of the trial. As in our patient, in both published trials ([1, 4]) the side effects were found to be minimal, and no laboratory abnormalities were detected.

In summary, as in two previously published pilot trials, our single clarithromycin-treated patient had a good clinical response, minimal side effects, and no resultant laboratory abnormalities. Loss of *M. leprae* viability was, as in one of the pilot trials ([1]), not obtained by a single day of treatment. On the other hand, in our patient and the other two studies ([1, 4]), by a few weeks of daily therapy and thereafter all viable *M. leprae* bacilli had been consistently eliminated by the means employed. Thus, as in previous trials ([1, 4]), clarithromycin appeared in our patient to be remarkably efficacious.

—Robert H. Gelber, M.D.

Medical Director
San Francisco Regional Hansen's Disease Program
2211 Post St., Suite 301
San Francisco, CA 94115, U.S.A.

REFERENCES

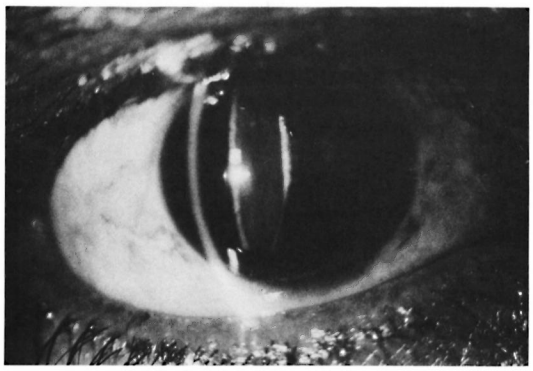
1. Chan, G. P., Garcia-Ignacio, B. Y., Chavez, V. E., Livelo, J. B., Jimenez, C. L., Parrilla, M. L. R. and Franzblau, S. G. Clinical trial of clarithromycin for lepromatous leprosy. Antimicrob. Agents Chemother. **38** (1994) 515–517.
2. Franzblau, S. G. and Hastings, R. C. *In vitro* and *in vivo* activities of macrolides against *Mycobacterium leprae*. Antimicrob. Agents Chemother. **32** (1988) 1758–1762.
3. Gelber, R. H., Murray, L. P., Siu, P. and Tsang, M. Clarithromycin at very low levels and on intermittent administration inhibits the growth of *M. leprae* in mice. Int. J. Lepr. **60** (1992) 485–487.
4. Ji, B., Jamet, P., Perani, E. G., Bobin, P. and Grosset, J. H. Powerful bactericidal activities of clarithromycin and minocycline against *Mycobacterium leprae* in lepromatous leprosy. J. Infect. Dis. **168** (11993) 188–190.
5. Walker, L. L., Van Landingham, R. M. and Shinnick, T. M. Clarithromycin is bactericidal against strains of *Mycobacterium leprae* resistant and susceptible to dapsone and rifampin. Int. J. Lepr. **61** (1993) 59–65.

Ocular Leprosy: Do Steroids Complicate Matters?

To the Editor:

Unique to leprosy are acute inflammatory conditions such as reversal reactions (upgrading) and erythema nodosum leprosum (ENL). Associated with these two reactive phases are active neuritis, silent neuritis, arthralgias, and orchitis, all of which necessitate the use of oral steroids. Topical steroid eye drops are used in ocular inflammatory conditions, such as episcleritis, scleritis and iridocyclitis. The type, dosage, delivery and duration of treatment with oral steroids varies with the severity of the condition and the speed with which the inflammation subsides. Most steroid regimens for treating reactive episodes in leprosy patients do not exceed a dosage of 60 mg of prednisolone daily or a duration of 6 months. The dosage of topical steroid eye drops also varies with the severity and the resolution of the inflammation under treatment, but most often does not exceed 12 drops a day or a duration of 1 month.

Oral steroids taken for over a year or topical steroid eye drops applied over a prolonged period are known to produce ocular complications ([3, 4]). One such complication is the forma-tion of a posterior subcapsular cataract. Tissue-culture experi-ments have shown that the presence of steroids in the growth medium adversely affects the growth of human lens epithelial cells ([1]). Reversal of the posterior subcapsular cataract can occur in some patients after stopping chronic steroid therapy ([2]). One other well-known complication is the rise in intraocular pressure producing a secondary open-angle glaucoma. Both complications can occur at any time during chronic corticosteroid administration. The rise in intraocular pressure can be harmful by causing optic nerve damage. Fortunately, discontinuing the ste-



THE FIGURE. Slit-beam illustrating posterior subpolar cataract in a 27-year-old, borderline lepromatous patient on protracted, unsupervised oral steroid therapy.

roid allows the intraocular pressure to return to pretreatment levels and, therefore, awareness and early diagnosis of the increase in pressure is very important. Although the secondary open-angle glaucoma and the secondary posterior subpolar cataracts are discernible as distinct entities in patients on long-term oral steroid therapy, evaluation of the occurrence of these complications in patients with iridocyclitis on topical steroid eye drops is difficult. Iridocyclitis by itself can produce both complicated cataracts and secondary closed-angle glaucoma, and the classical steroid-associated ocular complications usually can be obscured.

In our experience, routine biomicroscopic ocular examination and applanation tension evaluation of leprosy patients put on 60 mg of oral prednisolone, tapered gradually over a period of 6 months, has not revealed the manifestation of these complications except in one young male patient. He developed a posterior polar cataract after 2 months of steroid therapy. We have, however, noticed the occurrence of classical steroid-induced ocular complications in some leprosy patients who had been on oral steroid therapy for over a year (The Figure). A common factor encountered in these patients is that of prolonged, unsupervised, irregular self--medication with steroids. We do not know how prevalent this malady is among leprosy patients but we do know that it does occur. These patients are prone to steroid-induced ocular complications that would only enhance the blindness and ocular morbidity statistics of leprosy patients unless adequate care is given to detecting these patients early and helping them adequately and appropriately.

All leprosy patients being put on long-term steroid therapy should have, as far as possible, a baseline ocular examination, followed by frequent slit-lamp examinations and applanation tension evaluations until the steroids are tapered off completely. While this may be possible in well-established tertiary hospitals it may not be practical in most leprosy-endemic control programs. In such cases both the medical personnel and the paramedical field workers should learn to record visual acuity and to estimate digital intraocular tension. Patients in whom alterations in vision or in intraocular pressure are perceived should be referred immediately to a center where a more comprehensive eye examination can be done. There are many field programs in which steroids, although of smaller strengths and shorter duration, are given to patients as a domiciliary treatment. In such situations the paramedical worker should teach the patient to self-test his visual acuity, albeit grossly, to teach a relative to estimate digital intraocular tension and to inculcate in both the importance of reporting promptly any change. Diabetics, individuals with high degrees of myopia and their relatives form a high-risk group prone to an in-crease in intraocular pressure on steroid administration. Leprosy patients categorized within this group would need intense hospitalized care during their steroid therapy.

The appearance of any steroid-induced ocular complication should, in all possible situations, dictate a policy of rapidly tapering the steroids and, if necessary, the addition of nonsteroidal anti-inflammatory drugs to try to offset the deprivation of the anti-inflammatory effects of the steroids.

—Ebenezer Daniel, M.S., D.O.
Rebecca Alexander, D.O.
Shirley Chacko, D.O.

Department of Ophthalmology
Scheiffelin Leprosy Research and Training Center
Karigiri, North Arcot District
Tamil Nadu 632106, India

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REFERENCES

1. JACOB, T. J., KARIM, A. K. and THOMPSON, G. M. The effects of steroids on human lens epithelium. Eye **1** (1987) 722–727.
2. LIMAYE, S. R., PILLAI, S. and TINA, L. U. Relationship of steroid dose to degree of posterior subcapsular cataracts in nephrotic syndrome. Ann. Ophthalmol. **20** (1988) 225–227.
3. MOHAN, R. and MURALIDHARAN, A. R. Steroid induced glaucoma and cataract. Indian J. Ophthalmol. **37** (1989) 13–17.
4. RENFRO, L. and SNOW, J. S. Ocular effects of topical and systemic steroids. Dermatol. Clin. **10** (1992) 505–512.

Patient Treatment Compliance in Leprosy; an Unjustifiably Critical Review

TO THE EDITOR:

My attention has been drawn to your editorial entitled "Patient Compliance in Leprosy: A Critical Review" by Vadher and Lalljee (Int. J. Lepr. 60, 1992, 587). Unfortunately, this review contained many important inaccuracies, unjustifiably criticized several of the compliance investigations undertaken by my colleagues and me, and failed to consider other highly pertinent studies that we had conducted.

Despite Vadher and Lalljee's assertion that methodological issues such as the definition and classification of compliance were rarely given due prominence in Huikeshoven's ([11]) and my ([5]) previous reviews on the subject, their review failed to cite or discuss our original paper ([3]) describing the basis of the dapsone/creatinine (D/C) ratio method for monitoring the self-administration of dapsone. The investigation reported in this paper demonstrated the severe limitations of trying to monitor dapsone ingestion using qualitative spot tests based on the reaction of dapsone and its metabolites with Ehrlich's reagent (p-dimethylamino-benzaldehyde) ([1]), primarily because of the relatively slow elimination of dapsone and its metabolites. As a consequence, the positivity of qualitative dapsone urine tests is markedly influenced by diuresis.

It was for this reason that we recommended estimating dapsone and its diazotizable metabolites by the more specific Bratton and Marshall procedure ([2]) and allowing for the effects of diuresis by ratioing to creatinine using the simple alkaline picrate method ([4]). We then described how the overall percentage of dapsone doses being taken by a group of leprosy patients could be calculated by estimating the mean test D/C ratio (T) of their urine samples and comparing it with the average supervised D/C ratio (S) of urine samples collected from a similar group of patients receiving the same daily dose of dapsone under supervision. In each case, values were corrected for the levels of normal diazotizable compounds present in the urine by determining the mean blank D/C ratio (B) of samples from another group of subjects not ingesting dapsone [% ingested doses = $100\ (T - B)/(S - B)$].

Vadher and Lalljee also failed to discuss the basis for the interpretation of individual urinary D/C ratios ([10]) or the essential conflict between discovering tests capable of providing unambiguous estimates of the extent of patient compliance and their simplicity ([5]).

The use of the pharmacologically inert marker substance isoniazid in compliance studies also should have been referred to since it enables parallel independent evidence concerning the regularity of drug self-administration to be obtained ([7]). We used isoniazid in this way in two of the studies summarized in Vadher and Lalljee's table ([8, 9]), but the fact that INH stood for isoniazid and the interpretation of urine tests to detect its metabolites, isonicotinic acid and acetylisoniazid, were not explained. Two other studies ([16, 17]) in which we used isoniazid as an innocuous marker to aid the assessment of the regularity of the self-ad-