

## Vital Signs: HIV Testing and Diagnosis Among Adults — United States, 2001–2009

### ABSTRACT

**Background:** Human immunodeficiency virus (HIV) infection is a major cause of morbidity, mortality, and health-care expenditures in the United States. HIV testing and linkage to care are essential to identify persons early in their course of infection to prevent progression to acquired immunodeficiency syndrome (AIDS) and death, and to reduce transmission.

**Methods:** CDC used 2001–2009 data from the National Health Interview Survey to estimate percentages of persons aged 18–64 years who reported ever being tested for HIV in the United States. Data from the National HIV Surveillance System were used to estimate numbers, percentages, and rates of HIV diagnoses, AIDS diagnoses, and late diagnoses of HIV infection (defined as an AIDS diagnosis made  $\leq 12$  months from an initial HIV diagnosis) for persons diagnosed with HIV infection during 2001–2008 and reported to CDC through June 2009; these were used to determine populations and regions most affected by HIV and AIDS, late diagnoses, and trends in late diagnoses over time.

**Results:** The percentage of persons aged 18–64 years ever tested for HIV was stable at approximately 40% from 2001 to 2006, increasing to 45.0% in 2009. The percentage of persons with late diagnoses of HIV infection was stable at approximately 37% from 2001 to 2004, decreasing to 32.3% by 2007 (most recent data available). In the 37 states with mature HIV reporting systems in 2007, the percentage of persons diagnosed late ranged from 25.0% to 47.2%. In 2008, most HIV diagnoses, by race/ethnicity, were among blacks or African Americans (51.2%) and, by transmission category, were among non-drug-injecting men reporting male-to-male sexual contact (55.0%). AIDS diagnosis rates were highest in the South and Northeast census regions and in the most populated states.

**Conclusions:** The number of persons in the United States who report ever being tested for HIV is increasing, and fewer persons are being diagnosed late in their infection. However, nearly one third of diagnoses still occur late. Increased testing efforts are needed, particularly among populations that account for most HIV diagnoses.

**Implications for Public Health Practice:** All health-care providers should expand routine HIV screening so that all adults are tested. Members of populations with higher rates of HIV diagnoses and living in geographic areas with high HIV prevalence should be screened more frequently than others. Persons likely to be at high risk for HIV infection (e.g., gay, bisexual, and other men who have sex with men) should be tested at least annually. Public health officials should emphasize the importance of HIV testing and allocate resources to increase testing among populations with the highest rates of HIV diagnoses.



## Background

Human immunodeficiency virus (HIV) is a communicable infection that leads to a progressive disease with a long asymptomatic period. Approximately 56,000 persons in the United States are newly infected with HIV each year (1), which is nearly one new infection every nine and a half minutes. Without treatment, most persons develop acquired immunodeficiency syndrome (AIDS) within 10 years of HIV infection (2). Antiretroviral therapy delays this progression and increases the length of survival, but is most effective when initiated during the asymptomatic phase. It is estimated that on average, an HIV-positive person aged 25 years who receives high-quality care will survive an additional 39 years (3). CDC estimates that approximately 1.1 million adults and adolescents were living with HIV infection in the United States at the end of 2006; however, as many as one fifth (21%) were unaware of their infection (4,5). Persons with late diagnoses of HIV infection have missed opportunities for treatment during the asymptomatic period and for prevention of transmission to others; they also have a shortened life expectancy (6). Testing identifies infected persons, which enables them to seek medical care that can improve the quality and length of their lives and reduce risk for HIV transmission.

HIV testing and linkage to care are integral parts of a comprehensive strategy to identify all persons with HIV infections and to initiate early intervention. In 2010, the National HIV/AIDS Strategy established a goal of increasing, by 2015, from 79% to 90% the percentage of persons living with HIV who are aware of their infection (7). This report describes trends in HIV testing, rates of HIV and AIDS diagnoses, and trends in late diagnoses of HIV infection in the United States.

## Methods

CDC used 2001–2009 data from the National Health Interview Survey (NHIS) to calculate the percentage of persons aged 18–64 years who reported ever being tested for HIV (excluding tests done for blood donations). NHIS is an ongoing, cross-sectional, household survey that provides data for a broad range of health measures based on in-person interviews with a nationally representative sample of the civilian non-institutionalized population. Methods for this analysis have been described previously (8).

Estimates of numbers, percentages, and rates of HIV diagnoses, AIDS diagnoses, and trends in late diagnoses (defined as an AIDS diagnosis made  $\leq 12$  months from an initial HIV diagnosis) were used to determine populations and regions most affected by HIV and AIDS, late HIV diagnoses, and trends in late HIV diagnoses over time. These estimates were derived from data reported to the National HIV Surveillance System by 50 states and the District of Columbia (DC) for AIDS diagnoses and by states with long-term, confidential, name-based HIV reporting systems (33\* since December 2000 and 37† since January 2005) for HIV diagnoses to allow for stabilization of data collection and adjustment of the data to monitor trends. Estimates presented are derived from cases that were followed up through December 2008 and reported through June 2009.

## Results

In 2008, 44.6% of persons aged 18–64 years reported ever being tested for HIV (Table 1). The percentage of persons ever tested for HIV aged 18–24 years (33.9%) was lower than for persons aged 25–34 years (57.8%) and 35–44 years (56.7%), although rates of HIV diagnoses among persons in these age groups were similar (33.1, 37.6, and 38.0 per 100,000, respectively). The percentage of persons ever tested for HIV was higher among blacks or African Americans (61.8%) and Hispanics or Latinos (47.6%) than whites (40.9%). More than one quarter (28.3%) of persons who acknowledged having an HIV risk factor<sup>§</sup> had not been tested. Trends in HIV testing

\*Alabama, Alaska, Arizona, Arkansas, Colorado, Florida, Idaho, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, and Wyoming.

†Alabama, Alaska, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, and Wyoming.

§Persons were asked if any of the following statements were true for them, but not which specific statement(s) applied to them. “You have hemophilia and have received clotting factor concentrations. You are a man who has had sex with other men, even just one time. You have taken street drugs by needle, even just one time. You have traded sex for money or drugs, even just one time. You have tested positive for HIV (the virus that causes AIDS). You have had sex (even just one time) with someone who would answer ‘yes’ to any of these statements.”

## Key Points

- Approximately 56,000 persons in the United States are newly infected with HIV each year.
- The number of adults aged 18–64 years who have ever been tested for HIV increased by 11.4 million during 2006–2009; however, an estimated 55% of adults have never been tested.
- An estimated 32% of all HIV diagnoses in 2007 were late diagnoses, occurring shortly before persons developed AIDS, making early treatment impossible.
- Early HIV testing reduces the spread of disease, extends life expectancy, and reduces costs of care. Every new HIV infection averted saves approximately \$367,000 in lifetime medical costs.
- Everyone should be tested for HIV. Persons at higher risk and in high-prevalence populations should be tested more often than others.
- Additional information is available at <http://www.cdc.gov/vitalsigns>.

show that the percentage of persons ever tested for HIV remained stable at approximately 40% from 2001 to 2006, increasing to 45.0% in 2009, representing 82.9 million persons (Figure 1). Trends in late diagnoses also were stable at approximately 37% from 2001 to 2004, decreasing to 32.3% in 2007 among persons in 33 states. In 2007, the percentage of persons with HIV who had a late diagnosis was 32.3% for the 37 states combined; however, percentages of late diagnoses ranged from 25.0% to 47.2% among those states (Table 2). In 22 states, the percentage of persons with a late HIV diagnosis exceeded the percentage for the 37 states combined (32.3%). In these 22 states, percentages of late diagnoses ranged from 32.4% to 47.2%.

Nearly 40,000 adults were diagnosed with HIV infection in 2008 in the 37 states with mature HIV reporting systems (29.9 per 100,000) (Table 1). Men accounted for 75.0% of these diagnoses. Blacks or African Americans accounted for 51.2% of estimated diagnoses and had an HIV diagnosis rate (112.1 per 100,000) that was nine times the rate for whites (12.6 per 100,000). Hispanics or Latinos had an HIV diagnosis rate (40.5 per 100,000) approximately three

**TABLE 1. Estimated number,\* percentage, and rate of HIV diagnoses among persons aged 18–64 years (37 states<sup>†</sup>), and percentage who reported ever being tested for HIV (United States<sup>§</sup>), by selected characteristics, 2008**

Characteristic	HIV diagnoses (37 states)			% ever tested for HIV (United States)
	No.	(%)	Rate per 100,000	
<b>Age group (yrs)</b>				
18–24	6,814	(17.1)	33.1	33.9
25–34	10,742	(27.0)	37.6	57.8
35–44	11,206	(28.1)	38.0	56.7
45–64	11,095	(27.8)	20.3	35.0
<b>Sex</b>				
Men	29,902	(75.0)	44.9	41.3
Women	9,955	(25.0)	14.9	47.7
<b>Race/Ethnicity</b>				
American Indian/Alaska Native	214	(0.5)	18.6	53.1
Asian	433	(1.1)	10.3	37.6
Black/African American	20,387	(51.2)	112.1	61.8
Hispanic/Latino	6,945	(17.4)	40.5	47.6
Native Hawaiian/Other Pacific Islander	33	(0.1)	35.9	—
White	11,474	(28.8)	12.6	40.9
Multiple race (non-Hispanic)	370	(0.9)	29.2	53.6
<b>Transmission category</b>				
Male-to-male sexual contact	21,932	(55.0)	—	—
Injection drug use (males)	2,465	(6.2)	—	—
Injection drug use (females)	1,526	(3.8)	—	—
Male-to-male sexual contact and injection drug use	1,127	(2.8)	—	—
Heterosexual contact (males)	4,295	(10.8)	—	—
Heterosexual contact (females)	8,363	(21.0)	—	—
Other <sup>¶</sup>	149	(0.4)	—	—
<b>Total</b>	<b>39,857</b>	<b>(100.0)</b>	<b>29.9</b>	<b>44.6</b>

\* Estimated numbers resulted from statistical adjustment that accounted for reporting delays, but not for incomplete reporting.

<sup>†</sup> Data from the National HIV Surveillance System. Includes data reported from 37 states with confidential, name-based reporting of HIV infection since at least January 2005: Alabama, Alaska, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, and Wyoming

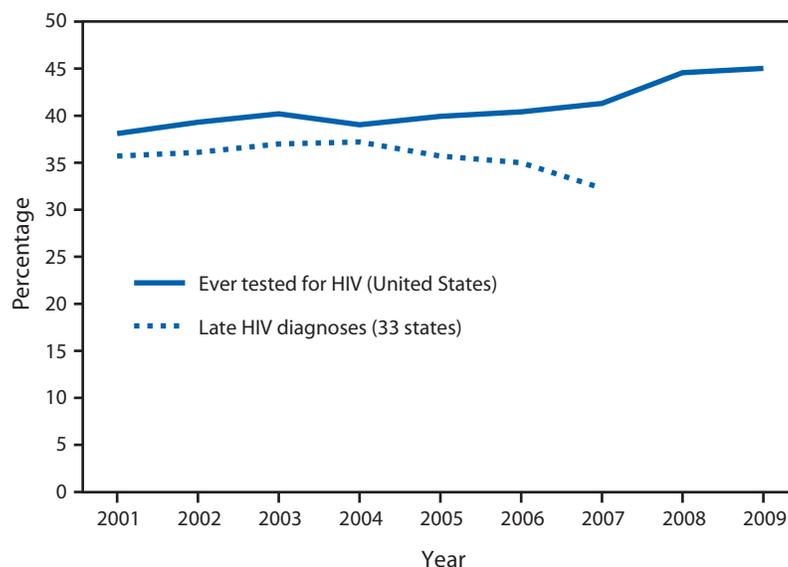
<sup>§</sup> Data from the National Health Interview Survey, 2008. Available at [http://www.cdc.gov/nchs/nhis/quest\\_data\\_related\\_1997\\_forward.htm](http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm). Percentages calculated using the number of respondents within each subgroup as the denominator.

<sup>¶</sup> Includes hemophilia, blood transfusion, perinatal exposure, and risk factors not reported or not identified.

times the rate for whites. By transmission category, men reporting male-to-male sexual contact accounted for the highest percentage (55.0%) of diagnoses, followed by heterosexual contact (31.8%), injection drug use (10.0%), and males reporting both male-to-male sexual contact and injection drug use (2.8%).

In 2008, among the 50 states and DC, AIDS diagnosis rates (per 100,000 population) for adults aged 18–64 years ranged from an estimated 2.0 per 100,000 in South Dakota to 130.1 per 100,000 in DC, with the highest rates occurring in the South and Northeast census regions and highly populated states (e.g., California and Illinois) (Figure 2).

**FIGURE 1.** Percentage of persons aged 18–64 years who reported ever being tested for HIV (United States, 2001–2009\*), and percentage of late HIV diagnoses (AIDS diagnosis within 12 months of initial HIV diagnosis) (33 states, 2001–2007†)



\* Data from the National Health Interview Survey. Available at [http://www.cdc.gov/nchs/nhis/quest\\_data\\_related\\_1997\\_forward.htm](http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm).

† Data from the National HIV Surveillance System. Includes data reported from 33 states with confidential, name-based reporting of HIV infection since at least December 2000: Alabama, Alaska, Arizona, Arkansas, Colorado, Florida, Idaho, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, and Wyoming.

### Conclusions and Comment

In 2009, 82.9 million adults aged 18–64 years reported having ever been tested for HIV, an increase of 11.4 million since 2006. However, 55% of adults have never been tested for HIV. Young persons (aged 18–24 years) had rates of HIV diagnoses that were similar to other age groups, but their testing rates were lower. In addition, although late diagnoses of HIV declined by 5% from 2001 to 2007 in the 33 states with mature HIV reporting systems, approximately one third of persons diagnosed with HIV infection in 2007 in 37 states were diagnosed late. These results indicate that progress has been made, but continued and intensified efforts are needed to identify persons with undiagnosed infection. Trends in late HIV diagnoses and AIDS diagnoses can be used to monitor the progress of testing efforts for identifying infected persons. With increased testing and linkage to care, more persons infected with HIV are identified, and if persons are diagnosed early in their infection, earlier treatment will reduce disease progression to AIDS.

Identifying persons early in the course of infection saves lives, reduces morbidity and mortality,

**TABLE 2.** Estimated number\* of HIV diagnoses, and estimated number and percentage of late HIV diagnoses (AIDS diagnosis within 12 months of initial HIV diagnosis), among adults aged 18–64 years, by state of residence — 37 states, 2007†

State of residence	No. of HIV diagnoses	Late HIV diagnoses	
		No.	(%)
Alabama	784	236	30.1
Alaska	37	15	41.2
Arizona	915	313	34.2
Arkansas	320	123	38.5
Colorado	463	150	32.3
Connecticut	540	169	31.3
Florida	7,670	2,309	30.1
Georgia	3,067	976	31.8
Idaho	40	11	27.5
Indiana	539	178	33.1
Iowa	136	51	37.8
Kansas	191	83	43.4
Kentucky	440	165	37.4
Louisiana	1,166	432	37.0
Michigan	823	304	36.9
Minnesota	363	114	31.4
Mississippi	573	167	29.1
Missouri	654	212	32.4
Nebraska	104	35	34.1
Nevada	490	156	31.9
New Hampshire	56	15	27.6
New Jersey	1,809	684	37.8
New Mexico	156	61	39.3
New York	6,129	2,056	33.6
North Carolina	2,082	538	25.8
North Dakota	10	4	44.4
Ohio	1,020	294	28.8
Oklahoma	302	107	35.3
South Carolina	836	344	41.2
South Dakota	28	10	35.6
Tennessee	1,083	271	25.0
Texas	4,487	1,469	32.7
Utah	131	37	28.4
Virginia	1,163	376	32.4
West Virginia	97	46	47.2
Wisconsin	300	93	31.1
Wyoming	19	7	37.7
<b>Total</b>	<b>39,024</b>	<b>12,614</b>	<b>32.3</b>

Source: National HIV Surveillance System.

\* Estimated numbers resulted from statistical adjustment that accounted for reporting delays, but not for incomplete reporting.

† Includes data reported from 37 states with confidential, name-based reporting of HIV infection since at least January 2005: Alabama, Alaska, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Idaho, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia, Wisconsin, and Wyoming.

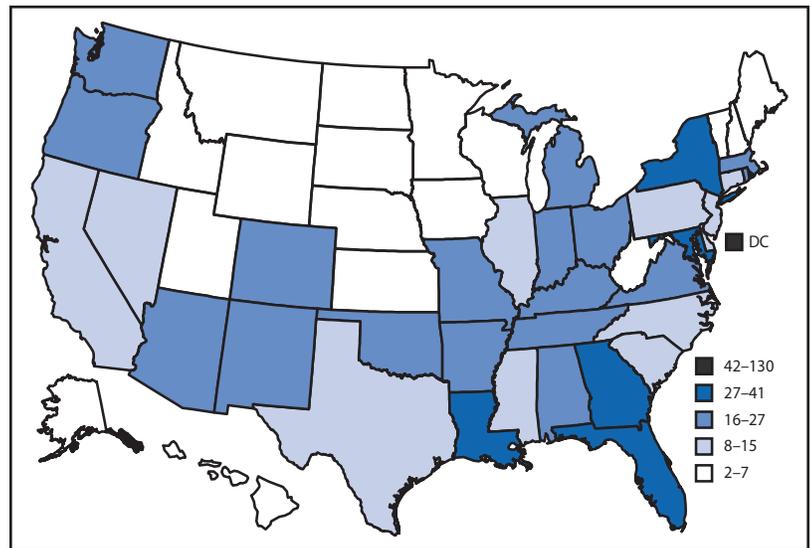
prevents new infections, and can reduce health-care expenditures. In one study, persons unaware of their infection were 3.5 times more likely to transmit HIV than persons aware of their infection (9). Persons who have been diagnosed can take precautions to avoid transmission and can be treated with appropriate

antiretroviral therapy. Such therapy lowers the amount of virus in the blood and genital secretions, likely reducing the biologic risk for transmission (10,11). Every new HIV infection averted saves approximately \$367,000 (2009 dollars) in lifetime medical costs (12). For all these reasons, HIV screening to identify infected persons and linking them to care and prevention services is a cornerstone of the national HIV prevention strategy (13).

For adults, CDC recommends routine HIV screening in health-care settings (14). CDC further recommends annual or more frequent testing of persons likely to be at high risk for HIV. Expanded efforts should be concentrated where the burden of disease is greatest. Knowledge of rates of AIDS diagnoses, HIV diagnoses, and HIV testing can be used to focus these efforts. For example, approximately 60% of blacks or African Americans have been tested for HIV at least once in their lives, a higher percentage than any other racial/ethnic group. Despite the higher percentage of persons who report ever having been tested, the disproportionately high rates of diagnoses among blacks or African Americans (112.1 per 100,000) and Hispanics or Latinos (40.5 per 100,000), suggest that adults from these subpopulations might benefit from more frequent testing to facilitate early diagnosis. The burden of HIV is greatest among gay, bisexual, and other men who have sex with men (MSM), who comprised more than half of all diagnoses in 2008. Surveys have found that a high percentage (58%) of MSM report testing in the preceding 12 months. However, 45% of HIV-infected MSM who were unaware of their infection reported having an HIV test in the preceding 12 months, indicating that they might have acquired their infection recently (15). Taken together, these findings indicate that although progress has been made towards increased testing rates among populations at risk, testing has not occurred at sufficient scale or repeated with enough frequency to identify all those with HIV.

The findings in this report are subject to at least four limitations. First, data from the NHIS sample of adults are self-reported and subject to recall bias and potential underreporting of sensitive information such as HIV testing and HIV risk factor status. Second, NHIS excludes active military personnel and those who live outside of households (e.g., persons who are incarcerated, in long-term care institutions, or homeless). Certain persons in these populations might be at greater risk for HIV infection than persons in

**FIGURE 2. Rates\* of AIDS diagnoses among adults aged 18–64 years, by area of residence — 50 states and the District of Columbia, 2008**



Source: National HIV Surveillance System.

\*Per 100,000 population. Estimated numbers resulted from the statistical adjustment that accounted for reporting delays, but not for incomplete reporting. Data classified by quintiles.

households. Third, the NHIS sample does not include persons aged 13–17 years, who are included in CDC's 2006 HIV testing recommendations (14). Finally, national HIV surveillance with uniform reporting was not implemented fully until 2008. CDC regards data from states with confidential, name-based, HIV surveillance systems sufficient to monitor trends in HIV diagnoses after 4 years of reporting. The areas included in estimates of numbers and rates of diagnoses of HIV infection are based on the date of implementation of confidential name-based HIV infection reporting. Data from the 37 states account for approximately 68% of AIDS diagnoses in the 50 states and DC but might not be nationally representative. Data for the prevalence of AIDS diagnoses were used to provide an indication of the geographic distribution of HIV diagnoses because they are available for all states. However, AIDS diagnoses are a measure of late stage disease and do not accurately reflect the entire distribution of current HIV diagnoses.

CDC supports and provides resources for various activities that promote HIV testing and linkage to care and prevention services. In 2009, CDC granted \$513 million to state and local health departments and community-based and other organizations for domestic HIV prevention and surveillance activities, including testing. The expanded testing initiative, a 3-year effort that began in 2007, was designed to

increase testing, early diagnosis of HIV infection, and linkage to care and prevention services primarily among blacks or African Americans. It resulted in approximately 1.4 million persons being tested and 10,000 HIV infections identified. However, approximately 25% of those infected were not linked to care initially, and efforts are needed to ensure all diagnosed persons are linked to care. In 2010, CDC awarded additional funding for an expanded HIV testing initiative. The 2010 funding is being used to expand this initiative to reach more populations at risk, namely MSM, injection drug users, and Hispanics or Latinos. State and local health departments and health-care providers are essential to the implementation of these initiatives and integration of CDC's recommendations into practice. State and local laws and programs consistent with CDC's recommendations can facilitate increased HIV testing. Health-care providers should offer HIV screening for all persons who have never been tested for HIV infection, repeat testing for persons at increased risk for HIV, and referrals to risk reduction services (e.g., behavioral interventions) for at-risk persons testing HIV-negative. Similarly, persons who have never been tested for HIV should request an HIV test, and persons at increased risk for HIV should be tested at least annually (14).

The National HIV/AIDS Strategy provides an opportunity for refocusing and intensifying federal, state, and local HIV testing efforts (7). HIV testing and HIV surveillance data are essential to monitor and evaluate national, state, and local efforts against HIV and to set priorities for resource allocation. CDC remains committed to strengthening its efforts against the HIV epidemic and working with its partners to increase testing for all persons, promote periodic testing for persons at high risk, link persons to care, treatment, and prevention services, and ultimately reduce the burden of HIV in the United States.

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