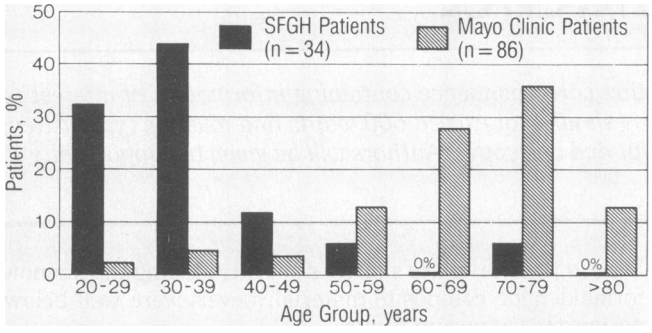

Figure 1.—The incidence of herpes zoster ophthalmicus by age in our series is compared with that of Womack and Liesegang's series.[2] SFGH = San Francisco General Hospital Medical Center

TABLE 1.—*Occurrence of Keratouveitis After Initiation of Acyclovir Therapy in Patients With HZO, n = 34*

	Patients, No.			
Route of Administration	*HIV-Positive*	*At Risk*	*HIV-Positive and At Risk*	*No Risk*
Oral	2/5	1/3	3/8	0/2
Intravenous	0/8	2/12	2/20	0/2
No therapy	...	...	...	0/2

HIV = human immunodeficiency virus, HZO = herpes zoster ophthalmicus

most of the HZO patients were elderly—older than 50 years.

More recently, along with the increase in the number of patients with the acquired immunodeficiency syndrome (AIDS) treated at SFGH, we have observed an increase in the number of HZO patients seen at our clinic: 36 patients with HZO were seen between January 1986 and May 1989. A review of the available medical records showed that 13 of 34 patients were known to be positive for the human immunodeficiency virus (HIV) at the time of presentation with HZO. Of the other 21 patients, 15 had risk factors for exposure to HIV, such as intravenous drug abuse, bisexuality, homosexuality, or prostitution, while 6 had no such risk factors.

The mean ages of the "known HIV-positive," "at risk," and "not at risk" groups were 36, 32, and 48 years, respectively. This differs from the previously reported age distribution for HZO, where most of the patients were older than 50 years (Figure 1).[2] The younger age distribution of the SFGH patients reflects the relative prevalence of zoster ophthalmicus in HIV-positive or at-risk persons in this population. The mean age of patients with HIV disease in San Francisco is 38 (Doug Franks, AIDS Surveillance Office, San Francisco Health Department, oral communication, March 30, 1990). This finding underscores the importance of considering HIV infection in young patients with HZO because it may be the initial manifestation of AIDS.[3-5] Moreover, Melbye and colleagues reported the cumulative incidence of AIDS to be 45.5% four years after an initial episode of HZO in a homosexual population.[3] Of our 15 at-risk patients, 9 of whom are homosexual, none has had a diagnosis of AIDS-related complex (ARC) or AIDS since the initial HZO episode. Our longest follow-up of these at-risk patients has been two years, however, and we may yet see the further sequelae of HIV disease in this group of patients.

In two of the HIV-positive patients, herpes zoster meningoencephalitis developed.[5] Such complications are anticipated in immunocompromised HIV-positive or at-risk patients. This has prompted us to treat aggressively all HIV-positive and at-risk HZO patients with intravenous acyclovir.

When the HIV-positive and at-risk groups were pooled, keratitis or uveitis developed in a larger percentage of patients on oral acyclovir treatment than on parenteral therapy (38% versus 10%, Table 1). Unfortunately, the small sample size limits the conclusions that can be drawn. In our potentially immunocompromised population, however, the administration of intravenous acyclovir does appear to reduce the occurrence of keratouveitis.

The younger age distribution of our HZO population suggests that in the future we will continue to see two predominant age groups of HZO—one a younger, HIV-associated group; the other, an elderly population. The therapeutic implications of this changing epidemiology are still unclear. We recommend treating all potentially immunocompromised patients with intravenous acyclovir (30 mg per kg per day for 5 days) followed by oral acyclovir (800 mg 5 times per day for 9 days) because this may prevent life-threatening dissemination as well as reduce the incidence of keratouveitis.

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REFERENCES

1. Balfour HH Jr: Varicella zoster virus infections in immunocompromised hosts: A review of the natural history and management. Am J Med 1988; 85(2A):68-73
2. Womack LW, Liesegang TJ: Complications of herpes zoster ophthalmicus. Arch Ophthalmol 1983; 101:42-45
3. Melbye M, Grossman RJ, Goedert JJ, et al: Risk of AIDS after herpes zoster. Lancet 1987; 1:728-731
4. Kestelyn P, Stevens AM, Bakkers E, et al: Severe herpes zoster ophthalmicus in young African adults: A marker for HTLV-III seropositivity. Br J Ophthalmol 1987; 71:806-809
5. Seiff SR, Margolis T, Graham SH, et al: Use of intravenous acyclovir for treatment of herpes zoster ophthalmicus in patients at risk for AIDS. Ann Ophthalmol 1988; 20:480-482

Radon in California Homes

To THE EDITOR: We would like to bring your readers up to date on issues raised in previous communications concerning radon in California homes.[1,2]

In March 1990 the California Department of Health Services (CDHS) published the results of a study of indoor radon concentrations in 310 California residences.[3] This survey was the first statewide effort to determine the extent of radon exposure in representative California homes and to identify areas of the state where residences may have elevated radon concentrations. In this study, radon measurements were carried out for a full year in order to obtain an accurate estimate of exposure unbiased by short-term fluctuations in radon levels because of weather conditions or changes in ventilation.

Confirming more limited earlier studies, the results of this most recently completed survey show that about 0.8% of California homes are expected to have annual average radon levels exceeding the current action level of 4 picocuries (pCi) per liter of air recommended by the United States Environmental Protection Agency (EPA). Of those homes having levels above 4 pCi per liter, none exceeded 20 pCi per liter.

The results also were analyzed by dividing the state into six geographic regions. The geometric mean radon concentration of the state was 0.85 pCi per liter. The geometric mean level in the Sierra Nevada region (from Placer County

south to Mariposa, as well as Alpine, Mono, and Inyo counties) was 2.20 pCi per liter, which was significantly higher than other areas. The Fresno-Ventura region (Madera, Fresno, Kings, Tulare, Kern, Santa Barbara, and Ventura counties) had the next highest level, with a geometric mean level of 1.31 pCi per liter.

Of the approximately 84,000 (confidence interval, 38,000 to 160,000) California homes predicted to have indoor radon concentrations above 4 pCi per liter, 54,000 (confidence interval, 24,000 to 97,000) are expected to be in the Sierra Nevada region (about 25% of 220,000 residences). This result is understandable in light of the extent of granitic rock formations (with higher uranium concentration than most rock types) and the harsher winters (with consequent "tighter" building construction, less ventilation, and larger pressure differences between home substructure and underlying soil due to the buoyancy of heated air) prevalent in this area.

The area with the next highest proportion of residences (3,000 to 16,000 of 1,000,000) expected to have radon concentrations above 4 pCi per liter is the Fresno-Ventura region. Portions of this region are currently undergoing intensive study by CDHS. In contrast, coastal counties north of Santa Barbara are projected to have less than 0.1% of homes (about 800 residences) above the EPA action level.

Data from this survey have been used by CDHS in designing more detailed surveys. For example, we are in the process of conducting a focused radon study of 800 homes in Ventura County and 200 homes in northwest Los Angeles County. In addition CDHS, in cooperation with EPA, is conducting a statewide survey of 3,000 homes whose selection was based on the analysis of the results in the six regions.

Overall, the accumulating data continue to show that California does not have a substantial problem with radon, although in selected areas of the state there is reason for some concern. Results of future surveys, combined with existing data, will allow us to make more precise recommendations regarding routine testing of homes for radon and the likelihood of the need for mitigation efforts.

In the meantime, while CDHS does not recommend, as a matter of public policy, that all California homes be tested for radon, we continue to encourage medical practitioners and the public to learn more about this environmental agent. Toward this end, we have produced a guidebook on radon,[4] as has the US Environmental Protection Agency,[5] which can be obtained by calling the CDHS Office of Radon Programs at (916) 324-2213. Information about radon contamination of water can be obtained by calling the department's Public Water Supply Branch at (415) 540-2172.

Persons who want their homes tested for radon can call the department's Office of Radon Programs at (916) 324-2213 to receive a list of companies that have demonstrated their laboratory proficiency in radon testing. Additional technical information also may be obtained by calling this number.

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REFERENCES

1. Kizer KW: Public health notes (Correspondence). West J Med 1989; 150:697-698

2. Kizer KW: Is household radon contamination a problem in California? California Physician 1989; 3:35-37

3. Liu K-S, Hayward SB, Girman JR, et al: Survey of Residential Indoor and Outdoor Radon Concentrations in California. Sacramento, California Department of Health Services (CDHS), March 1990

4. A Californian's Guide to Radon. Sacramento, CDHS, 1988

5. A Citizen's Guide to Radon, What It Is and What to Do About It. Washington, DC, Environmental Protection Agency, 1986