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Exclusive Enteral Nutrition (EEN) in Pediatric Crohn's Disease: Mechanisms and Long-term Outcomes

Nicole Sactila*

Department of Gastroenterology, The University of Auckland, Auckland, New Zealand

Introduction

Crohn's disease is a chronic Inflammatory Bowel Disease (IBD) that often manifests during childhood and adolescence, posing significant challenges for growth, development, and quality of life. Traditional treatment regimens, such as corticosteroids and immunosuppressants, are effective in inducing remission but are often associated with adverse effects, especially in pediatric populations. In this context, Exclusive Enteral Nutrition (EEN) has emerged as a non-pharmacological, first-line therapy for inducing remission in children with Crohn's disease. EEN involves the sole consumption of a nutritionally complete liquid formula for a defined period, typically 6 to 8 weeks, with the exclusion of all other foods. Despite its seemingly simple approach, EEN has shown efficacy comparable to corticosteroids, with the added benefits of mucosal healing and improved growth outcomes, prompting growing interest in its mechanisms and long-term effects [1].

Description

The therapeutic effects of EEN are believed to be multifactorial. One of the primary mechanisms involves the modulation of the gut microbiota. Crohn's disease is characterized by dysbiosis, or an imbalance in gut microbial communities, which contributes to chronic intestinal inflammation. EEN alters the composition of the microbiota, reducing pro-inflammatory bacterial species and increasing the abundance of beneficial microbes. This shift is associated with decreased intestinal permeability and a reduction in the levels of inflammatory cytokines such as TNF-α and IL-6. Additionally, EEN is thought to provide a "rest" to the inflamed bowel by eliminating exposure to dietary antigens and additives that may trigger or exacerbate inflammation. The formula's controlled nutrient content supports epithelial regeneration and enhances the integrity of the mucosal barrier, leading to clinical and endoscopic remission [2]. EEN also plays a critical role in improving nutritional status and supporting normal growth, which are particularly important in pediatric patients who may experience delayed puberty or growth failure due to chronic inflammation and malnutrition. By delivering balanced macro- and micronutrients in an easily absorbable form, EEN supports weight gain, lean body mass restoration, and bone mineralization. Unlike corticosteroids, which often impair growth and bone development, EEN offers a steroid-sparing alternative with positive effects on linear growth and overall health [3].

Long-term outcomes of EEN in pediatric Crohn's disease continue to be a subject of research. While EEN is highly effective for inducing remission, maintaining remission typically requires the transition to a less restrictive diet and the introduction of maintenance therapies such as immunomodulators or biologics. However, repeated courses of EEN have been shown to be effective in managing relapses. Moreover, early use of EEN at diagnosis has been associated with better long-term disease control, reduced hospitalization rates, and delayed need for surgical interventions. Emerging evidence also suggests that integrating Partial Enteral Nutrition (PEN) with a specific exclusion diet may help sustain remission and improve adherence, making nutritional therapy a viable long-term strategy [4]. Despite its benefits, EEN poses practical challenges, including the need for strict adherence, potential psychosocial stress from dietary restrictions, and difficulties in implementing the therapy outside of specialized centers. Ongoing research is focused on identifying biomarkers to predict response to EEN, optimizing formula composition, and developing personalized dietary approaches that maintain the therapeutic effects of EEN while improving palatability and quality of life [5].

Conclusion

In conclusion, exclusive enteral nutrition represents a highly effective, non-pharmacological therapy for inducing remission in pediatric Crohn's disease. Its mechanisms of action- rooted in microbiome modulation, mucosal healing, and nutritional rehabilitation- address both the inflammatory and systemic effects of the disease. While challenges remain in sustaining remission and ensuring adherence, the long-term benefits of EEN, particularly in growth and disease progression, underscore its value in pediatric IBD management. As research continues to refine its application, EEN stands as a cornerstone of a more holistic, patient-centered approach to treating Crohn's disease in children.

Acknowledgment

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Conflict of Interest

None.

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**Addressfor Correspondence*: Nicole Sactila, Department of Gastroenterology, The University of Auckland, Auckland, New Zealand; E-mail: sactila.nicole@gmail.com*

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