger irrespective of what our biological energy levels may be
  - We are eating more sugar!



Biological Psychology 5e, Figure 13.17

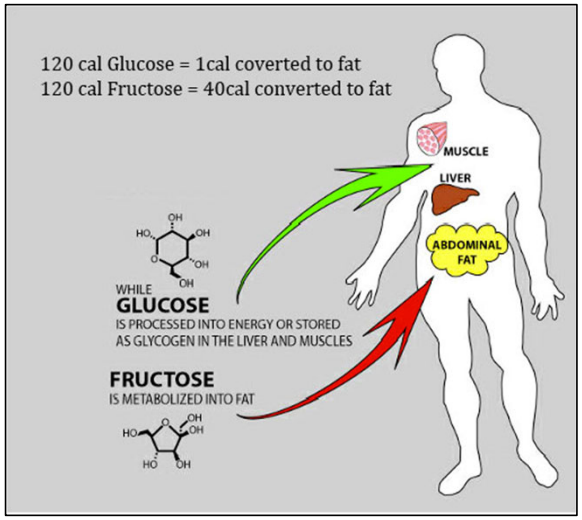


Source: USDA ERS, Food Availability (Per Capita) Data System

For your benefit- not on exam

Why is it so freakin' hard to lose weight?

- NOT ALL CARBS (or calories) ARE EQUAL (glycemic index)
- **Carbs that have lower glycemic index (whole grains) digest more slowly,** cause less of an insulin spike
- **Proteins** and **whole grain carbs-** require more energy to digest (less goes into storage)
- **Some foods** (beef, eggs, beans, fruits, whole grain carbs) are more filling than others (donuts, cake, chips)



- **Fructose** (as in high fructose corn syrup) vs glucose
  - Sugar (sucrose) is a combination of glucose and fructose
  - Fructose doesn't stimulate satiety centers, may increase ghrelin

For your benefit- not on exam

Which Diet?

- Lots of confusion and conflicting advice.
- Shocking lack of properly conducted scientific experiments for many of these diets, especially long term.
- Macronutrients
  - "standard" advice is 50% carbs, 30% fat, 20% protein
  - by calories
  - low fat vs. low carbohydrate

- Reducing caloric intake (50-75% of ad lib levels) prolongs life in humans and animals
  - **Intermittent fasting** is one method that shows promise for losing weight (2-3 days/week, drop calories from 1800-2500 to 500-700). Keeps your metabolism guessing
- **Our current environment is "pathological", not our weight problems**
  - Many times, radical lifestyle change is needed to lose weight

For your benefit- not on exam

Psych 304- 1st Midterm Term 2: February 1st, 2024

– Lectures will following Tuesday resume after reading break, starting with Ch. 14 (Sleep)

- 40 Marks for the entire exam – 80 min to complete
- 24 ***multiple choice***, 1 mark each, testing on 2 chapters
  (Ch.12, sex; Ch.13, homeostasis feeding)
  - 12 question from each chapter; 4 choices (a-d)
  - Questions will be presented in order of lectures
  - Some questions will be straightforward (covered in video/live lectures and text)
  - Others: Tricky (more obscure stuff; integrating 2-3 bits of information, trickier distractors)
  - Any question that has **bold** *or italicized* fonts, PAY ATTENTION! This may be a key word/term that will influence how you interpret the question and pick your answer.

Multiple Choice (continued)

- There is only one correct answer (some may seem like they have more than one correct answer- these have particularly tricky distractors).
- No questions were made up where the answers cannot be found (or figured out) with information given in the lectures (and sometimes textbook)
- **ALL** of the m/c questions come from material that were covered at least in part in the lectures (ie: no questions come exclusively from the textbook).
- ~5 multiple choice questions test on content **exclusively** from the lectures.
- READ EVERY QUESTION CAREFULLY
- BRING PENCILS!!!! **BRING ERASERS!!!!!**

What the midterm will look like

- **Written Portion-** 16 marks
  - **Short Answers (2)** (8 marks each)
  - This section will have one question each asking about content from 2 chapters (Ch.12, *Sex;* Ch.13, *Homeostasis-feeding*)
  - ONE QUESTION may have more than one correct answer (i.e. there are multiple points you can make that will get you to full marks).
  - The number of points a question is worth is roughly the number of points you should list to obtain full marks (e.g.: if it's a 8 mark question, you should write down 8-9 points you know about the topic).
  - Point form is acceptable
  - Diagrams are fine, as long as they are labeled clearly
  - Anything from the lecture slides is fair game

What you will (not) be responsible for (a non-exhaustive list)

- Chapter 12: **NOT** responsible for ”Pheromones Guide Reproductive Behaviorand “Parental Care” section
- Chapter 13: **NOT** responsible for “Temperature Regulation” of “Fluid Regulation” sections **(but all of sections 13.4, 13.5, 13.6**)

What happens on exam day

- The exam invigilator will be giving the exam (your instructor will show up about 15 min into it).
- **PLEASE FILL IN YOUR NAME AND STUDENT NUMBER (and write it down too in the boxes provided).**
- **IT IS YOUR RESPONSIBILITY** to ask the TA/instructor for clarification on an exam question
- Read the exam over before starting. If there are any questions, save them for your instructor.
- Your Scantron sheet and your multiple choice booklet MUST BE TURNED IN at the end of the exam.

Missing the Exam/Cheating

- If you miss the exam, you ***must*** let your instructors ***AND*** TAs know as soon as possible to see if we can arrange a make-up exam.
  - If you cannot make up this exam, I will discuss how your final mark will be evaluated on a case-by-case basis
- There is a zero tolerance policy on cheating
  - Exams not turned in IN class will not be graded; it is your responsibility to make sure that the TA receives your exam
  - The Dept. of Psychology has instituted cheating detection software for m/c exams.
  - PLEASE keep your eyes on your own papers, and don't show off your papers to others….

Study hints/exam tips

- Know your brain circuits/hormonal cascades/pathways/drug effects
- The majority of questions are on topics that are covered in both textbook AND lectures
  - ~85% of the marks can be obtained from information that was covered in both the lectures and textbook (the remainder, just from the lecture notes)
- DO NOT LEAVE ANY QUESTIONS BLANK
  - If you don't know a multiple choice answer, guess
  - If you don't know a short answer, write down SOMETHING, you may get part marks