

METABOLISM REALITY CHECK

Thursday, November 21, 2019
2:00 - 3:00 PM ET

PRESENTED BY
Sohailla Digsby, RDN, LD, CPT

Learning Library
TODAY'S DIETITIAN

Learning Objectives

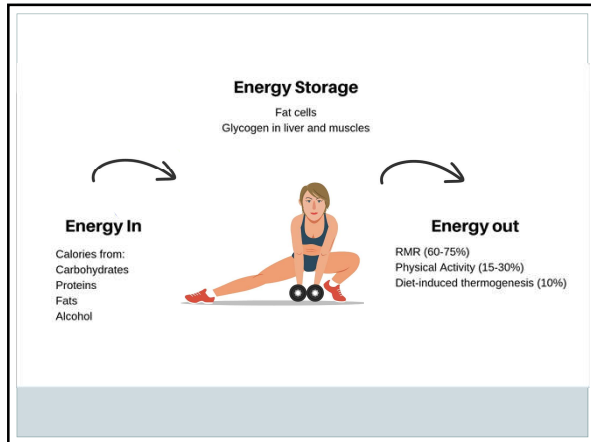
- 1** Understand the roles various types of exercise play in boosting metabolism, such as resistance training and high intensity interval training (HIIT).
- 2** Identify methods of assessment of fat loss vs general weight loss, and distinguish related cues to help client manage expectations.
- 3** Evaluate metabolic adaptation research and macronutrient research for muscle preservation.
- 4** Determine and counsel the causes of plateaus as they relate to food, exercise, and emotions, and implement the appropriate course of action.

Metabolism:

Noun: the process by which your body converts what you eat and drink into energy

Calories + Oxygen → Energy

- Used to carry out all bodily functions
- Basal Metabolic Rate (BMR):** the number of calories your body uses to carry out its basic functions
- Resting Metabolic Rate (RMR):** the number of calories burned at rest
- These two terms are often used **interchangeably**
- Factors determining your individual RMR:
 - Body size and composition
 - Gender
 - Age



- Additional Factors**
- Sleep
 - Hormones
 - Dieting history
 - Macronutrient distribution
 - Nutrient density of food
 - Circadian rhythm
 - Medications/disease states

Exercise:
If there is no calorie deficit because extra calories are consumed, no weight is lost.

Does Exercise Cause Weight Loss?
Perhaps you've heard:



ABS
are made in the
KITCHEN
YOU CAN'T OUT-TRAIN
A BAD DIET

Most Basic Needs to Survive and Thrive

Fluid

- Satiety
- Water-induced thermogenesis (up to 30-40 min post-ingestion)
 - Cool water between meals (16 oz., 3x/day)
 - Burns ~17,400 cal annually (~5 pounds)
 - Estimated need: half body weight in pounds (70 oz. for 140 pounds)

Calories

- Insufficient intake (starvation-stress response)
 - RMR suppression up to 20%
 - Effects of elevated cortisol on thyroid-stimulating hormone (TSH, and T3 and T4 production)
 - If RMR is 1200, that's 240 calories/day (25 pounds annually)
 - If RMR is 1500, that's 300 calories/day (31 pounds annually)
- Respect hunger (below the neckline), but control appetite (above the neckline)
 - Leaner countries: stop eating when satisfied based on internal cues (6 on hunger scale: a little full, but pleasantly full)
 - US: stop eating when full (7 on hunger scale: a little uncomfortable, but could still eat) and often this is based on external cues (size of cup/plate, eating until plate is clean)

Boschmann M, Steingiger J, Franke G, Birkenfeld AL, and LuftFC. (2007). Water drinking induces thermogenesis through osmosensitive mechanisms. *Journal of Clinical Endocrinology and Metabolism*. 92:3334-3337
Omschinski L. (1992). You count, calories don't. *WansinkB*. (2007). *Mindless Eating*.

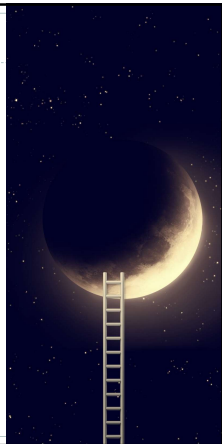
Aging

- Metabolism decreases ~2% per decade starting in your 20s
 - Burn about 25-30 less calories/day (= to a 5-6 minute walk), 2.5 to 3 pounds annually
 - Due to ongoing muscle loss (sarcopenia)
 - Hormonal changes
 - Changes in behavioral norms and social influences
- Metabolism decreases ~6-8% per decade after 50
- Change in stress level
- Typically sleep less
- More sedentary
 - At home
 - Often working longer hours
 - Often driving longer distances
- More money
 - ↑ Dining out
 - ↑ Alcohol (or more frequent)
 - ↑ Vacations/travel



Sleep and Alcohol

- Sleep Stages 3 and 4:
 - Deep sleep providing physical restoration
 - Body heals, repair, and regeneration of tissues
- REM Sleep: Mental Restoration
 - 90 minute cycle to complete all stages
 - Need 4-5 cycles to restore your body (7-9 hours is optimal)
 - 4 cycles is 6 hours
 - 5 cycles = 7.5 hours
 - 7-9 hours is optimal
- Alcohol disrupts sleep and hormonal balance, particularly testosterone
- Liver has to prioritize removal of toxins: each serving of alcohol takes about 1 hour to metabolize



Prevention: Fueling for Movement and Sustenance is Key

Child-onset obesity: twice as many fat cells as adults

- Adult has ~30-50 billion fat cells
- Obese adults (with child-onset obesity) has 60-100 billion fat cells
- Once weight is lost, the body has a persistent, strong drive to regain it.

“The more fat cells one has, the more difficult it is to reduce or maintain weight. Theory: Every adipocyte needs to maintain a minimal amount of fat—an increased number of adipocytes resists weight reduction.”*

*Comans, Fabio. Metabolism and Fat. Understanding Scientific Principles for Application. Presentation given at SCW Fitness Marka Conference. Chicago, IL, October 2019.
Sherk et al. *Physiol Reports*, 2017;Higginson and Mchamara. *Evolution, Medicine & Public Health*, 2016;Maclean et al. *Am J Physiol*, 2011;Jackson et al. *Am J Physiol*, 2010; Brownell K. et al. *Physiology and Behavior*, 1986

Lean Body Mass

Increases in lean body mass increase the resting metabolic rate (RMR):

- Lean body mass cannot increase without adequate protein
- Each pound of muscle burns about ~5-10 cal/day at rest
- Average adults can gain about 2-4 pounds of muscle initially

https://journals.hww.com/co-clinical/nutrition/Abstract/2001/03000/Dissecting_the_energy_needs_of_the_body.11.aspx,2001

“EPOC” *Excess Post-exercise Oxygen Consumption*

- Increasing oxygen use during and after exercise also increases calories burned until homeostasis is reached
- Very demanding loads with short recovery
 - Heavy weight-lifting exercise with brief rest periods
 - Anaerobic training with short rest/recovery periods
- EPOC or “oxygen debt:” 6-15% increase for up to 24 hours depending on intensity, duration, and type of exercise
 - The major impact of exercise occurs during the activity itself
 - 5 calories are expended per liter of oxygen consumed

<https://travut.com/Ar2a2gk/>; <https://www.ncbi.nlm.nih.gov/pubmed/11710152>; <https://travut.com/vq46637b/>

“HIIT”
High Intensity Interval Training

- VO2Max improvement (cardiorespiratory fitness)
 - Near max exertion, the heart muscles' contractile capability increases
 - Increase in stroke volume
 - Increase in number of mitochondria and size, leading to greater cardiovascular capacity, despite intensity of exercise
- Insulin sensitivity improvement
- Increased subcutaneous fat and visceral fat loss
- Improvement in both elevated systolic and diastolic pressure
- Improved HDL

<https://www.unm.edu/~kravitz/Article%20folder/metabolicEffectsHIIT.html>

HIIT
VIIT
Tabata
Intervals

- **Varied** intervals
- Allows for **greater** calorie burn in **less** time
- **Don't do** HIIT on consecutive days
 - 48 hours of **recovery** time
 - **Limit to 3** maximally strenuous workouts per week
- Examples
 - HIIT/VIIT/Tabata
 - Jogging with **sprints**
 - Competitive sports like **basketball** and **soccer**
 - Jump rope
 - Swimming laps

https://www.exrx.net/docs/default-source/files/00-resource-library/high-intensity-interval-training.pdf?sfvrsn=1b072be6_2.2014

“NEAT”
Non-exercise Activity Thermogenesis

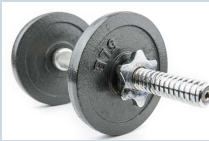
- Non-exercise movement
 - Standing
 - Fidgeting
 - Typing
 - Walking to and from the bathroom, etc.
- Calories burned per day range from about 250-475
- “Don't Just Sit There, Move!” (DJST)

Expectation Management

Upon adding carbs back (if they've been cut):

- Expect water weight gain
- Expect energy and stamina to improve, and possibly mental clarity
- Focus on how you feel, not the scale
- Greater sustainability with slow, steady fat-tissue loss
- Try these instead of the scale:
 - Total body composition analysis
 - Intermittent measurements
 - Slip-it-on-Sunday (how do clothes feel?)
 - Energy/stamina

What is typically lost when weight is lost in month 1?



Fat tissue loss looks better than fluid and muscle loss. But, it's not typically the first to go.

Slow and steady is more reasonable and sustainable, and it's usually more noticeable!

PRO TIP:
 Don't give up before month 2: you'll typically see more fat loss in month 2 than in month 1 (even though the numbers in month 1 look more impressive on the scale).



Simplify, But Don't Oversimplify

What You Eat Matters, But Especially HOW Much!

When study subjects were offered ultra-processed foods, they ate ~500 calories **more** on average, mostly from carbohydrates and fat.

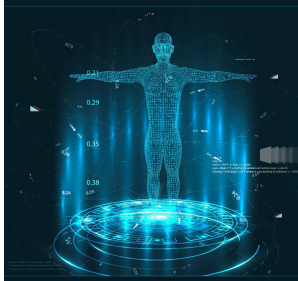
Is this 100% true?



Cell Metab. 2019 Jul 23;0(1):67-77.e3. doi: 10.1016/j.cmet.2019.05.008. Epub 2019 May 16.

Body Composition and RMR Testing

- Body composition testing
 - Visit 1
 - 4 weeks later
 - 6-12 weeks later
 - Maintenance every 4-6 months
- RMR testing annually



Time to Predict Weight Loss; JAND, June 2014
Miller, Todd, and Stephanie Mull. Preventing Metabolic Adaptation During Weight Loss. Presentation given at the Food & Nutrition Conference & Expo, Washington, DC, October 2018

Falsely-predicted RMR & Poorly-estimated Calorie Intake

A Dangerous Duo

- Significant deficit: muscle mass loss, lowers metabolism
 - Goal deficit range: 300 to 600 calories per day
 - The more fat someone has to lose, **the higher the deficit** can be without the risk of metabolic adaptation (which often happens around the 1 or 3 month point)
- Research: they think they are eating 500 calories **less** daily for 12 months, but ACTUALLY:

	Low Carb	vs	Low Fat
Month 0-3:	-884 kcal/d		-722 kcal/d
Month 3-6:	-307 kcal/d		-251 kcal/d
Month 6-12:	-56 kcal/d		-75 kcal/d

<https://onlinelibrary.wiley.com/doi/pdf/10.1002/oby.22389>, 2019

REALITY CHECK



Do your cells know when the holidays and weekends are?

Biggest Loser Research


Per a 2016 study in the Journal of Obesity:

- 6 years after the 30-week competition, RMR remained suppressed at the same average level as at the end of the competition
- Needed about 500 calories/day **lower** than expected based on body comp changes, age, etc.
- Those with the **greatest weight loss** during the competition **experienced the greatest slowing** of RMR long term
- Those who were most successful at **maintaining their weight loss** after 6 years, had the **greatest ongoing metabolic slowing**
- Leptin levels were reduced **by 94%** at the end of the 30 weeks, and 6 years later were still down from baseline **by 32.7%** (leptin is a hormone that controls satiety)

<https://onlinelibrary.wiley.com/doi/full/10.1002/oby.21538>, 2016

Calorie Needs to Stay Alive

Organ	Cals/Day Needed for 143 lb. Person
Brain	304.8
Heart	114.4
Kidney	110
Liver	254
Skeletal Muscle	278.2
Adipose Tissue	94.05
Total	1155.45



Yes, you CAN eat too little.

Kicking the Emotional Plateau

- Are your expectations realistic?
- Have you had an accurate RMR assessment?
- Could you be...
 - oversimplifying or overcomplicating?
 - comparing leading to despairing?
- Are you...
 - keeping up or always catching up?
 - strategic or sorry? i.e. splurges on weekends/holidays/traveling
- Focusing **too intently** or **too little** on “the numbers?”
- Are you listening to your body’s **cues**?
- Are you getting enough **rest** and **sleep**?
- Are you prioritizing **wellness over weight loss**?
- Are you **overtraining**?
- Has fitness/body image/food taken it’s place at the top of your list of important values, or is it fueling and energizing you to help you fulfill your greater purpose?



REALITY CHECK:
Which Aspects Can Be Managed?

Your Health Behaviors | Your Activity Level | Your Eating



Your...

- fridge
- pantry
- weekend
- habits when stressed or bored
- mini-binge
- disinhibited moments
- macronutrients

Typical Culprits

- Added sugar (especially from beverages)
- Alcoholic beverages
- Extra fat
- Large portions
- Dining out
- Late night eating/drinking
- Excessive hunger leading to hasty choices
- Mindless eating/snacking (often for reasons other than hunger)

Metabolism Jump Start
5-day, App-based Challenge

1 2 3 4 5

Daily steps to maximize your metabolism

Free for webinar participants

<https://mailchi.mp/bestbodyin52/5days>

Click to join my 5-day Metabolism Jump Start beginning on November 23, 2019

Circadian Rhythm: Diet-induced Thermogenesis (DIT)

- Meals with a high carb or high protein content had **higher** DIT when compared to high fat (not always significant)
- Meals with medium-chain triglycerides (MCTs) had a **significantly higher** DIT than long-chain triglycerides (LCTs)
- Single event meals had **significantly higher** DIT when compared to eating multiple small meals/snacks

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4539058/>, 2016

Eating During Sleeping Time

Study findings:

“The same meal consumed in the evening determined a **lower** RMR and **increased** glycemic/insulinemic responses, suggesting **circadian variations** in the energy expenditure and metabolic pattern of healthy individuals.”

<https://www.nature.com/articles/jip2015138>, 2015

Front-load for Optimal Fueling

- If you get up at 5 AM...**
 - Aim to wrap up your caloric food and beverages between 5 p.m. and 7 p.m. daily, having 75% of your total calories consumed by 2 p.m.
- If you get up at 6 AM...**
 - Wrap up between 6 p.m. and 8 p.m., having 75% of your total calories consumed by 3 p.m.
- If you get up at 7 AM...**
 - Wrap up between 7 p.m. and 9 p.m., having 75% of your total calories consumed by 4 p.m.
- If you get up at 8 AM...**
 - Wrap up between 8 p.m. and 10 p.m., having 75% of your total calories consumed by 5 p.m.



Protein Recommendations

Population	g Protein/kg/day	g Protein/lb/day
Average Individual (RDI)	0.8 g/kg/day	0.35 g/lb/day
50 years or older	1.0 g/kg/day	0.45 g/lb/day
Athletes	1.2-2.0 g/kg/day	0.5-0.9 g/lb/day
Recreational Athlete	1.0 g/kg/day	0.45 g/lb/day
Endurance Athlete	1.4-1.4 g/kg/day	0.54-0.63 g/lb/day
Strength Athlete	1.5-2.0 g/kg/day	0.68-0.9 g/lb/day

<http://forms.acsm.org/TPC/POF/13%20Gillespie.pdf>
<https://www.acsm.org/docs/default-source/brochures/protein-intake-for-optimal-muscle-maintenance.pdf>

Macronutrient Breakdown

Protein recommendations are trending **upwards** for those who are active and/or maintaining a calorie deficit.

Miller Method recommends the following to grow/preserve lean mass: fat 20%; protein: 2-2.8g/kg of lean mass and carbs to complete to calorie deficit requirement below (caution if dehydration is likely)

- Males: **at** the measured RMR or 10% **above** to create a deficit
- Females: **at** the RMR or 15% **below**
- **Not lower than 20%** below RMR (actual)

Circulation. 2007 Jul 31;116(5):480-8. Epub 2007 Jul 23.
 Miller, Todd, and Stephanie Mull. Preventing Metabolic Adaptation During Weight Loss. Presentation given at the Food & Nutrition Conference & Expo, Washington, DC, October 2018.

Reality Check!

- Are you **hydrated**? Nutrient **deficient**?
- **Eating** in regular intervals? Are you eating **enough**? (Every 3-5 hours with adequate protein and fiber each time!)
- Do you have a **diet mentality** or are you planning on **lifestyle change**?
- Are you **weight training**? **Overtraining**? **Varying**?
- Are you prioritizing **sleep**?
- **Limiting** caffeine and alcohol?
- When was your **last medical check-up** and labs?
- **Medication** check?
- **Hormone** check?
- **Are maximizing your Circadian rhythm**?

Putting It Into Practice

- Reality check: aging/metabolism vs. lifestyle/choices
- For weight loss: test actual RMR annually when possible (over predicted), and body composition regularly
 - Deficit of 300 to 600 calories per day to preserve lean mass
 - Focus on calories and macronutrients if weight loss is the goal
 - Exercise is primarily for maintenance, muscle mass preservation, and health improvement
- To increase lean mass and RMR: include intervals of increased intensity and muscle work to failure
- Manage expectations!

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QUESTIONS?

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