# The Acquired Immunodeficiency Syndrome in the Wife of a Hemophiliac

ARTHUR E. PITCHENIK, M.D.; RICHARD D. SHAFRON, M.D.; ROBERT M. GLASSER, M.D.; and THOMAS J. SPIRA, M.D.; Miami, Florida; and Atlanta, Georgia

A 71-year-old previously healthy woman developed unexplained thrush, onychomycosis, Pneumocystis carinii pneumonia, and a T-cell defect consistent with the acquired immunodeficiency syndrome. Her only apparent risk factor was infrequent, monogamous sexual contact with her husband, a 74-year-old hemophiliac who had received factor VIII concentrate and subsequently died due to P. carinii pneumonia. She first developed probable signs of the syndrome (recurrent thrush and onychomycosis) 1 year before her husband became ill. These findings suggest that the syndrome can be transmitted heterosexually by an asymptomatic person, and that the female sexual partners of hemophiliacs treated with factor VIII concentrate may be at risk of acquiring the syndrome; frequent sexual contact or several sexual partners are not necessary for transmission to occur; and the syndrome can occur in elderly people if exposed to risk factors. This case further supports the theory that the syndrome in hemophiliacs is due to an infectious agent that can be transmitted heterosexually as well as parenterally.

THE ACQUIRED IMMUNODEFICIENCY SYNDROME has been reported in homosexual men, intravenous drug abusers, Haitians, hemophiliacs, infants born to mothers in high-risk groups for this syndrome, and female sexual contacts of male intravenous drug abusers or bisexual men (1-19). Over 90% of these patients have been less than 50 years old and almost all have been less than 70 (4; CENTERS FOR DISEASE CONTROL. Unpublished data). We report a case of the acquired immunodeficiency syndrome in the 71-year-old wife of a 74-year-old hemophiliac who had received factor VIII concentrate and subsequently died due to Pneumocystis carinii pneumonia and probable acquired immunodeficiency syndrome. Her only apparent risk factor for acquiring the syndrome was infrequent monogamous sexual contact with her husband when he was asymptomatic.

# Methods

The patient, her husband, and other family members were extensively interviewed. Historical data from the patient were confirmed by a personal interview done by a member of the Centers for Disease Control (CDC) Task Force on the acquired immunodeficiency syndrome. Several interviews were done in the patient's house in order to better evaluate her home environment. The patient and her husband were also examined and followed over a period of 8 years.

and followed over a period of 8 years. Immunologic and serologic testing was done as previously described (6). Antibody to human T-cell leukemia virus membrane antigens was measured using indirect living cell immunoflourescence of human T-cell leukemia virus infected HUT-102 cells (20).

▶ From the Department of Medicine, Division of General Medicine, University of Miami School of Medicine, Miami, Florida; and the Division of Host Factors, Centers for Infectious Diseases, Atlanta, Georgia.

62 Annals of Internal Medicine. 1984;100:62-65.

### Case Report

A 71-year-old white woman, the wife of a patient with hemophilia A, was in good health until January 1982, when she developed slowly progressive fatigue, recurrent crusting blisters on her lips diagnosed clinically as herpes simplex, onychomycosis, and extensive thrush. The thrush responded to treatment with nystatin or ketoconazole but repeatedly recurred when these medications were discontinued. At the start of 1983 she developed watery, non-bloody diarrhea that recurred intermittently. In June 1983 she developed fever, a nonproductive cough, and dyspnea requiring hospitalization.

On admission, the patient appeared chronically ill and had a temperature of 38.9 °C. There were crusted herpetic lesions on her lower lip, onychomycosis of her fingers and toes, thrush, and fine rales throughout both lung fields. Other findings on physical examination were normal. The hematocrit was 39.9%, the peripheral leukocyte count was 5900/mm<sup>3</sup> with 58% neutrophils, 2% band forms, 34% lymphocytes, 3% monocytes, and 3% eosinophils. The sedimentation rate was 73 mm/h. The platelet count, blood urea nitrogen, blood glucose levels, and the results of a urinalysis were normal. Quantitative immunoglobulin studies showed an elevated IgG at 1690 mg/dL (normal, 617 to 1325 mg/dL), an elevated IgA at 669 mg/dL (normal, 65 to 301 mg/dL), and a normal IgM. Skin tests read at 24, 48, and 72 hours showed no reactivity to trichophytin, 1:500 strength (Iatric Corporation, Tempe, Arizona), mumps (Ell Lilly and Company, Indianapolis, Indiana), intermediate strength tuberculin purified protein derivative (Connaught) Laboratories, Willowdale, Ontario, Canada), and candida. 1:500 strength (Iatric Corporation). Arterial blood gas tests done with the patient breathing room air showed a partial pressure of oxygen of 49 mm Hg, a partial pressure of carbon diox-ide of 31 mm Hg, and pH 7.46. Initial chest roentgenogram showed a left upper lobe infiltrate and a right perihilar infiltrate. later developed. Routine sputum and blood cultures were negative. Transbronchial lung biopsy samples stained with methena-mine silver showed numerous *P. carinii* cysts and intra-alveolar exudate. Cultures of bronchial washings were negative for mycobacteria and fungi. Her pulmonary symptoms resolved, and her chest roentgenogram showed significant clearance after 2 weeks of treatment with trimethoprim-sulfamethoxazole. The thrush cleared after a course of ketoconazole. The patient was, discharged from the hospital on 20 June 1983 and was examined bimonthly through mid-October 1983. During this time, the patient's temperature reached 38.9 °C on several occasions, the onychomycosis persisted, herpetic lesions recurred several times on her lips, and severe thrush recurred repeatedly requiring several courses of ketoconazole. (The thrush recurred each time ketoconazole therapy was discontinued.) No underlying immunosuppressive illness has been found to explain the patient's opportunistic infections. Immunologic blood tests done 29 June 1983 and 17 July 1983 (after discharge from the hospital and after recovery from P. carinii pneumonia) showed a decreased T-helper cell: T-suppressor/cytotoxic cell ratio and decreased to absent in-vitro blastogenic responses to mitogens and antigens (Table 1). Serologic tests showed antibody evidence of previous infection with hepatitis A virus, cytomegalo-virus, Epstein-Barr virus, and human T-cell leukemia virus (Table 2).

The patient is of Irish descent, was born in Philadelphia, and lived there until 1970, when she moved to Florida with her

©1984 American College of Physicians

a						
- C. T.	 	 				
10 A.		Imphosyla i	Jhonotynoc o	ad Minchagania	Decession is h	
				IU DIASUUREIIIC	RESDUIISES IO N	nurens and Anurens.

	Date of	Normal Ranget	
	6/29/83	7/17/83	
Lymphocyte count, /mm <sup>3</sup>	1760	1551	1046-3085
Bicells. %	6	11	4-23
B cells, /mm <sup>3</sup>	106	171	54-419
T cells. %	46	55	46-82
Teells, /mm <sup>3</sup>	810	853	671-2073
T-helper/inducer cells (Th), %	17	19	30-60
T-helper/inducer cells, mm <sup>3</sup>	299	295	401-1588
T-suppressor/cytotoxic cells (Ts), %	33	38	12-35
T-suppressor/cytotoxic cells, /mm <sup>3</sup>	581	589	188-831
Th/Ts ratio	0.51	0.5	1-3.9
Mitogens (normalized %) ‡			
Phytohemagglutinin	86	0	86-370
Concanavalin A	27	1	61-691
Pokeweed	68	0	41-309
Antigens (stimulation ratio)			
Candida	0.6	0.5	> 3.
Tetanus	0.8	1.2	> 3
Streptolysin O	2.1	0.8	> 3
Herpes simplex virus	1.6	2.2	> 3
Cytomegalovirus	1.0	0.7	> 3

beyte subpopulations presented as a percent of peripheral-blood lymphocyte count. T cells = OKT3, T-helper/inducer cells = OKT4, T-suppressor/cytotoxic cells

Virial over a second se

husband. There was no other history of travel. The patient had worked as a cook in restaurants until 1974 when she retired. the had sex only with her husband, to whom she had been married for the past 50 years. For the past 10 years they slept in parate beds and had genital intercourse approximately once very 2 to 3 months until mid 1981 (approximately 6 months before she first became ill and 18 months before her husband rst became ill). There was no bleeding or trauma during sexulintercourse. She denied any other sexual practices and denied euse of alcohol, tobacco, or illicit drugs by any route. Before illness she had always been in good health and took no medication. She had never administered factor VIII concentrate her husband or had contact with instruments for drug use. The factor VIII was always administered by a nurse.) She had rectinad a blood transfusion or shared a common razor, tooth ush or scissors with her husband. Except for bleeding hemorids on several occasions in 1981 and 1982, her husband had hadino external bleeding or open wounds since 1970. The husand had a left knee arthroplasty done in 1978 but there was no postoperative external bleeding and his wife had no contact the operative site or with the bandages. A few times in 1981 the patient hand-washed her husband's shorts, which were stained with small amounts of dried blood from his bleeding emorrhoids; however, the shorts were always first soaked in aduschold bleach (an effective antiviral agent recommended empirically for use as a disinfectant in acquired immunodeficicy syndrome precautions) (23) before she washed them in the water. Further, she had no skin abrasions, skin punctures, or open wounds of any kind. The patient and her husband had not children and lived alone. They had few outside social or unity activities and never had social contact with persons a high-risk group for the acquired immunodeficiency syn-

The patient's husband was a 74-year-old white man of Italian Scent who had clinically mild hemophilia A. Although he addition that the second secon estive bleeding, occasional nosebleeds, and spontaneous Using of his skin in childhood, hemophilia was not diagnosed the receive factor VIII until 1970, when he hemorrhaged the attoch extraction. He subsequently received factor VIII

concentrate in November 1976, May 1977, and October 1977 for recurrent hemarthrosis of the left knee, January through June 1978 for a left knee arthroplasty that was complicated by recurrent hemarthrosis, March 1981 for bleeding hemorrhoids, and January 1982 for bleeding hemorrhoids and hemarthrosis of the left knee. He did not receive factor VIII after this time. Factor VIII coagulant activity measured in January 1978 was less than 1% of normal, and the factor VIII antigen was 182% of normal. Circulating anticoagulant against antihemophilic factor was not found. The husband's only other medications were ibuprofen for joint pains and propranolol for occasional cardiac palpitations. He had sexual contact only with his wife, and there was no history of illicit drug use. Except for his bleeding diathesis, he was in good health until January 1983 when h developed a mild non-productive cough, low-grade fever, and

### Table 2. Virologic Data

Test*	Results
Hepatitis A antibody	Positive
HBsAg	Negative
HBsAg antibody	Negative
HBcAg antibody	Negative
CMV	1:32
CMV (IHA)	1:16000
EBV IgG	> 1:10
EBV IgM	Negative
HSV I	1:2048
HSV II	1:16
HTLV (%)	48

• HBsAg = hepatitis B surface antigen; HBcAg = hepatitis B core antigen; CMV = cytomegalovirus measured by complement fixation; CMV (IHA) = cytomegalovirus measured by indirect hemagglutination assay; HSV 1 = herpes simplex virus type 1 measured by indirect hemagglutination assay; HSV II = herpes simplex virus type 11 measured by indirect hemagglutination assay; HSV U = Epstein-Barr virus (viral capsid antigens) measured by immuno-fluorescent assay; HTLV (%) = percent of T-cells infected with human T-cell leukemia virus that fluoresced using patient serum (6.1% of uninfected control cells fluoresced using patient serum; a negative test was less than 20%).

Pitchenik et al. • Immunodeficiency in a Hemophiliac's Wife

63

progressive weakness, malaise, and weight loss for which he was hospitalized on 15 April 1983. These symptoms started about 1 year after his wife first developed recurrent herpetic oral lesions, onychomycosis, and thrush.

On admission he appeared chronically ill and had a temperature of 38.4 °C. There was a healed amputation below the right knee, deformed knee joints secondary to previous hemarthroses and the healed sear of his previous left knee surgery. The rest of the physical examination was normal. The hematocrit was 32.3%, the peripheral blood leukocyte count was 4100/mm<sup>3</sup> with 25% lymphocytes, and the sedimentation rate was 119 mm/h. Partial thromboplastin time was 104 s. Prothrombin time and platelet count were normal. Several blood cultures and initial chest roentgenogram were negative. Serum levels of IgG and IgM were normal, but IgA was elevated to 1030 mg/dL. Cytomegalovirus titer by complement fixation was 1:16. Serologic tests for syphilis and hepatitis B surface antigen were negative. The patient was treated with a 2-week course of ampicillin because an oral cholecystogram showed nonvisualization of the gallbladder and an abdominal sonogram revealed gallstones; however, the fever, malaise, and weakness persisted. A repeat peripheral blood leukocyte count on 26 April was 3700/mm<sup>3</sup> with 27% lymphocytes. On 7 May, he had dysphagia and rapid. respirations. A repeat chest roentgenogram showed an interstitial infiltrate in both upper lung fields, and tests for arterial blood gases with the patient breathing room air showed a partial pressure of oxygen of 44 mm Hg, a partial pressure of car-bon dioxide of 25 mm Hg, and pH 7.5. Therapy with high-dose corticosteroids and penicillin was started. The patient subsequently developed thrush, diffuse interstitial infiltrates as shown on chest roentgenogram, and worsening respiratory distress. He died on 19 May 1983. An autopsy showed extensive P. carinii pneumonia, acute and chronic ulcerative esophagitis with epithelial cell intranuclear inclusions typical of herpes viral infection, chronic cholecystitis, cholelithiasis, and mild nonspecific hepatitis. There was no malignancy or evidence for other underlying immunosuppressive diseases.

# Discussion

The patient, a 71-year-old woman, had a significant Tcell defect (Table 1) and unexplained opportunistic infections meeting the CDC criteria for the acquired immunodeficiency syndrome (24). After extensive interviews with the patient, her husband, and other family members, and after investigation of her home environment, we determined that her only apparent risk factor was sexual intercourse approximately once every 2 to 3 months with her husband, a 74-year-old hemophiliac who had received factor VIII concentrate and who subsequently died due to P. carinii pneumonia. Further, she first developed probable signs of the acquired immunodeficiency syndrome (recurrent thrush and onychomycosis) 1 year before her husband became ill. This suggests that the syndrome can be transmitted heterosexually by an asymptomatic person and the female sexual partners of hemophiliacs treated with factor VIII concentrate may be at risk for acquiring the syndrome; frequent sexual contact or several sexual partners are not necessary for transmission to occur; and the syndrome can occur in elderly people (given the proper risk factors) and need not be restricted to the younger population as previously described (4).

Although the patient's husband received high-dose steroids for 13 days before the histologic diagnosis of *P. carinii* pneumonia, the clinical evidence suggests that this infection preceded the steroids and that he had the acquired immunodeficiency syndrome. The onset of illness

64 January 1984 • Annals of Internal Medicine • Volume 100 • Number 1

in the patient approximately 6 months after her last sexual contact with her husband and the onset of symptoms in her husband 1 year after last receiving factor VIII concentrate suggest a long incubation period for the acquired immunodeficiency syndrome.

The patient had antibody evidence of current or past infection with herpes simplex virus, Epstein-Barr virus and cytomegalovirus (Table 2); however, antibodies to these viruses are prevalent in control groups for the syndrome and the general population (6, 25, 26). Of possible greater significance is antibody evidence in the patient for infection with human T-cell leukemia virus. Human Tcell leukemia virus is a lymphotrophic virus that prefer entially infects T-helper cells and has recently been hypothesized to be of etiologic importance in the acquired immunodeficiency syndrome (20, 27-30). In a study, 25% to 40% of cases of the syndrome (mostly homosex. ual men) had antibodies to this virus compared to only 1% or less of controls (20). Further, there is evidence that human T-cell leukemia virus can be transmitted by heterosexual contact (31), and it is possible that our patient acquired human T-cell leukemia virus infection from her husband in this way.

The wives of patients with factor VIII deficiencies who had abnormal OKT4/OKT8 ratios were reported to show decreased percentages of OKT4 cells (32). Al though it is possible that these immunologic abnormalities were related to the acquired immunodeficiency syndrome, these women and their hemophiliac husbands did not have the syndrome, and the meaning of their T-cell defects was therefore uncertain. The probable transmission of the syndrome in the present case from a hemophiliac husband to his wife further supports the theory that the occurrence of the syndrome among hemophiliacs who are treated with factor VIII concentrate is due to an infectious agent that can be transmitted heterosexually as well as parenterally through blood products. Monogamous and infrequent sexual contact as well as the absence of other risk factors in the patient (who led a remarkably secluded life with her husband) is evidence against the theory that frequently repeated stimulation with multiple antigens (as occurs among promiscuous male homosexuals) is necessary for the acquired immunodeficiency syndrome to occur (33).

ACKNOWLEDGMENTS: The authors thank Dr. Dale Lawrence of the Centers for Disease Control Task Force on the acquired immunodeficiency syndrome for interviewing the patient; Bonnie M. Jones, Cornelia R. McGrath, Dr. Janet K. Nicholson, C. David Cross, and Dr. J. Stever McDougal for technical assistance with immunologic testing and Dr. John A. Stewart and Dr. Ciril Cabradilla for serologic testing of specimens at the Centers for Disease Control; to Dr. Jay H. Sanders and Dr. Bruce L. Eval for their advice and support, and to Ms. Rosa Gonzalez for assistance in preparing this manuscript.

Requests for reprints should be addressed to Arthur E. Pitchenik, M.D. University of Miami School of Medicine, Department of Medicine, R-60 P.O. Box 016960; Miami, FL 33101.

#### References

- GOTTLIEB MS, SCHROFF R, SCHANKER HM, et al. Pneumocystis carina pneumonia and mucosal candidiasis in previously healthy homosexual men: evidence of a new acquired cellular immunodeficiency. N Engl Med. 1981;305:1425-31.
- MASUR H, MICHELIS MA, GREENE JB, et al. An outbreak of community acquired *Pneumocystis carinii* pneumonia: initial manifestation of ce<sup>1</sup> lular immune dysfunction. N Engl J Med. 1981;305:1431-8.

道法

SIEGAL FP, LOPEZ C, HAMMER GS, et al. Severe acquired immunodeficiency in male homosexuals, manifested by chronic perianal ulcerative

ciency in male homosexuals, manifested by chronic perianal ulcerative herpes simplex lesions. N Engl J Med. 1981;305:1439-44. (CENTERS FOR DISEASE CONTROL. Acquired immunoideficiency syn-drome (AIDS) update—United States. MMWR. 1983;32:309-11. (CENTERS FOR DISEASE CONTROL. Opportunistic infections and Kapo-ri's sarcoma among Haitians in the United States. MMWR. (1982;31:353-4, 360-1. Disease and the United States. MMWR.

PITCHENIK AE, FISCHL MA, DICKINSON GM, et al. Opportunistic in

PITCHENIK AE, FISCHL MA, DICKINSON GM, et al. Opportunistic infections and Kaposi's sarcoma among Haitans: evidence of a new acquired immunodeficiency state. Ann Intern Med. 1983;98:277-84.
 VIEIRA J, FRANK E, SPIRA TJ, LANDESMAN SHN. Acquired immune deficiency in Haitians: opportunistic infections in previously healthy Haitian immigrants. N Engl J Med. 1983;308:125-9.
 RACNI M, LEWIS H, SPERO JA, BONTEMPO FA: Acquired immunodeficiency-like syndrome in two haemophilias: Lancet. 1983;1213-4.
 CENTERS FOR DISEASE CONTROL. Pneumocystis carinii pneumonia among persons with hemophilia A. MMWR. 1982;31:365-7.
 CENTERS FOR DISEASE CONTROL. Value on accurate immune deficiency and the state on accurate immune deficiency.

1010 CENTERS FOR DISEASE CONTROL. Update on acquired immune deficiency syndrome (AIDS) among patients with hemophilia A. MMWR. 1982;31:644-6, 652.

DAVIS KC, HORSBURGH DR JR, HASIBA U, SCHOCKET AL, KIRKPA-TRICK CH. Acquired immunodeficiency syndrome in a patient with he-imophilia. Ann Intern Med. 1983;98:284-6. 22 ELLIOTT JL, HOPPES WL, PLATT MS, THOMAS JG, PATEL IP, GAN-

SAR A. The acquired immunodeficiency syndrome and Mycobacterium avium-intracellulare bacteremia in a patient with hemophilia. Ann In-Tern Med. 1983:98:290-3.

POON MC, LANDAY A, PRASTHOFER EF, STAGNO S. Acquired immunodeficiency syndrome with *Pneumocysis carinii* pneumonia and My-cobacterium avium-intracellulare infection in a previously healthy paficient with classic hemophilia: clinical, immunologic, and virologic find-ings. Ann Intern Med. 1983;98:287-90.

AGENTERS FOR DISEASE CONTROL. Unexplained immunodeficiency and opportunistic infections in infants—New York, New Jersey, California. MMWR. 1982;31:665-7.

OLESKE J, MINNEFOR A, COOPER R JR, et al. Immune deficiency syn-

drome in children. JAMA. 1983;249:2345:9 CENTERS FOR DISEASE CONTROL. Immunodeficiency among female lexual partners of males with acquired immune deficiency syndrome (AIDS)—New York. MMWR. 1983;31:697-8.

 [6] CENTERS FOR DISEASE CONTROL. Immunodeficiency among female exual partners of males with acquired immune deficiency syndrome (AIDS)—New York. MMWR. 1983;31:657-8.
 [7] MASUR H, MICHELIS MA, WORMSER GP, et al. Opportunistic infection in previously healthy women: initial manifestations of a community-ac-quired cellular immunodeficiency. Ann Intern Med. 1982;97:533-9.
 [8] HARNIS C, SMALL CB, KLEIN RS, et al. Immunodeficiency in female sexual partners of men with the acquired immunodeficiency syndrome. N Engl J Med. 1983;308:1181-4.
 [9] PITCHENIK AE, FISCHL MA, SPIRA TL, Acquired immunod deficiency. N Engl J Med. 1983;308:1181-4. JP PITCHENIK AE, FISCHI, MA, SPIRA TJ. Acquired immune deficiency

- syndrome in low risk patients: evidence for possible transmission by an asymptomatic carrier. JAMA. 1983;250:1310-2.
  20. Essex M, MCLANE MF, Lee TH, et al. Antibodies to cell membrane antigens associated with human T-cell leukemia virus in patients with attige dessociated with human T-cell leukemia virus in patients with AIDS. Science. 1983;220:859-62. BURTON RC, FERGUSON P, GRAY M, HALL J, HAYES M, SMART YC. 21.
- Effects of age, gender, and cigarette smoking on human immunoregula-tory T-cell subsets: establishment of normal ranges and comparison with patients with colorectal cancer and multiple sclerosis. Diag Immunol. 1983;1:216-23.
- 1983;1:216-23.
   TEASDALE C, THATCHER J, WHITEHEAD RH, HUGHES LE. Age dependence of T lymphocytes [Letter]. Lancet. 1976;1:1410.
   CENTERS FOR DISEASE CONTROL. Acquired immune deficiency syndrome (AIDS): precautions for clinical and laboratory staffs. MMWR. 1003;41:572-60.
- 1982:31:577-80.
- CENTERS FOR DISEASE CONTROL. Update on acquired immune deficiency syndrome (AIDS)-United States. MMWR. 1982;31:507-8, 513-
- 25. DREW WL, MINTZ L, MINER RC, SANDS M, KETTERER B. Prevalence of cytomegalovirus infection in homosexual men. J Infect Dis. 1981:143:188-92
- CENTERS FOR DISEASE CONTROL. Epidemiologic aspects of the current outbreak of Kaposi's sarcoma and opportunistic infections. N Engl J Med. 1982;306:248-52.
- GALLO RC, SARIN PS, GELMANN EP, et al. Isolation of human T-cell leukemia virus in acquired immune deficiency syndrome (AIDS). Sci-ence. 1983;220:865-8.
- GELMANN EP, POPOVIC M, BLAYNEY D, et al. Proviral DNA of a retrovirus, human T-cell leukemia virus, in two patients with AIDS. 28.
- Science, 1983;220:862-5. BARE-SINOUSSI F, CHERMANN JC, REY F, et al. Isolation of a T-lym-photropic retrovirus from a patient at risk for acquired immune deficien-cy syndrome (AIDS). *Science*, 1983;220:868-71.
- 30. MARX JL. Human T-cell leukemia virus linked to AIDS. Science, 1983;220:806-9. 31.
- SCHUPBACH J, KALYANARAMAN VS, SARNGADHARAN MG, BLATT-NER WA, GALLO RC. Antibodies against three purified proteins of the human type C retrovirus, human T-cell leukemia-lymphoma virus, in adult T-cell leukemia-lymphoma patients and healthy blacks from the Caribbean. Cancer Res. 1983;43:886-91. 32. DESHAZO RD, ANDES WA, NORDBERG J, NEWTON J, DAUL C, BO-
- ZELKA B. An immunologic evaluation of hemophilias, plate c, and their wives: relationships to the acquired immunodeficiency syndrome. Ann Intern Med. 1983;99:159-64. 33. SONNABEND J, WITKIN SS, PURTILO DT. Acquired immunodeficiency
- syndrome, opportunistic infections, and malignancies in male homesexit als: a hypothesis of etiologic factors in pathogenesis. JAMA. 1983;249:2370-74.

Pitchenik et al. • Immunodeficiency in a Hemophiliac's Wife

14 - 41 - 44 - 41 - 45