Winter 2012 Series

Put Some Pep In Your Step

Cory Scheadler & Alex Lucas
What is a Calorie

A calorie = Energy contained in a food substance.

A single calorie = energy required to \( \uparrow \) temperature of 1g water by 1°C

1 kilocalorie (kcal) = 1 Calorie

1g CHO = 4 kcal  1g Protein = 4 kcal
1g Fat = 9 kcal  1g Alcohol = 7 kcal
How Does Your Body Use Calories?

Calories = Fuel source = Energy (E)

Energy is required to maintain life

Basal Metabolic Rate (BMR) - lowest E to sustain life.
≈ Resting Metabolic Rate (RMR) E used at rest.

Thermic Effect of Food (TEF) - E required to use food eaten (CHO<Protein)

Thermic Effect of Activity (TEA) - E required for activity

So BMR+TEF+TEA = daily total
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How can understanding Calories be of value?

Expenditure

Intake

FOOD

TEF

PHYSICAL ACTIVITY

BMR

Faculty & Staff Fitness Program
How many Calories?

Pancakes – 225
Syrup - 200

Bagel – 215
Banana – 90
Butter – 100

Orange Juice – 110
Coffee – 0
Latte - 150
### Nutrition Facts

**Serving Size:** 6 oz  
**Servings Per Container:** 25

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories</th>
<th>Calories from Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>690</td>
<td>76</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% Daily Value*</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>8g</td>
<td>13%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>3g</td>
<td>15%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>126mg</td>
<td>42%</td>
</tr>
<tr>
<td>Sodium</td>
<td>408mg</td>
<td>17%</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>109g</td>
<td>36%</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>3g</td>
<td>11%</td>
</tr>
<tr>
<td>Sugars</td>
<td>27g</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>43g</td>
<td></td>
</tr>
</tbody>
</table>

Vitamin A 2%  
Vitamin C 3%  
Calcium 3%  
Iron 10%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

<table>
<thead>
<tr>
<th></th>
<th>Calories:</th>
<th>2,000</th>
<th>2,500</th>
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</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>Less than</td>
<td>65g</td>
<td>80g</td>
</tr>
<tr>
<td>Sat Fat</td>
<td>Less than</td>
<td>20g</td>
<td>25g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Less than</td>
<td>300mg</td>
<td>300mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>Less than</td>
<td>2,400mg</td>
<td>2,400mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>300g</td>
<td>375g</td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>25g</td>
<td>30g</td>
<td></td>
</tr>
</tbody>
</table>

Calories per gram:  
Fat 9  
Carbohydrate 4  
Protein 4

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How many Calories?
Energy cost of activity

Moderate intensity exercise = 3.5 – 7 kcal per minute
- Walking - 3 to 4.5 mph
- Stationary bicycling
- General weight lifting

Vigorous intensity exercise = >7.5 kcal per minute
- Race walking - >5 mph
- Jogging or running
- Stationary bicycling >10 mph
- Circuit weight training
Additional Factors

Age – 1 – 2 % per decade (Muscle mass, Hormones)

Gender – Females < Males (Muscle mass, Hormones)

Exercise Type – Running > Walking

Fitness Level – Higher Fitness < Lower Fitness (Efficiency)
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Putting it all together
Your Energy Requirement

1. Conversions

Weight

150 lbs / 2.2 = 68.2 kg

Height

5'5" = 65" * 2.54 = 165 cm
2. Resting Metabolic Rate (RMR)

If you know your % fat:

\[
\frac{0.30}{\text{% fat}} \times \frac{68.2}{\text{weight}} = \frac{20.5}{\text{fat weight}}
\]

\[
\frac{68.2}{\text{Weight}} - \frac{20.5}{\text{fat weight}} = \frac{47.7}{\text{lean body weight}}
\]

Cunningham: \( RMR = 500 + 22 \left( \frac{47.7}{\text{Lean body weight}} \right) = \frac{1549}{\text{RMR}} \) kcal
Putting it all together
Your Energy Requirement

2. Resting Metabolic Rate (RMR)

If you do not know your % fat:

Harris-Benedict:

Male RMR
\[
66.47 + 13.75 \left( \frac{68.2}{\text{weight}} \right) + 5 \left( \frac{165}{\text{height}} \right) - 6.76 \left( \frac{30}{\text{age}} \right) = \frac{1627}{\text{RMR}} \text{ kcal}
\]

Female RMR
\[
655.1 + 9.56 \left( \frac{68.2}{\text{weight}} \right) + 1.85 \left( \frac{165}{\text{height}} \right) - 4.68 \left( \frac{30}{\text{age}} \right) = \frac{1472}{\text{RMR}} \text{ kcal}
\]
3. Physical Activity Index (PAI)

<table>
<thead>
<tr>
<th>Activity level</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Rest</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Very Sedentary</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Sedentary/Maintenance</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Light</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Light Moderate</td>
<td>1.7</td>
<td>1.6</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Heavy</td>
<td>2.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Very Heavy</td>
<td>2.3</td>
<td>2.0</td>
</tr>
</tbody>
</table>

PAI workout (PAI-w) days = ___1.7_____

PAI non-workout (PAI-nw) days = ___1.4_____

[Image of Winter 2012 Series Healthy Happy Hour]
Putting it all together
Your Energy Requirement

4. Thermal Effect of Food (TEF)

\[
\frac{1600}{RMR} \times \frac{0.05 \text{ to } 0.10}{5-10\%} = \frac{80 \text{ to } 160}{TEF}\text{ kcal}
\]
5. Estimated Energy Requirement (EER)

Workout day: \[
\frac{1600}{RMR} \times \frac{1.7}{PAI-w} + \frac{120}{TEF} = \frac{2840}{EER-w} \text{ kcal}
\]

Non-workout day: \[
\frac{1600}{RMR} \times \frac{1.4}{PAI-nw} + \frac{120}{TEF} = \frac{2360}{EER-nw} \text{ kcal}
\]
Practical implications

Taking in less Calories –

Low Fat vs. Low Calorie

Expending more calories –

Extra day of exercise

Incidental PA (stairs, parking further away)
Examples of changing your exercise routine

For a person typically exercising 2 x p/week for 1 hour
20 minutes treadmill walking -4 kcal x 20mins = 80 kcal
40 minutes weight lifting -(moderate)5 kcal x 40 = 200 kcal
= 280 – 300 kcal per session (approx)
= 560 – 600 kcal per week

Adding 1 extra workout day or half an hour of walking
= 600 + 120 = 720 kcal

Or walking faster, or higher grade
= 5kcal x 30 = 150 kcal
Examples of changing diet

Eating smaller portions – Serving sizes
Eating Smaller meals more often (TEF)
Choosing lower calorie options
Treat type foods less often

Applebee’s choc chip Sundae - 1580 kcal
Expenditure
2360

Intake-adjust accordingly

TEF - 120
PA - 640
BMR - 1600

FOOD

WITH AGING
WITH AGING

Expenditure
2360

Intake-adjust accordingly

FOOD

TEF - 120
PA - 640
BMR - 1600
WITH AGING

Expenditure
2470

Intake-adjust accordingly

FOOD

TEF - 120
PA - 750
BMR - 1600
What’s the take home?

IT takes effort to count and monitor Energy Balance

BUT,

Monitoring for a week here and there gives you a good idea of where you can make changes and really helps with managing your energy use!

GOOD LUCK!
THANK YOU FOR COMING!
We hope you enjoyed this session!
Questions!