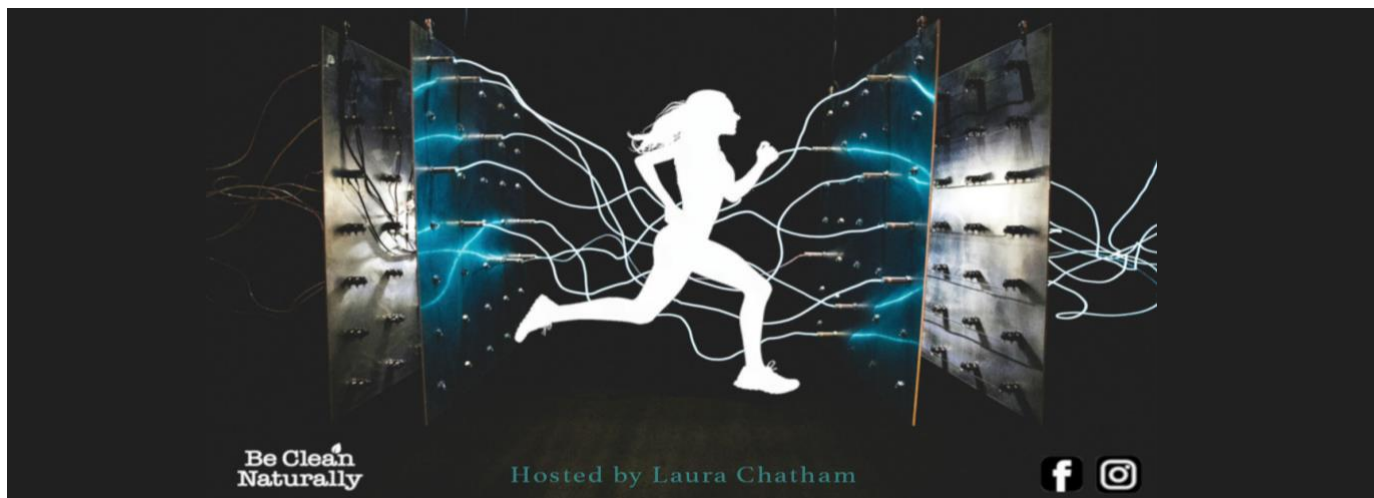


Topic: Energy

Date: August 12, 2024



OVERVIEW: Let's discuss the thing that makes all our sports (and life) possible – energy! Where does it come from (food!)? What does it do? and How do we use it to achieve the work and gains we need to perform at our best, for the longest?

AGENDA

1. What is Energy in the human body? Where does it come from, where does it go?
2. Scientific Research – 1° and 2° literature sources, references, error
3. Nutrition – What foods give me energy and how much?
4. Discussion:
 - How do I stay on top of all the shopping, and food prep, and time spent eating??
 - Environmental Sustainability
 - How to recuperate energy after big exertions (...more on this next month!)

1. WHAT IS ENERGY?

- **Energy:** the ability to do work. It can be in various forms such as heat energy, kinetic energy, or potential energy.
- **Calorie:** a measurement unit of energy. 1 calorie = amount of energy required to raise the temperature of 1 gram of water by 1°C (at 1 atmospheric pressure). *1000 calories = 1 Cal = 1kcal, which is often the unit on food labels. Note that kcal and calories are often used interchangeably (which is very confusing :/).¹

Macronutrient Energy Conversion ²	
Protein:	4 kcal / gram
Carbohydrates (sugar):	4 kcal / gram
Fats:	9 kcal / gram

2. SCIENTIFIC RESEARCH

- **Primary Literature Source:** original research papers that describe a firsthand account of an experience or experiment. They should include methods of obtaining information, possible sources of error, and numerical errors on any values given (eg. 100 ± 10 Cal).
- **Secondary Literature Source:** summaries or re-writes of primary sources. These articles are often easier to read but have more chance of having information changed or lost.
- **Reliable Articles Should Include:** Author name(s), Publish/Edit date, and References throughout text to note what information comes from where.
- **ERROR** is often not reported. Did you know that nutrition labels are allowed to be off by 20% in Canada?? This means that if your energy gel claims to have 100 Cal, it actually may have anywhere from 80-120 Cal! ^{3,4}



"Don't worry. With only one source, the speech might be plagiarism, using two or more, it is research."

3. NUTRITION

- The 3 Macronutrients that your body *needs* in large quantities and provide energy: Protein, Carbohydrates, Lipids
- **Protein:**
 - Huge variety of body functions including building/repairing tissue (muscle, skin, ligaments, tendon, etc.), DNA replication, enzyme function, metabolism, and more! Protein can also provide energy but is typically a last-resort for a body in starvation.⁵
 - Protein helps with feeling satiated (full) so can be used strategically to stop that tummy from grumbling
 - Examples: lean meat, eggs, beans, lentils, nuts
- **Carbohydrates** (sugars):
 - Energy (4kcal/g) that is metabolized and able to be used almost immediately after eating. The more complex the sugar, the longer it may take to digest but the more varied sources of energy your body has to take from.⁶
 - Stored as glycogen in your liver
 - Different types include **Simple Sugars** (monosaccharides; single sugar units) – *eg. glucose, fructose (from fruit), and galactose* – and **Complex Sugars** (di/polysaccharides) – *eg. sucrose (table sugar), lactose (milk sugar), starch*
 - Examples: cane sugar, maple syrup, honey, fruit, bread, pasta
- **Fats:**
 - A type of lipid our body mainly uses for energy and insulation. Other lipids include sterols (eg. cholesterol), fat-soluble vitamins (Vit. A, D, E & K), and phospholipids.⁷
 - Slow-acting Energy (9kcal/g) that is slow to digest and be metabolized into energy
 - Stored in adipose cells throughout your body
 - Examples: animal fat, eggs, dairy, nuts, oils

RESOURCES

- (1) Osilla, E.; Safadi, A.; Sharma, S. *Calories*. National Library of Medicine. <https://www.ncbi.nlm.nih.gov/books/NBK499909/> (accessed 2024-08-12).
- (2) *Food and Nutrition Information Center (FNIC)*. USDA National Agricultural Library. <https://www.nal.usda.gov/programs/fnic> (accessed 2024-08-12).
- (3) Government of Canada. *Nutrition labelling compliance test*. <https://inspection.canada.ca/en/food-labels/labelling/industry/nutrition-labelling/additional-information/compliance-test> (accessed 2024-08-12).
- (4) Nuckols, G. *Nutrition Labels Are Inaccurate (and the Math Behind Why It Doesn't Matter)*. Stronger By Science. <https://www.strongerbyscience.com/nutrition-labels/> (accessed 2024-08-12).
- (5) *Protein*. <https://en.wikipedia.org/wiki/Protein> (accessed 2024-08-12).
- (6) *Monosaccharide*. <https://en.wikipedia.org/wiki/Monosaccharide> (accessed 2024-08-12).
- (7) *Lipid*. Wikipedia. <https://en.wikipedia.org/wiki/Lipid> (accessed 2024-08-12).