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Letters to the Editor

Treatment with Lopinavir/Ritonavir in Heavily Pretreated Subjects Failing Multiple Antiretroviral Regimens in Clinical Practice

To the Editor: Lopinavir, coformulated with a boosting dose of ritonavir, (LPV/r) has been recently licensed as a new protease inhibitor (PI) with excellent pharmacokinetic properties (1). Due to the achievement of high blood levels, there is a high genetic barrier to clinical resistance to LPV/r. Indeed, as many as 11 mutations at HIV-1 protease codons 10, 20, 24, 46, 53, 54, 63, 71, 82, 84 and 90 have been reported to contribute to LPV/r resistance, and at least 8 of these appear to be required for significant clinical resistance (2). Although preliminary LPV/r efficacy studies have yielded promising results, especially on drug-naive subjects (3–5), the role of LPV/r as a salvage therapy for heavily experienced patients in clinical practice has not yet been fully elucidated.

We report an observational study of the first 41 patients shifted to an LPV/r-including regimen and reaching at least 16 weeks (mean ± SD, 23 ± 5 weeks) of LPV/r therapy in our area. The subjects were pretreated with a median of 5 (range 4–6) nucleoside reverse transcriptase inhibitors (NRTIs), 1 (range 1–2) nonnucleoside reverse transcriptase inhibitors (NNRTIs) and 4 (range 2–5) PIs. The median number of different treatment regimens used before commencing LPV/r therapy was 8 (range 4–13), including dual NRTI treatments, and the median HIV-1 RNA load and $CD4^+$ counts at baseline were 5.29 (range 3.79–7.00) $\log_{10}$ copies/mL and 138 (range 4–689) cells/μL, respectively. A total of 26 (63.4%) and 30 (73.2%) subjects had $>10^5$ HIV-1 RNA copies/mL and <200 $CD4^+$ cells/μL, respectively. Genotypic antiretroviral resistance analysis (6) at baseline revealed a median number of 6 (range 0–10) NRTI resistance mutations, 1 (range 0–4) NNRTI resistance mutations, and 2 (range 0–4) and 5 (range 1–8) primary and accessory PI resistance mutations, respectively. There was only one case without resistance mutations, possibly resulting from multiple treatment interruptions before starting LPV/r. The number of patients harboring virus with at least one primary NRTI, NNRTI, and PI resistance mutations was 38 (92.7%), 28 (68.3%), and 35 (85.4%), respectively. Five (12.2%) subjects harbored virus with a 69S-XX insertion or Q151M complex NRTI class resistance, and more than two primary PI resistance mutations were present in virus from 20 (48.8%) individuals.

Except for two subjects in whom LPV/r was associated with one NRTI and one NNRTI (efavirenz), the new regimen combined LPV/r with two NRTIs, mainly stavudine/didanosine (16 cases) and stavudine/lamivudine (8 cases). However, based on baseline RT genotype, only 9 (22.0%) and 18 (49.3%) patients were administered 2 and 1 reverse transcriptase inhibitors expected to retain activity against their viral isolate, respectively, according to the on-line drug resistance interpretation system available at the Stanford University web site (http://hivdb.stanford.edu/). Based on a standardized questionnaire, the self-reported adherence to treatment was optimal in this cohort. Overall, there was a significant response to LPV/r therapy both in terms of HIV-1 RNA levels (5.25 ± 0.68 $\log_{10}$ at baseline vs. 3.94 ± 1.27 $\log_{10}$ at the end of follow-up; $p < .001$, paired t test) and in terms of $CD4^+$ cell counts (166 ± 153 vs. 225 ± 193; $p = .009$). Interestingly, changes in HIV-1 RNA levels and $CD4^+$ cell counts were comparable in subjects with <5 $\log_{10}$ HIV-1 RNA copies/mL (−1.30 $\log_{10}$ copies/mL and +45 cells/μL) and >5 $\log_{10}$ HIV-1 RNA copies/mL (−1.32 $\log_{10}$ copies/mL and +67 cells/μL), respectively. HIV-1 RNA levels were suppressed to <500 copies/mL and <50 copies/mL in 13 (31.7%) and 9 (21.9%) patients, respectively.

Table 1 shows the evolution of PI resistance mutations under the selective pressure of LPV/r (GenBank accession numbers AF493336 to AF493415). There was a statistically significant increase in the prevalence of total PI resistance mutations (me-

TABLE 1. *Evolution of primary and accessory protease inhibitor resistance mutations under LPV/r selective pressure*

	Patients harboring mutant virus, *n*			Patients harboring mutant virus, *n*	
Primary mutations	Baseline	Follow-up	Accessory mutations	Baseline	Follow-up
D30N	0	0	L10F/I/V[a]	27	27
M46I/L[a]	15	17	K20I[a]	13	19
G48V	4	8	L24I[a]	3	3
I50V	0	1	V32I	3	3
I54V[a]	13	19	L33F	3	7
V82A/F/T/S[a]	16	22	M36I	15	17
I84V[a]	10	10	I47V	0	3
L90M[a]	30	28	F53L[a]	2	2
			D60E	7	7
			L63P/T[a]	36	33
			A71I/T/V[a]	28	25
			V77I	17	17

[a] Mutations reported to be involved in resistance to lopinavir coformulated with a boosting dose of ritonavir (LPV/r).

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TABLE 2. *Multiple linear regression analysis of predictors of virologic and immunologic response to LPV/r*

	Dependent variable							
	HIV-1 RNA change				$CD4^+$ cell count change			
	Univariate		Multivariate[a]		Univariate		Multivariate[a]	
Predictor	B[b]	*p*	B	*p*	B	*p*	B	*p*
Baseline HIV-1 RNA	0.308	0.278	NT[c]		15.129	0.645	NT	
Baseline $CD4^+$ cell counts	0.003	0.008	0.003	0.015	−0.115	0.426	NT	
Primary PI resistance mutations at baseline, *n*	−0.445	0.005	−0.252	0.093	−21.336	0.266	NT	
LPV/r resistance mutations at baseline, *n*	−0.253	0.008	−0.041	0.881	−10.217	0.373	NT	
Total PI resistance mutations at baseline, *n*	−0.173	0.011	−0.099	0.677	−6.486	0.428	NT	
Previous treatment regimens, *n*	−0.116	0.169	NT		−16.093	0.095	−0.088	0.622
Previously used PIs, *n*	−0.579	0.007	−0.462	0.020	−60.376	0.015	−60.376	0.015
Active RT inhibitors associated with LPV/r, *n*[a]	0.174	0.499	NT		−26.105	0.378	NT	

[a] Model $R^2 = 0.380$ for HIV-1 RNA change (predictors: $CD4^+$ cell counts, number of primary protease inhibitor (PI) resistance mutations, number of previously used PIs). Model $= R^2 = 0.142$ for $CD4^+$ cell count change (predictor: number of previously used PIs).
[b] Regression coefficient.
[c] NT, not tested due to $p > .10$ in the univariate analysis.
LPV/r, lopinavir coformulated with a boosting dose of ritonavir; RT, reverse transcriptase.

dian 8 vs. 7; $p = .001$, Wilcoxon signed-rank test). Among the mutations reported to be involved in LPV/r resistance only K20I, M46I/L, I54V, and V82A/F/T/S increased in prevalence. However, other mutations not previously associated with LPV/r resistance were more frequent in the posttreatment than in the pretreatment sample, including both primary (G48V) and accessory (L33F, I47V) PI resistance mutations.

Multiple linear regression analysis was then used for evaluating predictors of virologic and immunologic response to LPV/r (HIV-1 RNA and $CD4^+$ cell count variation at the end of follow-up with respect to baseline) (Table 2). In the univariate model, the decrease in HIV-1 RNA levels was significantly increased by higher baseline $CD4^+$ cell counts and decreased by a larger number of primary, total, and LPV/r-specific resistance mutations as well as of previously used PIs. In the multivariate model, baseline $CD4^+$ cell counts and the number of previous PIs remained the only significant predictors of the variation in HIV-1 viremia after LPV/r therapy. Previous exposure to PIs also was the only baseline variable significantly associated with a decreased $CD4^+$ cell response to LPV/r. Multiple logistic regression confirmed that baseline $CD4^+$ cell counts and the number of previously used PIs were the only predictors of virologic response when responders ($n = 22$) and nonresponders ($n = 19$) were defined on the basis of a >1 log or <1 log decrease in HIV-1 RNA, respectively (data not shown).

Although no general conclusion can be drawn from a limited observational study, the virologic response rate in this group of heavily pretreated subjects was consistent with that reported for the LPV/r expanded access program targeting infected patients with no more treatment options available (7) and significantly worse than that obtained when LPV/r has been associated with an NNRTI in NNRTI-naive subjects (8,9). Although the proportion of patients achieving suppression of viral replication was relatively low, overall both the decrease in viremia and the increase in $CD4^+$ cell numbers were significant, indicating that LPV/r may be effective, at least in the short term, even in heavily pretreated patients failing multiple highly active antiretroviral therapy (HAART) regimens. Interestingly, the evolution of the protease sequence under LPV/r selective pressure was more complex than that predicted on the basis of the 11 mutations previously reported to be additively responsible for resistance to LPV/r in isolates selected by other protease inhibitors (2). Indeed, although some, but not all, of the LPV/r resistance mutations increased in prevalence, other resistance mutations were apparently selected by LPV/r therapy, including some of those relatively specific for different PIs (e.g., the saquinavir resistance key mutation G48V and the amprenavir accessory mutation I47V). This highlights the flexibility of HIV-1 protease and strengthens the notion that there are many paths to cross-resistance among all of the presently available PIs. If confirmed in larger studies, these data may contribute to a better prediction of LPV/r susceptibility based on protease genotype.

Salvage therapy with LPV/r is expected to be highly effective in subjects with high viral load provided that the multiple PIs previously administered have not extensively altered the viral protease. Unfortunately, this possibility may be relatively unlikely in most patients failing multiple HAART regimens, because all of the PIs made available sequentially have often been used in such cases. Although LPV/r seems to have a prominent role in drug-naive individuals and in many patients experiencing treatment failure, a fraction of heavily pretreated subjects unlikely to benefit significantly from LPV/r therapy remains.

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Hepatocellular Carcinoma in HIV-Infected Patients With Chronic Hepatitis: An Emerging Issue

To the Editor: Hepatitis C virus (HCV) infection is a pandemic that is five times more prevalent than HIV-1 infection, affecting an estimated 170 million persons worldwide. More than one third of persons with HIV are coinfected with HCV. Progression to end-stage liver disease seems to occur faster in these patients than in HIV-infected patients without HCV coinfection (1). Risk factors for progression are the degree of immunodeficiency, age, and alcohol intake. Because the life expectancy of HIV-infected persons has dramatically improved since the introduction of highly active antiretroviral therapies, cirrhosis and eventually hepatocellular carcinoma (HCC) are now recognized at an increasing rate in patients coinfected with HIV and HCV (2,3).

Because HIV–HCV-coinfected patients are significantly younger and with a shorter duration of HCV infection than those with HCV alone, we tried to identify the main features of HIV-infected individuals with end-stage liver disease resulting from HCV infection and diagnosed with HCC in San Matteo Hospital and to compare them with those of a control group of patients with HCV-related HCC but without HIV infection. During a 1-year follow-up period, we identified 13 patients with HCC who had been diagnosed during a periodic monitoring by abdominal ultrasonography. The preliminary results of this analysis showed that 5 were infected with HIV. Among these, 3 were intravenous drug users. The mean time between exposure to HCV and the development of HCC was estimated to be about 10 years. Two subjects were also coinfected with hepatitis B. One patient had a concomitant history of alcohol abuse. All subjects had a <500 $CD4^+$ T-cell count, and 2 were stage Child-Pugh A and 3 stage Child-Pugh B at the time of HCC diagnosis. Patients in the control group ($n = 8$) were considerably older (63.9 ± 8.9 vs. 40.2 ± 10.4), and the duration of HCV infection was considerably longer (23.1 ± 10.9 vs. 14.8 ± 2.7). Nobody reported an increased alcohol intake, and all were stage Child B/C.

Hepatocellular carcinoma seems to occur at a younger age and after a shorter period of HCV infection in subjects coinfected with HIV and is becoming a significant clinical problem in regard to diagnosis and treatment (4). Because HIV patients have several adjunctive risk factors for the development of HCC (mainly alcohol abuse, coinfection with HBV, and a variable degree of immunodeficiency), clinicians should address their efforts in developing strategy toward the prevention and earlier diagnosis of this disease. Thus, treatment of chronic hepatitis C with interferon and ribavirin should be encouraged in HIV-positive patients, and in those with HCV-related cirrhosis the periodic monitoring of alpha-fetoprotein and abdominal ultrasonography should be recommended.

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Efficacy and Safety of Atorvastatin in the Treatment of Hypercholesterolemia Associated With Antiretroviral Therapy

To the Editor: Prolonged treatment with highly active antiretroviral therapy (HAART) has been associated with the lipodystrophy syndrome, which includes disorders in body fat distribution and metabolic changes such as glucose intolerance, diabetes mellitus, hypercholesterolemia, and hypertriglyceridemia (1–3). Hypercholesterolemia in these patients is mainly a result of an increase in the subfractions bound to low- and very low-density lipoproteins (LDL and VLDL) (4), which results in these persons having an increased risk for cardiovascular disease (5). HMG-CoA reductase inhibitors (statins) are the standard pharmacologic therapy for endogenous hypercholesterolemia, and they reduce the levels of total cholesterol (TC) and LDL-C (6). Some of these drugs have been successfully used in patients with HIV with no greater risk of toxicity than in the general population (7–9), but others, such as simvastatin, lovastatin, and fluvastatin, which are metabolized via the cytochrome P-450, should be avoided during antiretroviral therapy because the protease inhibitors (PIs) inhibit cytochrome P-450, which could lead to increased toxicity of these statins, and nonnucleoside reverse transcriptase inhibitors (NNRTIs) are the inducers of cytochrome P-450 and could reduce their plasma levels (10–13). Pravastatin, which does not interact with cytochrome P-450, and atorvastatin, which interacts with it but to a much lesser degree than other statins, should be the treatment of choice in patients with HIV (10–13).

We evaluated the efficacy and safety of atorvastatin in the treatment of hypercholesterolemia in 20 consecutive patients who had been receiving HAART for at least 12 weeks and who had a baseline TC count >240 mg/dL, with or without high triglycerides (TG) levels, despite following fitness and dietary measures (14). Patients were excluded if they had a history of dyslipidemia before antiretroviral therapy, or if they were alcoholic, pregnant, or receiving estrogens, beta blockers, retinoids, or corticoids. All patients were instructed to take a nightly dose of 10 mg atorvastatin, to follow a healthy diet low in cholesterol, to achieve an ideal body weight, to stop smoking, and to carry out some physical activity. Before starting treatment, a 12-hour fasting blood sample was taken for study of the lipid profile and for measurement of the lymphocyte subsets, HIV viral load, and muscle and liver enzymes. TC and TG levels were measured by enzymatic methods (Roche), HDL-C after precipitation (Sigma) and LDL-C by a direct method (Sigma) and not by Friedewald's formula to avoid interference with TG >400 mg/dL. All tests were performed on a Cobas Mira autoanalyzer. The patients were seen after 12 and 24 weeks, when information was collected concerning tolerance and adverse side effects, and a further analysis was made measuring the same parameters as before. Informed consent was obtained from all study subjects and the study was conducted according to Good Clinical Practice guidelines. Because the study was intended as a pilot study, no power calculations were made. The calculations were made with the statistics program SPSS 8.0. The main epidemiologic characteristics of the 20 patients are shown in Table 1. At the time of inclusion in the study, the mean CD4 count was 555 × 10^6/L, and 16 patients had a viral load <50 copies/mL. At the start of the study the mean level of TC was 299 mg/dL and of TG 318 mg/dL, and after 24 weeks there was a significant reduction in the mean level of TC to 209 mg/dL (95% confidence interval [CI], 198–

TABLE 1. *Epidemiologic and clinical characteristics of 20 patients*

Sex	
Male	16
Female	4
Mean age (range), years	47.0 (30–66)
HIV risk	
Homosexual transmission	11
Heterosexual transmission	6
Post-transfusion transmission	2
Injection drug use	1
Previous AIDS	9
Obese	5
Diabetes	2
HAART	
Protease inhibitors	13
NNRTI	7
Mean time on HAART (range), months	31.2 (6–48)
Smoking[a]	10
Alcohol use[b]	1

[a] Smoking: more than half a pack per day.
[b] Alcohol use: more than 60 g/d.
HAART, highly active antiretroviral therapy; NNRTI, nonnucleoside reverse transcriptase inhibitors.

TABLE 2. *Comparison of the parameters studied before initiation of atorvastatin treatment and 24 weeks later*

Parameter	Start of study	24 weeks	*p* value
Body mass index (kg/mt^2)	25.5 ± 3.9	25.0 ± 3.3	.239
Systolic blood pressure, mm Hg	130.5 ± 18.5	125.0 ± 15.2	.255
Diastolic blood pressure, mm Hg	82.7 ± 11.9	79.7 ± 7.3	.367
Total cholesterol (mg/dL)	**299 ± 33.3**	**218.5 ± 43.5**	**.0001**
HDL-C (mg/dL)	42.3 ± 16.0	43.9 ± 14.4	.612
LDL-C (mg/dL)	**203.8 ± 31.7**	**127.5 ± 30.1**	**.0001**
Triglycerides (mg/dL)	318.5 ± 302.2	187.9 ± 79.6	.058
TC/HDL-C	**7.6 ± 1.8**	**5.0 ± 1.4**	**.0001**
AST (IU/mL)	27.9 ± 14.5	26.3 ± 15.0	.555
ALT (IU/mL)	32.9 ± 27.4	32.9 ± 24.1	.896
γGT (IU/mL)	94.2 ± 137.9	86.8 ± 77.9	.684
Creatine kinase (IU/mL)	92.1 ± 60.3	118.5 ± 113.2	.164
CD4 cells (×10^6/L)	555 ± 347	530 ± 318	.500
Percentage nondetectable viral load	80	85	.080

Values are expressed as mean ± standard deviation.
TC, total cholesterol; HDL-C: high-density lipoprotein–cholesterol; LDL-C: low-density lipoprotein–cholesterol.

238 mg/dL). This mean decrease of 81 mg/dL represents 27% ($p < .0001$). The reduction was produced in the LDL-C (mean at 24 weeks: 122, 95% CI, 112–143 mg/dL), with a mean reduction of 76 mg/dL (37%; $p < .0001$). There was no significant change in the level of HDL-C (+1.3 mg/dL; $p = .612$), though the ratio of TC/HDL-C was reduced ($p < .0001$). The plasma TG levels fell, but the change was not significant (mean decrease: 130 mg/dL, 40.8%). To achieve a normal distribution of TG levels, a logarithmic transformation was made; a Student *t* test was applied, and the reduction of TG levels was then very significant (2.42 vs. 2.23 $\log_{10}$; $p < .001$). There were no cases of myalgia or myositis, and the creatine kinase levels remained stable throughout the study period, both in the patients treated with PI and in those receiving NNRTI. Neither were there significant changes in the levels of transaminases, CD4 lymphocytes, or viral load (Table 2).

Atorvastatin at a dosage of 10 mg/d significantly reduced TC levels in patients with HIV receiving HAART, with no serious adverse side effects. This reduction in TC, which was at the expense of LDL-C, was sufficiently significant for more than half the patients to attain TC levels below 240 and LDL-C levels below 130 mg/dL (14). There was also a very significant decrease of 40% in TG levels, which contributed to the reduction in the atherogenic profile of these patients (15). This response to statins was similar as that found in endogenous hyperlipidemias (6). An important point in this study, despite the small number of patients involved, was the absence of liver or muscle toxicity, both in the patients treated with PI and in those receiving NNRTI. The 6 months' treatment with atorvastatin did not appear to have any influence on the immunologic and virologic control of the patients.

In summary, atorvastatin seems to be safe and effective at a dosage of 10 mg/d for the treatment of hypercholesterolemia secondary to HAART, with the reduction being mainly at the expense of LDL-C. There was also a significant reduction in TG levels.

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Changing Faces of Commercial Sex in Thailand: Implications for the HIV/AIDS Epidemic

To the Editor: The evolution and diversification of commercial sex has always played an important role in the spread of sexually transmitted diseases in a community. The rapid spread of HIV/AIDS in Thailand during the early to mid-1990s had, perhaps unfairly, highlighted the prevalence of commercial sex in Thai society. Because of the national public campaign against AIDS and the "100% Condom Programme" promoting use of condoms in commercial sex, the demand for commercial sex has decreased significantly in the last decade. The economic crisis of 1997–1998 also contributed to sharp decrease in the average number of clients per sex worker in recent years, as estimated by the Ministry of Public Health (MOPH) (1). Ironically, the apparent decrease in demand did not curtail the supply of commercial sex. On the contrary, there is clear evidence that in the last decade the sex industry in Thailand has been going through a transformation to maintain the demand and is presently thriving with renewed vigor. A Thai Red Cross Society study of the changes in commercial sex setting using two rounds of geographic mapping of commercial sex sites in Bangkok (2) showed that the number of brothels, tea houses, and hotels where sex service can be obtained directly decreased by about 60% from 1991 to 1993/4. The same study also reported that, during the same period, the number of massage

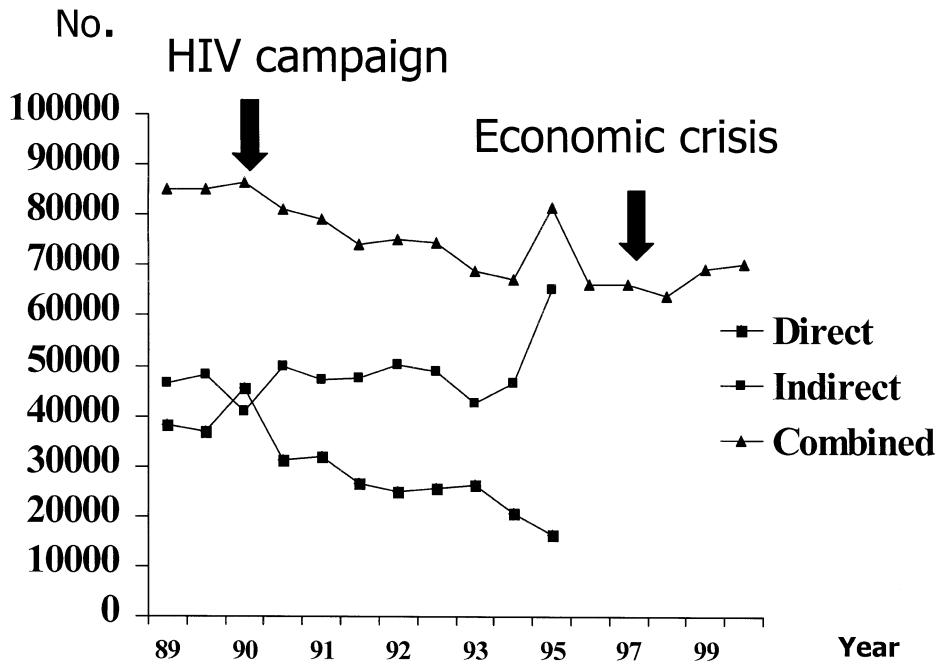

FIG. 1. Government census results showing number of commercial sex workers (CSWs) in Thailand, 1989–2000. Source: Division of Venereal Diseases, Thai Ministry of Public Health. Note: reports switched from semi-annually to annually in 1994.

parlors, cafes, bars, nightclubs, and other disguised sites where indirect commercial sex takes place showed an increase. Moreover, the total number of all sites actually increased slightly, from 1420 sites in 1991 to 1496 sites in 1994. Evidently, as the numbers of brothels and of the direct commercial sex workers (CSW) who worked there dwindled, the sex industry compensated by diversifying to other forms of indirect service, which partially explains the increase in number of sex venues (massage parlors, bars, and nightclubs). This hypothesis is confirmed by the MOPH sex service census (3). Previously scarce forms of disguised sex service, including escort service and call girls working through advertised telephone numbers or through middlemen like taxi drivers, have also emerged. Consequently, since 1996 the Venereal Disease Division of MOPH has stopped reporting separate counts of the number of direct and indirect CSWs in Thailand due to the difficulty in obtaining reliable data (Fig. 1). Although the official census counts for total number of CSWs in Thailand varied between 63,941 and 86,494 in the 1990s, it is generally believed that the actual number of CSWs is much greater—see, e.g., Napaporn et al. (4) and Wathinee and Guest (5). Wathinee and Guest (5) gave the range of number of female sex workers during any 1-year period at 200,000 to 300,000. Studies using a statistical estimation procedure to estimate the number of HIV-infected direct and indirect CSWs (6,7) have estimated the combined number of all *HIV-infected* CSWs in Thailand during 1993–1994 to be between 69,776 and 83,616 (Table 1). Using these estimates for the HIV-infected CSWs and the nationwide HIV seroprevalence rates from government HIV sentinel data (8), one can estimate the number of working CSWs in Thailand during a 6-month period in 1993–1994 to be between 355,176 and 420,383—more than 5 times the government total.

These statistics, as well as the undocumented illegal sex workers from other countries who account for up to 10% of all CSWs in Thailand, contribute to uncertainty in estimating the actual extent of the commercial sex industry in Thailand and present a gap in the government intervention measures. More importantly, the small population of male sex workers (MSW), which makes up less than 4% of the total sex worker population by MOPH estimates, has also become more visible in recent years. Many MSWs have both male and female customers, and sometimes either a steady partner (male or female) or wife. They usually work out of bars, massage parlors, or nightclubs, and have a high turnover rate. A 1989 survey done by field workers of the Thai Red Cross Society estimated a total of 4000 male bar workers in Thailand (9). More recently, two geographic mapping surveys by the Thai Red Cross AIDS Re-

TABLE 1. *Estimates for the numbers of HIV-infected commercial sex workers (CSWs), HIV prevalence rates, and the estimated total CSW population sizes during 1993–1994*

	Estimated number infected	HIV prevalence rate (%)[a]	Estimated total population size[b]
Direct CSW			
June 1993	54,595	30.42	179,471
December 1993	60,452	29.52	204,783
June 1994	64,157	28.21	227,426
December 1994	66,445	32.71	203,134
Indirect CSW			
June 1993	15,181	8.64	175,706
December 1993	16,275	9.25	175,946
June 1994	16,903	8.76	192,957
December 1994	17,171	9.82	174,857

Data from Wathinee and Guest (5).

[a] HIV prevalence rate computed from nationwide numbers of HIV-seropositive persons divided by number of tests in the HIV sentinel data (8).

[b] Median estimate divided by HIV prevalence rate.

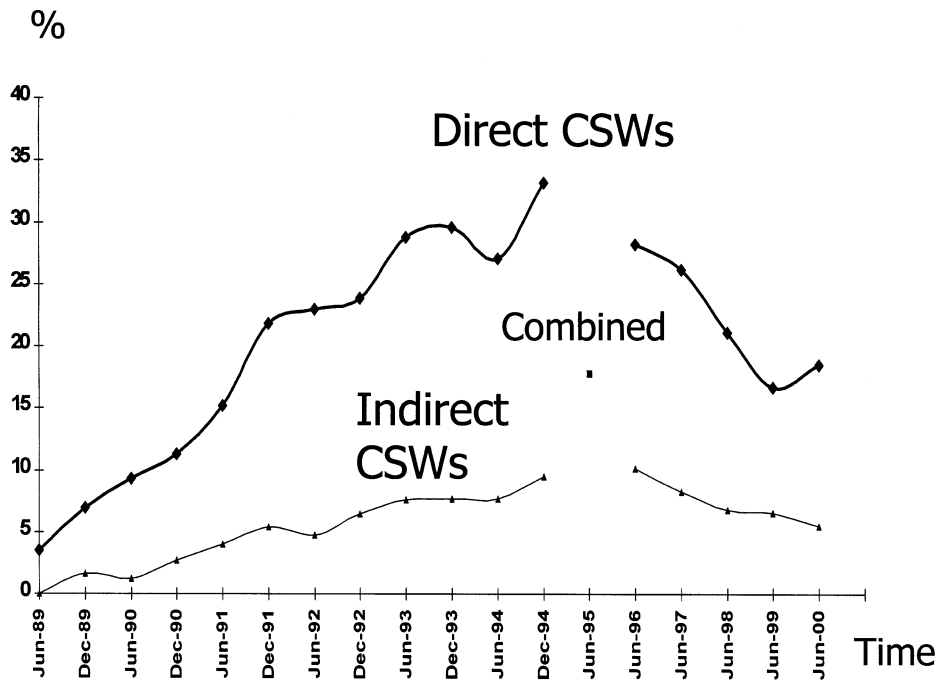

FIG. 2. HIV prevalence among commercial sex workers in Thailand, 1989–2000. Source: Division of Venereal Diseases, Thai Ministry of Public Health. Note: reports switched from semi-annually (June and December) to annually in June in 1995. June 1996 shows a combined total only.

search Centre of five major urban areas in Thailand alone found a total of 4780 MSWs during the low season in 1999–2000 and 5577 during the high season (10).

What do all these statistics mean in the context of AIDS epidemic in Thailand? We can only speculate. It has been widely acknowledged that Thailand has been exemplarily successful as a nation in its fight against HIV/AIDS. It suffices to say that, although most models in the early 1990s predicted that the number of HIV infections in Thailand would reach 1 million by the mid or late 1990s if there were no behavior change, by all existing estimates the total number of HIV infections in Thailand was still less than 1 million at the turn of the millennium. The recent round of HIV Sentinel Surveillance of MOPH data (8), the most reliable indicator available, shows no definite decreasing trend for many high-risk groups such as direct CSWs, pregnant women, and intravenous drug users since 1997. Several factors give one cause for caution in assessing the future direction of the epidemic. One is the persistently high HIV prevalence in IVDUs and direct (brothel-based) CSWs (Fig. 2). Another is the prevalence of HIV infection in pregnant women, which leads to uncertainty over the extent of vertical transmissions in the near future. Moreover, although the HIV prevalence of the MSWs is lower than that of females CWSs and has decreased in recent years, a survey study on MSWs in Chiang Mai from 1991–1996 (the most recent survey of its kind) has shown infrequent condom use (less that 50%) among MSWs with clients (both males and females) and even lower rates of use with noncommercial (steady and casual) partners (11). Furthermore, the recent Behavioral Sentinel Surveillance by MOPH (12) showed increased frequency in noncommercial sex and low condom use for young men in general. Evidence in the past has suggested that, among particular groups that are hard to identify or reach (e.g. indirect CSWs, MSWs, men having sex with men, and undocumented foreign CSWs), the effectiveness of intervention measure is at its lowest. Hence it is no accident that surveys have also shown that condom use in MSWs, MSMs, and undocumented CSWs is the lowest of all groups. The observed increase in non-brothel commercial sex has further enhanced the difficulty in targeting the appropriate intervention measures and gives reason for concern in the future.

Budget cuts resulting from the economic crisis in 1997–1998 also led to cutbacks in prevention expenditures, such as free distribution of condoms and media campaigns. These cutbacks contribute to an uncertain future in HIV/AIDS prevention. The added burden of the treatment of a growing number of AIDS patients and HIV-infected children (estimated 4000–5000 vertical transmissions per year (13)) also cut into the total government budget for AIDS. The effect of budgetary considerations is reflected in the decline in distribution of free condoms as well as a lack of domestic and foreign funding for systematic studies of the recent changes in the commercial sex industry in Thailand. Although there was a flurry of excellent studies on the sex industry in Thailand in the early 1990s—e.g., Wathinee and Guest (5) and Bhassorn et al. (14)—as a result of urgency in face of the emerging AIDS epidemic at that time, few studies other than the yearly sex service census conducted by the Venereal Disease Division of MOPH have taken place in recent years, particularly after the end of the economic crisis in 1998. Rededication of efforts is needed to understand the ongoing changes in the structure and scope of the commercial sex industry in contemporary Thailand, and its impact on the control and prevention of HIV/AIDS epidemic.

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