At a Glance
Phenylketonuria (PKU)

Deficient enzyme: Phenylalanine hydroxylase (PAH); converts phenylalanine to tyrosine

Enzyme Cofactor: Tetrahydrobiopterin (BH_4)

Toxic Metabolite: Phenylalanine (Phe)

Clinical Presentation, if untreated: irreversible intellectual disabilities, seizures, behavioral abnormalities, eczema, "musty" odor, hypopigmentation (skin, hair, iris)

Goal Treatment Range[1]: Blood Phenylalanine: <360 µmol/L (<6 mg/dL)
(to convert mg/dL to µmol/L multiply by 60)
Blood Tyrosine: normal for lab

Nutrient Needs by Age[2]

See SERN/GMDI PKU Management Guidelines for recommended nutrient needs during pregnancy and lactation

Age	Phe mg/d	Phe mg/kg/d	Tyr mg/d	Protein g/kg/d	Energy
0-3 mo	130-430	25-70	1100-1300	2.5-3.0	Age appropriate DRI
3-6 mo	135-400	20-45	1400-2100	2.0-3.0	
6-9 mo	145-370	15-35	2500-3000	2.0-2.5	
9-12 mo	135-330	10-35	2500-3000	2.0-2.5	
1-4 yrs	200-320	-	2800-3500	1.5-2.1	
>4 yrs to adult	200-1100	-	4000-6000	120-140% DRI	

Starting a PKU Diet

1. Determine goals for Phe (mg), Protein (g) Tyrosine (mg), Energy (kcal).
   - Use 50 mg Phe = 1 g protein to calculate mg of Phe from grams of protein.
2. Calculate amount of whole protein source (breast milk, infant formula, food) needed to meet Phe goal.
3. Calculate amount of medical food needed, in addition to the whole protein source to meet total protein goal.
4. Calculate energy intake from whole protein and medical food sources to ensure total calorie needs are met.
5. Calculate Tyr intake from whole protein and medical food sources.

Implementing the Simplified PKU Diet[3]

1. At 4-6 months of age, when solid food is introduced, consider implementing the Simplified PKU Diet.
2. Reduce Phe allowance (from whole protein source) by 30% (40% in those with more restrictive Phe allowances).
3. Allow unmeasured intake of "uncounted foods." These are fruits, uncounted vegetables, foods with <75 mg Phe/100g and all other foods with <20 mg Phe or <0.4 g protein per serving, including many foods modified to be low in protein such as low protein bread and pasta.
4. Monitor blood Phe weekly for the first 4 weeks, without making diet changes.

Medical Therapy

Sapropterin dihydrochloride: synthetic form of BH4 (PAH cofactor) Dose 5-20 mg/kg/d
Kuvan® www.biomarin.com
Javygtor™ www.cyclepharma.com (Note: other generic versions available)
Palynziq® (pegvaliase) www.biomarin.com: phenylalanine ammonia lyase (enzyme substitution for PAH) Dose 20-60 mg/d

Phenylketonuria (PKU)

Medical Foods for PKU

*A glycomacropeptide (GMP) product **Product used for large neutral amino acid (LNAA) therapy

	Abbott abbottnutrition.com	Cambrooke cambrooke.com	Mead Johnson hcp.meadjohnson.com	Nutricia nutriciametabolics.com	Vitaflo vitafloUSA.com
Infant (0-1 yr)	Phenex®-1		Phenyl-Free® 1	PKU Periflex®Early Years	PKU explore™ 5 PKU start™
Toddler & Young Children	Phenex-1 Phenex-2	*Glytactin® BetterMilk™ Pouch *Glytactin BetterMilk 15 *Glytactin BUILD 10, 20/20 *Glytactin RTD 10, 15 *Glytactin COMPLETE 15 *Glytactin RESTORE Powder 5 *Glytactin SWIRL 15 PKU REFRESH™AA 15	Phenyl-Free 1 Phenyl-Free 2	PKU Periflex Early Years PKU Periflex Junior Plus PhenylAde® Essential Drink Mix PhenylAde 60 Drink Mix PhenylAde MTE Amino Acid Blend PKU Lophlex® LQ *PhenylAde GMP Drink Mix *PhenylAde GMP Ready *PhenylAde GMP Mix-In *PhenylAde GMP Ultra	PKU explore 10 PKU start PKU trio™ PKU express™ plus 15, 20 PKU cooler® 10, 15, 20 PKU air® 20 *PKU sphere™ NEXT15 *PKU sphere® liquid *PKU sphere powder 15, 20
Older Children & Adults	Phenex-2	*Glytactin BetterMilk Pouch *Glytactin BetterMilk 15 *Glytactin BUILD 10, 20/20 *Glytactin RTD 10, 15 *Glytactin RTD *Lite* 15 *Glytactin COMPLETE 15 *Glytactin RESTORE *Powder* 5 *Glytactin RESTORE *Lite Powder* 10 *Glytactin SWIRL 15 PKU REFRESH AA 15	Phenyl-Free 2 Phenyl-Free 2 HP	Periflex Advance Periflex LQ Phenylade Essential Drink Mix Phenylade 60 Drink Mix Phenylade MTE Amino Acid Blend PKU Lophlex LQ PKU Lophlex Powder PKU Maxamum® *PhenylAde GMP Drink Mix *PhenylAde GMP Ready *PhenylAde GMP Ultra *PhenylAde GMP Mix-In Phlexy-10® Drink Mix Phlexy-10 Tablets **PhenylAde PheBLOC™	PKU trio PKU express plus 15, 20 PKU cooler 10, 15, 20 PKU air 20 *PKU sphere NEXT15 *PKU sphere liquid *PKU sphere powder 15, 20

Laboratory Monitoring[2]

Blood Phenylalanine[a]	Prealbumin, Albumin[c]	Zinc, Copper, Vitamin B_{12}[d]
Blood Tyrosine[a]	25-OH Vitamin D[c]	Comprehensive Metabolic Panel[d]
Plasma Amino Acids[b]	CBC[c]	Essential Fatty Acids[d]

[a] Weekly to twice weekly in infancy then weekly to monthly thereafter; weekly to twice weekly in pregnancy
[b] As indicated in infancy, then at every clinic visit thereafter; weekly to monthly in pregnancy
[c] 6-12 months; monthly to per trimester in pregnancy
[d] Yearly or as indicated; at first visit then as indicated in pregnancy

References

1. Smith, WE, et al. ACMG Practical Guideline. Phenylalanine hydroxylase deficiency diagnosis and management: A 2023 evidence-based clinical guideline of the American College of Medical Genetics and Genomics (ACMG). Genetics in Medicine. 2023
2. GMDI PKU Management Guidelines;
3. Bernstein LE, et al. Multiclinic Observations on the Simplified Diet in PKU. J Nutr Metab. 2017.