



## Risk Factors for Hepatitis C Infection and Perception of Antibody Status among Male Prison Inmates in the Hepatitis C Incidence and Transmission in Prisons Study Cohort, Australia

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**ABSTRACT** *The objective of this study was to compare the prevalence of risk factors for hepatitis C virus (HCV) infection among male prison inmates enrolling into a prospective cohort in Australia. We tested 121 inmates who were previously untested or were previously known to be anti-HCV antibody negative for anti-HCV antibodies by enzyme-linked immunosorbent assay. HCV-positive inmates were classified as cases (n=25) and HCV-negative inmates as controls (n=96). The study found that cases were less educated than controls and confirmed that prior imprisonment, drug injection, and a longer duration of injecting were risk factors for HCV infection. More than half of those who tested HCV positive perceived that they did not have HCV infection, and 44% were unsure of their HCV status. Those inmates who were incorrect about their HCV status tended to be less educated and were more likely to have been previously imprisoned than those who were correct about their HCV status. Inmates who were unsure of their HCV status were less likely to have been tested for HCV than those who had a clear perception of their HCV status, even if incorrect. Three (12%) inmates who tested positive denied injecting drug use, but reported other risk factors. Prisons are likely to remain an important site for the diagnosis of HCV infection and targeted interventions aimed at risk reduction among inmates with low education levels and a previous imprisonment history.*

**KEYWORDS** *Hepatitis C virus (HCV), Injecting drug user (IDU), prison, risk behaviors.*

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## INTRODUCTION

An estimated 210,000 of the Australian population are currently living with hepatitis C virus (HCV) infection, and it is estimated that 16,000 new infections occur annually.<sup>1</sup> Prison inmates have a high prevalence of HCV infection in Australia (approximately 40%)<sup>2,3</sup> and report risk behaviors for HCV infection such as the shared use of drug-injecting equipment,<sup>2-4</sup> tattooing,<sup>5</sup> and fights.<sup>6</sup>

A prospective study to estimate HCV transmission in prison inmates in Australia, the Hepatitis C Incidence and Transmission in Prisons Study (HITS),<sup>7</sup> serologically screened male inmates for HCV infection at enrollment. A case-control analysis of those screened was undertaken and compared the prevalence of risk factors for HCV infection among inmates positive and negative for anti-HCV antibody.

## METHODS

A nurse offered enrollment in the HITS cohort to recently incarcerated inmates who had never had a documented positive or indeterminate anti-HCV antibody result in their prison medical file. Forensic inmates, the severely mentally ill, inmates under 18 years of age, inmates on periodic detention, inmates in the drug court program, and those unable to give informed consent were excluded.

All inmates who consented to participate were tested for anti-HCV antibodies and inmates who were anti-HCV negative were enrolled in the HITS cohort. However, for this analysis, at enrollment a case was defined as an inmate who tested anti-HCV antibody positive in two HCV enzyme-linked immunosorbent assays (anti-HCV version 3, Murex Biotech, Dartford, UK, and Innostest HCV Ab III, Innogenetics Biotechnology for Healthcare, Belgium), and a control was defined as an inmate who tested anti-HCV antibody negative.

A structured interview, including questions about demographic details and lifetime risk factors for acquisition of blood-borne viral infection (e.g., prison history, drug use, sexual behavior, tattooing, body piercing, other exposure to blood), was adapted from a previous prison study<sup>8</sup> and administered by a trained nurse.

The statistical program used in this study was SPSS version 10.0 (Chicago, IL). All of the statistical tests used a .05 level of significance, and all *P* tests were two tailed. Continuous data were analyzed using a *t* test. Categorical data were analyzed using a Pearson chi square test; a Fisher exact test was used when an expected count was less than 5. Corresponding odds ratios (ORs), *t* values, and 95% confidence intervals (CIs) were calculated.

## RESULTS

We recruited 125 subjects from November 2000 to August 2001. Four inmates with missing results were excluded from this analysis. Data on 121 male inmates were analyzed, and 25 (21%) inmates were defined as cases and 96 (79%) inmates as controls.

The sample was similar to the 2001 NSW Inmate Census<sup>9</sup> in terms of mean age (32 years vs. 33 years) and the proportion with a history of previous imprisonment (65% vs. 71%, *P* = .16). However, the study sample had significantly more inmates born in Australia (79% vs. 69%, *P* = .02) compared to the census. The characteristics of cases and controls are summarized in the Table. Cases were significantly

**TABLE. Demographic characteristics and risk factors for hepatitis C virus infection in cases and controls**

	Cases (n=25), % or (mean ± SD)	Controls (n=96), % or (mean ± SD)	Odds ratio or (t value)	95% CI
Age, years	(29 ± 7.3)	(33 ± 11.5)	(1.6)	-1.1-8.6
Australian born*	96	75	8	1.0-62.3
Education level ≤ 10 years at school*	84	53	4.6	1.5-14.5
History of previous imprisonment*	84	59	3.6	1.4-11.3
Number of times in prison*	(7 ± 6.0)	(3 ± 3.3)	(-4.3)	-5.8-2.2
Sentence length, months	(26 ± 52.9)	(67 ± 72.4)	(1.5)	-13.3-95.4
History of drug injection*	88	32	15.4	4.3-55.3
Currently in methadone treatment*	20	4	5.75	1.4-23.3
History of being tattooed	64	49	1.85	0.8-4.6
History of body piercing	68	51	2.04	0.8-5.2
Number of sexual partners in the last 3 months	(1.7 ± 1.4)	(1.4 ± 1.7)	(-0.8)	-1.0-0.5

CI, confidence interval.

\* $P \leq .05$ .

more likely to have been born in Australia ( $P = .02$ ), report an education level of 10 years or less ( $P = .01$ ), have a history of previous imprisonment in an adult prison or juvenile detention center ( $P = .02$ ), have more episodes of imprisonment (7 vs. 3,  $P < .01$ ), have a history of drug injection ( $P < .01$ ), and be currently in methadone treatment ( $P = .02$ ). There were no statistically significant differences in terms of previous tattooing ( $P = .18$ ), body piercing ( $P = .13$ ), number of sexual partners ( $P = .6$ ), or sentence length ( $P = .14$ ).

Of the 25 inmates who tested anti-HCV positive, 44% reported being unsure of their HCV status at the time of testing, 52% believed they were negative, and 1 inmate believed he had an indeterminate status. Of the 96 anti-HCV negative inmates, 26% were unsure of their status at the time of testing, and 74% believed that they were negative. Those inmates who were incorrect about their HCV status tended to have less than 10 years of education ( $P = .02$ ) and were more likely have a history of previous imprisonment ( $P = .05$ ) than those who were correct about their HCV status. Inmates who were unsure of their HCV status were significantly less likely to have had a previous test than those who had an idea of their HCV status ( $P < .01$ ).

We then analyzed subjects with a history of drug injection. There were 22 cases (88%) and 31 controls (32%) who reported a history of drug injection, and they differed significantly in terms of mean duration of injecting (10 years vs. 5 years,  $P = .02$ ) and a history of injecting drugs in a prison or juvenile detention center (36% vs. 10%,  $P = .02$ ). There were no significant differences between injecting drug user (IDU) cases and controls regarding a history of tattooing ( $P = .38$ ), body piercing ( $P = .17$ ), previous imprisonment ( $P = .33$ ), ever injecting on a daily basis ( $P = .49$ ), ever sharing drug-injecting equipment ( $P = .45$ ), or ever sharing drug-injecting equipment in an adult or juvenile detention center ( $P = .25$ ).

We identified three cases (12%) who denied a history of injection drug use. All had a history of body piercing, noninjecting drug use, and previous imprisonment, and two had been tattooed.

## DISCUSSION

We confirmed that a history of prior imprisonment, drug injection, and a longer duration of injecting were risk factors associated with HCV infection in subjects screened for the HITS cohort.<sup>3,10,11</sup> Interestingly, three cases denied a history of drug injecting. However, they did report other risk factors, such as tattooing, body piercing, prior imprisonment, and noninjecting drug use. It was not possible to confirm the significance of these risk factors for HCV infection in this study because of the small sample size.

Subjects in this study were either unaware of their HCV status or had a previous negative result documented in their file. Serological tests revealed that approximately one fifth of the sample had HCV infection, casting doubt about the use of self-report to assess HCV status. Of these subjects, over half believed that they were negative for HCV, and the remainder were unsure of their status. This finding is similar to a study of opiate users in treatment.<sup>12</sup> The study found that HCV-positive subjects were less educated than those without HCV infection. In a prison setting, it may be appropriate to target HCV testing to inmates with a history of drug injection, who are less educated, and have a previous imprisonment history. This finding is important as such at-risk inmates can be targeted for HCV prevention advice. Also, it may highlight a need to increase education in the community and prison about the importance of HCV screening in those at risk and ensure that such education is appropriate for those with limited formal education. Prisons are likely to remain an important setting for the diagnosis and prevention<sup>13</sup> of HCV infection.

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