Burn Baby Burn: Maximize your Metabolism!

Practical Diet and Exercise Tips for Your Patients

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MAXIMIZE EATING PLAN TO WORK WITH A PATIENT’S METABOLISM
Energy Balance Equation


Estimating RMR

- **Mifflin St. Jeor Equation:**
  - **Men**
    \[ 10 \times \text{wt (kg)} + 6.25 \times \text{ht (cm)} - 5 \times \text{age (y)} + 5 \]
  - **Women**
    \[ 10 \times \text{wt (kg)} + 6.25 \times \text{ht (cm)} - 5 \times \text{age (y)} - 161. \]
  - Multiply by AF 1.3-1.5 for most of our patients.

- **EXAMPLE:**
  - **Woman:** \[ 10 \times (113.6 \text{kg}) + 6.25 \times (165.1 \text{cm}) - 5 \times 40 - 161 = 1806 \text{ kcal RMR} \times 1.3 = 2350 \text{ total kcal burned/day} \]
  - \[ - 500 \text{ kcal for 1 pound weight loss/week} = 1850 \text{ kcal goal} \]

No two individuals have the same RMR

Subjects of Same Height and Weight

<table>
<thead>
<tr>
<th>Predicted</th>
<th>Actual</th>
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<tbody>
<tr>
<td>1724</td>
<td>1263</td>
</tr>
<tr>
<td>1740</td>
<td>1523</td>
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RESTING METABOLIC RATE TESTING (RMR)
## Where Do Those Calories Go?

<table>
<thead>
<tr>
<th>Organ</th>
<th>% of Metabolic Rate</th>
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<tbody>
<tr>
<td>Brain</td>
<td>21</td>
</tr>
<tr>
<td>Heart</td>
<td>10</td>
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<tr>
<td>Kidney</td>
<td>7</td>
</tr>
<tr>
<td>Liver</td>
<td>32</td>
</tr>
<tr>
<td>Lungs</td>
<td>9</td>
</tr>
<tr>
<td>Muscle</td>
<td>16</td>
</tr>
<tr>
<td>Fat Mass</td>
<td>5</td>
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</tbody>
</table>

**RMR 60-75%**

**TEF**

**Exer/PA**

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*Graphic: Eat Well, Live Well. A Healthy Way of Life Nutrition Manual. LifeTime Fitness, 201*

Where to Get Metabolic Testing

- Good Samaritan Hospital
- Christ Hospital
- Lutheran General Hospital (out of pocket only)
- Some doctor’s offices (like ours)
- Some gyms and fitness facilities (LifeTime Fitness)

- Usually covered by insurance
- If not, $60-100 per test out of pocket
INDICATIONS FOR TESTING
RMR
Indications for Testing RMR

- **Patient just starting a weight loss journey.**
  - Need an accurate metabolic measure, a precise place to start.
  - Confidence in knowing they are consuming the right amount of kcal for weight loss.
  - Puts power in patient’s hands – eat this and you will see results.
  - Debunks any preconceived notions of what their metabolism is (fast, slow, normal)
Indications for Testing RMR

- Someone not seeing results OR someone who is discouraged from months/years of trying.
  - Need an accurate metabolic measure. Predictive equations can over and underestimate kcal needs.
  - Provides a precise and accurate starting point. No more wondering if patients are eating too much or too little.
  - Provides hope in knowing this weight loss attempt might be different.
  - Realization that metabolism is normal, not slow.
  - Provides an understanding this is within their control and gives an extra boost of motivation.
Indications for Testing RMR

- A patient whose weight has crept up over the years. Now struggling to lose.
  - Age is a factor. ~ 2%-3% decline in RMR/decade – in muscle mass
  - Over span of 30 years, that could be 6% decline.
  - Ex: 1500kcal RMR age 20 → 1410 kcal RMR age 50
Indications for Testing RMR

- Someone has lost or gained a significant amount of weight or has hit a plateau.

  - Every 10% loss = 136 kcal RMR reduction

    - For 250 pound person = 25 pounds lost

  - FFM 60-70% of RMR (FM only 5-7%) (this is importance of sparing as much muscle during weight loss as possible!)

- Also, formally obese persons have 3-5% lower RMR than their never obese counterparts.

- Readjust kcal goals to help with continued weight loss or weight maintenance.

MAXIMIZE EATING TO MAXIMIZE METABOLISM
Talk to the Patient

- Of course, we need to eat less and exercise more to lose weight. Patients know this.
- Ask WHAT and WHEN they are eating. You will be SURPRISED!
- Take a different approach.
  - “We need to work with your metabolism”
  - “Let’s talk about an eating plan that maximizes your metabolism”
  - “Do you know how your body uses calories? Let’s get an eating plan together that is metabolism-smart”
MEAL FREQUENCY
Meal Frequency

- Meal frequency inversely related to ↓ body weight in many studies (1, 2) but not all (3)

- Eating more frequently (i.e. 5-6x/d vs. 2-3x/d)
  - ↓ hunger (3, 2) which aids in better control with food and eating at each eating bout
  - ↑ satiety (2)

- Better control of insulin and glucose levels (4)

- May ↑ RMR and thermogenesis (2) – WITH PROTEIN

Meal Frequency

- Study evaluated overweight individuals- 3 groups:
  - Traditional diet 3 meals/day (~15% protein)
  - Traditional diet 6 meals/day (~15% protein)
  - High protein diet 6 meals/day (~35% protein)

- High protein 6 meals per day significantly decreased BF and ABF, increased LBM and TEM then other 2 groups.

- Thermogenesis ↑ 128% compared to other 2 groups.

- Metabolic advantage of protein, meal frequency or controlled kcal amounts throughout the day?

CALORIES PER MEAL
Calories: Does $2+2=4$?

- **1500 calories** is weight loss for most people.
- Are these 2 things the same?
  - **750 calorie lunch** & **750 calorie dinner** = 1500 cals
  - **250 calories 6 times per day** = 1500 cals

- In our clinic, however, we tend see much better weight loss with 5-6 meals/day.
- Why? Too many kcal at one time?
- How many kcal is too many at one time? What’s the threshold?
- Very limited research in this area.

ENERGY PACKETS

- 200-300 calories worth of food x 5-6 times per day.
- Allows the body to use the calories consumed and not store extra as adipose tissue.
- Helps metabolism—especially with protein.
- Limited research here, but good anecdotal evidence in our clinic.

250 250 250 250 250 250 250
7am 10am noon 3pm 6pm 8pm
PROTEIN POWER
The Protein Effect

- Can prevent the secretion of ghrelin. Stimulates the secretion of PYY, GLP-1 and CCK.
- Blunts brain's response to food stimuli and ↓ food cravings and motivation for food.
- More satiating = feel full longer.
- Triggers body to rebuild and repair tissues = lose more fat and less muscle during weight loss.
- Enhanced glycemic control
- Increased thermogenesis and RMR
- Positive effects on body composition, specifically lean muscle mass

Halton T, Hu F. *Jour Amer. Coll Nutr.* 23:5;373-385
How Much Protein?

- Unlike an Atkins-type diet, new attention w/ ~30% pro, low fat <30% & moderate CHO~40%.

- Current US dietary guidelines rec: $\sim 15\%$ of total calories (45-75g protein 1200-2000 kcal/d diet)

- Many studies suggesting benefits with 25-35%. That’s $\sim 90$-150g/d (1200-2000 kcal/d)

- Many studies are recommending $\sim 20$-30g pro/meal.

- Caution for those with renal issues or h/o gout.

Halton T, Hu F. *Jour Amer. Coll Nutr.* 23:5;373-385
Higher Protein, Moderate Fat Diets

- Recent meta-analysis of 24 randomized controlled trials (n= 1063).
- Sig differences in HP group: Body weight (↓0.79kg), FM (↓ 0.87kg) and TG(↓4.14 mg/dL)
- Mitigated reductions in FFM (0.43 kg) and RMR (142 kcal/d lesser reduction with HP diet)
- 3/5 found increases in satiety w/ high pro diet

ALERT! Protein at Breakfast

**Breakfast (1):**

- Increases fullness and reduces appetite, food cravings and ↓ neural signals that regulate reward-driven eating behavior.

**Protein (~30g!) at breakfast** a very important factor (2):

- ↓ in late-night snacking of foods high in sugar and fat.
- More fullness associated with protein breakfast then lunch and dinner
- Satiety system is activated & stays ↑ throughout the day
- Best w/ solids.

Protein Sources

Include with each meal and snack

- Lean meats - chicken, turkey, lean pork, lean beef
- Fish and seafood
- Dairy including yogurt (Greek) and light cheese
- Eggs
- Beans / lentils / legumes
- Soy products (tofu, edamame)
- Nuts, seeds
- Protein powders, shakes and bars
Helping Patients Incorporate Protein

- Have a protein with each meal **and** snack
  - Toast/celery/apple with peanut/almond butter
  - LF/LS Greek yogurt and fruit
  - Cottage cheese with fresh fruit
  - Chicken/tuna/turkey with salad or fresh veggies
  - Cheese stick and ½-1 piece whole fruit
  - 2-4 Hard boiled egg/egg white with fresh fruit
  - ½ cup edamame or ¼ cup almonds, walnuts
  - Protein bar/protein shake (<200 kcal, <10g sugar and at least 10g protein)
Lower Energy Density Foods

- Need more vegetables, whole fruits and fiber sources to increase volume without increasing calories.
- Consume with protein.
- 1 cup veggies = 25 kcal, 1 cup pasta = 250 kcal
Maximize your Eating to Maximize Metabolism

- Eat 5-6 times per day, every 2-3 hours.
- Consume 150-300 calories at each of those small meals to reduce body weight.
- Consume a protein source at each of the small meals.
- Consume adequate vegetables and fruits to help increase food volume without significantly increasing kcal.
- Keep track of what you are eating - myfitnesspal!
MAXIMIZE YOUR EXERCISE TO MAXIMIZE YOUR METABOLISM
EPOC

What is it?

- Excess post exercise oxygen consumption
- Oxygen consumption is elevated above resting levels after acute exercise.
- Leads to increased lipid oxidation for hours following the exercise session.
- The amount of EPOC and post-exercise energy expenditure is suggested to be highest when the body experiences significant physiological stress like that of high-intensity aerobic exercise.
High Intensity Interval Training (HIIT)
HIIT
(High Intensity Interval Training)

- Alternating high intensity bursts of exercise (85-95%) for 30-60 seconds with 2-4 minutes of lower intensity (60-75%).

- Regular cardio ↑ your metabolism while you're doing it, but when finished, metabolism returns to its regular rate sooner. HIIT, however, ↑ metabolism for hours afterwards.

- HIIT spikes your metabolism after your finished (while you're at rest) because your body is so strained, it needs extra time to recover.

- HIIT has been shown to significantly increase EPOC (Excess Post-Exercise Oxygen Consumption) and calorie burn for up to 36 hours.
HIIT, Cont.

- An example of HIIT on a treadmill is alternating running at 9 mph for 30 seconds, then jogging between 5-6 mph for 2 minutes.

- Think of it this way: gunning your car at 90 mph for 30 seconds, then braking down to 10 MPH, then gunning and braking again uses much more gas than driving at a steady pace. The same is true for your body, except in this case, the more fuel (body fat) you use, the better!

- Longer recovery: Not able to sustain for as long
Resistance Training
Resistance Training

- Resistance training uses external resistance to cause muscle contractions with the intent to strengthen and tone, build mass and expand endurance.

- Utilizes isometric, isotonic, or isokinetic exercise to strengthen or develop skeletal tissues of the muscles.

- Resistance training works because it breaks down muscle cells through catabolism, which prepares the body to respond with anabolism, a process that repairs and strengthens muscles.

- Resistance training ↑ the rate at which the body burns calories, high EPOC.
Resistance Training, Cont.

- Implement exercises that **recruit the largest number of muscles** (squats, lunges, kettlebell swings, squat thrusts, burpees, inverted rows, pull ups, and push ups).
- Take it slow at first. Give your body time to grow accustomed to the intense workouts!
- Use compound movements. *The more muscles engaged, the better.* Isolation movements are less effective overall.
- Find the balance between push and pull. "Push" is all about the chest and triceps, but "pull" focuses on the back and biceps.
Types of Resistance:

- Weight training:
  - Free weights
  - Machine weights
  - Universal equipment
  - Resistance bands or tubes
  - Pool exercises
  - Stability balls

- Isometric exercises: Ex: Planks

- Isokinetic exercises: Ex: Curves

- Isotonic exercises: Ex: Bench press

- Plyometric exercises: Calisthenics/Burpees
Resistance:

- Free weights:
Resistance

- Universal equipment: Pulleys:
Resistance:

- Resistance Bands or tubes
Resistance:

- Pool exercises:
Resistance:

- **Machine weights:**
Resistance

- Calisthenics/plyometrics

![Push-up Diagram](image1)

![Jump Rope](image2)
Basic cardio
Basic cardio

- Steady state type of exercises at lower/moderate/higher intensity levels (60-75%)

- Has higher sustainability

- Easier on the joints
Basic cardio vs HIIT vs Resistance

- **Which is better?**

- **HIIT:** Produces much larger amounts of EPOC after exercise. Longer recovery, increased risk of injuries due to wear and tear.

- **Lower intensity cardio:** Lower EPOC, shorter recovery, much less wear and tear, easier.

- **Resistance:** Second best way to improve EPOC. Best way to preserve or improve skeletal tissue. Skeletal tissue important to enhance EPOC.
Research Study


- Primary aim was to investigate post exercise oxygen consumption after 3 sessions of exercise at different intensity levels.

- Continuous moderate exercise “CME” (60-75%)
- One aerobic interval (30 seconds) “1-AIT” (85-95%)
- 4 aerobic intervals (30 seconds) “4-AIT” (85-95%)
Findings

- 4-AIT: 2.9 liters of O2
- 1-AIT: 1.3 liters of O2
- CME: 1.4 liters of O2

Results show that 4-AIT induces much higher EPOC compared with 1-AIT and CME.

1-AIT compared with CME gave similar results in EPOC, even though 1-AIT exercised for 19 minutes compared with 47 in the CME group.
Tips

- **Know your target heart rate**: Perform to a VO2 Max stress test: \(220 - \text{age} - \text{RHR} = \text{HRR}\): \(\text{HRR} \times \% \text{ intensity} + \text{RHR}\)

- For beginners: Focus on lower intensity cardio (60-70%) to build stamina and establish a physical base

- Modify HIIT to fit your capabilities

- For resistance: Take it slow at first. Give your body time to grow accustomed to the intense workouts!

- Use compound movements. The more muscles engaged, the better. Isolation movements are less effective overall.

- Find the balance between push and pull. "Push" is all about the chest and triceps, but "pull" focuses on the back and biceps.

- Diversify your regimen.
5 Components of Fitness

- Exercise regimen: Muscular strength, endurance, cardiovascular conditioning, body fat, and flexibility.

- Mon: HIIT (sparring) w/ stretching
- Tues: OFF
- Wed: Moderate-higher intensity cardio (swimming) (70-80%)
- Thur: HIIT (grappling) w/stretching
- Friday: Moderate-higher intensity cardio (running) (70-80%) mixed w/Weights: Chest/Triceps/Shoulders
- Sat: OFF
- Sunday: Moderate-higher intensity cardio (running) (70-80%) mixed w/weights: Back/Biceps/Legs/Core
Thank you!

Any questions?