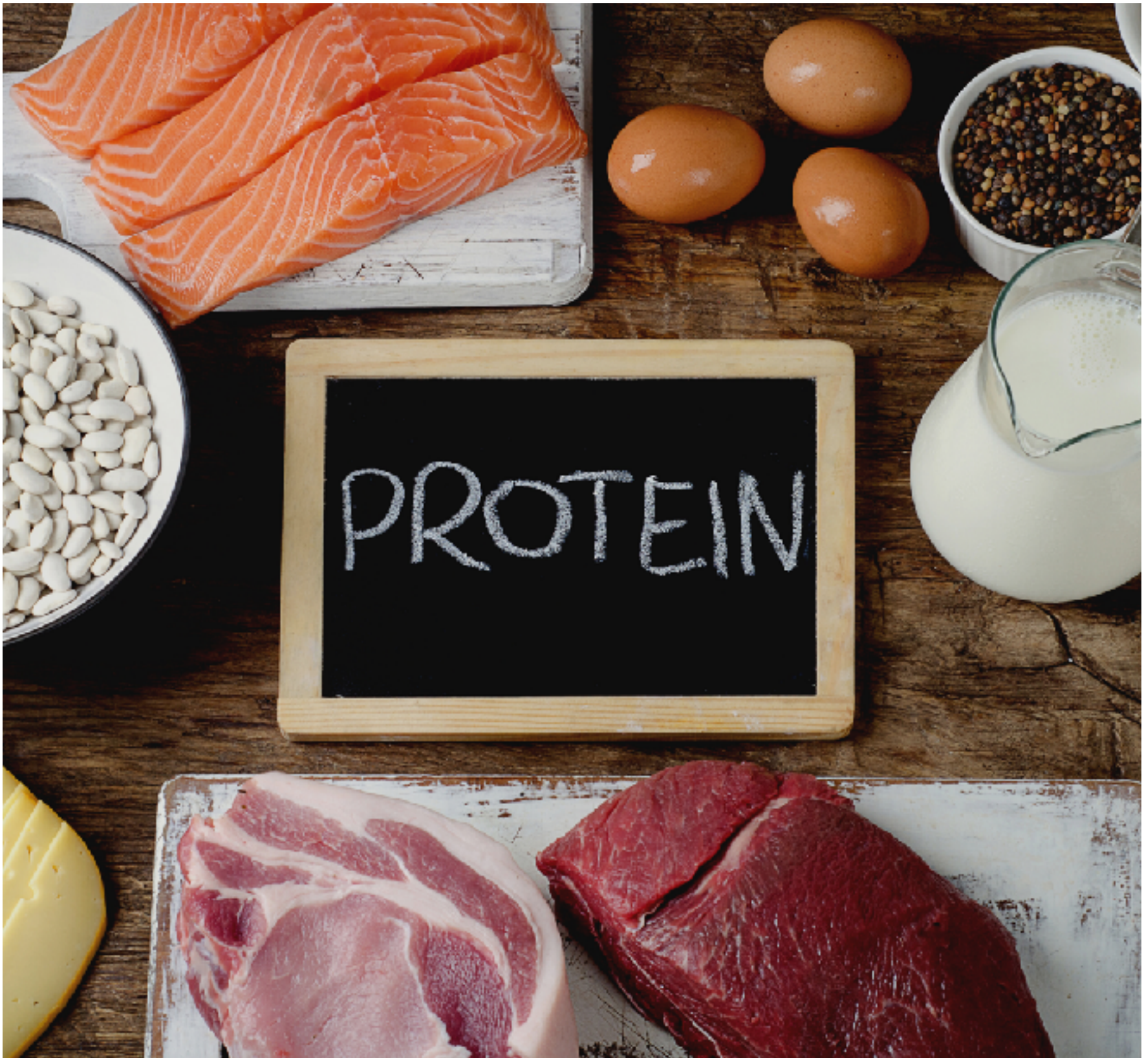
Food, Movement & Lifestyle

Protein



What is Protein?

Protein

Proteins are made up of **amino acids** that join together to form long chains known as **peptides.** Different amino acids play different roles in the body. Eg lysine, leucine and methionine are crucial in the formation of muscle.

There are 20 amino acids that help form the thousands of different protein combinations (string of beads) of proteins in your body.

Think of a piece of meat as made up pieces of protein (amino acids) strung together like a string of beads in which each bead is an amino acid but the string of beads is known as a **peptide**.

These strings of peptides make a **protein**.

Where does Protein come from?

Protein comes from bacteria. This is a question that I have often though about. How can a cow that only eats grass form so much muscle? Where is the cow getting its protein from? After all it only eats a vegetarian diet. Should humans be vegetarians for this reason? Our primary source of protein/EAA (Essential Amino Acids) in nature is in the form of bacteria, this bacteria is found on the roots of plants eg grass. The bacteria takes in nitrogen (inorganic) and makes amino acids from it as nitrogen is a structural component of amino acids. A cows stomach then digests the plant (as cows have the ability to process fibres). The bacteria in a cows' stomach will then rebalance all of the amino acids - by capturing the inorganic nitrogen and converting it into EAA that are then available for humans to consume.

What does Protein do for you?

1. It plays a role in the formation of the building blocks of the body (usually this is the only function we associate with protein).

2. Plays a metabolic role.

Why focus your diet around protein?

- Satiety
- Blood sugar control
- Build muscle
- Thermogenic calorie burn
- Helps against muscle loss as we age

Functions of protein

1. Satiety

Reduces appetite, reduces cravings for late-night snacking and hunger level. Protein is the macronutrient that takes the longest to leave the stomach, making you feel fuller for longer and slowing digestion down.

2. Build muscle

Stimulates Muscle Protein Synthesis (MPS) which means it stimulates the body to make muscle but only when eaten in a portion size of 30g.

3. Thermogenic effect

Thermogenic effect aka **Thermic Effect of Food** (TEF). Protein can increase your metabolism in the short term as it uses calories/energy to digest protein and to make use of the nutrients obtained from the protein. Protein has a higher TEF that fats or carbohydrates. Thermogenesis can lead to up to 170 calories being burnt over a day.

4. Helps with weight loss

Protein can aid the amount of calories burned in a day (thermogenic effect) and because you feel fuller for longer it can decrease the amount of calories you are consuming in a day and reduce cravings as your body is being fuelled with protein, which it could be craving other wise. Eating a diet high in protein may have a knock on effect and aid weight loss with out you even trying.

5. Helps your body repair itself after injury

Protein forms the main building blocks of your tissues, muscles and organs so it can play a major role in the repair of the body after an injury.

6. Helps you stay fit as you age

Once we hit our late 30's into our 40's our bodys' ability to make and maintain muscle starts to slow down which can lead to lower levels of muscle and strength. By keeping your protein intake high and lifting weights you can maintain muscle mass and even increase muscle mass while maintaining strength.

Amino acids

There are 20 amino acids, 9 of which are essential aka the human body can not make them, it needs to be consumed in the diet.

Non - Essential Amino acids: Can be made in the Human body

1. Alanine
2. Arginine
3. Asparagine
4. Aspartic acid
5. Cysteine
6. Glutamine
7. Glutamic acid
8. Glycine
9. Proline
10. Serine
11. Tyrosine

Essential Amino acids: Cannot be made in the Human body

1. Histidine
2. Isoleucine
3. Leucine
4. Lysine
5. Methionine
6. Phenylalanine
7. Threonine
8. Tryptophan
9. Valine

Sources of the Essential Amino Acids

Histidine - Fish, meat, dairy products, gelatine, peanuts and sunflower seeds.

Isoleucine - Cheese, gelatine, meat, fish, sunflower seeds, peanuts, and oats.

Leucine - Cheese, gelatine, meat, fish, sunflower seeds, peanuts, almonds and oats.

Lysine - Dairy products, meat, fish, tofu, beans, broccoli, lentils and potatoes.

Methionine - Dairy products, meat, fish, Brazil nuts, sunflower seeds, sesame seeds and oats.

Phenylalanine - Cheese, gelatine, sunflower seeds, peanuts, almonds and oats.

Threonine - Cheese, meat, fish, gelatine, sunflower seeds, peanuts and almonds.

Tryptophan - Cheese, meat, fish, sunflower seeds, peanuts, Brazil nuts and oats.

Valine - Cheese, meat, fish, gelatine, sunflower seeds, peanuts and oats.

Protein Requirements

- A human body needs to make up to **300g** of new proteins daily.
- A lot of recycling will take place in order to hit this number.
- For every new protein that is made, 85% of proteins are getting recycled.

Protein RDA

Unfortunately the Recommended Daily Allowance (RDA) on protein was set too long ago and hasn't been updated. If you do any searching for an answer it is set at .8g per kilo of body weight.

Latest research suggests that consuming 1.2-1.6g of protein per kilogram of body weight to be an optimum level of protein to build muscle and achieve satiety. (Leidy et al., 2015).

How to calculate your protein goal:

- Convert your weight to kilograms: divide lbs by 2.2 = bodyweight in kilos.
- Aim to consume 1.6g of protein per kg of body weight daily - this will help the body to build muscle.
- **Protein:** Multiply your body weight in kilograms by the amount of protein recommended. (Kg x protein per kilo).

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How do you figure out how much protein you should consume?

Example: Ensure body weight is in kilos e.g. 135lbs / 2.2 = 61.4kg

Amount of protein to be consumed:

1.6g x 61.4kg = 98g.

1.6g (protein amount per kilo of body weight - from chart above) x 61.4kg body weight = consume **98 grams of protein daily** to maintain health.

Protein Portion size = 30g

30g of protein = 3g of Leucine(1)

Why 30g? - a 30g portion size portion of protein should contain 3g of leucine. Leucine is an essential amino acid that stimulates the body to build muscle (MPS - Muscle Protein Synthesis).

If protein is eaten in lower amounts the protein will be used by the organs and brain of the body and not by the body to build muscle.

Are all proteins created equally? Is there a difference between animal and plant proteins?

This all comes down to the proteins DIAAS (Digestible Indispensable Amino Acid Score). Proteins that score high on DIAAS are the most compatible to human proteins.

Animal protein: A DIAAS score of 95-100% is very similar to human proteins.

Plant proteins: A DIAAS score 60-70% means the protein is not very similar to human proteins. Why is this? If a protein is attached to a fibre in a plant this can be problematic when it comes to digestion as humans can not digest fibre therefore this protein may be excreted and not absorbed. Also, plant proteins contain different ratios of EAA compared to animal proteins eg lysine is lacking in grains, methionine is lacking in peas, soy and legumes.

The limiting amino acids in plant foods are: these amino acids are key to building muscle (MPS).

1. Leucine

2. Lysine

3. Methionine

Why should your focus be on providing your body with enough protein to build muscle?

I hear it all the time “But I don’t want to get bulky” Listen lady I dare you, to try and and get bulky… it takes years of hard work and consistency with training and diet. Why should building muscle be a priority? As Dr Mark Hyman puts it “Skeletal muscle is the currency of aging; muscle is an essential element in maintaining optimal metabolic health, reducing body fat and supporting longevity. A major piece of building and maintaining muscle is protein consumption”.

Making muscle uses large volumes of amino acids, especially leucine. If the blood levels of leucine are not high enough the body cannot justify making muscle as it may not have enough amino acids for other processes in the body. Muscle building will fail to start. Exercise e.g. resistance training is catabolic (breaks down muscle). Supplementing with Branch Chain Amino Acids (BCAA) prior/during training won’t change that.

When it comes to amino acids and building muscle - which amino acids should we focus on consuming?

- Leucine - 3g with each main meal = 9g daily
- Lysine - 3g daily
- Methionine - 1g daily

Leucine - goal is to consume 9g per day

How does leucine help with building muscle (otherwise known as Muscle Protein Synthesis (MPS)? By turning on mTOR gene/protein, when mTOR is activated it triggers, muscle hypertrophy known as the muscle building, it regulates the construction and rejuvenation of muscle tissue aka cell proliferation, survival and cell death (apoptosis). Leucine turns on mTOR.

Resistance training is another method the body can use to activate mTOR. Combining leucine and resistance training is a great combination to amplify the effect of mTOR.

Leucine content in food:

Food	Grams	Leucine content
Cheddar cheese	100g	2.39g
Tuna 1	100g	1.79g
Sunflower seeds	100g	1.66g
Sesame seeds	100g	0.25g
Egg	1 x egg	0.60g
Chicken	100g	1.61g
Salmon	100g	1.62g
Prawns	100g	1.66g
Tofu	100g	0.61g
Chickpeas	100g	0.63g
Lentils	100g	0.61g
Yogurt, plain	100ml	0.58g
Whey	30g	2.5g

What does 9g of Leucine look like over the course of the day?

3 eggs = 0.6g x 3 = 1.80g of leucine = 18g or protein

100g of chicken = 1.61g of leucine = 30g of protein

150g of prawns = 2.49g of leucine = 45g of protein

50g of sunflower seeds = 0.83g of leucine = 11g of protein

100ml of yogurt = 0.58g of leucine = 6g of protein

30g Whey = 2.5-3g of leucine = 25g of protein

Leucine total = 9.81g = 135g of protein. It can take some effort to hit your leucine goal.

Lysine - The goal is to consume 1g per day

Lysine helps with Muscle Protein Synthesis (MPS) which really means building muscle and this amino acid is limited in grains, making it an ideal amino acid to focus on if you are following a vegan diet.

Lysine content in food:

Food	Grams	Lysine content
Cheddar cheese	100g	2.07g
Tuna 1	100g	2.02g
Sunflower seeds	100g	0.94g
Egg	1 x egg	0.45g
Chicken	100g	1.82g
Salmon	100g	1.83g
Prawns	100g	1.82g
Tofu	100g	0.53g
Chickpeas	100g	0.59g
Lentils	100g	0.63g
Yogurt, plain	100g	0.47g
Whey	30g	2.19g

What does 1g of Lysine look like over the course of the day?

3 eggs = 0.45g x 3 = 1.35g of leucine = 18g or protein

100g of chicken = 1.82g of leucine = 30g of protein

100g of prawns = 1.82g of leucine = 30g of protein

Lysine total = 5.02g = 78g of protein. As you can see it is quite simple to consume 1g of lysine daily.

Methionine - goal is to consume 3-4g per day

Makes and repairs RNA/DNA. The amino acids - taurine, cysteine and glutathione are made from methionine.

Methionine content in food:

Food	Grams	Methionine
Cheddar cheese	100g	.0.65g
Tuna	100g	0.65g
Sunflower seeds	100g	0.49g
Egg	1 x egg	0.19g
Chicken	100g	0.59g
Salmon	100g	.59g
Prawns	100g	.59g
Tofu	100g	0.10g
Chickpeas	100g	0.12g
Lentils	100g	0.08g
Yogurt, plain	100g	0.16g
Whey	30g	0.49g

What does 3-4g of Methionine look like over the course of the day?

3 eggs = 0.6g x 3	= 0.57g of methionine = 18g or protein
100g of chicken	= 0.59g of methionine = 30g of protein
150g of prawns	= 0.88g of methionine = 45g of protein
50g of sunflower seeds	= 0.24g of methionine = 11g of protein
100ml of yogurt	= 0 .08g of l methionine = 6g of protein
30g Whey	= 0.49g of methionine = 25g of protein

Methionine total = 2.8g = 135g of protein. It takes some effort to hit your methionine goal.

Protein goal

- What is the amount of protein you should be consuming in a day?
- Divide your protein goal between the meals that you eat in a day.
- Breakfast - snack - lunch - snack - dinner - snack.

Protein timing

Over night the body is in a catabolic state e.g. it is breaking down and recycling proteins found in the body (eg muscle). To take the body out of a catabolic state the body needs 3g of Leucine e.g. 30g of protein. For this reason it is best to consume 30g of protein at your first and last meal of the day to keep you in a muscle building state for as long as possible.

Not that lunch isn't an important meal but once we are exposed to 30g of protein/3g of leucine the body should stay in a muscle building state for up to 5 hours. The reason to hit 30g of protein at such time would be more for satiety and preventing the over consumption of refined carbohydrates, this could send blood sugar levels crashing and also encourages cravings and poor food choices later on in the day.

Having 30g of protein included in your last meal of the day will encourage:

1. Satiety

2. It will aid to keep blood sugar levels balanced which should help to improve the quality of your sleep

3. It will also help to keep you in a muscle building state e.g. anabolic state.

Protein timing around training

After training: If you are a beginner in the gym when it comes to weight training it is important to help feed your muscle and encourage MPS by consuming 30g of protein/3g of leucine within 2 hours of training. For a well trained individual - stick with your normal meals as the body knows the deal.

Protein content in food:

100g of chicken = 30g of protein aka 1/3 - 33% of chicken = protein

100g of beef = 26g of protein aka 1/4 - 25% of beef = protein

100g of pork = 25g of protein aka 1/4 - 25% pork = protein

100g of cheddar cheese = 25g of protein aka 1/4 - 25% pork = cheddar cheese

100g of prawns = 24g of protein aka 1/4 - 25% prawns = protein

100g of fish = 20g of protein aka 1/5 - 20% of fish = protein

100g of chickpeas = 19g of protein aka 1/5 - 20% of chickpeas = protein

100g of tempeh = 19g of protein aka 1/5 of - 20% tempeh = protein

100g of soy beans = 18g of protein aka 1/5 - 20% of soy beans = protein

100g of tofu = 8g of protein aka >1/10 - 10% of tofu = protein

100g of natural yogurt = 8g of protein aka >1/10 - 10% of tofu = natural yogurt

1 egg = 6g of protein19