

## 16.0 UROLOGY

### 16.1 CONGENITAL ABNORMALITIES OF THE KIDNEYS

**AEROMEDICAL CONCERNS:** Polycystic disease may be associated with hypertension, berry aneurysms of the cerebral arteries, renal stones, infection or hematuria. Simple retention cysts in the renal cortex may be susceptible to trauma. Medullary sponge kidneys can be associated with hematuria and formation of calculi. Large polycystic kidneys are not compatible with high performance flying because G forces cause the kidney to pull on the pedicle that may result in bleeding.

**WAIVER:** A waiver is possible if renal function is normal and the aviator remains asymptomatic.

**INFORMATION REQUIRED:**

1. Nephrology consultation is required, together with confirmation by CT scan or MRI that there is no coexisting berry aneurysm.
2. Annual submission with 24 hour urine collection for determination of creatinine clearance is required.

**TREATMENT:** N/A.

**DISCUSSION:** The majority of patients with polycystic disease present with evidence of impaired renal function after the age of 30. Over a period of 10 years, one third of men and two thirds of women with polycystic disease of the kidneys will experience urinary tract infection. Approximately one third will also have hepatic cysts and renal stones occur in 10%. Intracranial hemorrhage from rupture of a Berry aneurysm causes death in 10% of cases of polycystic disease of the kidneys. Medullary sponge kidneys rarely give rise to significant disability.

**ICD-9 CODE:**

**753.1 Cystic Disease of the kidney**

**753.17 Medullary Sponge kidney**

## 16.2 HEMATURIA

**AEROMEDICAL CONCERNS:** Hematuria may be a sign of significant underlying renal and/or urinary system disease.

**WAIVER:** Renal function impairment, significant polycystic kidney disease, or anemia secondary to hematuria is disqualifying. Service group restriction may be necessary for those aviators who have recurrent, microscopic hematuria precipitated by exposure to high Gz.

### **INFORMATION REQUIRED:**

1. Waiver is not required for adequately investigated microscopic hematuria with less than 5 red cells per high power field.
2. Adequate investigation includes:
  - a. CT scan with renal protocol
  - b. Urology or Nephrology consultation (if CT scan abnormal) with further diagnostic testing as indicated.
  - c. Call NOMI Internal Medicine for guidance if needed
3. Male aviators whose urinalysis consistently (more than 50%) shows more than 3-5 rbc/hpf or female aviators consistently showing more than 8-10 rbc/hpf require a urology or nephrology consult.
4. An exercise history may be all that is needed to identify cases of "march hematuria".
5. Urological consultation may be required to exclude serious conditions including neoplasia and to identify easily treatable conditions.

**TREATMENT:** As appropriate for the condition found.

**DISCUSSION:** One study reported the results of renal biopsy in a large number of cases of asymptomatic hematuria as follows: glomerulonephritis 77%, pyelonephritis 1%, normal kidney 20%. Of those patients who have a membranoproliferative glomerulonephritis with mesangial deposits of IgA, 60% will have raised serum IgA levels. Patients with IgA glomerulonephritis will need regular follow-up as 5-8% develops progressive disease leading to renal failure.

### **ICD-9 CODE:**

**599.7 Hematuria**

## 16.3 PROSTATITIS

**AEROMEDICAL CONCERNS:** The symptoms of acute prostatitis, which include severe perineal discomfort, backache, urgency and frequency of micturition can be extremely distracting in the cockpit. Similarly, the backache from chronic prostatitis can be an irritant in flight. The side effects of some forms of medication are not compatible with flying.

**WAIVER:** Patients with acute prostatitis should be grounded. Waiver is possible for patients with chronic prostatitis provided they are asymptomatic.

**INFORMATION REQUIRED:**

1. Urology consultation.

**TREATMENT:** Waivers have been recommended and granted for patients on trimethoprim/sulfamethoxazole, carbenicillin, erythromycin, nitrofurantoin and ciprofloxacin.

**DISCUSSION:** Some patients with prostatitis are very sensitive to the effects of alcohol although the mechanism for this is unclear. Aviators should be warned to restrict their alcohol intake while on treatment. Of patients with chronic prostatitis, 25% are asymptomatic and up to 35% have urinary symptoms. The side effects of nitrofurantoin relevant to aviation can include an acute pulmonary reaction with cough, dyspnea and chest pain, a chronic reaction with similar symptoms but with a more insidious onset and, occasionally nystagmus, vertigo or drowsiness. Trimethoprim can rarely cause hallucinations, ataxia, vertigo, apathy or depression. There is not as much experience in military aviation with the newest drug, ciprofloxacin, but it has been reported to cause the same side effects as other quinolones, such as tremor, light headedness, confusion, lethargy, drowsiness, insomnia, blurred vision, changes in color perception and headache. The reported incidence of headache is 1.2% with other CNS effects arising in 0.4% of cases.

**ICD-9 CODE:**

**600 Benign Prostatic Hypertrophy**

**601.0 Acute Prostatitis**

**601.1 Chronic Prostatitis**

## 16.4 REITER'S DISEASE

**AEROMEDICAL CONCERNS:** The arthritis and conjunctivitis can be distracting in flight. There is a risk of cardiac arrhythmias, myocarditis, pericarditis and central or peripheral nervous system symptoms.

**WAIVER:** Aviators with recurrent disease or significant disability are NPQ. Waiver recommendations will depend on disease activity and the degree of any residual effects present.

### **INFORMATION REQUIRED:**

1. The information required depends on the presenting symptoms.
2. The HLA B27 titer can give some indication of the susceptibility to recurrence and the severity of sequelae.
3. Chlamydia, salmonella, shigella or yersinia titers can help to define the post-enteritis cases as opposed to sexually transmitted cases.
4. Gram stain of urethral discharge may be necessary to exclude gonorrhea.
5. A current ECG is necessary to rule out cardiac complications.

**TREATMENT:** Treatment other than aspirin is CD for aviation.

**DISCUSSION:** The sexually transmitted form of Reiter's disease predominates in Caucasian populations while the postenteritic form is commoner in other races. Up to 88% of patients will have peripheral, migrating arthritis although 10% will have a persistent monoarthritis. The lower spine is involved in 20% of cases with sacroiliitis in 5-10%. Ligamentous and cartilaginous attachments are inflamed in 22% giving rise to plantar fasciitis and Achilles tendinitis. Eye symptoms occur in 30-40% of patients but when sacroiliitis is present almost 50% have uveitis. Urinary symptoms can range from unnoticeable to acute hemorrhagic cystitis or prostatitis. Keratoderma blennorrhagica affects the skin of the palms and soles in 20% and causes painless balanitis in 26%. The ECG is abnormal in 5-13% of cases with conduction defects occurring in 4% and aortic valve complications in 2%. Thrombophlebitis of the calf occurs in 5% of cases. Other rarer complications include myocarditis, pericarditis, aortitis, peripheral neuropathy, meningoencephalitis and transient hemiplegia. A higher level of HLA B27 seems to be associated with a higher risk of developing Reiter's disease and its sequelae. The overall mortality from Reiter's disease is <1% but can rise to 22% in those cases who develop serious cardiovascular complications. The majority of cases are self-limiting, with 70% resolved within 6 months. However, 15% will have symptoms for more than 1 year. Chronic heel pain gives a poorer prognosis and 15-26% of such patients will eventually develop ankylosing spondylitis. The risk of recurrence is 15% annually; in a 10-year follow-up, 63% of patients had more than 1 attack. At 20 years, almost 50% had some disability (usually deformity of the foot) sufficient to interfere with work or leisure activity; 18% were unable to work.

### **ICD-9 CODE:**

**099.3 Reiter's Disease**

## 16.5 RENAL STONES

**AEROMEDICAL CONCERNS:** In-flight incapacitation secondary to the pain of renal colic is the major concern. There has been one USAF case of renal colic that contributed to a mishap. The majority of renal stones is causally related to dehydration and occurs as single episodes.

**WAIVER:** Many causes of, or associated conditions seen with nephrolithiasis are treatable and are frequently waived. Certain conditions are considered more problematic in the aviation arena such as:

1. Recurrent stones (2 stones in one year)
2. Cysteine stones
3. Hypercalcuria (absorptive, type one and type three)
4. Retained stones in the collecting system

These conditions are considered disqualifying and a **waiver is not recommended in applicants**. Waiver is **generally not recommended in designated aviation personnel, but considerations are made on a case-by-case basis**.

Waiver is **generally recommended for designated aviation personnel with:**

1. Calcium Oxalate, Calcium Phosphate, Uric Acid, and Struvite stones
2. Retained stones in the renal parenchyma
3. Recurrent stones greater than 12 months apart

### **INFORMATION REQUIRED:**

**Applicants:** An applicant with a history of a single renal stone or renal stones greater than 60 months apart may apply for aeromedical waiver consideration. The applicant must be **stone free for one year prior to application**. The waiver submission requires:

1. Urinalysis
2. Blood chemistries. See Metabolic Workup Worksheet
3. 24 hour urine metabolic workup. See Metabolic Workup Worksheet.
4. Stone analysis (if stone obtained)
5. Urology consult
6. IVP or imaging study
7. KUB is required at the time of application to an aviation training program

### **Designated:**

Any member diagnosed with a primary or recurrent renal stone requires the following workup:

1. Urinalysis.
2. Blood chemistries. See Metabolic Workup Worksheet for required labs.
3. IVP or imaging study
4. 24 hour urine metabolic workup. See Metabolic Workup Worksheet for required labs and normal values. *Note that member must meet normal values on this worksheet regardless of local laboratory norms.*
5. Stone analysis (if available).

The condition is NCD and the member may be found PQ if ALL of the following conditions are met:

1. This is the member's first renal stone or more than 60 months have passed since the last stone
2. The stone is a single stone
3. The member is completely stone free (no retained stones), as confirmed by imaging study
4. All labs required by the Metabolic Workup Worksheet are normal
6. Member must be grounded for:
  - a. 2 weeks after spontaneous passage
  - b. 4 weeks following stone manipulation/lithotripsy
  - c. 12 weeks following open surgery and must be found fit for full duty by urology

The following conditions are CD and require a waiver:

1. Recurrent stones (less than 60 months apart)
2. Cysteine stones
3. Hypercalcuria (absorptive, type one and type three)
4. Multiple stones
5. Retained stones (regardless of location)
6. Any abnormality noted on the Metabolic Workup Worksheet

Waivers are considered on a case by case basis. Waiver submission must include:

1. Renal stone workup as noted above
2. Urology Consult
3. Any metabolic abnormalities should be evaluated and/or treated as indicated prior to waiver submission

**TREATMENT:** Conservative management aimed at encouraging natural elimination of the stone, surgery or extracorporeal shock-wave lithotripsy will necessitate grounding until elimination of the stone and complete recovery. Metabolic abnormalities should be treated according to current guidelines. Urology consult is essential in determining the best treatment modality and counseling the member on measures to reduce recurrence.

**DISCUSSION:** The peak incidence of renal stones occurs in males at age 35. Dehydration is one of the key contributing factors. There is usually a gradual onset of flank, abdominal or back pain over an hour or more before acute colic. The risk of stone recurrence ranges from 20 to 50% over 10 years. A lifetime recurrence rate of 70% has been reported. The reported recurrence in patients who have required lithotomy approaches 80%.

**ICD-9 CODES:**

**592.0 Renal Stones**

**592.1 Ureteral Calculus**

**592.03 Retained renal calculus**

**592.04 Recurrent renal calculus**

**P59.96 Lithotripsy**

## 16.6 RENAL STONE METABOLIC WORKUP WORKSHEET

### RENAL STONE METABOLIC WORKUP

*All Blanks Must Be Filled In!*

NAME	DATE
RANK/RATE	SSN

URINALYSIS	Microscopic	
	Protein	
	pH	
	Culture & Sensitivity	

BLOOD CHEMISTRIES			#1	#2	#3
	Calcium	8.5-10.5			
	Creatinine	< 1.5 mg/dl			
	Electrolytes	normal limits			
	Phosphate	2.1-4.1 mg/dl			
	Uric Acid	3.0-8.5			

- For initial waiver request, submit 3 sets of blood chemistries drawn over one to two week asymptomatic period.

24 HOUR URINE CHEMISTRIES			
	Calcium	M < 300 ,F < 250 mg/24h	
	Creatinine	M > 1, F >0.6 g/24h	
	Phosphate	< 1 g/24h	
	Citrate	> 320 mg/24h	
	Oxalate	<45 mg/24h	
	Uric Acid	M<800, F<750 mg	
	Total Volume	1 liter minimum	

**IVP or imaging RESULTS:**

**STONE ANALYSIS:**

## 16.7 PROTEINURIA

**AEROMEDICAL CONCERNS:** The underlying processes that cause proteinuria can lead to renal insufficiency or failure presenting with signs and symptoms that may include fatigue, susceptibility to infection, edema, and electrolyte disturbances. The underlying processes that cause proteinuria may render the member unfit for military aviation duties.

### **CLINICAL APPROACH:**

1. Screen with dipstick.
2. If positive, ensure no exercise for 24 hours and member is well-hydrated, then repeat.
3. If repeat is positive, perform microscopic analysis to rule out false-positive conditions.
4. Refer or consult with nephrologist for additional testing (24 hour urine collection, creatinine clearance, and other studies to rule out systemic disease) and assistance with diagnosis and treatment.

**WAIVER:** Benign proteinuria is a condition that generally meets the criteria of the waiver principles. Serious proteinuria is a condition with a more uncertain outcome that may not always be suitable for waiver and requires a case-by-case approach for evaluation.

Waiver may be considered for both **Applicant and Designated** personnel if:

1. Protein excretion < 1 gram/day
2. Normal renal function
3. No systemic disease (including hypertension)

Waiver for proteinuria may be considered for **Designated** personnel on a case-by case basis with:

1. Hypertension that is well controlled
2. Daily protein excretion of up to 2 grams

Protein excretion rate greater than 2 grams/day is CD and WNR due to high likelihood of progression to renal failure

### **INFORMATION REQUIRED:**

#### **Initial waiver:**

1. 24 hour urine studies for total protein and creatinine
2. Serum chemistries
3. Internal medicine and/or nephrology consult
  - a. Rule out systemic disease and treat any underlying cause if discovered
4. Supporting labs, imaging studies, and renal biopsy as indicated

#### **Follow-up:**

1. 24 hour urine studies for total protein and creatinine clearance every 6 months until stable
2. Annual submission once stable
3. Re-evaluate waiver if:
  - a. Protein excretion exceeds 1 gram/day

- b. Renal function declines
- c. Related systemic disease becomes apparent

**TREATMENT:** Treatment as dictated by Internist or Nephrologist (may utilize medications such as ACEI or ARB, or recommend salt and protein restriction) for persistent (non-orthostatic) benign proteinuria or serious proteinuria..

**DISCUSSION:**

**Definition:** Normal adults may excrete up to 150 mg/day of total protein in the urine (may consist of 5-15 mg/day of albumin). Proteinuria is defined as total protein excretion exceeding 150 mg/day. Proteinuria is a sign, not a diagnosis.

**Epidemiology:** Proteinuria can be found by dipstick in as much as 17% of the adult population. Four population-based studies have found that fewer than 2% of those with positive dipstick results for proteinuria have serious and treatable urinary tract disorders (the positive predictive value is low).

**Measurement:** Screening is normally accomplished using a urine analyzer or "dipstick" during a scheduled physical examination. These random samples measure the concentration rather than the total amount of protein and are therefore influenced by the degree of urine dilution. More accurate tests include a 24 hour urine collection or a spot urinary protein to creatinine ratio (normal < 0.2). Urinalysis dipstick has a sensitivity of ~88% and specificity of ~96%.

**Additional Dipstick Facts:**

- 1. Causes for false positive readings
  - a. Alkaline urine (pH > 7.5)
  - b. Mucus, RBC's, WBC's, or semen in the urine
  - c. Dipstick immersed too long in the urine
  - d. Concentrated urine
- 2. Cause for false negative readings
  - a. Dilute urine

**Pathophysiological Mechanisms for proteinuria:**

- 1. Glomerular damage (most common for proteinuria of > 2 grams/day)
- 2. Tubular damage
- 3. Overflow (tubules unable to reabsorb an excessive filtered load of protein)

**Underlying Causes and Diagnoses:**

- 1. "Benign" proteinuria (asymptomatic with protein excretion of < 1 gram/day)
  - a. Inflammatory process
  - b. Intense activity or exercise
  - c. Dehydration
  - d. Transient proteinuria (idiopathic)
  - e. Orthostatic (postural) proteinuria
  - f. Persistent (non-orthostatic) proteinuria caused by mild forms of more serious disease

2. "Serious" proteinuria (protein excretion of > 1 gram/day and possibly symptomatic)
  - a. Diabetes
  - b. Hypertension
  - c. HIV/AIDS
  - d. Chronic glomerulonephritis
  - e. Multiple myeloma
  - f. Lupus nephritis
  - g. Nephrosclerosis
  - h. Nephrotic syndrome

**Prognosis:** The prognosis for conditions with high levels of proteinuria are much more likely to lead to renal failure (PARADE and REIN studies). Prognosis with impaired renal function and/or systemic disease (especially diabetes or HTN) is worse than if these conditions are absent. Prognosis for conditions causing benign (asymptomatic with protein excretion of < 1 gram/day) proteinuria in the absence of systemic disease, and with normal renal function, is favorable. When systemic disease (e.g. diabetes, hypertension, etc.) is present or renal function is abnormal (Cr clearance > 1.4 mg/dl in men or > 1.2 mg/dl in women), there is a higher risk for loss of kidney function and cardiovascular complications (MI and CVA) even with benign levels of proteinuria.

**ICD-9 CODE:**  
**719.0 Proteinuria**