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High-Risk Groups for Late Diagnosis of HIV Infection: A Need for Rethinking Testing Policy in the General Population

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ABSTRACT

The aim of the study was to identify high-risk groups and the determinants of late HIV diagnosis in France in the era of highly active antiretroviral therapy (HAART), from January 1996 to June 2005. Informations were collected from an electronic medical record of all HIV-1–infected patients who sought care in six HIV reference centers in France, constituting a prospective multicentric cohort. Patients were defined as "late testers" if they had presented with either symptoms of clinical AIDS or a CD4 cell count less than 200/mm^3 during the year of diagnosis, as "nonlate" if their CD4 count was above 200, and as "unknown" if CD4 cell count in the year at the time of diagnosis was not documented. Among the 4516 patients available for analysis, the percentage of late testing was 38% (n = 1718) and decreased after 2003 (31.5% in 2004–2005). This percentage was higher in heterosexual men (48.2%) than in homosexual men (31.7%) or heterosexual women (32.6%) and was higher for patients older than 30. Heterosexual men living in a couple with children had a higher risk of late testing (odds ratio [OR] = 1.65, 95% confidence interval [CI]: 1.03 to 2.66), while heterosexual women in a couple without children had a lower risk (OR = 0.46, 95% CI: 0.25 to 0.83). Among homosexual men, unemployment was associated with late testing (OR = 2.23, 95% CI: 1.14 to 4.36). The proportion of late testing was still high. Groups classically identified as low risk for HIV infection, particularly heterosexual men in a couple with children, were found to be at high risk for late testing. It seems necessary to improve HIV testing policy in the heterosexual population.

INTRODUCTION

SINCE ITS INTRODUCTION in the mid-1990s, the benefit of highly active antiretroviral therapy (HAART) for the treatment of HIV disease has been well established, with substantial reductions in AIDS incidence and mortality.[1,2]

Early access to HIV diagnosis constitutes a major public health issue in industrialized countries.[3,4] Indeed, late testing could have an important impact on AIDS mortality.[5] In France, voluntary HIV testing is free and can be done in laboratory or in a voluntary counseling and testing centers. The test is also strongly recommended before marriage and during the first months of pregnancy, and is

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mandatory for blood and organ donors. In all cases, the patient's oral informed consent is required.

However, in spite of this testing policy, late diagnosis of HIV infection remains common despite the widespread availability of antiretroviral treatment since 1996 and facilitated access to HIV testing. Frequency of late diagnosis is still high and has possibly increased in the last few years in Western European countries and United States.[6–9] Several recent studies showed that 30%–40% of patients diagnosed as HIV positive between 1996 and 2002 were classified as late testers.[4,10–13]

Thus, new strategies that aim to reduce the delay in seeking HIV diagnosis and care are needed. To design such focused interventions, we must identify correlates of late diagnosis of HIV infection.

Within the domain of HIV study, the use of databases constitutes an alternative to randomized controlled trials, particularly when the results of large-scale trials with clinical end points have to some extent been rendered obsolete by the time they are completed.[14]

The aim of this study was to evaluate the proportion of late HIV diagnosis and to identify determinants of late testing in France in the era of HAART, using a new observational database developed for the care management of HIV-infected patients.

MATERIALS AND METHODS

The database

Information was collected from six large HIV reference centers in France (Nantes, Nice, Toulouse, Paris, Marseille, and Tourcoing). These hospitals maintain prospective cohorts of all HIV-1–infected patients who seek care in the centers and who provide written consent. The cohorts are implemented via an electronic medical record (EMR).[15] The patients enter the cohort when they seek care in one of these centers, regardless of their HIV disease history, and all previous clinical events as well as therapeutic history are collected with appropriate dates. The EMR collects demographic details, clinical events, antiretroviral history, viral load and CD4 cell count data for patients at regular 3- to 6-month intervals during routine clinical assessments. This system allows for the use of the databases with minimal delay, limited to automatic and manual quality controls performed before any analysis.

Patients selected for the analysis

For the purposes of this study, selected patients were those who had been diagnosed with HIV infection since 1996. All patients diagnosed with HIV infection for the first time between January 1996 and June 2005 were included.

Definitions and data collected

Patients were defined as "late testers" if they had presented with either symptoms of clinical AIDS or a CD4 cell count less than 200/mm^3, and as "nonlate testers" if CD4 count was above 200. Their status was defined as "unknown" if information regarding CD4 count in the year of time of diagnosis was not documented.

Collected variables were: gender, age, route of transmission (homosexual/bisexual, heterosexual, injection drug use, others), Centers for Disease Control (CDC) stage, date of CDC stage C, CD4 cell count, employment status (stable employment, on employment benefit, unemployed, other (disabled person, retired, student)), living in a couple or not, with or without children (single without children, single with children, in a couple without children, in a couple with children).

Statistical analysis

Two analyses were conducted. First, a descriptive analysis compared the risk of late testing across all patients. Second, an analytic approach of the determinants of late testing was carried out separately among homosexual/bisexual males (n = 1518), heterosexual men (n = 1039), and heterosexual women (n = 1151) because of different epidemiologic patterns regarding HIV estimated prevalence, dynamics of the epidemics and HIV progression at diagnosis according to national surveillance data,[16] and because of different profiles regarding so-

cial and demographic characteristics and sexual lifestyles. Injection drug users (IDU) were not considered in the subgroup study because their number in the study population was small ($n = 267$).

Comparisons used χ^2 test for categorical variables and t test or nonparametric Wilcoxon test for continuous variables. Multivariate analysis used logistic regression with a stepwise analysis in descending sequence (threshold of 0.05). Each variable statistically significant at the threshold of 0.2 in bivariate analysis was included into the model. Analyses were systematically adjusted on calendar period of HIV diagnosis divided into five 2-year periods (1996–1997, 1998–1999, 2000–2001, 2002–2003, and 2004–2005) and on the center to adjust for the differences in care management that could be exist between centers. Interactions were also studied.

Statistical analyses were performed using SAS (version 9.1; SAS Institute; Cary, NC).

RESULTS

Population

A total of 5702 patients diagnosed for HIV infection since 1996 were included in our analysis. Men comprised 69.4% ($n = 3958$) of patients, and women 31.6% ($n = 1744$), with the proportion of women increasing over time from 23.5% in 1996 to 32% in 2004 ($p < 0.0001$). Mean age was 37 years (± 11 years), women being younger than men at HIV diagnosis (34 years versus 38 years, respectively, $p < 0.0001$). Mean CD4 cell count at time of HIV diagnosis was 372 cells/mm3 (± 282), and median time between the first measure of CD4 cell count and HIV diagnosis was 1 month.

With regards to route of transmission, 47.2% were infected through heterosexual contact and 33.5% through homosexual contact.

CD4 cell counts were below 200 cells/mm3 in 31% of patients and 17% of patients were CDC stage C.

Employment status at HIV diagnosis was available for 2463 patients (43.2% of the total population). Among these patients 63.8% were active. Women were more frequently inactive than men (29.9% versus 9.9%, $p < 0.0001$). Homosexual men had a rate of employment higher than intravenous drug users (77.5% versus 51, $p < 0.0001$). Marital status was available for 2790 patients (49% of the total population). Among these, 45.7% were single without children, this proportion being higher for men (54.4% versus 26.4% respectively, $p < 0.0001$), and 21.4% lived in a couple with children. The proportion of persons living in a couple without children was higher in women (29.6% versus 11.6% respectively, $p < 0.0001$).

Late testing

Among the 5702 patients, 1718 patients (30.1%) were classified as late testers, 2798 (49.1%) as nonlate, and 1186 (20.8%) could not be classified as late or nonlate testers because of lack of CD4 count in the year following HIV diagnosis and were thus defined as "unknown."

Prevalence of late testing

Among the 4516 patients classified as late or nonlate testers, the proportion of late testing was 38% ($n = 1718$). The proportion of late testers was similar in all centers except for center 3 where this proportion was higher. This proportion decreased significantly with time, from 40.5% in 1996–1997 to 31.5% in 2004–2005 ($p < 0.0001$). The proportion of late testers decreased among men, from 37.8% in 1996–1997 to 21.8% in 2004–2005 in homosexual men, and from 48.2% to 39.5% in heterosexual men. This proportion was stable for heterosexual women, 28.1% in 1996–1997 and 32.3% in 2004–2005 (Fig. 1).

Late testing was determined by the occurrence of an AIDS-defining illness in the same year as HIV diagnosis in 41.3% ($n = 709$) of patients. Median time between HIV diagnosis and AIDS-defining illness was 10 days. Late testing was defined as a CD4 cell count inferior to 200 cells/mm^3 (without AIDS-defining illness) in the same year than HIV diagnosis in 58.7% ($n = 1009$). Median time between HIV diagnosis and first measure of CD4 cell count was 15 days.

High-risk group of late testing

Late testing was associated with male gender (39.6% versus 34.6% in women, $p = 0.002$), nonhomosexual route of transmission, living in

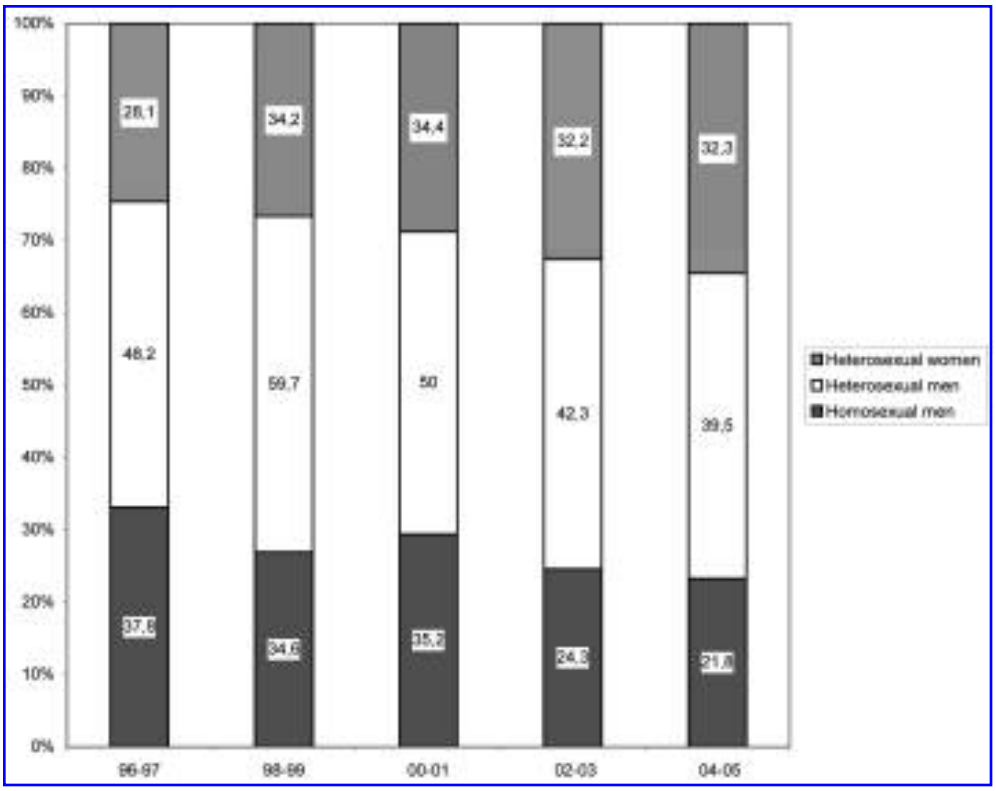

FIG. 1. Frequency of late testing by groups.

a couple with children compared to single patients without children (48.9% versus 34.2%, $p < 0.0001$), and diagnosis before 2001. Employment status was not associated with late testing (Table 1).

In multivariate analysis (Table 1), the probability of late testing was associated with age above 30 years, and was higher for those infected by a route of transmission other than homosexual intercourse. Being diagnosed after 2003 was associated with a lower probability of late testing compared to those diagnosed in 1996–1997 (OR = 0.65, 95% CI: 0.46–0.92 for 2004–2005). Women had a lower probability of late testing than men (OR = 0.78, 95% CI: 0.62–0.97), as those in a couple without children compared to single women without children (OR = 0.75, 95% CI: 0.57–0.98).

Risk factors for late testing

Homosexual men (n = *1518*). The proportion of late testers was 31.7%. The proportion of late testing was higher for men diagnosed before 2001, and who were older than 30. With regards to marital status, patients infected by homosexual intercourse but living in a couple with children was associated with late testing (51.7% versus 30.6% respectively, $p = 0.001$). Employment status was not associated with late testing.

In multivariate analysis, late testing was associated with age above 30 years, was more frequent in men diagnosed after 2001 compared to those diagnosed in 1996–1997 (OR = 0.58, 95% CI: 0.34–0.99, OR = 0.33, 95% CI: 0.15–0.72, respectively, for those diagnosed in 2002–2003 and 2004–2005), and in inactive men versus employed (OR = 2.23, 95% CI:1.14–4.36). Single men who were infected through homosexual intercourse and who had children had a lower risk of late testing than single men without children (OR = 0.36, 95% CI: 0.17–0.73) (Table 2).

Heterosexual men (n = *1039*). The proportion of late testers was 48.2%. The proportion of late testers was higher for heterosexual men older than 30 years, for those diagnosed after 2001, for those living in a couple with children (61.6% versus 44.2% respectively, $p = 0.001$).

TABLE 1. CHARACTERISTICS AT HIV DIAGNOSIS, ACCORDING TO HIV TESTING STATUS, 1996–2005, FRANCE. $N = 4516$

	Late testing n = *1718* N *(%)*	*Nonlate testing* n = *2798* N *(%)*	p[a]	*aOR*
Center				
1	268 (36.3)	470 (63.7)	<0.0001	1
2	229 (36.1)	406 (63.9)		1.30 (0.89–1.91)
3	613 (45.4)	736 (54.6)		1.71 (1.30–2.24)[b]
4	213 (31.7)	459 (68.3)		0.96 (0.73–1.27)
5	110 (42.0)	152 (58.0)		1.23 (0.85–1.78)
6	285 (33.1)	575 (66.9)		1.17 (0.90–1.52)
Period of HIV diagnosis				
1996–1997	335 (40.5)	493 (59.5))	<0.0001	1
1998–1999	383 (41.7)	536 (58.3)		0.95 (0.71–1.28)
2000–2001	424 (40.7)	619 (59.3)		1.03 (0.78–1.36)
2002–2003	347 (34.7)	653 (65.3)		0.79 (0.60–1.05)
2004–2005	229 (31.5)	497 (68.5)		0.65 (0.46–0.92)[b]
Age at HIV diagnosis				
<30	298 (23.4)	978 (76.6)	<0.0001	1
30–39	678 (39.7)	1030 (60.3)		2.03 (1.60–2.56)[b]
40–49	444 (46.2)	518 (53.8)		2.72 (2.08–3.56)[b]
50–59	215 (52.1)	198 (47.9)		2.89 (2.04–4.08)[b]
≥60	83 (52.9)	74 (47.1)		4.09 (2.49–6.72)[b]
Gender				
Male	1233 (39.6)	1883 (60.4)	0.002	1
Female	485 (34.6)	915 (65.4)		0.78 (0.62–0.97)[b]
Route of HIV diagnosis				
Homo/bisexual	483 (31.7)	1040 (68.3)	<0.0001	1
Heterosexual	876 (40.0)	1314 (60.0)		1.78 (1.40–2.27)[b]
Injecting drug use	78 (48.4)	83 (51.6)		1.97 (1.20–3.25)[b]
Unknown	211 (45.4)	254 (54.6)		2.07 (1.46–2.95)[b]
Others	70 (39.5)	107 (60.5)		1.79 (1.07–2.98)[b]
Employment status				
Stable employment	490 (36.2)	865 (63.8)	0.59	
On unemployment benefit	77 (35.0)	143 (65.0)		
Unemployment	125 (39.1)	195 (60.9)		
Others	62 (33.3)	124 (66.7)		
Marital status				
Without partner and without children	363 (34.2)	697 (65.8)	<0.0001	1
Without partner and with children	151 (37.1)	256 (62.9)		0.76 (0.58–1.00)
In a couple without children	120 (32.4)	250 (67.6)		0.75 (0.57–0.98)[b]
In a couple with children	255 (48.9)	266 (51.1)		1.20 (0.94–1.55)

[a]*p*: comparison between late and nonlate testers.
[b]$p < 0.05$.
aOR, adjusted odds ratio.

Employment status was not associated with late testing.

In multivariate analysis, late testing was higher in patients older than 30 years and in men living in a couple with children compared to single men without children (OR = 1.65, 95% CI: 1.03–2.66). Heterosexual men diagnosed for HIV infection after 2003 had a lower risk of late testing than those diagnosed in 1996–1997 (OR = 0.36, 95% CI: 0.17–0.73) (Table 3).

Heterosexual women (n = *1151*). The proportion of late testing was 32.6%. The proportion of late testers was higher for women older than 30 years and was lower for women living in a couple without children (21.1% versus 34.8% respectively, $p = 0.02$). No associations were found with employment status or period of HIV diagnosis.

In multivariate analysis, late testing was higher in women older than 30 years. Women living in a couple without children had a lower

TABLE 2. FACTORS ASSOCIATED WITH LATE TESTING, AMONG 1518 HOMOSEXUAL PATIENTS, 1996–2005, FRANCE

	Late testing (n = *480*) n *(%)*	*Nonlate testing* (n = *1038*) n *(%)*	p	*aOR*
Center				
1	82 (31.8)	176 (68.2)	0.02	1
2	82 (34.0)	159 (66.0)		1.17 (0.53–2.61)
3	132 (36.2)	233 (63.8)		1.08 (0.63–1.84)
4	72 (28.6)	180 (71.4)		0.89 (0.53–1.52)
5	26 (41.3)	37 (58.7)		4.17 (1.24–13.99)[a]
6	86 (25.4)	253 (74.6)		0.95 (0.58–1.55)
Period of HIV diagnosis				
1996–1997	131 (37.6)	217 (62.4)	<0.0001	1
1998–1999	115 (34.6)	217 (65.4)		0.94 (0.56–1.60)
2000–2001	118 (35.1)	218 (64.9)		0.97 (0.60–1.59)
2002–2003	70 (24.3)	218 (75.7)		0.58 (0.34–0.99)[a]
2004–2005	46 (21.5)	168 (78.5)		0.33 (0.15–0.72)[a]
Age at HIV diagnosis				
<30	77 (17.6)	361 (82.4)	<0.0001	1
30–39	210 (33.2)	423 (66.8)		3.20 (1.96–5.23)[a]
40–49	127 (42.2)	174 (57.8)		4.59 (2.63–8.00)[a]
50–59	51 (46.8)	58 (53.2)		6.29 (3.02–13.09)[a]
≥60	15 (40.5)	22 (59.5)		3.54 (0.84–14.98)[a]
Employment status				
Stable employment	190 (29.4)	457 (70.6)	0.12	1
On unemployment benefit	16 (25.4)	47 (74.6)		0.80 (0.39–1.61)
Unemployment	21 (42.0)	29 (58.0)		2.23 (1.14–4.36)[a]
Others	13 (22.0)	46 (78.0)		0.80 (0.39–1.61)
Marital status				
Without partner and without children	188 (30.6)	426 (69.4)	0.001	1
Without partner and with children	12 (22.2)	42 (77.8)		0.36 (0.17–0.78)[a]
In a couple without children	29 (25.2)	86 (74.8)		0.59 (0.33–1.03)
In a couple with children	31 (51.7)	29 (48.3)		1.85 (0.98–3.51)

[a]$p < 0.05$.
aOR, adjusted odds ratio.

probability of late testing than single women without children (OR = 0.46, 95% CI: 0.25–0.83) (Table 4).

DISCUSSION

To our knowledge, this study provides the most up-to-date data about late HIV diagnosis in France. As a whole, the proportion of late testing was 38% and decreased after 2001. Late testing increased with age, and was higher in the heterosexual population, particularly men, living with a stable sexual partner and with children.

Some limits of the study should be discussed. With regards to late testers, we were not able to classify 20.8% of the population. Compared to late and nonlate testers, these patients were younger, 36.7% being younger than 30 years versus 28.3% respectively ($p < 0.0001$), more frequently infected through intravenous drug use (8.9% versus 3.6%, $p < 0.0001$) and diagnosed in 1996–1997 (46.6% versus 18.3%, $p < 0.0001$). These factors were associated with late testing in our study. As a result, the proportion of late testers could be underestimated. However, subsequent analyses have been undertaken, which have classified these patients as late testers and non late. This strategy did not change the analytic results (data not shown). For 50% of the total population, social characteristics such as employment or marital status and children were not available. However, characteristics of the patients for whom these data were not collected did not differ from the other patients in terms of age at HIV diagnosis, gender, and proportion of late testers. They

Table 3. Factors Associated with Late Testing Among 1039 Heterosexual Men, 1996–2005, France

	Late testing (n = *501*) n *(%)*	*Nonlate testing* (n = *538*) n *(%)*	p	*aOR*
Center				
1	69 (43.9)	88 (56.1)	0.0001	1
2	56 (39.4)	86 (60.6)		1.46 (0.64–3.30)
3	190 (60.5)	124 (39.5)		2.32 (1.32–4.08)[a]
4	63 (38.9)	99 (61.1)		1.23 (0.69–2.19)
5	34 (51.5)	32 (48.5)		1.33 (0.64–2.76)
6	89 (44.9)	109 (55.1)		1.04 (0.60–1.79)
Period of HIV diagnosis				
1996–1997	91 (48.2)	98 (51.8)	0.0006	1
1998–1999	123 (59.7)	83 (40.3)		0.99 (0.52–1.88)
2000–2001	126 (50.0)	126 (50.0)		0.77 (0.43–1.39)
2002–2003	93 (42.3)	127 (57.7)		0.60 (0.33–1.08)
2004–2005	68 (39.5)	104 (60.5)		0.36 (0.17–0.73)[a]
Age at HIV diagnosis				
<30	56 (29.2)	136 (70.8)	<0.0001	1
30–39	178 (49.7)	180 (50.3)		2.54 (1.47–4.40)[a]
40–49	164 (53.6)	142 (46.4)		3.11 (1.76–5.49)[a]
50–59	67 (51.2)	64 (48.9)		2.80 (1.36–5.79)[a]
≥60	36 (69.2)	16 (30.8)		6.74 (2.43–18.67)[a]
Employment status				
Stable employment	148 (47.6)	163 (52.4)	0.88	
On unemployment benefit	25 (48.1)	27 (51.9)		
Unemployment	26 (44.1)	33 (55.9)		
Others	17 (53.1)	15 (46.9)		
Marital status				
Without partner and without children	72 (44.2)	91 (55.8)	0.0004	1
Without partner and with children	42 (39.6)	64 (60.4)		0.68 (0.39–1.17)
In a couple without children	37 (43.5)	48 (56.5)		0.89 (0.51–1.56)
In a couple with children	114 (61.6)	71 (38.4)		1.65 (1.03–2.66)[a]

[a]$p < 0.05$.
aOR, adjusted odds ratio.

were diagnosed more frequently in 2004–2005 and were more likely to have a route of transmission other than homosexual intercourse. Therefore, it seems thus unlikely that these missing values might induce biased results.

Because of legal restrictions, it was not possible to collect country of birth information in our EMR database. Migrants had a higher probability to be late testers in France,[16] and had specific factors associated with late testing. They make up an important proportion of the population, particularly in heterosexual women, and therefore would have an important influence on results.

A different access to care according to groups could explain our results. However, the French care system allows access to everybody, regardless of their social situation. Differenciated access to care would be the result of individuals not seeking care, and cannot be related to financial or social restrictions. Besides, our study did not identify individuals in poor social conditions as persons particularly at risk of late testing, but rather the opposite.

The proportion of late testing was similar to those observed in other studies in Europe and in United States.[4,12,13,17,18] In our study, the proportion of late testers decreased after 2003. To our knowledge, our data are the most up-to-date, as other studies on late testing have not considered the years 2003, 2004, and 2005. The proportion of late testers could have reached its maximum in 2001, except for heterosexual women in whom this proportion was stable. This may be due to an increased proportion of migrant among HIV-infected women.

A major finding was that a heterosexual route of transmission was observed in 40% of

TABLE 4. FACTORS ASSOCIATED WITH LATE TESTING AMONG 1151 HETEROSEXUAL WOMEN, 1996–2005, FRANCE

	Late testing (n = *375*) n *(%)*	*Nonlate testing* (n = *776*) n *(%)*	p	*aOR*
Center				
1	58 (31.9)	124 (68.1)	<0.0001	1
2	39 (27.7)	102 (72.3)		1.22 (0.54–2.75)
3	146 (42.9)	194 (57.1)		2.29 (1.33–3.93)[a]
4	42 (23.5)	137 (76.5)		0.67 (0.38–1.19)
5	20 (27.4)	53 (72.6)		1.04 (0.50–2.17)
6	70 (29.7)	166 (70.3)		1.39 (0.82–2.35)
Period of HIV diagnosis				
1996–1997	45 (28.1)	115 (71.9)	0.70	1
1998–1999	76 (34.2)	146 (65.8)		1.21 (0.62–2.37)
2000–2001	96 (34.4)	183 (65.6)		1.40 (0.75–2.60)
2002–2003	98 (32.2)	206 (67.8)		1.13 (0.61–2.10)
2004–2005	60 (32.3)	126 (67.7)		1.10 (0.49–2.46)
Age at HIV diagnosis				
<30	115 (23.8)	369 (76.2)	<0.0001	1
30–39	151 (38.2)	244 (61.8)		2.03 (1.33–3.11)[a]
40–49	54 (33.1)	109 (66.9)		1.57 (0.90–2.73)
50–59	44 (53.7)	38 (46.3)		3.84 (2.01–7.34)[a]
≥60	11 (40.7)	16 (59.3)		3.30 (0.94–11.54)
Employment status				
Stable employment	67 (30.2)	155 (69.8)	0.57	
On unemployment benefit	20 (29.9)	47 (70.1)		
Unemployment	55 (33.1)	111 (66.9)		
Others	14 (23.3)	46 (76.7)		
Marital status				
Without partner and without children	56 (34.8)	105 (65.2)	0.06	1
Without partner and with children	66 (35.5)	120 (64.5)		0.68 (0.39–1.17)
In a couple without children	23 (21.1)	86 (78.9)		0.46 (0.26–0.83)[a]
In a couple with children	58 (32.8)	119 (67.2)		0.77 (0.47–1.26)

[a]$p < 0.05$.
aOR, adjusted odds ratio.

our population, which is consistent with the findings of other studies.[6,12,13] It seems important to widen prevention campaigns in the heterosexual population. Prevention campaigns have been focused on at-risk groups, such as intravenous drug users or men who have sex with men, both groups being found to have the lowest probability of late testing in our study. These campaigns have had good results, the proportion of IDUs having decreased from 24% in 1996 to 11.4% in 2003.[19] However, even in the homosexual group, the proportion of late testing was still frequent (31.7%), justifying the need to maintain efforts to increase HIV testing in this population, as concluded by Chadborn et al.[5] that observed 31% of late testers in homosexual men in England and Wales. Within the heterosexual population, women had a lower probability of late testing, possibly explained by prenatal tests or gynecologic follow-up that could add to the likelihood of HIV testing.

In our study, IDUs were more frequently found to be late testers than homosexual men, in opposition to results from Italy[13] or Sweden.[12] However, only 4.7% of the population have been infected through injection drug use, which indicates that this route of transmission is sparse, and has decreased over time, IDUs representing 8.2% in 1996–1997 and 2.4% in 2004–2005. Patients who still contract HIV through drug use may represent a very specific group, with particular characteristics that could explain late HIV testing.

Living in a couple and having children appears to be strong determinants of testing behavior among the heterosexual population, particularly in men. Usually, these factors are

associated with a low risk of infection. But when infection occurs, these factors constitute risk factors of late testing, because these persons do not consider themselves at risk for infection and so do not get tested for HIV. Moreover, physicians do not suggest HIV testing because they do not think these patients can be infected. It seems important to encourage HIV testing toward populations considered to be at low risk for HIV infection. HIV testing should be more systematically proposed in general practice. For women living in a couple without children was associated with a low risk of late testing. This result could be explained if children are considered as a proxy of the duration of couple. Indeed, in a recent study (C. Delpierre et al., unpublished data), migrant women in a recently formed couple (<5 years) had a lower probability of late testing, whereas French women who had been in a couple for more than 5 years had a higher probability of late testing. In our population, country of birth was unknown but the proportion of migrants may have been important, particularly for women, 50% of women coming from sub Saharan Africa versus 20% for men in France.[20] Women in a couple with children are more likely to be in a longstanding couple and so more likely to be French than women in a couple without children that could be more frequently migrant.

This study confirms that late testing is still frequent in France. Late testing concerns groups identified as at low risk of HIV infection, particularly heterosexual men. When an infection occurs, these patients might believe they are not at risk for infection and do not use HIV testing. It seems thus necessary to improve HIV testing policy in the heterosexual population. Testing campaigns focused on this population should emphasize the impact of late testing on mortality for the individual, and on the impact of late testing on the infection transmission route.

Our results also showed that a more systematic testing proposition is associated with earlier testing as observed in pregnant women. So, HIV testing should be proposed more systematically to heterosexual population, particularly for men, by the health care professionals who treat them (general practitioner, worksite physician). Sexual practices questioning should be integrated in the physician consultation to help their patients to consider HIV testing.

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