

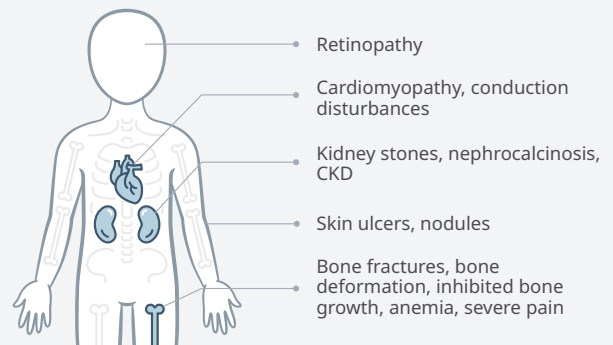
# Primary hyperoxaluria (PH), a kidney stone disease that starts in the liver and can lead to systemic damage<sup>1,2</sup>

PH is a family of ultra-rare genetic disorders in which excess levels of **oxalate** produced by the liver lead to<sup>1,2</sup>:

- **Recurrent kidney stones (CaOx crystals)**
- **Nephrocalcinosis**
- **Chronic kidney disease**

Progressive kidney damage can result in **end-stage kidney disease** and **systemic oxalate deposition**, which can be life-threatening.<sup>1</sup>

## Systemic Oxalate Deposition in PH Causes<sup>1,3,4</sup>



## Warning Signs of PH<sup>5-11</sup> (one or a combination of)

The first warning sign may be a single kidney stone in children or recurrent stones in adults.



**Family history**  
of kidney or bladder stones



**CKD with no known etiology**



**Systemic oxalosis**



**Recurrent stones in adults**



**Nephrocalcinosis**



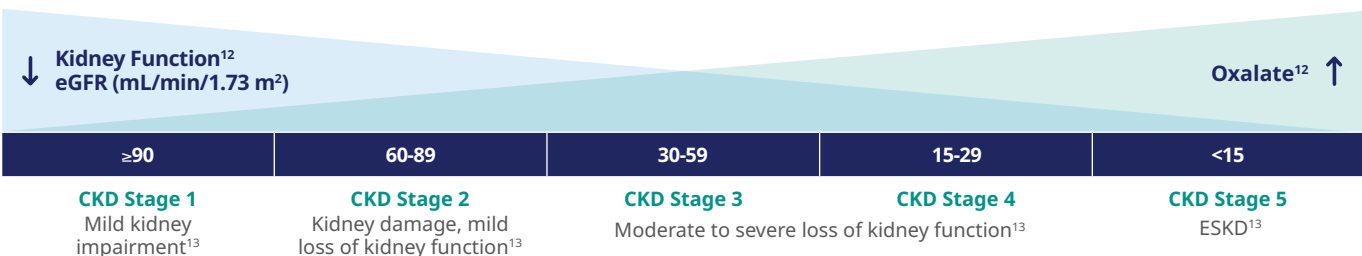
**Severe infantile form:**  
Failure to thrive, ESKD, severe retinal abnormalities



**Single kidney stone in a child**



**ESKD**



**Oxalate accumulation can occur even in the absence of current symptoms<sup>12,14</sup>**

For more information, visit the [Rare Renal Disorders page on scientific-exchange.com](https://www.scientific-exchange.com)

Abbreviations: BSA=body surface area; CaOx=calcium oxalate; CKD=chronic kidney disease; COD=calcium oxalate dihydrate; COM=calcium oxalate monohydrate; eGFR=estimated glomerular filtration rate; ESKD=end-stage kidney disease; ESWL=extracorporeal shock wave lithotripsy; HOG=4-hydroxy-2-oxoglutarate; PCNL=percutaneous nephrolithotomy; Pox=plasma oxalate; RNAi=ribonucleic acid interference; siRNA=small interfering ribonucleic acid; Uox=urinary oxalate; URS=ureteroscopy.

For full list of references, please scan the QR code



Please note that this content is not meant to provide diagnosis or treatment recommendations.  
The best diagnosis strategy and management options are to be determined by the patient's physician.

## PH Diagnosis

### Diagnostic Workup

Or

Refer to a Nephrologist for Diagnosis  
Visit [OHF.org](https://www.ohf.org) for Resources and for Guidance

#### Urine Collection (eGFR >30 mL/min/1.73 m<sup>2</sup>)<sup>15</sup>:

##### 24-hour collection (preferred)<sup>15,16</sup>

Elevated Uox on at least 2 assessments:

- >0.83 mmol/24 h/1.73 m<sup>2</sup> or >75 mg/24 h

##### Spot urine<sup>15</sup>

Oxalate: creatinine ratio > normal for age

#### Plasma Collection (eGFR <30 mL/min/1.73 m<sup>2</sup>)<sup>1,15</sup>:

Pox >50 μmol/L

#### Stone Analysis<sup>17-19</sup>:

- **PH1**: >95% COM (whewellite)
- **PH2**: Typically >80% COM
- **PH3**: Composed of COM and COD, with 24% to 100% COM

#### Urinary Metabolites (Nonconfirmatory)<sup>1,4,15</sup>:

- Elevated glycolate → **PH1**
- Elevated L-glycerate → **PH2**
- Elevated DHG → **PH3**

#### Rule Out Secondary Causes<sup>5,15</sup>:

- Enteric causes (eg, chronic pancreatitis, cystic fibrosis, inflammatory bowel syndrome, bariatric surgery)
- Very high-oxalate, low-calcium diet
- Premature infant

#### Genetic Testing<sup>5,15</sup>:

- AGXT mutation → **PH1**
- GRHPR mutation → **PH2**
- HOGA1 mutation → **PH3**

Urine and genetic testing can be done simultaneously or sequentially.

## PH Management

### Current Available Management Options

Or

Refer to Nephrology for Management  
Visit [OHF.org](https://www.ohf.org) for Resources and for Guidance

#### CaOx Crystal Inhibition<sup>15</sup>:

##### Hyperhydration

- Adults: 3.5 L to 4 L daily
- Children: 2 L to 3 L/m<sup>2</sup> BSA daily
- Infants: gastrostomy tube

##### CaOx crystallization inhibitors

- Potassium citrate (preserved renal function patients)

#### Kidney Stone Management<sup>15</sup>:

PCNL or URS instead of ESWL

#### Oxalate Reduction:

##### Pyridoxine (vitamin B6) in responsive patients with PH1<sup>15</sup>

- Test for responsiveness<sup>15</sup>
- B6-responsive AGXT mutations: Gly170Arg, Phe152Ile, Ile244Thr<sup>11,20,21</sup>

##### RNAi/siRNA therapy for patients with PH1<sup>15</sup>

#### Advanced CKD (eGFR <30 mL/min/1.73 m<sup>2</sup>)<sup>15</sup>:

##### Dialysis

For CKD stage 4 to 5, high Pox, systemic oxalosis

##### Organ transplant

- **PH1**, eGFR <30 mL/min/1.73 m<sup>2</sup>, B6-unresponsive, no access to RNAi → **liver-kidney transplant**
- **PH1**, CKD stage 5, B6-responsive → **kidney transplant**
- **PH2**, eGFR <30 mL/min/1.73 m<sup>2</sup> → **liver transplant**