Dietary protein tolerance in BH4 responsive PKU toddlers: 6 cases from a single centre

Mullane E1,2, Pinsent B1,2, Fitzell K1,2, Evans M1
1 Department of Metabolic Medicine, Royal Children’s Hospital Melbourne.
2 Department of Nutrition and Food Services, Royal Children’s Hospital Melbourne.

Introduction

Phenylketonuria (PKU) is an inborn error of metabolism that is diagnosed through newborn screening (NBS) in Australia. Dietary phenylalanine (Phe) restriction is primary treatment. Oral tetrahydrobiopterin (BH4) may improve Phe control and allow relaxation of Phe restriction in responsive individuals. 24 hour BH4 loads have been offered in the newborn period at our centre for 18 years. A clinically significant response to BH4 is defined as ≥30% reduction in blood Phe following treatment. BH4 is commenced following introduction of solid food when Phe levels approach the upper end of the desired range and with increasing protein intake. The degree of dietary liberalisation in BH4 responsive patients is variable.

Method

Retrospective data were collected for 6 BH4 responsive children for the first 2 years of life. Details of dietary assessment included BH4 dose, natural protein and Amino Acid (AA) substitute intake.

Results

For all patients Phe level on NBS ranged from 250-533µmol/L and response to BH4 was documented as 32-73% on 24 hour load. All had a Phe-load prior to BH4 test. 3/6 commenced BH4 therapy before 12 months of age. BH4 dose in second year of life was 7.7-20.7mg/kg/d.

- All 6 patients had unrestricted natural protein intake (>RDI) by ~12 months of age, with diets including all food groups.
- By 24 months 4/6 remained on unrestricted/uncounted protein, only 2 of these had ceased AA substitute.
- 1/6 was avoiding dairy foods due to perceived intolerance, resulting in reduced protein intake.
- 1/6 progressively restricted protein dense foods and by 24 months was excluding meat, dairy foods and limiting grains.
- 2/6 patients who had unrestricted diet and no AA substitute have continued to have acceptable Phe control at 3 years of age.
- Number of samples received also reduced in the second year.

Conclusion:

Despite response to BH4, patients appear to experience poorer Phe control in the second year of life. Anecdotally, parental complacency, difficult toddler eating behaviour, frequent intercurrent illness and formula refusal have played a role in these cases. This poses the question of whether it would be prudent to maintain tighter dietary restriction until intake is more reliable, possibly around school age, even in those with good BH4 response.