

A 14-year-old girl is brought to the physician for evaluation of facial puffiness, fatigue, and decreased appetite for the past few days. The patient recently immigrated from China to the United States. Temperature is 36.7 C (98 F), blood pressure is 110/70 mm Hg, pulse is 80/min, and respirations are 18/min. Physical examination shows periorbital and pretibial edema. Serum laboratory results are as follows:

Creatinine	0.9 mg/dL
Albumin	2.2 mg/dL
Total bilirubin	0.5 mg/dL
Aspartate aminotransferase	56 U/L
Alanine aminotransferase	64 U/L
Alkaline phosphatase	97 U/L
HBsAg	Positive
HBeAg	Positive
Anti-HBsAg antibodies	Negative
Anti-HCV antibodies	Negative
Anti-HIV antibodies	Negative

Urinalysis shows 4+ proteinuria, no red blood cells, and no casts. Which of the following is the most likely diagnosis in this patient?

- ☐ A. Focal segmental glomerulosclerosis
- ☐ B. Membranoproliferative glomerulonephritis
- ☐ C. Membranous nephropathy
- ☐ D. Minimal change disease
- ☐ E. Poststreptococcal glomerulonephritis

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- ☐ A. Focal segmental glomerulosclerosis [14%]
- ☐ B. Membranoproliferative glomerulonephritis [18%]
- ☒ C. **Membranous nephropathy** [44%]
- ☐ D. Minimal change disease [23%]
- ☐ E. Poststreptococcal glomerulonephritis [1%]

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Explanation:

User Id: 

Nephrotic versus nephritic syndrome		
	Nephrotic syndrome	Nephritic syndrome
Clinical features	<ul style="list-style-type: none">• Edema• Fatigue• Proteinuria• Absence of hematuria• Hypoalbuminemia	<ul style="list-style-type: none">• Hypertension• Oliguria• Hematuria• Proteinuria• Casts
Pediatric etiologies	<ul style="list-style-type: none">• Minimal change disease	<ul style="list-style-type: none">• Poststreptococcal glomerulonephritis• Hemolytic uremic syndrome
Adult etiologies	<ul style="list-style-type: none">• FSGS• Membranous nephropathy• Membranoproliferative glomerulonephritis	<ul style="list-style-type: none">• IgA nephropathy• Membranoproliferative glomerulonephritis• Crescentic glomerulonephritis

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This patient's **edema**, **hypoalbuminemia**, and **markedly elevated urine protein** are consistent with **nephrotic syndrome (NS)**. Common causes of NS include minimal change disease in young children and focal segmental glomerulosclerosis (FSGS) and membranous nephropathy in adolescents and adults.

Although **membranous nephropathy** is less common in children, **hepatitis B infection** is a significant risk factor. Universal **vaccination** has dramatically reduced rates of hepatitis B virus-associated membranous nephropathy (HBVMN), and unvaccinated children who have immigrated from endemic areas should be screened for hepatitis B. This patient is positive for HBsAg and HBeAg and negative for anti-HBsAg antibody, findings consistent with active hepatitis B infection. The pathogenesis of HBVMN may involve deposition of HBeAg or its corresponding antibody in the glomeruli.

This patient's **edema, hypoalbuminemia, and markedly elevated urine protein** are consistent with **nephrotic syndrome (NS)**. Common causes of NS include minimal change disease in young children and focal segmental glomerulosclerosis (FSGS) and membranous nephropathy in adolescents and adults.

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Additional workup for this patient should include a 24-hour urine sample (protein excretion **>3 g/day** is consistent with NS), serum C3 (typically low with HBVMN), antinuclear antibody (elevated in lupus), and renal biopsy.

(Choice A) FSGS is a common cause of NS in adults and adolescents. HIV is the most commonly associated infection.

(Choice B) Membranoproliferative glomerulonephritis can cause NS or nephritic syndrome, most commonly in adults, and has been associated with hepatitis B infection. However, it is significantly less common than membranous nephropathy.

(Choice D) Minimal change disease is the most common cause of NS in preadolescent children. This patient is a teenager and has active hepatitis B infection, making membranous nephropathy more likely.

(Choice E) Poststreptococcal glomerulonephritis is the most common cause of nephritic syndrome in children. The absence of hypertension, oliguria, hematuria, and casts makes nephritic syndrome unlikely.

Educational objective:

Membranous nephropathy is a common cause of nephrotic syndrome (edema, proteinuria, and hypoalbuminemia) in adolescents and adults. Active hepatitis B infection is an important risk factor, and vaccination reduces this risk.

References:

1. **Universal hepatitis B vaccination reduces childhood hepatitis B virus-associated membranous nephropathy.**
2. **Membranous nephropathy in children: clinical presentation and therapeutic approach.**

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