

PROTEINURIA

How is proteinuria detected/quantified?

Dipstick: Negative or trace on the reagent strip is normal. 1+ to 4+ proteinuria in a concentrated urine (specific gravity ≥ 1.020) is abnormal.

Random or “spot” urine for protein and creatinine: <0.2 mg protein/mg creatinine is normal in a child >2 yr old. <0.5 mg protein/mg creatinine is normal in a young child 6-24 months old. A random urine protein : creatinine of ≥ 3.0 is nephrotic range proteinuria.

24hour urine collection for protein and creatinine: $<100\text{mg}/\text{m}^2/24\text{hr}$ is normal. To determine if the collection is an adequate collection versus an over or undercollection— Females have 15-20mg creatinine/kg body weight in an adequate 24 hour urine collection. Males have 20-25mg creatinine/kg body weight in an adequate 24 hour urine collection. Nephrotic range proteinuria is $>50\text{mg}/\text{kg}/\text{day}$ or $>40\text{mg}/\text{m}^2/\text{hr}$.

Is the proteinuria associated with a non-pathological condition?

FEVER: Children may have proteinuria during a febrile illness. This proteinuria should resolve with the resolution of fever/acute illness.

HEAVY EXERCISE: Proteinuria may occur with vigorous exercise. This proteinuria should resolve after refraining from exercise for two days.

ORTHOSTATIC PROTEINURIA: Also known as POSTURAL PROTEINURIA is a pattern of proteinuria which is dependent upon body position. **In the recumbent position normal amounts of proteinuria are excreted. During upright “quiet” ambulation abnormal amounts of proteinuria are excreted.** Although generally considered to be a benign condition, much of what is known about orthostatic proteinuria has been gained by the study of this condition in adult males. Therefore, children with this condition should continue to have an annual follow up with a urine analysis. **Orthostatic proteinuria is not associated with hypertension, edema, or hematuria.**

How to test for orthostatic proteinuria: The child should void and completely empty the bladder prior to going to bed. It is important for the child to remain in the recumbent position throughout the night prior to obtaining a urine specimen. The first morning urine should be tested for proteinuria and a urine analysis. This specimen should be “negative” or “trace” on the reagent dipstick. This urine should also be sent for a urine protein to creatinine ratio. A ratio of <0.2 is consistent with orthostatic proteinuria. The urine analysis including microscopy exam should be normal. A random afternoon/evening urine should also be evaluated for proteinuria which should have $\geq 1+$ proteinuria. Our group prefers to test 3 consecutive days of first morning and random afternoon voids to evaluate for orthostatic proteinuria.

WHICH PATIENTS WITH PROTEINURIA SHOULD BE REFERRED TO PEDIATRIC NEPHROLOGY?

Any patients with abnormal excretion rates of proteinuria NOT associated with a NON-pathological condition should be referred to a pediatric nephrologist. Proteinuric patients with hypertension, renal insufficiency, hematuria, proteinuria that is $\geq 500\text{mg}/\text{m}^2/\text{day}$, or a family history of progressive renal disease should be referred. *Isolated asymptomatic* proteinuria that is $>100\text{mg}$ and $<500\text{mg}/\text{m}^2/\text{day}$ may be followed by a primary care physician in 3 to 4 months to re-evaluate with an interval history and updated family history, physical examination (including blood pressure) and protein excretion quantification (24 hour urine collection for protein and creatinine). If the proteinuria $> 100\text{mg}/\text{m}^2/\text{day}$ persists > 3 months with or without an updated family history that uncovers progressive kidney disease, or the patient develops hypertension, edema, renal insufficiency, or hematuria, the patient should be referred.

WHAT IS MICROALBUMINURIA? Urine reagent strip dipsticks test for albumin.

Sending a “spot” or random urine (or a 24 hour urine collection) for protein measurement to a clinical laboratory will result in the measurement of low and high molecular weight proteins in addition to albumin—It is a “total protein” measurement. “Microalbumin” is essentially small amounts of albumin that is detected. Clinical/reference laboratories have sensitive assays to detect low amounts of albumin or “microalbuminuria.” Microalbuminuria is important for assessing the risk of chronic kidney disease in postpubertal diabetes mellitus patients that have had diabetes for >5 years. Normal microalbuminuria is considered Urine albumin/creatinine (mg/g or $\mu\text{g}/\text{mg}$) in a first morning urine specimen <30 . Diabetes therapy should be intensified in diabetics with a microalbumin to creatinine ration >30 to prevent progressive chronic kidney disease.