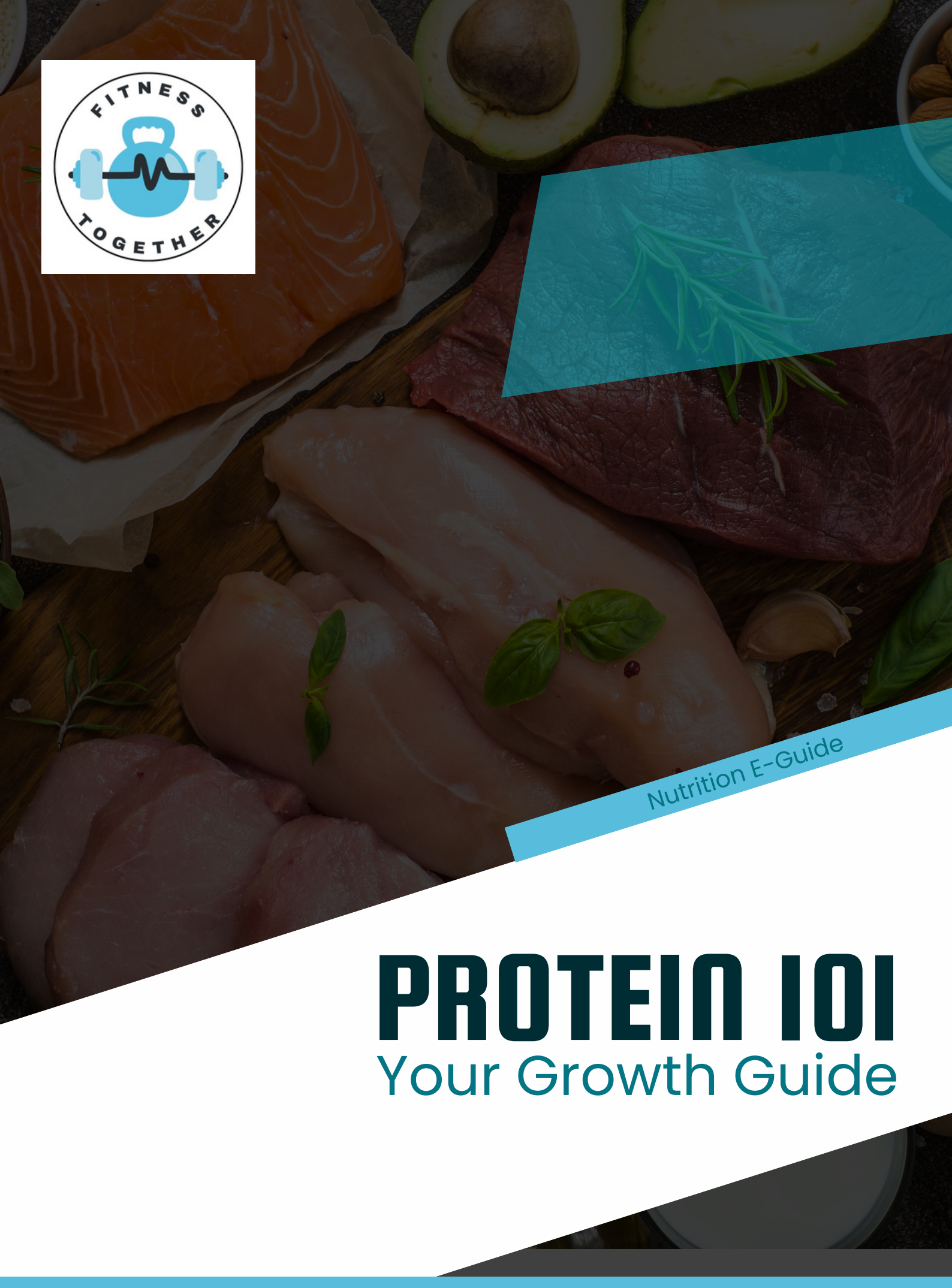

Nutrition E-Guide

PROTEIN 101

Your Growth Guide

Introduction

Protein: it's more than just a fitness buzzword. It's a key player in your health and well-being, **essential for everyone, not just athletes**. This guide is your ticket to understanding why.

Protein is the building block of your body - vital for muscle, bone, and overall health. It's not just about building muscle; it's about maintaining a healthy, functioning body.

We'll explore what protein is, how much you need, and the best ways to include it in your diet. You'll learn about different protein sources and how to balance them with your lifestyle, whether you're hitting the gym hard or just aiming for a healthier you.

Get ready for a straightforward, practical look at protein. By the end of this guide, you'll be equipped to make informed choices about how protein fits into your life.

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Protein 101: Your Complete Guide

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The Basics of Protein

Key Roles

At its core, protein is **a major component of every cell in your body**. It's like the brick-and-mortar of your muscles, organs, skin, and even hair.

When you think of protein, you might picture muscle growth and repair, thanks to foods like chicken, fish, eggs, and milk. But let's take your understanding of proteins a step further. Proteins are the **essential macromolecules of life**, the cellular action molecules. They're involved in virtually every function of our body.

STRUCTURE
Provides structure to all cells in the human body and are an integral part of muscle, bone, skin, hair and nails.

ENZYMES
Act as enzymes that accelerate biochemical reactions, vital for the generation of energy for muscle contraction.

TRANSPORT AND STORAGE
Transport and store substances, e.g. in our blood, oxygen is transported by the protein hemoglobin!

HORMONES
Hormones regulate different roles in the body such as the release of insulin from the pancreas which regulates our blood glucose levels.

SIGNALLING
Insulin from the pancreas binds to muscle cell receptors, signaling them to increase glucose uptake.

MOVEMENT
Proteins contract our muscles. The proteins in our muscles turn chemical energy stored in the bonds of ATP into mechanical work!

IMMUNE HEALTH
Proteins support out immune health by the creating antibodies to fight infections!

GROWTH AND DEVELOPMENT
Proteins have a regulatory role in the formation of new proteins and thus muscle growth and the development of new proteins.

The Basics of Protein

The Building Blocks of Life

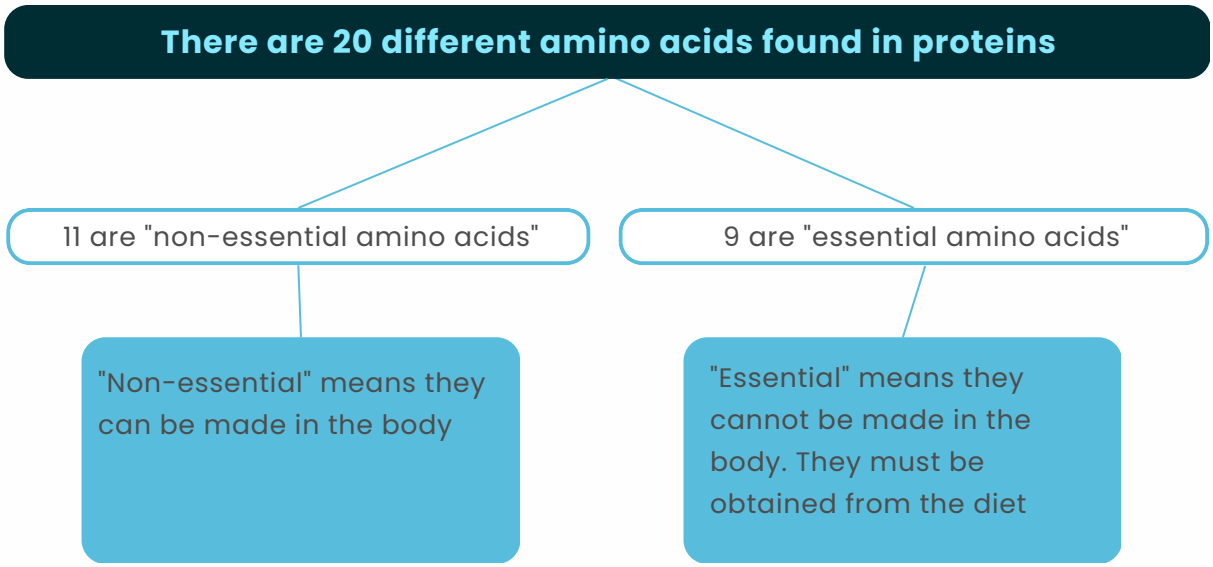
Amino acids are the building blocks of all proteins. Amino acids are connected by peptide bonds and once connected, they are called peptides. The majority of proteins are polypeptides, poly meaning many, containing up to an astonishing 300 amino acids!

Because muscle is mostly protein, meat is seen as a good source of protein. That being said, protein sources are not exclusively animal-based, there are also many plant-based protein sources. Vegetarians, however, are at risk for incomplete protein intake due to plant-based sources lacking in certain amino acids.

Incomplete protein intake is unable to sustain life and for that reason, our diet must include all essential amino acids in adequate amounts.

If you tried to build a wall without cement to bind the bricks, the wall would not be standing for a long time! You need all of the equipment to do the job properly. The same goes for protein intake. We need all amino acids to sustain life.

Diet diversity is therefore extremely important for vegetarians to ensure they get all essential amino acids in adequate quantities.



Sources & Quality

Complete vs Incomplete Proteins

Protein is found in both animal and plant sources, but there are key differences between them. Understanding these differences is crucial for making informed dietary choices, especially when balancing health and fitness goals.

Proteins can be referred to as either complete or incomplete depending on the amino acids present. This is an indicator or the quality of the protein.

Complete Protein

Contain all of the essential amino acids.

Incomplete Protein

Does NOT contain all of the essential amino acids.

Incomplete proteins are unable to sustain life and for this reason, plant based dieters need to eat varying sources of proteins to obtain all essential amino acids.

DID YOU KNOW?

Amino acids in animal-based sources are NOT different than plant-based sources. In fact, despite common misbelief, they are identical! The quality of a source of protein source is determined more so by the kinds of amino acids present. A short supply of essential amino acids will interfere with normal protein synthesis.

When you consume foods rich in protein, these foods contain different levels and varieties of essential amino acids. The quality of the protein improves with a higher presence of diverse essential amino acids and their individual amounts.

Sources & Quality

Quality

Protein quality hinges on three key factors: availability, digestibility, and the amount of essential amino acids. Availability indicates how easily the body can use the protein, while digestibility concerns how well it can be broken down and absorbed. Finally, essential amino acids are vital for high-quality protein. Together, these factors impact a protein's effectiveness in supporting health.

Essential Amino Acids

Histidine
Isoleucine
Leucine
Lysine
Methoinine
Phenylalanine
Threonine
Tryptophan Valine

Non- Essential

Alanine
Arginine
Asparagine
Aspartic acid
Cysteine
Glutamic acid
Glutamine
Glycine
Proline
Serine
Tyrosine

Animal-based sources generally outrank plant-based sources when it comes to availability, digestibility and the essential amino acids present. Plant-based sources are typically more difficult to digest due to the fiber content and the presence of ani-nutrients and as a result, have poorer absorption.

The impact of this is the need for increased consumption of plant-based proteins to meet protein needs.

Sources & Quality

Complimentary Proteins

With plant-based proteins, variety is a nutritional necessity. Unlike animal proteins, which are typically 'complete,' most plant proteins lack one or more essential amino acids. But there's a simple solution: combining different plant-based foods.

Plant-Based Food	Limiting Amino Acid	Complimentary Foods to Form Complete Protein
Beans	Methionine	Rice, Corn, Wheat
Lentils	Methionine	Rice, Almonds, Seed
Rice	Lysine	Beans, Lentils, Peas
Corn	Tryptophan	Beans, Lentils, Peas
Quinoa	Lysine	Soy Products
Grains	Lysine, Threonine Tryptophan	Beans, Lentils

Sources & Quality

Animal Based Sources

Chicken Breast

Protein per 100g = 31g
Calories per 100g = 165
20g protein = 65g
1 breast = 43g protein

Turkey Breast

Protein per 100g = 29g
Calories per 100g = 135
20g protein = 70g
1 slice = 26g protein

Lean Beef Steak

Protein per 100g = 26g
Calories per 100g = 250
20g protein = 77g
1 steak = 52g protein

Pork Loin

Protein per 100g = 27g
Calories per 100g = 242
20g protein = 75g
1 chop = 40g protein

Lamb Chop

Protein per 100g = 25g
Calories per 100g = 294
20g protein = 80g
1 chop = 30g protein

Salmon Fillet

Protein per 100g = 25g
Calories per 100g = 208
20g protein = 80g
1 fillet = 37g protein

Tuna (tinned)

Protein per 100g = 23g
Calories per 100g = 116
20g protein = 87g
1 can = 38g protein

Prawn

Protein per 100g = 24g
Calories per 100g = 99
20g protein = 84g
100g = 24g protein

Egg

Protein per 100g = 13g
Calories per 100g = 155
20g protein = 84g
2 large eggs = 26g

Low Fat Greek Yogurt

Protein per 100g = 10g
Calories per 100g = 59
20g protein = 200g
1 cup = 24g protein

Low Fat Cottage Cheese

Protein per 100g = 11g
Calories per 100g = 72
20g protein = 182g
1 cup = 25g protein

Whole Milk

Protein per 100g = 3.4g
Calories per 100g = 61
20g protein = 588g
1 cup = 8.3g protein

Sources & Quality

Plant Based Sources

Lentils

Protein per 100g = 9g
Calories per 100g = 116
20g protein = 222g
1 cup = 17g protein

Chickpeas

Protein per 100g = 7.5g
Calories per 100g = 164
20g protein = 267g
1 cup = 12g protein

Black Beans

Protein per 100g = 9g
Calories per 100g = 132
20g protein = 225g
1 cup = 15.3g protein

Kidney Beans

Protein per 100g = 8.7g
Calories per 100g = 127
20g protein = 230g
1 cup = 15.4g protein

Tofu

Protein per 100g = 8g
Calories per 100g = 76
20g protein = 250g
100g = 8g protein

Tempeh

Protein per 100g = 19g
Calories per 100g = 193
20g protein = 105g
100g = 19g protein

Edamame

Protein per 100g = 11g
Calories per 100g = 122
20g protein = 182g
1 cup = 17g protein

Quinoa

Protein per 100g = 4.4g
Calories per 100g = 120
20g protein = 455g
1 cup = 8.1g protein

Green Peas

Protein per 100g = 5g
Calories per 100g = 81
20g protein = 400g
1 cup = 7.25g protein

Chia Seeds

Protein per 100g = 17g
Calories per 100g = 486
20g protein = 118g
1 oz = 4.8g protein

Spirulina

Protein per 100g = 57g
Calories per 100g = 290
20g protein = 35g
1 tbsp = 4g protein

Seitan

Protein per 100g = 75g
Calories per 100g = 370
20g protein = 27g
100g = 75g protein

Protein & Muscle Growth

Understanding Synthesis and Breakdown

Amino acids are continuously integrated into proteins, a process known as protein synthesis, while at the same time, existing proteins are constantly being broken down and recycled, a process referred to as protein degradation or breakdown. This relationship between synthesis and breakdown is known as “protein turnover”.

This relationship relates to all proteins in the body and not just structural proteins found in your muscles.

Muscle Growth

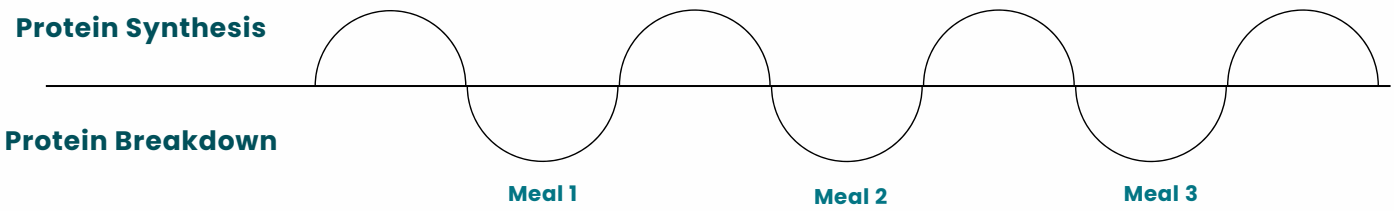
synthesis > breakdown

Muscle Atrophy

synthesis < breakdown

However, from this point, we will be focusing on the protein turnover related to muscle and how we can favor protein synthesis over breakdown to maintain or grow muscles.

Protein synthesis requires two core things, protein intake through the diet and physical activity. The amount and quality of both impact the extent of the rise in protein synthesis.



The above graph depicts a wave-like pattern of protein synthesis and breakdown across the day which is in balance. Each rise comes after feeding. The muscle mass would remain stable in such a case.

Muscle growth would occur if the waves of synthesis grow and are greater than the breakdown. The opposite is also true.

Protein & Muscle Growth

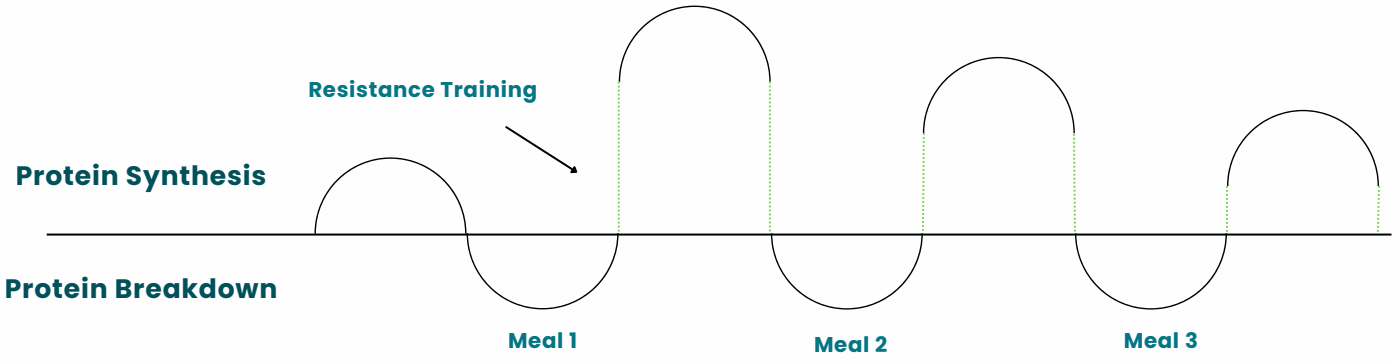
How Muscle Growth Occurs

Now that you know all about protein turnover, let's focus on how muscle growth occurs. For muscles to grow (hypertrophy), you need to have a **net positive protein turnover**. In other words, more proteins are being synthesized than are being broken down.

There are two things you can do to achieve muscle growth.

1. Complete resistance training.
2. Increase protein intake and ensure adequate energy intake.

Resistance training doesn't just challenge our muscles; it activates a complex network of growth signaling pathways which lead to a further spike in muscle protein synthesis.



After you train, you spike the rate of protein synthesis. Repeated spikes in protein synthesis over consistent periods lead to long-term net positive protein turnover, in other words, your muscles grow.

What this indicates is the importance of training first. If your muscles do not get the stimulus to grow, all the protein shakes in the world will not make a difference.

When you marry both training and appropriate nutrition, you get the perfect combination for muscle growth.

Amounts, Timing & Type

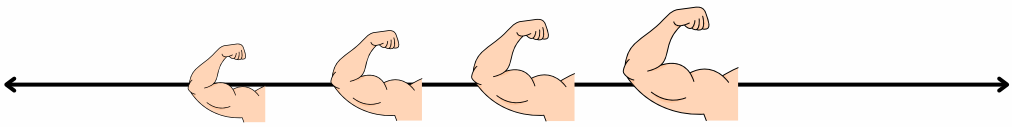
How Much Protein?

The RDA (recommended dietary allowance) of protein is 0.8 grams per kg of body mass daily. However, this amount only signifies the amount of protein needed to avoid deficiency, not how much you truly need.

Muscle growth can occur along a continuum of protein intakes. The overall body composition goal needs to be taken into account when deciding how much you will consume.

I recommend being at or above 1.6 g/kg/bm.

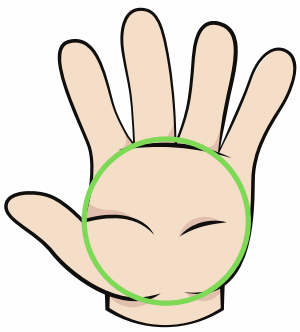
1.6
g/kg/bm



2+
g/kg/bm

The amount of **protein per serving does matter** when you are seriously focusing on muscle growth.

The rate of muscle protein synthesis appears to be maximized between 0.3 to 0.4 g/kg/bm per serving. Eating more than this does not have any additive benefit when it comes to muscle growth.



For simplicity's sake aim to achieve a **palm of protein** per meal to meet your protein needs.

Tracking isn't for everyone and you do not need to weigh all of your food!

DAILY INTAKE

1.6–2+
g/kg/bm

e.g 80 X 1.6-2.2 = 128-176g

PER SERVING

0.4
g/kg/bm

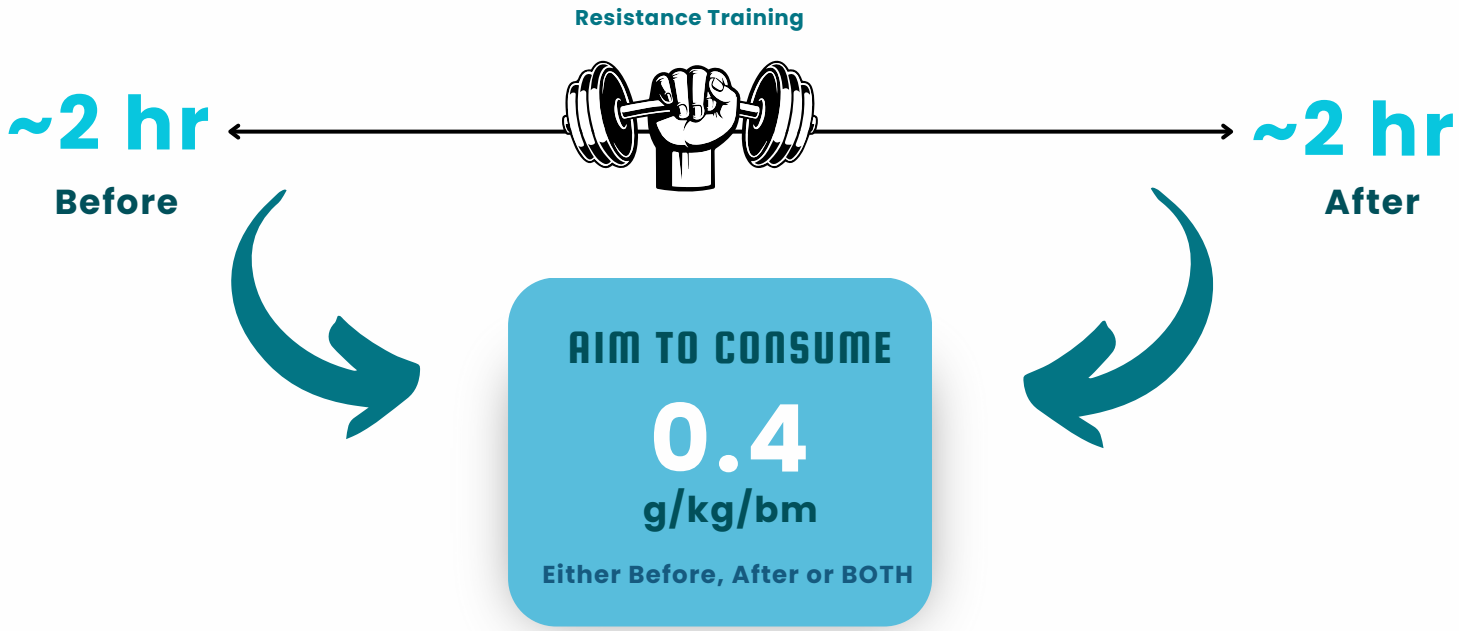
e.g 80 X 0.4 = 32g

Amounts, Timing & Type

When Should I Eat?

Resistance training primes the muscles the be more responsive to protein intake. The spike in muscle protein synthesis after exercise lasts for up to 24-48 hours but it diminishes over time, once it reaches its peak soon after the exercise.

Given this spike in muscle protein synthesis from resistance training, it is very wise to maximize the responsiveness by consuming protein in 1 to 2 hours before and/or after exercise.



There is little difference between consuming protein before vs after exercise, with research to support both being effective strategies. The main thing is to consume protein within the time frame around exercise.

Outside of these timings, aim to have an even distribution between meals. Aim to space protein intakes by 3 to 5 hours throughout the day.

Amounts, Timing & Type

What Should I Eat?

The type of protein source you eat is a key component of maintaining protein balance or a positive protein balance.

When it comes to natural protein sources, the best choice for digestibility and amino acid availability is lean animal-based sources. For example, the three below (refer back to page 6) for more.

Chicken Breast

Protein per 100g = 31g
Calories per 100g = 165
20g protein = 65g
1 breast = 43g protein

Turkey Breast

Protein per 100g = 29g
Calories per 100g = 135
20g protein = 70g
1 slice = 26g protein

Lean Beef Steak

Protein per 100g = 26g
Calories per 100g = 250
20g protein = 77g
1 steak = 52g protein

Foods that contain all of the essential amino acids are best to support muscle growth. If you are a plant-based eater, you will need to consume more food volume and be careful to pair your sources to achieve both adequate protein intake and all of the essential amino acids.

DID YOU KNOW?

Another factor is the amount of the amino acid **leucine** present. Leucine is a key player in the increase of muscle protein synthesis. Protein foods that are high in leucine are therefore advantageous, with 3 grams being the magic number. Animal-based sources are rich in leucine, as it the supplement **whey protein.**

Protein & Other Nutrients

Combo with Carbs

After a rigorous workout, your body craves nutrients for recovery. Aside from replenishing glycogen stores, carbohydrates step in to elevate insulin levels, a hormone known for its muscle-preserving qualities.

Insulin works its magic by reducing the breakdown of protein and encouraging the uptake of amino acids into the muscles. This process is vital, especially after resistance training, where muscle protein breakdown is a common aftermath.

Consuming a mix of protein and carbohydrates after a workout has been shown to lead to greater muscle protein synthesis compared to consuming either nutrient alone. This enhanced synthesis is due to the increased muscle protein building that occurs when these nutrients are ingested together.

Results from the research suggest that the ingestion of <20 grams of protein with a larger amount of carbohydrates can increase net muscle protein synthesis in the hours after resistance exercise.

When your protein intake is above this point, there is no additive effect of carbohydrate intake on muscle protein synthesis.

So what does this mean?

If you are stuck on post-exercise protein options, combine your smaller protein source with a carb source to boost your recovery.

BCAA

Branched Chain Amino Acids

Branched-Chain Amino Acids (BCAAs) have become a staple in the fitness world, touted for their supposed muscle-building and recovery benefits. Comprising **leucine**, **isoleucine**, and **valine**, BCAAs are indeed essential amino acids. But do they live up to the hype?

BCAAs are not made in the body and are oxidized in the body during exercise, meaning they need to be replenished. This has led to LOTS of claims about supplementing with them:

From muscle building to reducing fatigue, the claims are endless.

❌ Despite the claims, research suggests that BCAA supplements might not be as effective as once thought.

BCAAs alone don't provide all the essential amino acids needed for muscle protein synthesis. They're a part of the puzzle, but not the whole picture.

BCAA supplements can be expensive, and for most people, the marginal benefits don't justify the cost.

Instead of relying on BCAA supplements, focus on consuming complete protein sources. Foods like chicken, fish, eggs, dairy, and plant-based proteins like quinoa and soy provide a full spectrum of essential amino acids.

While BCAAs aren't necessarily harmful, they're not the magic solution they're often made out to be. A balanced diet with complete protein sources, coupled with good hydration and rest, is a more effective and holistic approach to muscle health and recovery.

Protein Powders

Safe Effective and Convenient

Protein powders are convenient, portable, and come in various forms, each with its unique properties. But with so many options, how do you know which one is right for you?

Whey

Derived from milk, whey is a fast-digesting protein rich in all essential amino acids. It's ideal for post-workout consumption due to its rapid digestion & absorption

Casein

Also from milk, casein digests more slowly, providing a steady release of amino acids. It's often recommended before bed to aid muscle recovery overnight.

Soy

A complete plant-based protein option that's comparable to whey in terms of amino acid content. Perfect for plant-based dieters.

Protein powders are supplements, meant to complement your diet, not replace whole food sources of protein. They're particularly useful in situations where you might need a quick protein source, like after a workout, or when dietary restrictions make it challenging to consume enough protein.

DID YOU KNOW?

Whey protein is made from cow's milk during cheese production. When milk is curdled to make cheese, it separates into solid curds and liquid whey. This liquid whey is then filtered to remove fats and lactose, concentrated, and dried into a powder. The result is a high-quality protein supplement.