

The Positive Effects of the Keto Diet on Muscle Building: A Comprehensive Overview

Professor Nikolaos Tzenios Ph.D., FRSPH, FRSM, FAAMFM, FWAMS, FMRS, AcIASS, mRSB, DABAAHP¹, Dr. Mary E. TAZANIOS, MD ObGyn², Mohamad Chahine, Ph.D.³, Poh Omasyarifa Binti Jamal⁴

¹ Public Health and Medical Research, **Charisma University**, Grace Bay, Turks and Caicos Islands,

Train to Teach in Medicine, Department of Postgraduate Medical Education, Harvard Medical School, Boston, Massachusetts, USA,

Doctor of Health Sciences Candidate, **MCPHS University**, Boston, Massachusetts, USA
Harvard Medical School Postgraduate Medical Education High Impact Cancer Research 2019-2021

² Clinical Research, TRG GEN+, Beirut, Lebanon

³ Biological and Chemical Technology, International Medical Institute, Kursk State Medical University, Kursk, Russian Federation.

⁴Obstetrics & Gynecology, Kursk State Medical University, Kursk, Russian Federation

Corresponding Author:

Professor Nikolaos Tzenios Ph.D., FRSPH, FRSM, FAAMFM, FWAMS, FMRS, AcIASS, mRSB, DABAAHP¹ 3 Walham Yard, SW61JA, London, Uk

Email address: Nicolas@Trccolleges.com

Abstract

The ketogenic (keto) diet, characterized by high fat, moderate protein, and low carbohydrate intake, has gained popularity for its potential health benefits and weight loss effects. Its impact on muscle building, however, remains a subject of interest and debate. This review aims to examine the current literature on the keto diet's role in muscle growth, recovery, and performance. We discuss how ketosis-induced changes in fat oxidation, inflammation, and hormonal balance may contribute to muscle building. The evidence suggests that, under certain conditions, the keto diet can support muscle growth and improve recovery in athletes and fitness enthusiasts.

Keywords: ketogenic diet, muscle building, athletic performance, ketosis, fat oxidation, inflammation, hormonal balance, muscle protein synthesis, resistance training, keto-adaptation, essential amino acids, body composition, individual variability.

Introduction

The ketogenic (keto) diet has become increasingly popular in recent years, particularly among athletes and fitness enthusiasts seeking to optimize body composition and performance. The keto diet is a high-fat, moderate-protein, and low-carbohydrate dietary approach, which aims to induce a state of ketosis – a metabolic process wherein the body shifts from utilizing glucose for energy to utilizing ketone bodies derived from fat (Paoli et al., 2015). While the keto diet's effects on weight loss and various health conditions have been well documented, its impact on muscle building remains a subject of interest and debate. This review examines the current literature to elucidate the positive effects of the keto diet on muscle building.

1. Enhanced Fat Oxidation and Energy Utilization

The state of ketosis promotes a shift in the body's primary energy substrate from glucose to ketone bodies derived from fat (Volek et al., 2016). This process enhances fat oxidation, leading to greater energy availability, which may support muscle growth and recovery (Wilson et al., 2017). By preserving glycogen stores in muscles, the keto diet can help athletes maintain energy levels during prolonged training sessions or competition (Phinney et al., 1983). Moreover, keto-adapted athletes have demonstrated improved endurance

performance, with some studies suggesting that these individuals may rely less on muscle glycogen during prolonged exercise (Volek et al., 2016).

2. Reduced Inflammation and Improved Recovery

The keto diet has been shown to reduce inflammation, a critical factor in muscle recovery and growth (Youm et al., 2015). Lower levels of inflammation may accelerate the repair and regeneration of muscle tissue, allowing for quicker recovery between workouts (Zinn et al., 2017). In addition, a ketogenic diet has been suggested to improve mitochondrial function and biogenesis, which can further support muscle growth and recovery (Bough & Rho, 2007).

3. Hormonal Balance and Muscle Building

The role of hormones in muscle building is well established, and the keto diet may positively impact hormonal balance (D'Agostino et al., 2013). For example, insulin sensitivity can be improved on a keto diet, allowing for more efficient nutrient partitioning and potentially contributing to muscle growth (Phinney et al., 1983). Additionally, a reduction in insulin levels during ketosis can promote lipolysis and the release of free fatty acids, providing a greater energy substrate for muscle protein synthesis (Volek et al., 2016). Furthermore, the keto diet may increase the production of growth hormone (GH) and testosterone, both of which play essential roles in muscle growth and repair (D'Agostino et al., 2013).

4. Muscle Protein Synthesis and Preservation

A key concern among those considering the keto diet for muscle building is whether adequate protein intake can be maintained to support muscle protein synthesis. Research suggests that moderate protein consumption (1.2-1.7 g/kg body weight) can promote muscle growth on a

keto diet without impairing ketosis (Paoli et al., 2012). In fact, a higher protein intake may even be beneficial, as it can increase muscle protein synthesis while sparing muscle tissue from catabolism (Wilson et al., 2017). Some studies have shown that a well-formulated keto diet can help preserve lean body mass during weight loss (Jabekk et al., 2010), while others have reported similar gains in muscle mass and strength between keto and non-keto dieters following resistance training programs (Vargas et al., 2018).

5. Potential Limitations and Considerations

While the keto diet can offer several benefits for muscle building, it is essential to recognize potential limitations and considerations. The transition to a keto diet may initially result in reduced training intensity due to a temporary decrease in energy levels as the body adapts to utilizing ketones for fuel (Burke et al., 2017). This adaptation period can last from a few days to several weeks, and individuals may experience a transient decline in performance (Phinney et al., 1983).

Additionally, some athletes may find it challenging to maintain a keto diet in the long term due to its restrictive nature, making adherence a potential issue (Paoli et al., 2015).

Furthermore, there is limited evidence on the keto diet's efficacy in promoting muscle building for high-intensity, glycolytic sports (such as sprinting and weightlifting), as these activities primarily rely on carbohydrate-based energy sources (Burke et al., 2017).

Discussion

The literature reviewed in this article highlights several mechanisms by which the keto diet may exert positive effects on muscle building. However, it is crucial to acknowledge the

limitations and controversies in the available evidence. As such, this discussion section aims to contextualize the findings and explore potential areas for future research.

First, it is important to consider the diversity of the athletic population when evaluating the effects of the keto diet on muscle building. The benefits of the keto diet may vary depending on factors such as training goals, sport type, individual metabolic responses, and genetic factors (Volek et al., 2016). For example, endurance athletes may experience greater benefits from the keto diet due to the enhanced fat oxidation and reduced reliance on muscle glycogen during exercise (Volek et al., 2016). In contrast, athletes engaged in high-intensity, glycolytic sports may not experience the same benefits due to the higher reliance on carbohydrate-based energy sources (Burke et al., 2017).

Second, the duration of keto-adaptation should be taken into account when assessing the diet's impact on muscle building. The initial decrease in training intensity during the transition to ketosis could hinder muscle growth and overall performance (Phinney et al., 1983). However, once fully adapted to the keto diet, athletes may experience improved recovery and hormonal balance, supporting muscle building (D'Agostino et al., 2013).

Therefore, future studies should consider the time course of keto-adaptation and its potential effects on muscle growth.

Third, the quality of dietary protein sources and the balance of essential amino acids (EAAs) should be considered when evaluating the impact of the keto diet on muscle building. The availability of EAAs, particularly leucine, plays a crucial role in muscle protein synthesis (Wilson et al., 2017). It is essential for individuals following a keto diet to ensure adequate protein intake and appropriate EAA balance to promote muscle growth.

Lastly, the majority of studies investigating the effects of the keto diet on muscle building have been conducted in the short term. Longitudinal studies are needed to better understand the long-term impact of the keto diet on muscle mass and strength, as well as the potential health implications of maintaining a ketogenic state over an extended period. In addition, more research is needed to compare the effects of the keto diet on muscle building with other dietary strategies, such as high-protein, low-fat diets or carbohydrate periodization.

By addressing these limitations and controversies, future research can contribute to a more comprehensive understanding of the keto diet's impact on muscle building and athletic performance. Such research may provide valuable insights for athletes, coaches, and fitness enthusiasts seeking to optimize their training and nutrition strategies to support muscle growth and overall performance.

Conclusion

In conclusion, the current literature suggests that the keto diet can have positive effects on muscle building under certain conditions. Enhanced fat oxidation, reduced inflammation, improved hormonal balance, and preserved muscle protein synthesis are potential mechanisms by which the keto diet may support muscle growth and recovery. It is crucial to recognize individual variability in response to the keto diet, and athletes should consider factors such as their training goals, type of sport, and personal preferences when determining if the keto diet is appropriate for their muscle-building objectives. Further research is warranted to better understand the long-term effects of the keto diet on muscle building and athletic performance across various populations and sports disciplines.

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