



*A 2010 NPKUA Funded Research Project*

## RESEARCH GRANT SUMMARY

### **“DOES DIETARY GLYCOMACROPEPTIDE IMPROVE BONE DEVELOPMENT IN PKU MICE?”**

*Dr. Denise Ney, Professor, Department of Nutritional Sciences, University of Wisconsin-Madison*

PKU is associated with long term bone loss, resulting in osteoporosis and fractures in early adulthood. This occurrence is becoming more evident in the growing population of adults and adolescents with PKU. The goal of Ney’s research is to compare the protein from a GMP diet compared to the traditional diet to improve bone development. The study also will review the relationship between concentrations of phe in the blood and bone development.

Although PKU can be managed by diet without side effects, studies have shown that bone loss is a potential side effect of the traditional PKU diet. A study by Dr. Denise Ney seeks to examine glycomacropeptide (GMP), a whey protein that contains only small amounts of phe, and its relationship to bone development. PKU mice fed GMP show significantly reduced concentrations of phe accumulation in the blood and brain compared with a traditional PKU diet, according to Ney. GMP provides a palatable source of low-phe protein that is an alternative to the traditional diet, thus, GMP is likely to improve compliance with the low-phe diet and improve quality of life for those with PKU, she says.

The GMP diet may ultimately improve bone density and strength in those with PKU because it has a better protein composition that supports collagen during growth. GMP contains higher levels of proline, a major residue in collagen. GMP also has less acid. These factors may improve bone development in PKU individuals compared to the traditional PKU diet.

In her study, PKU mice will be fed low-phe diets containing GMP, traditional PKU diet foods or a control diet. The study will take place for 14 weeks to assess the impact on phe levels in the blood and affects on bone development. The mice will have this diet as their sole source of protein from weaning until early adulthood, which is 14 weeks for mice. Blood samples will be taken from the mice for phe analysis after six weeks of the diet. Statistical analysis and studies, including x-rays, scans and digital photography will follow.

The specific aim of Ney’s study is to assess the impact of the GMP diet compared to the traditional diet by looking at bone density, markers of bone turnover and biomechanical performance. The study is best conducted in mice with PKU because of their short lifespan compared to humans with PKU, Ney said. Human bone studies can best follow after research on the mice, she added.

Ney expects that PKU mice fed GMP through young adulthood will show larger bone size, contributing to increased bone mass and strength compared to mice who eat the traditional PKU diet. Such results will support replacing the traditional PKU diet with a better-tasting GMP food product diet. This diet would improve metabolic control and quality of life for those with PKU.