



# Prevalence and risk factors of hepatitis C in HIV-negative homosexual men in Sydney, Australia

## Abstract

**Objective:** To determine the prevalence and risk factors for hepatitis C (HCV) in HIV-negative homosexual men in Sydney.

**Methods:** A cohort study was conducted in a sample of community-based, HIV-negative, homosexual men in Sydney. Participants underwent a face-to-face interview regarding sexual behaviour, sexually transmissible infections, and injecting drug use (IDU).

**Results:** Eight hundred and twenty-four men consented to HCV testing, and the prevalence was 0.85% (95% CI 0.34-1.74). HCV seropositivity was strongly associated with a history of IDU (OR=60.43, 95% CI 6.70-544.79). All HCV seropositive individuals reported a history of either IDU or other means by which they may have had parenteral exposure to HCV. There was no evidence of an independent association between sexual behaviour and HCV infection.

**Conclusion:** The prevalence of HCV in this cohort was about the same as in the general population in Australia, and there was no evidence for sexual transmission in this population.

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Approximately 16,000 cases of HCV infection are reported annually in Australia.<sup>1</sup> The great majority of HCV transmission occurs among people with a history of injecting drug use (IDU); however, in about 10% of newly acquired HCV infection cases reported in Australia the source of exposure is unknown.<sup>2</sup> Although sexual transmission is generally thought to be uncommon, its overall contribution to the HCV epidemic remains uncertain,<sup>3</sup> particularly in populations where sexual practices may involve exposure to blood.<sup>4,5</sup>

The prevalence of HCV has generally been found to be somewhat higher in homosexual men than in the general population.<sup>4,6</sup> While this may be related to potentially higher-risk sexual practices, homosexual men also report higher rates of injecting drug use.<sup>7</sup> Whether or not the higher prevalence of HCV among homosexual men represents sexual transmission, or confounding with other behaviours, is unclear. In this report, we examine the prevalence of HCV in a cohort of HIV negative, homosexually active men in Sydney.

## Methods

The Health in Men (HIM) study is a prospective cohort study of HIV negative homosexual men that started in 2001. The

data presented in this paper were collected at baseline interview. The study methods have been described in detail elsewhere.<sup>8</sup> Briefly, homosexual men were eligible for inclusion if they lived in Sydney or participated regularly in its gay community, and if they tested HIV negative at baseline. They were recruited from a variety of community-based sources, including various outdoor gay events and gay community events. All participants underwent a face-to-face interview. The questionnaire recorded data on lifetime experience of some sexual behaviours, but for more specific behaviours such as fisting and unprotected anal intercourse (UAI), data on the last six months were recorded in order to facilitate more accurate participant recall.<sup>8</sup> Areas covered in the questionnaire were: lifetime number of male sexual partners, years since first anal sex, UAI and fisting in the last six months (since these behaviours have been reported to facilitate blood exposure), sexual identity, self-report of specific sexually transmissible infections (STIs), lifetime history of injecting drug use and body tattooing and piercing, history of HCV testing, and demographic factors. Personal identifiers such as full name and address were collected for cohort maintenance purpose only, and were kept in a separate database from the study data. The

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study has been approved by the Human Research Ethics Committee at the University of New South Wales.

In addition to HIV testing, participants recruited in 2001 and 2002 were also offered optional HCV testing. Ninety-seven per cent of participants consented to this screening. All participants who consented to HCV testing received pre-test information. HCV testing was performed using an enzyme immunoassay (EIA, Abbott AxSYM HCV v3.0). All positive and indeterminate results (i.e. weak positive and equivocal) underwent a supplementary EIA testing (Abbott Murex anti-HCV v4.0). Qualitative polymerase chain reaction (PCR) for HCV RNA detection (Cobas AmpliCor hepatitis C test v2.0) was also performed on specimens that tested as indeterminate by EIA.

The exact binomial method was used to calculate 95% confidence intervals (CIs) for prevalence values. Crude analyses were performed to identify factors associated with prevalence of HCV seropositivity. For continuous variables, values were categorised into approximate tertiles of exposure range. Odds ratios (ORs) and their corresponding 95% CIs were calculated for these associations. Power calculations showed that under the assumption that HCV seroprevalence in this sample was 1%, and 20% of HCV negative men had risky sexual exposure for HCV transmission, the study would have a power of 80% to detect an OR of 5.4 for the association of HCV seropositivity with risk behaviour.

## Results

### Seroprevalence

HCV testing was performed on 824 (97%) consenting participants. The median age was 35 years, ranging from 18 to 75 years. Seven men tested positive at screening and six had indeterminate results (one weak positive and five equivocal). All seven positives were confirmed by supplementary testing, and the six men with indeterminate results tested negative at both supplementary and PCR testing. Thus the seroprevalence of hepatitis C was 0.85% (95% CI 0.34-1.74).

### Predictors of seropositivity

Age and socio-economic status (SES) were significantly associated with seropositivity to HCV. Those who tested positive were more likely to be older ( $p$  trend=0.007) and report being a pensioner ( $p=0.004$ ). Most factors associated with potential sexual transmission, such as higher partner numbers, longer duration of anal sex with other men, history of sex work, and self-reported history of sexually transmitted infections, were more common among HCV positive men. However, a significant association was only found for longer duration of anal sex ( $p$  trend<0.001) and a reported history of gonorrhoea ( $p=0.022$ ). Seropositivity for syphilis, hepatitis A and hepatitis B infection were each higher among HCV positive men, but this reached significance only for HBV infection ( $p=0.013$ ). There were no associations between HCV seropositivity and sexual practices that plausibly could have facilitated blood exposure, such as UAI and fisting in the past six months.

A self-reported history of injecting drug use was strongly associated with HCV seropositivity, with a 60-fold increased risk (OR=60.43, 95% CI 6.70-544.79). There was only one man who tested HCV positive and did not report a history of IDU, but this man reported both a history of body piercing (ears) and tattooing.

### History of testing and self-reported results

The majority of participants (63.0%) reported having been HCV antibody tested previously. Nevertheless, there was evidence of considerable confusion about these results. Of 37 men who reported they had been told they were HCV antibody positive, only six (16.2%) tested HCV positive.

## Discussion

The seroprevalence of HCV in this community-based sample of HIV-negative homosexual men, of less than 1%, is about the same as the estimated population prevalence of HCV in Australia.<sup>9</sup> All HCV seropositive individuals reported a history of either IDU or other means by which they may have had parenteral exposure to HCV. The univariate association of HCV seropositivity with measures of sexual transmission and the strong association with parenteral risk behaviours demonstrate the strong confounding between sexual and parenteral risk behaviours in this population. However, we found no evidence of an independent association between sexual behaviour and HCV infection, despite high levels of sexual risk behaviour.

About three per cent of men in the HIM study refused testing for HCV. However, with the exception of two men, these men also refused screening for other STIs in the study, so the refusal was not HCV specific. We may have underestimated the prevalence of HCV if men who knew they were HCV positive were more likely to decline testing. Nevertheless, a comparison of self-reported HCV status showed no difference between men who did not test for HCV and those who were tested (data not shown). Thus, a substantial underestimation is unlikely.

Given the seroprevalence of 0.85% in our sample, this study is not sufficiently powered to rule out an odds ratio of less than 5.4 for the association between any individual sexual behaviour and HCV transmission. However, given the high level of multiple different sexual risk behaviours that were reported in this sample, and the absence of cases of HCV infection in people without parenteral risk factors, such an association appears unlikely. Our results on HCV prevalence can probably be generalised to community-based samples of gay-identifying men in Australia.

The seroprevalence of 0.85% in this cohort of HIV-negative homosexual men was much lower than that reported in 1996 in a previous Sydney-based study.<sup>4</sup> In that clinic-based study, the prevalence of HCV among HIV-negative homosexual men in central Sydney was 4.0%. In community-based studies of men who have sex with men (MSM) in the US, the prevalence of HCV infection in HIV-negative men has ranged from 1.6% to 4.7%.<sup>10-12</sup> A national survey of homosexual men attending sexual health clinics in the United Kingdom reported a similarly low prevalence

Table 1: Predictors of hepatitis C seropositivity.

	Total	HCV positive		OR	95% CI	p value
		n	%			
<b>Number of lifetime male sex partners</b>						
1-200	459	2	0.4	1	–	$p^1=0.080$
201-500	140	1	0.7	1.64	0.15-18.31	
>500	224	4	1.8	4.15	0.75-22.97	
<b>Years since first anal sex</b>						
0-22	612	0	0.0	–	–	$p^1<0.001$
23-25	81	2	2.5	1	–	
>25	121	5	4.1	1.70	0.32-9.05	
<b>Ever been paid for sex</b>						
No	672	4	0.6	1	–	$p^2=0.093$
Yes	151	3	2.0	3.39	0.75-15.34	
<b>UAI in the last six months</b>						
No	304	2	0.7	1	–	$p^2=0.954$
With regular partner only	276	3	1.1	1.66	0.27-10.03	
With casual partners only	132	1	0.8	1.15	0.10-12.86	
With both	111	1	0.9	1.37	0.12-15.34	
<b>Fisting in the last six months</b>						
No	700	6	0.9	1	–	$p^2=0.971$
With regular partner only	43	0	0.0	–	–	
With casual partners only	56	1	1.8	2.10	0.25-17.82	
With both	24	0	0.0	–	–	
<b>Sexually transmitted infections (self-report)</b>						
<b>Gonorrhoea</b>						
No	565	2	0.4	1	–	$p^2=0.022$
Yes	259	5	1.9	5.54	1.06-28.93	
<b>Non-specific urethritis</b>						
No	579	3	0.5	1	–	$p^2=0.111$
Yes	245	4	1.6	3.19	0.71-14.39	
<b>Anogenital herpes</b>						
No	738	5	0.7	1	–	$p^2=0.115$
Yes	86	2	2.3	3.49	0.66-18.34	
<b>Serological tests</b>						
<b>Syphilis</b>						
Negative	785	6	0.8	1	–	$p^2=0.095$
Positive	26	1	3.9	5.19	0.60-45.00	
<b>Hepatitis A</b>						
Negative	259	1	0.4	1	–	$p^2=0.317$
Positive	554	6	1.1	2.82	0.34-23.64	
<b>Hepatitis B</b>						
Negative or vaccinated	651	3	0.5	1	–	$p^2=0.013$
Prior infected	161	4	2.5	5.50	1.21-25.01	
<b>Injecting drug use</b>						
<b>Injecting drug use ever</b>						
No	706	1	0.1	1	–	$p^2<0.001$
Yes	76	6	7.9	60.43	6.70-544.79	
<b>Body piercing and tattooing</b>						
<b>Had body piercing</b>						
No	408	2	0.5	1	–	$p^2=0.262$
Yes	413	5	1.2	2.49	0.48-12.93	
<b>Had tattooing</b>						
No	650	4	0.6	1	–	$p^2=0.155$
Yes	173	3	1.7	2.85	0.63-12.89	

Note:

1, score test for trend of odds; 2, test of homogeneity.

of 1.0%.<sup>13</sup> In a sexual health clinic study in Italy, 4.4% of HIV-negative homosexual men who attended a sexual health clinic were HCV seropositive.<sup>14</sup>

In HIV-positive homosexual men, generally higher rates of HCV have been reported, ranging from 5.8% to 35.9%.<sup>10,11,14</sup> An epidemic of acute hepatitis C in HIV-positive homosexual men in London was recently reported, and it was speculated that these cases were sexually transmitted, perhaps related to a high rate of concurrent syphilis infection.<sup>13</sup> Another reason for suspecting that unprotected sex among HIV-positive men may be a higher risk setting for HCV transmission than among HIV-negative men is that individuals with HIV/HCV co-infection have higher HCV viral loads.<sup>15</sup>

In conclusion, this study finds the prevalence of HCV in homosexual men to be about the same as in the general population and finds no evidence for sexual transmission. The higher prevalence of HCV reported in other series of homosexual men probably reflects the strongly confounded relationship between sexual and parenteral risk behaviours in this population.

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