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Association between MOTS-c Levels and Sarcopenia Risk in Chronic Peritoneal Dialysis Patients

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Introduction

MOTS-c, a mitochondrial-derived peptide, has garnered significant attention for its role in metabolic regulation, cellular homeostasis, and muscle maintenance. In chronic peritoneal dialysis patients, the risk of sarcopenia is particularly high due to multiple contributing factors, including chronic inflammation, oxidative stress, malnutrition, and prolonged exposure to uraemic toxins. Sarcopenia, characterized by progressive loss of muscle mass and function, significantly affects morbidity and mortality in dialysis patients. Understanding the association between MOTS-c levels and sarcopenia risk could provide valuable insights into potential therapeutic interventions and early diagnostic markers.

Chronic peritoneal dialysis patients experience various metabolic and physiological changes that predispose them to muscle wasting. Uraemic toxins, persistent inflammation, and nutritional deficiencies collectively contribute to impaired protein synthesis and increased muscle catabolism. MOTS-c has been identified as a crucial regulator in metabolic processes, playing a role in insulin sensitivity, mitochondrial function, and skeletal muscle homeostasis. Reduced levels of MOTS-c have been linked to impaired muscle function and increased frailty in various populations. Therefore, examining MOTS-c levels in chronic peritoneal dialysis patients and their relationship with sarcopenia could improve risk stratification and inform personalized treatment approaches [1].

Description

Recent studies suggest that MOTS-c exerts protective effects against muscle degeneration by promoting mitochondrial biogenesis and reducing oxidative stress. The peptide interacts with key metabolic pathways, including AMP-Activated Protein Kinase (AMPK) and the mammalian target of rapamycin (mTOR), both of which are essential regulators of muscle protein synthesis and degradation. Dysfunction in these pathways contributes to muscle atrophy in dialysis patients, highlighting the potential significance of MOTS-c in mitigating sarcopenia risk. In addition, MOTS-c has been shown to enhance glucose metabolism and insulin sensitivity, factors that are closely linked to muscle health and energy balance. These mechanisms underscore the importance of evaluating MOTS-c levels in the context of sarcopenia risk among chronic peritoneal dialysis patients.

The relationship between MOTS-c levels and sarcopenia in chronic peritoneal dialysis patients has yet to be fully elucidated. However, preliminary findings from pilot studies indicate that lower MOTS-c levels are associated with reduced muscle mass and function. These findings align with existing evidence suggesting that mitochondrial dysfunction contributes to sarcopenia progression [2]. Given that peritoneal dialysis patients often exhibit metabolic alterations and energy imbalances, the potential role of MOTS-c as a biomarker for sarcopenia warrants further exploration. Establishing a direct link between MOTS-c levels and sarcopenia risk could pave the way for novel therapeutic interventions targeting mitochondrial function to prevent or mitigate muscle loss in this vulnerable population. Nutritional status is a critical determinant of muscle health in peritoneal dialysis patients, and MOTS-c may serve as an important mediator in this context. Protein-energy wasting, commonly observed in dialysis patients, exacerbates muscle degradation and accelerates sarcopenia onset. Ensuring adequate protein intake and optimizing nutritional support are essential strategies for preserving muscle mass and function. If MOTS-c levels are found to be influenced by dietary factors, interventions aimed at enhancing MOTS-c production through targeted nutrition or supplementation may offer a promising approach to managing sarcopenia risk. Additionally, physical activity has been shown to modulate MOTS-c expression, suggesting that exercise-based interventions could be beneficial in promoting muscle maintenance and metabolic health in dialysis patients [3].

Despite the growing interest in MOTS-c as a potential biomarker and therapeutic target, several challenges must be addressed before clinical implementation. The heterogeneity of peritoneal dialysis patients, variations in residual kidney function, and differences in dialysis modalities may all influence MOTS-c levels and their association with sarcopenia. Furthermore, standardized methods for measuring MOTS-c levels and defining clinically relevant thresholds are needed to ensure accurate assessment and applicability in clinical practice. Large-scale, longitudinal studies are required to validate the preliminary findings and determine the long-term implications of MOTS-c modulation in sarcopenia prevention and management. The potential clinical applications of MOTS-c measurement in peritoneal dialysis patients extend beyond sarcopenia risk assessment. Given its role in metabolic regulation and mitochondrial function, MOTS-c may have broader implications for cardiovascular health, insulin resistance, and overall patient outcomes. Identifying patients with low MOTS-c levels could allow for early interventions aimed at optimizing metabolic health and reducing complications associated with chronic kidney disease and dialysis therapy. The integration of MOTS-c assessment into routine clinical practice could complement existing risk stratification tools and provide a more comprehensive understanding of patient health status [4].

Emerging therapeutic strategies targeting mitochondrial function and metabolic pathways hold promise for mitigating sarcopenia in dialysis patients. Pharmacological agents that enhance MOTS-c activity or mimic its effects could be explored as potential interventions for preserving muscle mass and function. Additionally, lifestyle modifications, including exercise programs and dietary interventions tailored to enhance mitochondrial health, may offer practical and sustainable approaches for managing sarcopenia risk. Collaborative efforts between nephrologists, nutritionists, and exercise physiologists will be crucial in developing holistic treatment strategies that address the multifaceted nature of sarcopenia in peritoneal dialysis patients [5].

Conclusion

In conclusion, the association between MOTS-c levels and sarcopenia risk in chronic peritoneal dialysis patients represents an important area of research with potential clinical implications. While preliminary findings suggest a link between low MOTS-c levels and muscle deterioration, further studies are needed to establish causal relationships and develop targeted interventions. Understanding the role of MOTS-c in muscle health could provide valuable insights into novel therapeutic approaches aimed at mitigating sarcopenia and improving patient outcomes. By integrating MOTS-c assessment into routine

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clinical practice and exploring potential therapeutic avenues, healthcare providers may enhance the quality of life and long-term prognosis of chronic peritoneal dialysis patients.

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Conflict of Interest

None.

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