

Assessing the Need for and Benefits of Treating Maternal PKU

Requirements for determining plasma phenylalanine concentration:

1. Blood should be sampled after the woman has consumed a diet adequate in protein (1 gm/kg/d), preferably for 2-3 days.
2. Blood should be drawn 2-3 hours post prandially
3. Plasma phenylalanine should be determined using a quantitative method (amino acid analyzer or McCaman-Robins fluorometric assay)
4. Turn around time for results should be 24 hours.

Need for phenylalanine restriction:

Serum phenylalanine (unrestricted diet)	Action
< 6 mg/dl	Do not restrict phenylalanine intake
> 6mg/dl	Treat with a phenylalanine restricted diet to prevent damage to offspring, including mental retardation, microcephaly, intrauterine growth failure and congenital heart disease.

Benefits of treatment according to gestational age and maternal blood phenylalanine:

The benefit of early metabolic control is summarized in the article "The International Collaborative Study of Maternal Phenylketonuria: Status report 1994" (Koch, et al; Acta Paediatr Suppl 407:111-19,1994). Data on further pregnancies as well as follow up psychological evaluations of MPKU offspring support the same conclusions regarding the benefit of treatment.

Controlling phenylalanine to 2-6 mg/dl before pregnancy is recommended for the best outcome of pregnancy. From a practical standpoint, as well, it is easier to establish good control before pregnancy because the diet is often difficult to tolerate in the early phases of pregnancy.

Maintaining blood levels of 2-6 mg/dl offers better protection to the fetus than levels of 6-10 mg/dl.

Achieving and maintaining metabolic control by 10 weeks gestation has resulted in birth outcomes nearly as good as when metabolic control was achieved before pregnancy. Since the heart is formed before 10 weeks gestation, there is a possibility of congenital heart defects if blood phenylalanine levels have been high during early pregnancy. Notably however, none of the offspring born to women who achieved control by 10 weeks gestation and maintained blood phenylalanine levels between 2 and 10 mg/dl for the remainder of the pregnancy had heart defects.

Achieving metabolic control after 10 weeks gestation offers some protection and is likely to result in damage to the offspring. The severity of the damage depends on how high the blood phenylalanine level was prior to achieving metabolic control; the higher the maternal blood phenylalanine, the greater the likelihood of damage to the fetus.

Achieving metabolic control after 20 weeks gestation offers limited protection to the fetus and is almost certain to result in damage to the offspring. The severity of the damage depends on how high the blood phenylalanine level was prior to achieving metabolic control; the higher the maternal blood phenylalanine, the greater the likelihood of damage to the fetus.