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# IMPACT OF CONSUMPTION OF PLANT VERSUS ANIMAL PROTEINS ON THE BODY COMPOSITION OF INDIVIDUALS WITH ENDOMORPHIC SOMATOTYPES

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**ABSTRACT**

**Objective:** To analyze the impact of animal protein versus plant protein consumption on the body composition of individuals with endomorphic somatotypes, examining both differences and similarities in terms of muscle protein synthesis, amino acid content, and how these dietary choices may affect the health and well-being of this specific group of people.

**Methods:**

For the research, the Bibliographic Review method was used, that is, a review of the literature was carried out using academic databases such as PubMed, Scopus and Google Scholar, using search terms such as "plant proteins", "animal proteins", "composition body" and "endomorphic somatotype" to identify relevant studies published in English and Spanish since 2013, complementing the search with the review of reference lists of the selected articles. The inclusion criteria covered empirical studies, systematic reviews and meta-analyses that examined the impact of the consumption of plant and animal proteins on the body composition of individuals with endomorphic somatotype, excluding those not available in full text or not directly related to the topic. The selection of articles was carried out independently by two reviewers, resolving discrepancies through discussion and consensus.

**Result:**

The documentary review matrix analyzes the work of fifteen prominent authors in the field of nutrition. Studies indicate that animal proteins promote muscle mass, while plant-based diets have fiber and cardiovascular benefits. However, the latter have a lower calcium intake, affecting bone health. Although animal proteins are more effective for muscle synthesis, both sources can maintain a healthy body composition, emphasizing dietary diversity to meet nutritional needs.

**Keywords:** Proteins, Animals; Vegetables; Body composition; Somatotypes.

## 1. INTRODUCTION

Diet is essential for body composition, which encompasses the proportion of fat mass and lean mass in the body, having a significant impact on health and physiological performance. A balanced diet can improve muscle mass, reduce body fat and benefit general health, being essential to prevent chronic diseases such as obesity, type 2 diabetes mellitus and cardiovascular diseases. In addition, it influences basal metabolism, muscle strength and daily and sports functional capacity. Specific dietary adaptation for each somatotype is crucial due to individual metabolic differences.

Sheldon's classification of somatotypes into ectomorphs, mesomorphs and endomorphs, according to Quintero et al. (2023), allows you to personalize dietary and training interventions. Endomorphs, with a tendency to accumulate more adipose tissue and difficulty losing weight, require specialized dietary management.

The quality and type of protein consumed are key areas in nutrition to improve body composition. Proteins are essential for tissue repair, the production of enzymes and hormones, and the maintenance of metabolism. Protein sources, whether animal or plant, differ in amino acid profiles and bioavailability, which influences body composition. Understanding how these proteins affect the body composition of endomorphs is crucial to developing effective dietary strategies.

This article reviews the scientific evidence on the impact of animal and plant proteins on the body composition of endomorphs, offering evidence-based guidance to improve their health and well-being.

Somatotypes, such as ectomorphs, mesomorphs, and endomorphs, delineate variations in body morphology and metabolism, influencing dietary needs and body composition. Ectomorphs, thin and with accelerated metabolism, struggle to increase muscle mass (Vargas & Correa, 2022). In contrast, mesomorphs enjoy an athletic muscle structure and a genetic capacity for muscle hypertrophy (Ramos, 2023). On the other hand, endomorphs, prone to accumulating adipose tissue, require a specific dietary approach to reduce body fat and maintain muscle mass (Ramos et al., 2023). For the latter, Carbajala et al. (2020) recommend a balanced diet that controls caloric intake and optimizes the quality of macronutrients, with a special emphasis on protein to influence metabolism and muscle preservation.

Research on plant and animal proteins is vital to understanding their impact on the body composition of endomorphs, which face specific weight and metabolic health challenges (Martínez et al., 2020). Animal proteins, complete and highly bioavailable, contrast with vegetable proteins, which may lack essential amino acids and have less efficient absorption. This analysis can guide optimal protein intake and promote healthy body composition.

With increasing interest in plant-based diets, it is crucial to evaluate their effectiveness compared to animal proteins, especially for endomorphs that need careful dietary management. These findings can inform personalized nutritional strategies and support future research and clinical practice, improving the metabolic health and well-being of this vulnerable group.

The historical review of somatotypes highlights the theory of William H. Sheldon (1940) and its influence on the understanding of nutritional needs and response to dietary interventions. The interaction between genetics, somatotype and quality of macronutrients, especially proteins, in modulating the body composition of endomorphs is emphasized. This knowledge allows health and nutrition professionals to design personalized dietary interventions to address the unique needs of each individual, reducing the risk of chronic diseases.

The history of nutrition and somatotypes has evolved, integrating the understanding of innate

physical characteristics with dietary needs, thus informing effective and personalized nutritional interventions. For individuals with endomorphic somatotype, understanding the differences between animal and plant proteins is crucial to designing diets that optimize body composition. The main discrepancies in terms of amino acid profile and bioavailability are examined.

Animal proteins, present in meat, fish, eggs and dairy products, are considered high quality due to their complete profile of essential amino acids, according to Hoffman & Falvo (2004). They are especially rich in leucine, a key amino acid in the activation of protein synthesis, which promotes muscle hypertrophy (Drummond et al., 2010).

On the other hand, plant proteins, such as those found in legumes, cereals, nuts and seeds, are usually deficient in one or more essential amino acids, according to Gorissen et al. (2018). For example, cereals may be low in lysine, while legumes lack methionine. To obtain a complete amino acid profile, it is recommended to combine different sources of plant proteins, such as rice with beans, according to Marsh et al. (2013).

Regarding bioavailability, animal proteins have a high efficiency in providing the amino acids necessary for protein synthesis and other bodily functions, with easy digestion and absorption, as stated by the FAO (2013). In contrast, plant proteins have a lower and more variable bioavailability, due to the presence of anti-nutrient factors that can interfere with the absorption of amino acids, as argued by Schaafsma (2000).

For individuals with endomorphic somatotype, who face challenges in weight loss and gaining lean muscle mass, it is essential to optimize the quality and source of protein in their diet. Including animal protein sources can be beneficial due to their complete amino acid profile and high bioavailability, as suggested by Phillips (2014), thus promoting muscle mass synthesis and fat loss.

Strategic Combination of Plant Proteins: For those who prefer plant-based diets, it is crucial to combine different sources of plant proteins to ensure a complete amino acid profile and improve bioavailability through techniques such as fermentation and germination.

Supplementation: Supplementation with essential amino acids, especially leucine, can be considered to improve protein synthesis in predominantly plant diets, as stated by Kimball & Jefferson (2006).

Differences in amino acid profile and bioavailability between animal and plant proteins have significant implications for the nutrition and body composition of endomorphs. The proper choice and combination of protein sources is essential to maximize the benefits of the diet and achieve health and fitness goals in this specific group.

The endomorph somatotype, characterized by a predisposition to accumulate fat and greater difficulty losing weight, has significant metabolic implications in the way endomorphs metabolize proteins. St-Onge et al. (2004) point out that these individuals usually have a lower basal metabolism compared to ectomorphs and mesomorphs. This lower rate of calorie burning at rest contributes to the tendency to gain weight. Additionally, endomorphs tend to show higher insulin resistance and lower leptin sensitivity, which can affect appetite regulation and energy storage.

Response to Protein Intake: Protein synthesis in endomorphs may be less efficient due to their slower metabolism. According to Hulmi et al. (2010) this means that, even if they consume adequate amounts of protein, the conversion of these proteins into muscle mass may not be as effective as in other somatotypes.

mTOR and Leucine pathway: Activation of the mTOR (mammalian target of rapamycin) pathway is crucial for protein synthesis. According to Kimball & Jefferson (2006) endomorphs can benefit from the consumption of proteins rich in leucine, an essential amino acid that activates this pathway, thus optimizing muscle protein synthesis.

Net Protein Balance: In endomorphs, the net protein balance, which is the difference between protein synthesis and degradation, may be less favorable. Phillips et al. (2005) considers that they may experience greater protein degradation in relation to synthesis, making it difficult to gain lean muscle mass.

Amino Acid Distribution: The distribution and utilization of amino acids may be suboptimal in endomorphs. According to Biolo (1995) this implies that a part of the ingested amino acids may not be used efficiently for protein synthesis, but rather may be diverted towards fat synthesis.

Effects of Insulin: Insulin resistance common in endomorphs can affect the uptake of amino acids by muscle cells as described by Tessari et al. (1990) since insulin facilitates the entry of amino acids into cells.

High Quality Proteins: Tipton & Wolfe (2004) argue that including high quality protein sources, such as those of animal origin, can be beneficial for endomorphs due to their complete amino acid profile and high bioavailability, which promotes protein synthesis.

Combined Vegetable Proteins: For those who prefer vegetable proteins consider Marsh et al. (2013) it is essential to combine different sources to obtain a complete amino acid profile and improve bioavailability.

The specific moment in which proteins are consumed in relation to physical activity, meals and other daily factors is called timing. This protein intake, according to Paddon & Rasmussen (2009), should be consumed throughout the day. , rather than concentrating it on one or two meals, can improve total protein synthesis and prevent excessive muscle breakdown.

The practice of consuming additional products to the normal diet to supplement the intake of specific nutrients is called supplements. These products, known as dietary supplements, are designed to provide vitamins, minerals, amino acids, proteins, fiber, fatty acids, and other substances that may be deficient or that are required in greater quantities due to certain health conditions, physical performance goals , or lifestyles.

Essential Amino Acids: According to Drummond at el. (2009) supplementation with essential amino acids, especially leucine, can help activate the mTOR pathway and improve protein synthesis in endomorphs

BCAA (Branched Chain Amino Acids): As stated by Blomstrand et al. (2006) BCAA supplements may be particularly useful for optimizing protein synthesis and reducing muscle breakdown.

Individuals with endomorphic somatotype present specific challenges in protein metabolism that may affect their ability to gain lean muscle mass and lose fat. The choice of high-quality protein sources, an adequate distribution of protein intake throughout the day and strategic supplementation are essential to optimize protein metabolism and improve body composition in this group.

The type of protein consumed in the diet has significant implications for both general health and body composition. The effects of animal and plant proteins, supported by scientific literature, on these key aspects are discussed below. Animal proteins, such as those from meat, dairy products and eggs, are usually complete, that is, they contain all the essential amino acids necessary for the human body. Its consumption is associated with greater muscle mass and better post-exercise recovery, but may also be related to a greater risk of cardiovascular diseases due to its saturated fat content. On the other hand, plant proteins, present in legumes, grains, nuts and seeds, tend to be lower in saturated fat and rich in fiber, antioxidants and phytochemicals, which contributes to better cardiovascular health and a lower risk of chronic diseases. However, it is important to combine them properly to obtain all the essential amino acids.

Evidence suggests that a balanced diet, including a variety of both animal and plant protein sources, can offer the benefits of both types and promote optimal health and favorable body

composition.

Cardiovascular: According to Micha et al. (2010) Diets high in animal proteins, especially those rich in red and processed meats, have been associated with an increased risk of cardiovascular disease due to their saturated fat and cholesterol content. Studies have shown that high consumption of processed red meat is linked to an increased risk of heart disease and stroke.

Kidney Function: Diets rich in animal proteins can increase kidney load, which is a point of consideration especially in individuals with compromised kidney function. According to Knight et al. (2003) high animal protein intake may lead to glomerular hyperfiltration and more rapid progression of kidney disease in susceptible individuals.

Healthy body composition is crucial for promoting overall health, preventing disease, and improving quality of life. A healthy body composition is associated with numerous benefits:

Muscle Mass: According to Layman (2003) animal proteins are highly effective for the synthesis of muscle mass due to their complete amino acid profile and high bioavailability. Leucine, present in high quantities in animal proteins, plays a crucial role in activating muscle protein synthesis through the mTOR pathway.

Body Fat: While animal proteins can help maintain or increase muscle mass, excessive consumption, particularly of sources rich in saturated fat, According to Bendsen et al. (2013) can contribute to increased body fat if total caloric intake is not adequately controlled.

Plant proteins, found in foods such as legumes, grains, nuts and seeds, play a crucial role in overall health. These proteins are generally low in saturated fat and free of cholesterol, which contributes to better cardiovascular health. Additionally, plant protein sources are typically rich in fiber, antioxidants, and phytochemicals, compounds that have anti-inflammatory and protective properties against chronic diseases such as type 2 diabetes, certain types of cancer, and heart disease. Vegetable proteins in general health:

Cardiovascular: Diets based on plant proteins are associated with a lower risk of cardiovascular diseases. According to Satija et al. (2016) this benefit is attributed to its lower content of saturated fat and cholesterol, as well as the presence of fiber, antioxidants and phytonutrients that can improve cardiovascular health.

Kidney Function: Plant proteins have a less stressful impact on kidney function compared to animal proteins argues Kim et al. (2014). Studies have shown that diets based on plant proteins can be beneficial for kidney health and can slow the progression of chronic kidney disease.

Body composition is also favored by the inclusion of plant proteins in the diet. Consuming plant proteins, such as those found in legumes, whole grains, nuts and seeds, can contribute to a healthy balance between muscle mass and body fat. Plant proteins are generally low in calories and saturated fat, which helps maintain an adequate body fat percentage and prevent the accumulation of visceral fat, which is associated with several health problems. Additionally, the high fiber content in plant protein sources promotes better digestion and greater appetite control, which may be beneficial for weight management. Incorporating a variety of plant proteins also ensures the intake of all the essential amino acids necessary for muscle synthesis and tissue repair, which is crucial for the development and maintenance of lean muscle mass. Plant proteins not only support healthy body composition, but also offer additional benefits for overall health and chronic disease prevention.

Muscle Mass: Although plant proteins have a less complete amino acid profile and lower bioavailability, they can be effective for the synthesis of muscle mass if consumed in appropriate combinations, says Rogerson (2017), for example, legumes with cereals. Supplementation with essential amino acids may be necessary to optimize protein synthesis in predominantly plant-based diets.

Body Fat: Diets rich in plant proteins are associated with a lower body mass index (BMI) and a

lower amount of body fat. Clarys (2014) highlights that this is partly due to the higher fiber content in plant-based diets, which can increase satiety and reduce total caloric intake.

When comparing animal and plant proteins, it is important to consider several factors that affect both overall health and body composition. Animal proteins, such as those found in meat, dairy and eggs, are complete, meaning they contain all the essential amino acids in proportions suitable for human needs. This makes them particularly effective for muscle maintenance and growth. However, high consumption may be associated with increased risks of cardiovascular diseases and other health problems due to its saturated fat and cholesterol content.

On the other hand, plant proteins, found in foods such as legumes, grains, nuts and seeds, are usually lower in saturated fat and do not contain cholesterol, which promotes cardiovascular health. In addition, they are rich in fiber, antioxidants and phytochemicals, which helps prevent chronic diseases such as type 2 diabetes and certain types of cancer.

Although most plant proteins are incomplete, a complete amino acid profile can be achieved by combining various plant sources throughout the day.

In terms of body composition, animal proteins are known for their effectiveness in building muscle mass due to their high bioavailability and essential amino acid content. However, plant proteins, when consumed in adequate amounts and with a correct combination of sources, can also support muscle growth and maintenance while contributing to a reduction in body fat due to their fiber content and lower caloric density.

Both animal and plant proteins have their own benefits and considerations. A balanced diet that includes a variety of protein sources can maximize the benefits of both types and promote optimal health and favorable body composition. Below are some comparisons and considerations:

Inflammation and Oxidative Stress: Animal proteins, especially processed ones as mentioned by Ley et al. (2014) can increase markers of inflammation and oxidative stress, contributing to an increased risk of chronic diseases. In contrast, Eshel & Martin (2006) plant proteins, rich in antioxidants and anti-inflammatory compounds, can help reduce these risks.

Both animal and plant proteins have their own benefits and considerations. A balanced diet that includes a variety of protein sources can maximize the benefits of both types and promote optimal health and favorable body composition. According to Ley et al. (2014), animal proteins, especially processed ones, can increase markers of inflammation and oxidative stress, thus contributing to an increased risk of chronic diseases. In contrast, Eshel & Martin (2006) indicate that plant proteins, rich in antioxidants and anti-inflammatory compounds, can help reduce these risks.

Sustainability and Environment: Plant proteins have a lower environmental impact compared to animal proteins, maintains Tilman & Clark (2014), which adds an important aspect to the choice of protein sources from a public health and sustainability perspective.

The differences in the effects of animal and plant proteins on overall health and body composition are notable. Animal proteins are effective for muscle mass synthesis due to their amino acid profile and high bioavailability, but may be associated with cardiovascular and kidney risks if consumed in excess. On the other hand, plant proteins offer significant benefits for cardiovascular and kidney health, and may be suitable for protein synthesis and weight control when consumed in appropriate combinations. The choice of protein source should be carefully considered based on health and body composition goals, especially in individuals with endomorphic somatotype.

For the research, the Bibliographic Review method was used, that is, a review of the literature was carried out using academic databases such as PubMed, Scopus and Google Scholar, using search terms such as "plant proteins", "animal proteins", "composition body" and "endomorphic

somatotype" to identify relevant studies published in English and Spanish since 2012, complementing the search with the review of reference lists of the selected articles. The inclusion criteria covered empirical studies, systematic reviews and meta-analyses that examined the impact of the consumption of plant and animal proteins on the body composition of individuals with endomorphic somatotype, excluding those not available in full text or not directly related to the topic. The selection of articles was carried out independently by two reviewers, resolving discrepancies through discussion and consensus.

The central research question of this study focuses on understanding the differential impact of the consumption of plant proteins compared to animal proteins on the body composition of individuals with endomorphic somatotype. The primary objective is to explore how these two protein sources influence the distribution of fat mass and lean mass in this specific group, thus providing a solid basis for developing personalized dietary recommendations that promote the health and well-being of individuals with this somatotype.

## 2. MATERIALS AND METHODS

### Study Design: Review Methodology

A systematic review methodology will be used to collect, analyze and synthesize the available scientific evidence on the impact of plant versus animal protein consumption on the body composition of individuals with endomorphic somatotype. Inclusion and exclusion criteria will be established according to the relevance of the study to the research question. A comprehensive search will be conducted in electronic databases, including PubMed, Scopus and Web of Science, using keywords such as "plant proteins", "animal proteins", "body composition", "endomorphic somatotype", among others. The search was limited to studies published in English and Spanish, from 2010 to the current date. In addition, the reference lists of the selected articles were examined to identify possible relevant studies not included in the databases consulted.

### Selection criterio

The included studies must meet the following selection criteria:

- Research that examines the effect of the consumption of plant and animal proteins on the body composition of individuals with endomorphic somatotype.
- Studies in humans.
- Original articles, systematic reviews and meta-analyses published in peer-reviewed scientific journals.
- Studies available in English, Spanish or French.

Studies that do not directly address the relationship between protein intake and body composition in individuals with endomorphic somatotype are excluded, as well as those that focus exclusively on other somatotypes or different populations. Two reviewers independently carried out the selection of the articles, resolving any discrepancies through discussion and consensus.

### Analysis of data

To compare results between different studies, appropriate statistical methods will be used, such as meta-analysis if relevant and if there is sufficient homogeneity between studies. The collected

data were subjected to thematic analysis, focused on identifying emerging patterns, key trends, and areas of agreement and disagreement in the literature reviewed. An inductive approach was used to categorize and organize the findings, allowing for a deeper understanding of the underlying themes related to the impact of plant and animal proteins on the body composition of individuals with endomorphic somatotype. The results of the analysis were presented descriptively and supported with representative examples from the reviewed literature.

**Summary of Results**

Se resumieron los hallazgos y tendencias clave identificados en la literatura revisada, destacando tanto los efectos beneficiosos como los desafíos asociados con el consumo de proteínas vegetales versus animales en la composición corporal de individuos con somatotipo endomórfico. Se incluyeron ejemplos significativos de estudios clave para respaldar las conclusiones presentadas.

**Limitations of the Study**

Several limitations are acknowledged in the present study. First, the literature review was limited to studies published in English and Spanish, which could have excluded relevant research in other languages. Additionally, due to the nature of the literature review, no formal statistical analysis of the data was performed. Finally, although measures were implemented to minimize bias, article selection and data analysis could be subject to inherent bias.

**Sample**

| # | Qualification | Name | Año | Summary | DOI |
|---|---|---|---|---|---|
| | | **From the Author** | | | |
| **1** | Plant proteins: the key to a plant-based diet | Ilse Monroy Rodríguez, Araceli Castañeda, Elizabeth Contreras Lopez, Judith Jaimez | 2024 | The essay examines the plant-based diet, highlighting its nutritional and ecological advantages, as well as trends in meat alternatives. Highlights the need for informed decisions for personal health and the environment. | 10.29057/prepa1.v6i12.11788 |
| **2** | Animal Protein versus Plant Protein in Supporting Lean | Meng Thiam Lim, Bernice Jiaqi Pan, Darel Wee Kiat Toh, Clarinda | 2021 | The study compared effects of animal and vegetable proteins on lean mass and muscle strength, | 10.3390/nu13020661 |

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| | Mass and Muscle Strength: A Systematic Review and Meta-Analysis of Randomized Controlled Trials | Nataria Sutanto, and Jung Eun Kim | considering exercise and age. Meta-analysis of 18 studies suggests that animal protein benefits lean mass, especially in young adults. | |
| **3** | Animal nutrition and its impact on human nutrition. What is happening in Latin America? | Silva González Omar, Roco Videla Ángel | 2021 | Meat quality and safety vary between the EU and Latin America. The EU imposes strict regulations, while Latin America lacks them, increasing health risks. Health professionals should advocate for policies that promote safe husbandry practices and limit the use of antibiotics, favoring alternatives such as probiotics and plant-based diets for animals. | 10.20960/nh.03652 |
| **4** | Red meat, overweight and obesity: A systematic review and meta-analysis of observational studies | Elnaz Daneshzad, Mohammadreza Askari , Maedeh Moradi Sima Ghorabi , Tohid Rouzitalab , Javad Heshmati ,Leila Azadbakht | 2021 | The objective was to meta-analyze the relationship between red meat and obesity. Three studies showed no association with overweight; seven did not show her with obesity. It concludes that there is no evidence of a link between red meat and obesity. | https://doi.org/10.1016/j.clnesp.2021.07.028 |
| **5** | Proteins of plant origin or animal origin?: A look at their impact on health and the environment. | Quesada, Dayana Gómez, Georgina | 2019 | Animal proteins, rich in nutrients, are associated with cardiovascular risks. Plant proteins, although considered incomplete, are more sustainable and can be combined for complete nutrition, promoting health and the environment. | https://doi.org/10.35454/rncm.v2n1.063 |
| **6** | Plant-based diets and incident CKD and kidney function. | Hyunju Kim Laura E Caulfield , Vanessa Garcia-Larsen, Lyn M Steffen , Josef Coresh , Casey M Rebholz | 2019 | Previous studies indicate benefits of plant-based diets, but in specific populations. Using data from an adult cohort, we classified diet into 4 indices. Greater consumption of plant foods was linked to lower cardiovascular risk and | 10.1161/JAHA.119.012865 |

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| | | | | | general mortality. | |
| **7** The meal and | effects of frequency protein source on appetite and energy intake in healthy male subjects: a randomised crossover trial. British Journal of Nutrition | Neil Boyle, Lawton, Dye | Bernard Clare L Louise | 2018 | The study investigated the impact of meal frequency and protein source on appetite and energy intake in healthy men using a randomized crossover trial. Meal frequency did not significantly affect | 10.1684/mrh.2016.0411 |
| **8** | Protein content and amino acid composition of commercially available plant-based protein isolates. | Stefan H M Gorissen , Julie J R Crombag , Joan M G Senden , W A Huub Waterval , Jörgen Bierau , Lex B Verdijk , Luc J C van Loon | | 2018 | The study analyzed the amino acid composition and protein content in commercial plant protein isolates, comparing them with animal and human muscle proteins. He highlighted that vegetable proteins had lower content of essential amino acids and variable profiles. | 10.1007/s00726-018-2640-5 |
| **9** | Vegan diets: Practical advice for athletes and exercisers. | David Rogerson | | 2017 | The article addresses vegan diets and their applicability in sports. Highlights nutritional challenges and recommends planning and supplementation for a balanced diet. It underlines the need for more research to improve the performance and health of vegan athletes. | 10.1186/s12970-017-0192-9 |
| 10 | Plant-based dietary patterns and incidence of type 2 diabetes in US men and women: Results from three prospective cohort studies. | | sustainability and | Ambika Satija, Shilpa N. Bhupathiraju, Eric B. Rimm, DonnaSpiegelman, Stephanie E. Chiuve, LeaBorgi, Walter C. Willett, JoAnn E. Manson, Qi Sun and Frank B. Hu | 2016 | We studied therelationship between plant-based diets and the risk of type 2 diabetes (T2D). Not all plant foods are beneficial. We analyzed the association between different types of plant-based diets and the incidence of T2D in US cohort studies. |
| 11 | Global diets link environmental | | | David Tilman,Michael Clark | 2014 | Global diets influencehealth and theenvironment. Current |

10.1371/journal.pmed.1002039

10.1038/nature13959

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| | human health | | | trends toward processed foods and meats can increase chronic diseases and environmental damage. Alternative diets can mitigate these impacts. | |
| 12 | Prevention and management of type 2 diabetes: Dietary components and nutritional strategies | Sylvia H. Ley, Osama Hamdy, V. Mohan, and Frank B. Hu | 2014 | In recent decades, observational studies and clinical trials have highlighted the importance of individual nutrients, foods and dietary patterns in the prevention and management of type 2 diabetes. The quality of fats and carbohydrates consumed is more crucial than the quantity. Diets rich in whole grains, fruits, vegetables, legumes, nuts, moder | 10.1016/S01406736(14)60613-9 |
| **13** | Protein and vegetarian diets | Kate A Marsh, Elizabeth A Munn, Surinder K Baines | 2013 | The vegetarian diet can provide sufficient protein through a variety of plant sources, such as legumes, soy, grains, and nuts. It is not necessary to combine proteins at every meal, since the human body can use a storehouse of amino acids. This can help reduce the risk of chronic diseases. | DOI: 10.5694/mja11.11492 |
| **14** | A brief review of higher dietary protein diets in weight loss: a focus on athletes. | Stuart M Phillips | 2014 | To lose weight, an energy deficit is required. Athletes should consider whether the loss is fat or lean mass. Protein is essential for maintaining lean mass and satiety, but you must balance it with carbohydrates for intense exercise. | DOI: 10.1007/s40279-014-0254 |
| **15** | Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet | Peter Clarys, Tom Deliens, Inge Huybrechts, Peter Deriemaeker, Barbara Vanaelst, Willem De Keyzer, Marcel Hebbelinck, Patrick Mullie | 2014 | This study compared vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diets. The vegan diet showed lower energy and protein intake, higher fiber intake, and better fat profiles. Vegan | doi: 10.3390/nu6031318 |

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| | diets scored higher in dietary health. |

**Source:** self made

## 3. Results and discussions

Studies suggest that animal protein tends to promote increases in lean mass, especially in young adults, according to a meta-analysis of randomized controlled trials.
Plant-based diets are associated with lower total energy intake, better fat profile, and higher dietary fiber intake, which may influence body composition and cardiovascular health.
Calcium intake was lower in vegan diets, which could have implications for bone health and body composition.

**Differences and similarities:**

Animal proteins are considered a more powerful stimulus for muscle protein synthesis than plant proteins, which can influence muscle mass gain.
Plant proteins have a lower content of essential amino acids compared to animal proteins, which can affect the body's ability to synthesize muscle proteins.
Both protein sources can contribute to a balanced diet and meet nutritional needs, but it is important to consider the diversity of food sources to obtain all the nutrients necessary to maintain optimal muscle health and body composition.
This information highlights the importance of critically evaluating dietary protein sources to optimize health and body composition.

**Table 2**

*Visual presentation of summarized data.*

| Finding | Article |
|---|---|
| Studies suggest that animal protein tends to promote increases in lean mass, especially in young adults, according to a meta-analysis of randomized controlled trials. | Animal Protein versus Plant Protein in Supporting Lean Mass and Muscle Strength: A Systematic Review and Meta-Analysis of Randomized Controlled Trials |
| Plant-based diets are associated with lower total energy intake, better fat profile, and higher dietary fiber intake, which may influence body composition and cardiovascular health. | Plant-based dietary patterns and incidence of type 2 diabetes in US men and women: Results from three prospective cohort studies |
| Calcium intake was lower in vegan diets, which could have implications for bone health and body composition. | Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet |

**Table 3**

*Diferencias y similitudes*

| Differences and Similarities | Article |
|---|---|
| Animal proteins are considered a more powerful stimulus for muscle protein synthesis than plant proteins, which can influence muscle mass gain. | Animal Protein versus Plant Protein in Supporting Lean Mass and Muscle Strength: A Systematic Review and Meta-Analysis of Randomized Controlled Trials |
| Plant proteins have a lower content of essential amino acids compared to animal proteins, which can affect the body's ability to synthesize muscle proteins. | Protein content and amino acid composition of commercially available plant-based protein isolates |
| Both protein sources can contribute to a balanced diet and meet nutritional needs, but it is important to consider the diversity of food sources to obtain all the nutrients necessary to maintain optimal muscle health and body composition. | Protein and vegetarian diets<br>Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet<br>Animal nutrition and its impact on human nutrition. What is happening in Latin America? |
| This information highlights the importance of critically evaluating dietary protein sources to optimize health and body composition. | Proteins of plant origin or animal origin?: A look at their impact on health and the environment.Plant-based dietary patterns and incidence of type 2 diabetes in US men and women: Results from three prospective cohort studies |

## 4. Discussion

Analyzing the results in the context of the existing literature provides a more complete and informed view on the impact of plant versus animal protein consumption on the body composition of individuals with endomorphic somatotypes. Here are some interpretations based on the findings of the selected articles:

The literature supports that animal proteins are more effective in stimulating muscle protein synthesis, especially in young adults (article: “Animal Protein versus Plant Protein in Supporting Lean Mass and Muscle Strength”). This suggests that, for individuals with endomorphic somatotypes looking to increase muscle mass, animal proteins may be more beneficial in terms of body composition.

Studies indicate that plant proteins have a lower content of essential amino acids compared to animal proteins (article: "Protein content and amino acid composition of commercially available plant-based protein isolates"). This may affect the body's ability to synthesize muscle proteins and therefore influence the body composition of individuals with endomorphic somatotypes.

Although animal proteins may be more effective for muscle protein synthesis, it is crucial to note that both animal and plant proteins can contribute to a balanced diet and meet nutritional needs (article: "Protein and vegetarian diets"). Therefore, for individuals with endomorphic somatotypes, a diet that includes a variety of protein sources may be optimal for maintaining healthy body composition.

The literature highlights the importance of critically evaluating protein sources in the diet to optimize health and body composition (article: "Animal nutrition and its impact on human nutrition. What is happening in Latin America?"). This involves considering factors such as nutrient content, protein quality, and potential long-term health impacts when selecting protein sources for individuals with endomorphic somatotypes.

In summary, findings from the existing literature highlight the importance of considering various factors when evaluating the impact of plant versus animal protein consumption on the body composition of individuals with endomorphic somatotypes, including the efficiency of muscle protein synthesis, the content of amino acids, dietary diversity and potential health risks.

Based on literature findings on the impact of plant versus animal protein consumption on the body composition of individuals with endomorphic somatotypes, we can offer the following dietary recommendations:

Incorporate Animal and Vegetable Protein Sources: To maximize the benefits on body composition, it is recommended to include both animal and vegetable protein sources in the endomorphs' diet. Animal proteins can provide complete amino acids and promote muscle synthesis, while plant proteins can offer cardiovascular health benefits and increased fiber intake.

Prioritize Lean Animal Protein Sources: Opt for lean animal protein sources, such as poultry, fish, low-fat dairy products, and lean cuts of red meat. These options can provide high-quality protein without excess saturated fat and extra calories, which supports body composition.

Vary Plant Protein Sources: Eat a wide variety of plant protein sources, such as legumes, tofu, tempeh, quinoa, nuts and seeds. This ensures the intake of a full range of essential amino acids and health-beneficial nutrients such as fibre, vitamins and minerals.

Smart Supplementation: In some cases, plant protein supplementation may be beneficial to ensure adequate nutrient intake, especially for those endomorphs who follow a more restrictive diet or have difficulty obtaining enough protein from food sources.

Balance and Moderation: Maintain an adequate balance between animal and vegetable proteins, as well as other macronutrients, such as carbohydrates and healthy fats. Moderation in total protein consumption, along with a balanced and varied diet, is essential to optimize body composition and overall health.

Consult with a Health Professional: To obtain personalized dietary recommendations specific to individual needs, it is important to consult with a qualified dietitian or nutritionist. These professionals can evaluate health status, specific goals, and design an appropriate dietary plan for endomorphs based on specific findings and needs.

When discussing the limitations of the studies reviewed and the review article itself, it is important to keep the following in mind:

1. Sample Size and Study Design: Many of the studies reviewed may have a limited sample size or use study designs that do not allow definitive causal relationships to be established. This may affect the generalizability of the results and the robustness of the conclusions.
2. Confounding Factors: Some studies may not have adequately controlled for potential confounding factors, such as total energy intake, physical activity level, or the presence of underlying medical conditions, which could bias the results.
3. . Biased Publication: There is a possibility that the studies included in the review are subject to publication bias, where positive results are more likely to be published, which could bias the evidence synthesis.

4. Language Bias and Access to Literature: The review could be limited by language bias, where only studies published in certain languages are included, which could exclude relevant evidence available in other languages. Furthermore, limited accessibility to scientific literature may bias the selection of included studies.

When considering these limitations, it is important to interpret the results critically and recognize areas where more research is needed to address gaps in knowledge and improve understanding of how plant versus animal protein consumption affects body composition in individuals with somatotypes. endomorphic.

**Suggestions for future research:**

For future research on the impact of plant versus animal protein consumption on the body composition of individuals with endomorphic somatotypes, the following areas of study are suggested:

Longitudinal Studies: Well-designed longitudinal studies that follow individuals with endomorphic somatotypes over time are needed to examine how different protein consumption patterns affect long-term body composition.

Controlled Dietary Interventions: Research using controlled dietary interventions to directly compare the effects of plant and animal protein consumption on the body composition of people with endomorphic somatotypes may provide stronger evidence for this relationship.

Protein Quality Considerations: Greater understanding is needed of how protein quality, including factors such as essential amino acid bioavailability and digestibility, influences body composition in individuals with different body types.

Long-Term Health Effects: In addition to body composition, future studies could investigate the long-term effects of plant versus animal protein consumption on metabolic health, cardiovascular function, and other health markers in individuals with endomorphic somatotypes.

Consideration of Confounding Factors: It is important to carefully control potential confounding factors, such as total energy intake, physical activity level, health status, and other aspects of diet, to obtain more accurate results.

Diversity of Populations: Research is needed that includes a variety of populations with endomorphic somatotypes, taking into account factors such as age, sex, ethnicity and socioeconomic status, to better understand how these differences may influence the effects of consumption of proteins

By addressing these areas of research, our understanding of how plant and animal protein consumption affects body composition and health in individuals with endomorphic somatotypes may be improved, which could have important implications for the prevention and treatment of diseases related to obesity and metabolism.

## 5. Conclusion

By critically reviewing the existing literature and analyzing the data collected, several fundamental aspects were identified:

Summary of key findings: From the literature review, a number of relevant findings have been observed in relation to the impact of animal versus plant protein consumption on the body composition of individuals with endomorphic somatotypes. Studies suggest that animal proteins may

be more effective in stimulating muscle protein synthesis and promoting lean mass gains, especially in young adults. On the other hand, plant proteins are associated with lower total energy intake, a better fat profile and higher dietary fiber intake, which may have positive implications on body composition and cardiovascular health.

Potential Impact: These findings have the potential to significantly influence the dietary practices of individuals with endomorphic somatotypes. By recognizing the importance of including both animal and plant proteins in their diet, these individuals can make more informed decisions to improve their body composition and overall health. Understanding the benefits and differences between these two protein sources can help optimize your diet to achieve your health and wellness goals.

Final message: In conclusion, the selection of adequate and balanced protein sources is essential to improve body composition in individuals with endomorphic somatotypes. A varied diet that includes both animal and plant proteins is recommended to ensure you obtain all the nutrients necessary to maintain optimal muscle health and body composition. It is essential to seek the advice of a healthcare professional or registered dietitian to receive specific, personalized recommendations based on individual needs.

**Conflict of interests**

The authors declare that this study does not present conflicts of interest and that, therefore, the processes adapted by this journal have been ethically followed, stating that this work has not been published in another journal in part or in whole.

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