

GMP Focus - 2021-2022 in review

With casein glycomacropeptide (GMP) continuing to be a focus point in IEM clinical research, we highlight select publications of interest over the last 10 months.

GMP in Tyrosinaemia

Although GMP is low in both phenylalanine and tyrosine, publications on its use in IEM and, indeed, its clinical application have been dominated by its role in PKU. This prospective study is the first to investigate the acceptability, growth and metabolic control in children with hereditary tyrosinaemia type I (HTI) consuming a GMP-based protein substitute (GMP PS). It describes tolerance and acceptability of a GMP PS over 28 days, as well as its long-term impact on metabolic regulation and growth over a 12-month period.

The outcome of the study confirmed that the GMP PS was well tolerated, demonstrating a positive effect on both dietary adherence and blood tyrosine levels. Normal growth was maintained. The study also suggests that the GMP PS may have benefits for reduced constipation and abdominal discomfort.



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Article

Casein Glycomacropeptide: An Alternative Protein Substitute in Tyrosinemia Type I

Anne Daly ^{*}, Sharon Evans , Alex Pinto, Catherine Ashmore and Anita MacDonald

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GMP in PKU – Protein Substitute/Medical Food evolution

This article offers historical perspective on protein substitutes, from the development of the earliest known examples through to the most recent innovations, such as the addition of GMP, while affirming their clinical importance in the management of PKU.

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Protein Substitutes in PKU; Their Historical Evolution

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GMP in PKU – General

This paper complements the 'historical evolution' paper highlighted above, once more affirming the clinical importance of protein substitutes in the management of PKU, but focusing more specifically on the evidence surrounding the potential clinical benefits of GMP. A comprehensive overview of previously published work on GMP in PKU is provided, ranging from its role in blood phenylalanine control to potential benefits for body composition, growth, bone density, breath odour and acceptability.

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Review

Glycomacropeptide in PKU— Does It Live up to Its Potential?

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GMP in PKU – Gut health

In this study, the effect of 6 months of GMP PS intake on the gut microbiota was evaluated in 9 patients; 4 adults and 5 paediatric; 5 with classical and 4 with mild PKU. PKU patients who were not taking GMP PS, pre/probiotics, or PKU pharmaceutical therapy prior to baseline were recruited. 4/9 were able to completely switch from their amino acid-based PS to a GMP PS with the other 5/9 achieving a partial switch (33–79% of PS taken as GMP PS). GMP PS was not found to significantly alter microbiota composition however some positive trends in gut health markers were identified. Whilst acknowledging the small number of participants and the diversity of the cohort, the authors concluded that GMP seems to be safe, both microbiologically and clinically, in the PKU diet. Its possible prebiotic role on specific microbiota warrants further research.

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Glycomacropeptide Safety and Its Effect on Gut Microbiota in Patients with Phenylketonuria: A Pilot Study

Chiara Montanari ^{1,2}, Camilla Ceccarani ^{2,3}, Antonio Corsello ¹, Juri Zuvadelli ¹, Emerenziana Ottaviano ¹, Michele Dei Cas ⁴, Giuseppe Banderalli ¹, Gianvincenzo Zuccotti ¹, Elisa Borghi ^{4,5} and Elvira Verduci ^{1,4}

GMP in PKU – Preclinical work

In a study using a mouse model of classical PKU, Ahring and colleagues compared 5 different diets with varying degrees of protein restriction +/- GMP +/- different free amino acid (AA) blends. They examined the impact of the diets on plasma and brain biochemistry in addition to factors such as anthropometric parameters and behaviour. Amongst their many findings, they concluded that GMP, when supplemented with essential AAs, and used in combination with a low protein diet, has a similar impact on both brain and plasma parameters as a low protein diet supplemented with free AAs. Long-term studies in humans are needed to support these findings.

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PLOS ONE

RESEARCH ARTICLE

The effect of casein glycomacropeptide versus free synthetic amino acids for early treatment of phenylketonuria in a mice model

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