Title: A continuing concern: HIV and hepatitis testing and prevalence among drug users in substitution programs in Zürich, Switzerland

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Abstract

Phase I of the Zurich Prometheus Study is a cross-sectional study focusing on an up-to-date serology for HIV and hepatitis B/C and associated risk factors for all clients in four participating clinics offering opiate substitution in Zurich, Switzerland. The mean age of the 603 respondents is 30.7 years (SD=6.2), and 38% of them are women. Seventy-five percent of the respondents have a history of injecting drug use (IDU), and over half have injected within the past six months. Lab-confirmed seroprevalence for HBV (50%) and HCV (57%) is twice that of HIV (24%). There is an 80% risk reduction for all three viral infections among those starting IDU after 1991—when harm reduction efforts were in full swing—compared to those who began before 1988—before clean needles were widely available. These findings suggest a strongly protective effective of harm reduction measures. But while a stabilization in HIV prevalence at 15% can be seen among drug users who started injecting after 1991, prevalence rates for HBV and HCV still remain several times higher. The prevalence data in this study support data showing continued high incidence rates for HBV and HCV, even among new injectors in the harm reduction era.
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Introduction

The spread of HIV in the late 1970s and early 1980s among drug users in Switzerland accounted for 30-70% prevalence rates seen in this population in the mid and late 1980s [Röhrig and Grob, 1990]. Due in part to successful interventions, the prevalence has since stabilized at below 10% in the 1990s [BAG, 1998]. Nevertheless, in-depth secondary analyses of European AIDS surveillance data have revealed a clear cohort effect in AIDS incidence among drug users, a pattern which is especially pronounced in Switzerland [Zellweger et al., 1996].

The prevalence rates of other bloodborne viral infections such as hepatitis A/B/C among drug users in Switzerland has remained at or above 50% in the 1980s and 1990s [Röhrig and Grob, 1990]. Much of the Swiss data on drug users come from Zurich which, during the Needle Park era, was home to one of the largest open drug scenes in Europe. Since the late 1980s, several novel interventions have been established in Zurich and elsewhere in Switzerland, such as the medical drug prescription program. It is estimated that half of the country's 30,000 hard drug users are in methadone substitution programs [Estermann, 1996]. Beginning as a national pilot project in 1994, high-threshold heroin prescription programs have also been in operation.

As of early 1997, antiretroviral therapy (ART) including a protease inhibitor was introduced widely for the treatment of HIV/AIDS in Switzerland. However, internationally, the effect of the new treatment regimen among HIV-positive people with concomitant hard drug use has been largely uncertain. HIV-positive drug users may face exclusion from such treatments due to concerns about poor adherence and interactions with street drugs. In general, therapies for drug addiction have highlighted the difficulties of long-term treatment in this population. However, recent successes with heroin prescription in Switzerland [Uchtenhagen et al., 1997] and treatment of multi-drug resistant tuberculosis in New York [Curtis et al, 1994] have given cause for increased optimism.

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The Zurich Prometheus Study was conceived to assess the feasibility of introducing triple combination therapies at opiate substitution clinics for HIV-infected drug users. While data on HIV and hepatitis are usually gathered at intake and on-site testing is possible, most opiate substitution clinics are low-threshold and do not require testing for HIV and hepatitis. And even if the clients themselves choose to test, there is no required cycle of testing either; therefore, it is difficult to arrive at a complete and up-to-date prevalence for the participants. An important exception are clinics which offer heroin prescription. Heroin prescription is part of a nation-wide study, and as such, participants are required to undergo examinations (including testing for HIV and hepatitis) every six months.

The Zurich Prometheus Study consists of three phases: Phase 1 is a cross-sectional study focusing on gathering up-to-date serological data for HIV and hepatitis as well as associated risk behaviors for all clients; Phase II is an examination of all HIV-positive clients as to HIV/AIDS treatment history and indication for highly active antiretroviral therapy (HAART); and Phase III is an open-label treatment study with a protease inhibitor in triple combination within a prospective case-control study of HIV-positive clients in opiate substitution clinics. This paper will discuss findings from Phase I of the study.

**Methods**

Phase I included a cross-sectional examination of all clients during a six-month period at four clinics offering opiate substitution in Zurich, Switzerland. Clients were offered a short description of the study and invited to participate upon giving anonymous informed consent. Study participants took part in an interview with questions on sociodemographics, drug use, drug sharing behaviors (to appear in a separate article), sexual behaviors, and serological status for hepatitis and HIV. All participants were offered serological testing for hepatitis B/C and syphilis. For those participants who refused a hepatitis test but consented to have their clinical records reviewed, patient files were examined to see if older lab results were available. All documented positive results and those negative results less than 6 months old were accepted for the current study. Due to considerations of cost and acceptance, a
special algorithm was erected for HIV testing—i.e., all participants with an HIV-positive result or an HIV-negative result from the past 6 months were exempted from re-testing provided the lab result could be obtained. All others were offered a voluntary HIV test. For each new laboratory test or review of patient records, study participants were asked to sign a detailed informed consent.

Each participating clinic had a physician who was engaged especially for this study. In general, these study physicians were responsible for organizing data collection for the study at their respective clinics. At some clinics, the study physician also performed all the data collection him/herself. The questionnaires were completed and all names stripped before being delivered to a central site where the study data were collected, entered and controlled. The data were analyzed using SPSS version 6.1.1 for the PowerMacintosh. The Student's t-test was used for analyzing continuous variables, along with Tukey HSD test for multiple comparisons. Chi-squared tests were used for nominal variables, and for some data, odds ratios were calculated. The Prometheus Study Group coordinated all the activities of the various phases of the study.

Setting plays a central role in the overall study, and the four participating clinics differ with regards to the range of services offered and the client profile. At the beginning of the study, important characteristics of the clinics were gathered systematically by standardized questionnaire. What follows is a brief description of each of the four participating clinics.

1. Clinic A is a major clinic in the city for low-threshold methadone maintenance. Although a wide variety of somatic, social, psychiatric and psychotherapeutic support is offered, participation in the program does not require simultaneous uptake of additional services. The primary goal is harm reduction—i.e., stabilizing drug use, physical well-being, and societal reintegration. Clients with a stabilized situation are given methadone for up to a week; other clients are required to consume their dosages under direct observation. Since its establishment in 1992, the number of clients has risen consistently. In 1997, a total of 678 clients were treated. More than 90% of the clients use the clinic as their primary source of medical care.
2. Clinic B is a clinic established in late 1993 expressly for the national medically controlled heroin prescription project PROVE [Uchtenhagen et al., 1997]. The entry criteria include heroin addiction for more than two years as well as two previous failed treatment attempts. The clients at this clinic consist primarily of drug-using women and occasionally their partners. The high-threshold therapy itself consists of heroin (IV or oral), morphium (MST oral), and/or methadone (oral) together with obligatory participation in the PROVE study design (twice yearly examinations) and in psychosocial and medical services. Liquid heroin must be consumed under direct observation (1-3 times a day); all other substances can be taken out, under stable conditions, from the remainder of daily portions for heroin or morphium tablets to a week for methadone. The number of client slots is set by the federal government, and in 1997, there were 91 patients. Around 70% of the clients use the clinic as their main health care provider.

3. Clinic C is a sociomedical hospice founded in 1989. In 1997, some 750 drug using patients were treated, many as "one-time" out-patient cases. Similarly, around half of these patients use the clinic as their main health care provider. The clinic offers medical and psychosocial care, along with 23 beds which are often occupied by HIV patients. A small number of the clients receive methadone, for which weekend doses are also given to take out.

4. As part of the university psychiatric clinic, Clinic D offers specific psychotherapeutic services. In 1997, 700 people were treated, but most of them as "one-time" out-patient cases. Nevertheless, around half of these clients use the clinic as their primary source of health care. There are 200-250 clients under regular care, with about half of those receiving methadone. Substitution therapy with methadone is offered on a case-by-case basis, and weekend doses are entrusted to clients.

Results
From July 1997 through January 1998, 717 clients at four opiate substitution clinics in Zurich were invited to participate in a cross-sectional study focusing on HIV prevalence. Of those, 603 (84%) agreed, with participation rates ranging from 80% in Clinic A and Clinic C to 100% in Clinic D.

Overall, the mean age is 30.7 years (SD=6.2), and 38% of the participants are women. There were important differences between the centers along several key study variables as can be seen in Table 1. While there are no differences in age, Clinic B and Clinic C stand out for the high proportion of women. Looking at the drug use variables, clients from Clinic B and Clinic C have used heroin longer, over 90% have injected drugs and for a longer length of time, and three-quarters of the IDUs injected within the past month. Similarly, a higher proportion (one-third) in these two centers reported a history of sex work, but 58% of the sex workers from Clinic C have practiced in the past month compared to only 4% in Clinic B. While there are no differences in the proportion of clients sexually active, clients from Clinic C register the lowest rate of condom use with both primary (17%) as well as casual partners (54%). Finally, the lab-confirmed HIV prevalence from Clinic C (57%) is more than double that of the overall prevalence, whereas that of Clinic A (14%) is almost half. Despite these differences, HIV-positive clients in the four clinics estimated similar times of infection.

**History of drug use**

Besides alcohol and tobacco which were consumed almost universally, all but one participant had a history of heroin use (median duration=8 years), and 80% have used cocaine (median duration=6 years). Seventy-five percent of the respondents have a history injecting drug use (median duration=9 years); 58% have injected drugs within the past six months. Needle sharing has been practiced by 58% of the IDUs at some point in their injecting careers; 10% of recent injectors have shared needles within the past six months.

**Sexual behavior**

Sixty-eight percent of the participants have been sexually active in the past six months; 48% had sex with a stable partner and 23% with a casual partner. Vaginal sex was the most popular practice (over 95% of the sexually active), and 32% of those who practiced vaginal
sex with a stable partner always used condoms compared to 65% among those with a casual partner. There were differences in sexual behavior along actual HIV status. HIV-negative drug users were significantly more likely than their HIV-positive counterparts to have been sexually active in the past six months (70% vs. 61%, p=.048), to have had sex with a stable sex partner in that time (51% vs. 39%, p=.02), and to not always use condoms in vaginal sex with their stable sex partners (26% vs. 74%, p<.00001). In stable partnerships, self-reported HIV serodiscordant couples report the highest rate of consistent condom use (80%), followed by seroconcordant HIV-positive couples (56%), and seroconcordant HIV-negative couples (20%, p<.00001). There were no differences between HIV-positive and HIV-negative drug users in rates of sexual activity with a casual partner or condom use in vaginal sex with a casual partner in the past six months.

There were no significant gender differences in overall sexual activity or sexual behaviors with a stable partner in the past six months, except that women were much more likely than men to have a partner who injects drugs (50% vs. 32%, p=.008). Women drug users were significantly less likely than their male counterparts to have had sex with a casual partner in the past six months (14% vs. 29%, p=.00001) and to always use condoms in vaginal sex with casual sex partners (55% vs. 68%, p=.02). Thirty-nine percent of the women have practiced commercial sex work (CSW) at some point; 17% within the past six months. The corresponding figures among men are 12% and 2%, respectively. Twelve percent of the women and 15% of the men have had a same-sex partner since 1980. Among the men, having had same-sex partners is strongly linked to commercial sex work (79% of CSW vs. 6% of non-CSW, p<.00001).

HIV and hepatitis

More than 95% of the drug users have been previously tested for HIV. The median was 4 tests. Only 22 participants (3.6%) reported never having had an HIV test. The two main reasons were no risk behaviors (45%) and not wanting to know the result (32%). Among the 10 non-testers who declared no risk behaviors, 7 had indeed reported none of the drug-related or sexual risk behaviors examined, whereas 1 reported front- and backloading but
no other risk behaviors, and 2 reported never using condoms in vaginal intercourse with their primary partners in the past six months.

Among those previously tested, 462 (80%) were HIV-negative, 118 (20%) HIV-positive, and 1 person did not know the result. Forty-seven percent of the self-reported HIV-negative respondents had their last test within the past six months. Actual lab results could be obtained for 88% of them and 90% of their self-reported HIV-positive counterparts. According to our testing algorithm (see Figure 1), 305 (51%) were eligible for HIV-testing within this study. Of those, 201 (66%) consented to a new test, including 12 of the 22 clients who had never been tested for HIV. The main reasons for refusing an HIV test among those who met the study algorithm were no interest (33%), fear of blood collection (26%), no risk (9%), already tested (8%), consented but no-show (7%), and fear of knowing the result (6%). Age, gender, and prior HIV-status given the testing algorithm were not determinants of testing for this study. However, refusal rates fluctuated strongly by recruitment site—from 13% in Clinic D to 21% in Clinic B to over 40% in Clinic A and Clinic C.

The overall rate of consent for hepatitis testing (54%) was lower but comparable to HIV, even though a hepatitis test was offered universally. Here, the impact of the HIV-testing algorithm can be estimated, since 28% of all participants refused an hepatitis test due to prior testing. The section on hepatitis (including the invitation for serological testing) preceded the section on HIV, and participants who consented to a hepatitis test were just as likely to consent to an HIV test should they be eligible and vice versa—61% consented to both, 31% refused both, and only 8% consented to one test but not the other. Therefore, refusing an HIV-test appears to be largely associated with testing in general as opposed to HIV-testing in particular.

Table 2 compares the self-reported prevalence rates for hepatitis and HIV with the laboratory-confirmed results. On the whole, lab-confirmed seroprevalences are somewhat higher than self-reported rates (ns for HIV and HBV, p=.002 for HCV). Seroprevalences for hepatitis B/C are double that of HIV. There was a tendency for prevalence rates for HIV and
HCV to be higher among women, but this finding is not statistically significant. Twenty-one respondents (3.5%) reported having had syphilis, but of the 262 TPHA lab tests performed, only 2 (0.8%) were reactive—i.e., 9/10 self-reported cases of syphilis were non-reactive.

The proportion of those who reported not knowing their status is higher for hepatitis (10-15%) than for HIV (4%). When we examine the newly positive cases (that is, among previously negative or unknown), we see that the discrepancy between HIV and hepatitis B/C is even greater (see Table 3). Only 5/385 (1.3%) self-reported non-positives were newly positive for HIV. In contrast, the rate of newly positive cases was 21% for HBV and 26% for HCV. But looking at the two groups of newly positives separately, we see that the prevalence rates for those who reported not knowing their status for HBV (56%) or HCV (70%) were comparable or even higher than the overall prevalence rates. Lower figures are evidenced among those who reported being negative for HBV (12%) or HCV (16%); nevertheless, these hepatitis "seroconversion" rates are considerably higher than that seen for HIV (1%).

Figure 2 shows the laboratory-confirmed seroprevalence rates for HIV, HBV, and HCV by history of injecting drug use. Drug users who reported no history of IDU manifest lower rates of infection compared to injectors—OR for HIV=9.5 (95% CI=3.5-24.6), OR for HBV=5.9 (95% CI=3.5-10.3), OR for HCV=6.3 (95% CI=3.8-10.4). Among injectors, prevalence rates for all three viral infections increase with duration of injecting drug use, but differently. For HIV, a big increase takes place between 6-10 years and 11-15 years, whereas for HBV, there are two jumps between no IDU and ≤5 years and again between ≤5 years and 6-10 years. For HCV, the largest jump is between no IDU and ≤5 years. Despite these differences, even new injectors (≤5 years) manifest high rates of HBV (38%) and HCV (54%).

In order to assess the impact of interventions among drug users, we looked at three time periods with different availability of harm reduction measures in Zurich—before 1987, when clean needles and syringes were not readily available; 1988-90, when needle exchange was introduced but clean works not yet widely available; and after 1991 when clean needles and syringes were widely available and complemented by additional harm reduction measures.
Since a history of injecting drug use appears to be one of the strongest predictors of infection, we considered IDUs only, taking the year of IDU initiation as the independent variable. Figure 3 shows marked differences in infection rates among IDUs who began injecting during the designated time periods. There is a three-fold drop in HIV prevalence among drug users starting injection after 1988, with an apparent stabilization at 15%. The drop in prevalence rates for HBV and HCV is delayed, does not appear as pronounced as that for HIV, and continues into recent years with no stabilization as yet. For all three agents, there is a protective effect on the order of 80% for those starting IDU after 1991 as opposed to those starting before 1987.

**Discussion**

The clients at the four participating institutions exhibit considerable differences between institutions, but many of them can be explained in large part due to the different services offered which attract a certain clientele base. However, the differences in recent injection, recent sex work, and condom use (n.s. but a trend) are relevant for increased interventions in some settings. Another relevant finding is the difference in HIV test acceptance rates between sites: here factors such as familiarity with the physician (e.g., very high in Clinic D) and low vs. high threshold (e.g., low in Clinic A and high in Clinic B) are assumed to have played a crucial role.

Given nearly universal levels of multiple testing and a study test algorithm exempting recent testers, the refusal rate of 34% for voluntary HIV testing for this study can be considered high, also in light of refusal rates of 16-18% among STD patients in Switzerland [Paget et al., 1997]. Refusal does not appear to be related to testing for HIV per se, but rather to any serological testing at all. Standard test procedures involving phlebotomy constitute major barriers for IDUs, since many have collapsed veins making blood collection difficult, and furthermore, many non-injectors and former injectors have developed a strong aversion against needles. For these reasons, the implementation of alternatives to standard testing procedures using blood serum such as saliva collection warrant serious consideration in monitoring and epidemiological studies among drug users. Saliva collection has been used...
successfully in other European settings [Davies et al., 1995; Rodés et al., 1994], including a pilot in Clinic A where participation rates were near 100%.

Although the exact testing procedure for HIV and hepatitis differed, the end result was comparable in that all previously positive lab results and those negative lab results from within the past 6 months on file were taken together with new lab results for this study. However, this procedure may inflate prevalence figures somewhat given the bias towards previously positive results.

Previous knowledge of HIV and hepatitis status was very high in this population, with lab-confirmed prevalences being somewhat higher than self-reported rates. This may be in part due to different lag times between the last test and current results. Unfortunately, data on time and number of hepatitis tests were not collected. The lab-confirmed seroprevalence rates for HBV and HCV are double that of HIV. The difference between HBV and HIV was already seen in the 1980s before the harm reduction era [Röhrig and Grob, 1990]. Therefore, one plausible factor is the high and early penetration of HBV and HCV accounts for the discrepancy with HIV which penetrated this population high but later. Another factor is the varying infectivity between the three viruses with HIV being the least infective of the three [Bodsworth et al., 1994; McGray, 1986].

The findings suggest that the introduction of harm reduction measures had a profound impact on infection rates, independent of the natural infection curve along the duration of IDU. Looking at different "generations" of IDUs, we found that IDUs who commenced after 1991 with harm reduction efforts in full swing had an 80% reduction in risk of being infected with HIV, HBV, and HCV, compared to those who began before 1988. The concordance in the OR for the three viruses is striking, considering different baseline prevalences, different trends by duration of IDU, and differences in infectivity. However, with HIV and to a lesser extent HCV, the impact was immediate and profound, and could already be seen in the intermediary period.
Nevertheless, despite such a prominent risk reduction, the prevalence rates of HBV and HCV even among those who began injecting in an era of harm reduction are disturbingly high. These results agree with incidence data from a methadone clinic in Geneva [Broers et al., 1998] and the nation-wide opiate prescription study [Steffen, 1998] which show recent seroconversion rates of under 1% for HIV but around 10% for HBV and HCV. Due in part to better testing for HIV and higher seroconversion rates for HBV and HCV, the results also suggest that self-reported results for HIV are considerably more reliable than those for HBV and HCV, especially among those drug users who report not knowing their infection status for which the odds of infection for HBV and HCV are greater than one-in-two.

Rates of classical needle sharing among IDUs in Zurich have stabilized in the 1990s at some 10-15% of injectors having practiced it (mostly on rare occasions) within the past six months [Wang et al., 1998]. Therefore, alternative routes may be more important in explaining the high numbers of hepatitis infections. One possible explanation could be indirect sharing practices (e.g., front- and backloading, spoon sharing) which are practiced by the majority of IDUs in Zurich [Wang et al., 1998; Marcinko, 1998]. Such practices may still provide very efficient avenues of transmitting hepatitis viruses. Oddly enough, there was an HCV prevalence of 12% among non-IDUs. Such cases were also reported in Australia [van Beek et al., 1998], and these cases may reflect either underreporting of injecting and/or sharing behaviors or lesser known routes of HCV transmission.

The rates of sexual activity reported in this sample are comparable to other drug-using populations; however, condom use in vaginal intercourse in this Zurich sample is among the highest reported internationally even for an in-treatment sample [Raktham et al., 1996; van den Hoek et al., 1990; Watkins et al., 1992]. Nevertheless, considering the high prevalences of HIV and HBV, condom use among this population is still deficitary. Consistent with findings elsewhere, consistent condom use was more likely to be seen with casual sex partners than with stable partners. HIV-positive drug users manifested considerably higher rates of condom use in vaginal sex with stable partners than their HIV-negative counterparts, but this protective difference was not seen with casual partners. Despite evidence worldwide that safer sex is a difficult target among IDUs [McDonald et al., 1994;
Ruiz et al., 1996], targeted interventions at the individual level are necessary. For example, individual counseling sessions provide an arena where the personal risk situations that drug users encounter can be addressed and tailored solutions found.

Once again, these results are taken from drug users with regular contact to a treatment setting here in Zurich. Contact means, in addition to opiate substitution or prescription, having access to clean needles and syringes, ascorbic acid, sterile water ampules, condoms, etc... which are readily available at the centers. Therefore, this population can be considered one whose drug use has been medically stabilized to varying degrees with regular access to prevention aids. Comparable serological and behavioral data for drug users without such contact (i.e., non-institutionalized, street-recruited drug users) are not currently available. But as the high levels of HBV and HCV show, additional targeted measures are clearly necessary.
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Table 1. Overview of the clients at the four participating clinics of the Zurich Prometheus Study

<table>
<thead>
<tr>
<th></th>
<th>Total (n=603)</th>
<th>Clinic A (n=314)</th>
<th>Clinic B (n=73)</th>
<th>Clinic C (n=96)</th>
<th>Clinic D (n=120)</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>Age (mean years)</td>
<td>30.7</td>
<td>30.6</td>
<td>32.2</td>
<td>30.7</td>
<td>30.1</td>
<td>ns</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td>37.8%</td>
<td>30.3%</td>
<td>80.8%</td>
<td>57.3%</td>
<td>27.5%</td>
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<td>Heroin (mean years)</td>
<td>8.4</td>
<td>8.1</td>
<td>9.4</td>
<td>9.7</td>
<td>7.8</td>
<td>.004</td>
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<tr>
<td>Cocaine (mean years)</td>
<td>6.8</td>
<td>6.8</td>
<td>4.8</td>
<td>8.5</td>
<td>6.6</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>History of IDU</td>
<td>75.3%</td>
<td>65%</td>
<td>93.2%</td>
<td>92.7%</td>
<td>77.5%</td>
<td>&lt;.00001</td>
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<tr>
<td>Mean duration (years)</td>
<td>9.6</td>
<td>8.5</td>
<td>11.7</td>
<td>10.7</td>
<td>9.3</td>
<td>.0005</td>
</tr>
<tr>
<td>IDU &lt; 1 month (among ever injectors)</td>
<td>61.7%</td>
<td>55.9%</td>
<td>77.9%</td>
<td>73%</td>
<td>51.6%</td>
<td>&lt;.0002</td>
</tr>
<tr>
<td>History of sex work</td>
<td>22.1%</td>
<td>16.9%</td>
<td>35.6%</td>
<td>34.4%</td>
<td>17.5%</td>
<td>&lt;.00001</td>
</tr>
<tr>
<td>Sex work &lt; 1 month (among ever CSWs)</td>
<td>28.6%</td>
<td>24.5%</td>
<td>3.8%</td>
<td>57.6%</td>
<td>23.8%</td>
<td>.001</td>
</tr>
<tr>
<td>Sexually active (&lt;6 months)</td>
<td>67.7%</td>
<td>69.7%</td>
<td>57.5%</td>
<td>63.5%</td>
<td>71.7%</td>
<td>ns</td>
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<tr>
<td>Consistent condom use in vaginal sex with primary partner(s)</td>
<td>32%</td>
<td>31.4%</td>
<td>42.9%</td>
<td>17.2%</td>
<td>34.6%</td>
<td>ns</td>
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<tr>
<td>Consistent condom use in vaginal sex with casual partner(s)</td>
<td>64.6%</td>
<td>73.8%</td>
<td>71.4%</td>
<td>54.2%</td>
<td>55.3%</td>
<td>ns</td>
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<tr>
<td>Consent to test for HIV within study test algorithm</td>
<td>65.9%</td>
<td>55.8%</td>
<td>78.4%</td>
<td>56.4%</td>
<td>86.3%</td>
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<tr>
<td>Lab-confirmed HIV-positive status</td>
<td>23.8%</td>
<td>13.9%</td>
<td>26.2%</td>
<td>57%</td>
<td>20.9%</td>
<td>&lt;.00001</td>
</tr>
<tr>
<td>Est. length of HIV infection(mean years)</td>
<td>8.5</td>
<td>8.2</td>
<td>9.7</td>
<td>8.5</td>
<td>8.5</td>
<td>ns</td>
</tr>
</tbody>
</table>
### Table 2. Comparison of self-reported and lab-confirmed prevalences for HIV and hepatitis

<table>
<thead>
<tr>
<th></th>
<th>Self-reported &quot;don't know&quot;</th>
<th>Self-reported positive (among known) results</th>
<th>Lab-confirmed serology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIV</strong></td>
<td>23 / 603 (3.8%)</td>
<td>118 / 581 (20.3%)</td>
<td>119 / 499 (23.8%)</td>
</tr>
<tr>
<td><strong>Hepatitis A</strong></td>
<td>84 / 568 (14.8%)</td>
<td>216 / 484 (44.6%)</td>
<td>——</td>
</tr>
<tr>
<td><strong>Hepatitis B</strong></td>
<td>63 / 580 (10.9%)</td>
<td>241 / 517 (46.6%)</td>
<td>233 / 466 (50%)</td>
</tr>
<tr>
<td><strong>Hepatitis C</strong></td>
<td>57 / 577 (9.9%)</td>
<td>249 / 520 (47.9%)</td>
<td>284 / 496 (57.3%)</td>
</tr>
</tbody>
</table>

### Table 3. Newly positive cases of HIV and hepatitis among those self-reporting negative or "don't know"

<table>
<thead>
<tr>
<th></th>
<th>Lab-confirmed newly positive cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total previously non-positives</td>
</tr>
<tr>
<td><strong>HIV</strong></td>
<td>5 / 385 (1.3%)</td>
</tr>
<tr>
<td><strong>Hepatitis A</strong></td>
<td>——</td>
</tr>
<tr>
<td><strong>Hepatitis B</strong></td>
<td>52 / 254 (20.5%)</td>
</tr>
<tr>
<td><strong>Hepatitis C</strong></td>
<td>67 / 261 (25.7%)</td>
</tr>
</tbody>
</table>
Figure 1. HIV testing for the Zurich Prometheus Study: previous testing, test acceptance, and lab-confirmed serology

### Study participants

<table>
<thead>
<tr>
<th></th>
<th>Study participants</th>
<th>603</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV-neg.</td>
<td>Yes 581</td>
<td>96.4%</td>
</tr>
<tr>
<td>HIV-pos.</td>
<td>No 22</td>
<td>3.6%</td>
</tr>
<tr>
<td>unclear</td>
<td></td>
<td>0.2%</td>
</tr>
<tr>
<td>untested</td>
<td>previous testing</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>previous result</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>date of last test</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>result on hand</td>
<td>100%</td>
</tr>
<tr>
<td>HIV-neg.</td>
<td>should test</td>
<td>50.6%</td>
</tr>
<tr>
<td>HIV-pos.</td>
<td>consent to test</td>
<td>65.9%</td>
</tr>
<tr>
<td>HIV-?</td>
<td>valid HIV result</td>
<td>82.8%</td>
</tr>
</tbody>
</table>

#### HIV-neg.

- **Yes 581 (96.4%)**
- **No 22 (3.6%)**
- **untested 12 (54.5%)**
- **HIV-neg. 462 (79.5%)**
- **HIV-pos. 118 (20.3%)**
- **HIV-? 1 (100%)**
- **untested 22 (100%)**

#### HIV-pos.

- **Yes 192 (87.7%)**
- **No 22 (10%)**
- **untested 12 (54.5%)**
- **HIV-neg. 180 (66.7%)**
- **HIV-pos. 8 (66.7%)**
- **HIV-? 1 (100%)**
- **untested 12 (54.5%)**

#### HIV-?

- **Yes 106 (89.8%)**
- **No 11 (9.3%)**
- **untested 1 (0.8%)**
- **HIV-neg. 180 (66.7%)**
- **HIV-pos. 8 (66.7%)**
- **HIV-? 1 (100%)**
- **untested 12 (54.5%)**

#### untested

- **HIV-neg. 270 (58.4%)**
- **HIV-pos. 12 (10.3%)**
- **HIV-? 1 (100%)**
- **untested 22 (100%)**

#### valid HIV result

- **HIV-neg. 379 (76.0%)**
- **HIV-pos. 119 (23.8%)**
- **indeterminate 1 (0.2%)**

---

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Figure 2. Laboratory-confirmed serology for HIV, hepatitis B, and hepatitis C by history and duration of injecting drug use (IDU)

Figure 3. Laboratory-confirmed serology for HIV, hepatitis B, and hepatitis C by commencement of injecting drug use (IDU)

"A continuing concern..."

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