

## Comparison Chart of Hereditary Diseases

There are four hereditary diseases known to affect the breed that may mimic one another.

DISEASE	SYMPTOMS	LABORATORY ABNORMALITIES OFTEN ASSOCIATED WITH THIS DISEASE
<b>Renal Dysplasia (RD)</b>		
Renal dysplasia is a congenital or neonatal disease which causes maldevelopment of the kidneys in utero, or early in life.	Increased water consumption Increased urination (dilute urine) Poor doer, decreased appetite Vomiting Possibly prone to urinary tract infection.	Low urine specific gravity Elevated creatinine and BUN Small kidneys Small, hyperechoic kidneys with or without cysts seen via abdominal ultrasound
<b>Protein Losing Enteropathy (PLE)</b>		
PLE is usually caused by inflammatory bowel disease or lymphangitis/lymphangiectasia. In affected Wheatens there is a stimulation of the immune system in the bowel wall	Vomiting Diarrhea Weight loss Ascites, edema, pleural effusion	Note that not all of the laboratory abnormalities are seen in every case. The most important are indicated by an asterisk. Hypoalbuminemia* Hypoglobulinemia* Hypocholesterolemia, eosinophilia, lymphopenia
<b>Protein Losing Nephropathy (PLN)</b>		
PLN is difficult to diagnose. The initial stages of the disease may be mistaken for liver, glandular or other enteric or kidney diseases. Wheatens with PLN may have serious thromboembolic events before renal failure starts, even before there is increased serum creatinine or BUN. An abnormality of the glomeruli usually causes PLN	Listlessness/depression Decreased appetite, vomiting, weight loss Ascites, edema, pleural effusion  Thromboembolic phenomena and hypertension (less common)  Late – Increased water consumption, increased urination	Note that not all of the laboratory abnormalities are seen in every case. The most important are indicated by an asterisk. Hypoalbuminemia*, hypercholesterolemia  Elevated MA (Microalbuminuria) Elevated urine protein/creatinine ratio*  Late - Elevated SDMA, creatinine, BUN
<b>Addison's Disease</b>		
Addison's disease (Hypoadrenocorticism) is the insufficient production and secretion of hormones (glucocorticoids, mineralocorticoids) by the adrenal gland cortex. The clinical signs are often non-specific and can mimic those of multiple other medical disorders	Listlessness/depression. Decreased appetite, vomiting, diarrhea, weight loss. Inability to handle stress Sudden collapse Slow heart rate	Decrease in Na/K ratio (Sodium/potassium ratio) Low resting cortisol and Abnormal ACTH stimulation test Possibly elevated SDMA, creatinine, BUN Possibly low urine specific gravity
Further information on all of these diseases can be found on the The SCWT Club of America's website: <a href="https://scwtca.org/health">https://scwtca.org/health</a>		

Wheatens who exhibit signs of kidney failure need to have careful diagnosis made, as RD and PLN can be mistaken for each other in the later stages of the disease process. The following chart assists with this comparison.

## Differences between RD and PLN

Renal Dysplasia (RD)	Protein Losing Nephropathy (PLN)
Usually referred to as Juvenile Renal Disease (JRD). Dogs <i>generally</i> die between the ages of 6 weeks to 3 years. Milder forms of JRD may be seen in older dogs.	Dogs tend to show their illness at 5-7 years old, but onset can be both earlier and later than this.
Dogs drink large amounts of water. Their Urine Specific Gravity (USG) is often low (the urine is dilute).	Dogs may not have these symptoms and can usually concentrate their urine until they reach end stage renal failure.
Dogs tend to lose little protein in the urine and the serum albumin usually stays normal.	Dogs lose large quantities of protein in the urine, i.e., they have a high urine protein/creatinine ratio (UPC), and their serum albumin drops.
Dogs eventually have high serum creatinine and Urea (BUN). Dogs generally <b>do not</b> have low albumin or high cholesterol.	Dogs may eventually have high serum creatinine and Urea (BUN). Dogs have low albumin readings and high cholesterol (unless they have concurrent PLE, in which the cholesterol may be normal or low).
Severely affected dogs may be born with small, malformed kidneys.	Usually have normal sized kidneys until later stages of the disease.
In the renal cortex are microscopic cystic lesions, decreased and immature fetal glomeruli and cystic glomeruli. These fetal changes are abnormal in dogs over 16 weeks of age.	Dogs show glomerular changes, such as glomerulosclerosis and/or glomeruloscleronephritis. They do not have many fetal glomeruli.
Dogs are not usually predisposed to effusions or thromboembolic events (clots).	Dogs can throw clots, e.g., in the lung, heart, brain, portal vein or distal aorta (saddle thrombus).

**Testing is important** as with many conditions, clinical signs may not show up until well after laboratory tests show changes. Also, many clinical signs of one disease can also mimic signs of another disease.

<b>RD</b>	<b>PLE<sup>1</sup></b>	<b>PLN<sup>1</sup></b>	<b>Addison's<sup>2</sup></b>
<ul style="list-style-type: none"> <li>• Increased water consumption</li> <li>• Increased urination (dilute urine)</li> <li>• "Poor doer"</li> <li>• Decreased appetite</li> <li>• Vomiting</li> <li>• Possibly prone to urinary tract infection</li> </ul>	<ul style="list-style-type: none"> <li>• Vomiting</li> <li>• Diarrhea</li> <li>• Weight loss</li> <li>• Ascites</li> <li>• Edema</li> <li>• Plural effusion</li> <li>• Thromboembolic events</li> </ul>	<ul style="list-style-type: none"> <li>• Listlessness/depression</li> <li>• Decreased appetite, vomiting, weight loss</li> <li>• Ascites, edema, pleural effusion</li> <li>• Increased water consumption</li> <li>• Increased urination (less common)</li> <li>• Thromboembolic events</li> <li>• hypertension</li> </ul>	<ul style="list-style-type: none"> <li>• Listlessness/depression</li> <li>• Decreased appetite, vomiting, weight loss</li> <li>• Inability to handle stress</li> <li>• Sudden collapse</li> <li>• Slow heart rate</li> <li>• Signs can be intermittent, recurrent, or sudden</li> </ul>

<sup>1</sup>**PLE and PLN** can be difficult to diagnose. The initial stages of the disease may be mistaken for liver, glandular or other enteric or kidney diseases. Wheatens with PLE and/or PLN may have serious thromboembolic events - lung, heart, brain, portal vein or distal aorta (saddle) before symptoms of renal failure start, and even before there is increased SDMA, creatinine or BUN.

<sup>2</sup>The clinical signs of **Addison's Disease** are often non-specific and can mimic those of multiple other medical disorders.

## Diagnosing: RD, PLN & PLE & Addison's Disease

These diseases can be difficult to diagnose and can be confused with each other. Here are some of the similarities and differences.

	<b>RD</b>	<b>PLN</b>	<b>PLE</b>	<b>Addison's</b>
<b>Age of Onset</b>	<1-3years	Mean ~ 6 years	Mean ~ 4.5 years	Mean ~3.5 years
<b>Sex Predilection</b>	None noted	Female: male=1.6	Female: male=1.7	None
<b>Polyuria/Polydipsia</b>	Yes	Only 25% had PU/PD	No, unless on steroids	Yes
<b>Vomiting/Diarrhea</b>	Yes	Yes	Yes	Yes
<b>Ascites/Edema</b>	No	Possibly	Possibly	No
<b>Azotemia (elevated SDMA, BUN, creatinine)</b>	Yes	Eventually	No	Possibly (pre-renal)
<b>Kidney Size</b>	Small	May be normal	Normal	Normal
<b>Hypoalbuminemia</b>	No	Yes	Yes	Possibly (melena)
<b>Hypoglobulinemia</b>	No	No	Yes	Possibly (melena)
<b>Hypercholesterolemia</b>	No	Yes	Hypocholesterolemia	No
<b>Low Na/K ratio</b>	Not noted	Rarely (~10%)	Rarely (~10%)	If typical
<b>Urine Specific Gravity</b>	Isosthenuria	Mean 1.023	Mean 1.033	Low (medullary washout)
<b>Proteinuria (elevated UPC)</b>	None or mild	Yes	No	No
<b>Histopathology K = kidney I = intestine</b>	Fetal Glomeruli, Fetal mesenchyme (K)	Glomerulosclerosis, Glomerulonephritis (K)	Inflammatory Bowel Disease (IBD), lymphangiectasia, lymphangitis (I)	Not indicated

Adapted from 1999 ACVIM PROCEEDINGS Soft Coated Wheaten Terrier PLE-PLN; Dr Meryl P. Littman VMD DACVIM, Philadelphia PA