

Transmission of hepatitis C genotypes in the Netherlands amongst recently genotyped patients

In 2006 we reported the genotype distribution amongst unselected chronic hepatitis C infected (HCV) patients who were seen by physicians treating HCV in the Netherlands and who were genotyped between February 2002 and June 2005.¹ However, data on transmission of HCV genotype is lacking, hence we performed a survey to increase our knowledge of the transmission of hepatitis C genotypes in the Dutch population. The approach was similar to that used before, although this survey includes data on patients co-infected with HIV.¹

A total of 27 physicians from 20 hospitals reported data for five novel genotyped HCV patients. We received data on 121 patients, coming from nine provinces of the

Netherlands. The median date of the HCV diagnosis was September 2005 (range: January 1985 to November 2006); the majority of the patients were male (69.4%). Patients were genotyped between June 2006 and April 2007, a median of 49.0 days (range 0 days to 21.1 years) after diagnosis. The mean age at diagnosis was 44.3 ± 11.4 (SD) years and mean age at genotyping was 46.1 ± 10.7 years. Most physicians gave a wide time range in which HCV infection apparently took place, and taking the upper limit of the range resulted in a mean age at infection of 28.7 ± 10.5 years. This survey confirms the genotype shift observed previously in the Netherlands.^{1,2} As follows from *table 1*, most patients were infected with

Table 1. Transmission of hepatitis C genotypes in the Netherlands amongst recently genotyped patients

	Genotype						
	All	1	2	3	4	6	2 + 4
Total patients, n (%)	121 (100)	63 (52.1)	11 (9.1)	34 (28.1)	10 (8.3)	2 (1.7)	1 (0.8)
Man/women, n/n (% men)	84/37 (69.4)	42/21 (66.7)	7/4 (63.6)	27/7 (79.4)	8/2 (80)	0/2 (-)	-/1 (-)
Country of origin, n (%):							
• The Netherlands	71 (58.7)	43 (68.3)	4 (36.4)	21 (61.8)	3 (30.0)	- (-)	- (-)
• Other	50 (41.3)	20 (31.7)	7 (63.6)	13 (38.2)	7 (70.0)	2 (100)	1 (100)
Country of infection, n (%):							
• The Netherlands	68 (56.2)	41 (65.1)	3 (27.3)	21 (61.8)	3 (30.0)	- (-)	- (-)
• Other	33 (27.3)	15 (23.8)	3 (27.3)	7 (20.6)	5 (50.0)	2 (100)	1 (100)
• Unknown	20 (16.5)	7 (11.1)	5 (45.5)	6 (17.6)	2 (30.0)	- (-)	- (-)
Route of transmission, n (%):							
• Transfusion of blood/blood products	18 (14.9)	11 (17.5)	1 (9.1)	3 (8.8)	2 (20.0)	- (-)	1 (100)
• Medical treatment	6 (5.0)	3 (4.8)	- (-)	1 (2.9)	2 (20.0)	- (-)	- (-)
• Injection drug use	55 (45.5)	30 (47.6)	2 (18.2)	20 (58.8)	3 (30.0)	- (-)	- (-)
• Parenteral exposure (e.g. tattoo)	1 (0.8)	- (-)	- (-)	1 (2.9)	- (-)	- (-)	1 (100)
• Occupational exposure	3 (2.5)	1 (1.6)	2 (18.2)	- (-)	- (-)	- (-)	- (-)
• Born in an endemic country	7 (5.8)	2 (3.2)	1 (9.1)	1 (2.9)	2 (20.0)	1 (50.0)	- (-)
• Other	8 (6.6)	3 (4.8)	1 (9.1)	4 (11.8)	- (-)	- (-)	- (-)
• Multiple possible routes	2 (1.6)	1 (1.6)	- (-)	- (-)	1 (10.0)	- (-)	- (-)
• Unknown	21 (17.4)	12 (19.0)	4 (36.4)	4 (11.8)	- (-)	1 (50.0)	- (-)
Viral load, n (%):*							
• Low viral load	52 (45.2)	27 (44.3)	4 (44.4)	16 (48.5)	4 (44.4)	- (-)	1 (100)
• High viral load	63 (54.8)	34 (55.7)	5 (55.6)	17 (51.5)	5 (55.6)	2 (100)	- (-)
HIV co-infection, n (%):							
• No/unknown	113 (93.4)	58 (92.1)	11 (100)	31 (91.2)	10 (100)	2 (100)	1 (100)
• Yes	8 (6.6)	5 (7.9)	- (-)	3 (8.8)	- (-)	- (-)	- (-)

*Low viral load defined as $\leq 800,000$ IU/ml or $\leq 2,000,000$ c/ml and high viral load as $> 800,000$ IU/ml or $> 2,000,000$ c/ml, no viral load known for six patients.

genotype 1, followed by genotype 3, and 2 and 4. Genotype 6 was rare. Most patients (n=71, 58.7%) originated from the Netherlands, and 64 of them had also been infected in the Netherlands. A large minority of patients came from abroad (n=50, 41.3%) and originated from 27 different countries. Twenty-eight of 50 patients were infected in the country of origin while for 17 patients the country of infection could not be assessed. Injection drug use was the main route of transmission (45.5%), while 14.9% of the patients were infected via transfusion of blood/blood products, and 5% were infected during medical treatment.

Data on 1867 hepatitis C infected patients reported to the Health Inspectorate in 1999-2002 have been published.³ Sex and age at diagnosis of these patients are very comparable to the patients in our survey, most of whom were diagnosed some years later (median September 2005). However, of the patients reported to the Health Inspectorate whose country of origin was known, a higher percentage originated from the Netherlands: 71.0% compared with 58.7% in our survey.³ This suggests that more of the recently diagnosed/genotyped patients originate from outside the Netherlands. Infection by injection drug use was the main route of transmission both in patients reported to the Health Inspectorate (54.0%) and in our survey (45.5%). Surprisingly, however, only a low percentage (4.0%) of the patients reported to the Health Inspectorate were infected via transfusion of blood/blood products. We found a higher frequency (14.9%) which, however, is not due to the fact that more patients in our survey acquired HCV in countries with less stringent HCV screening policies for blood transfusion, as 14 out of 18 patients who had been infected by transfusion originated from the Netherlands, where they had been infected prior to 1992.

So far, data relating the genotype to transmission routes are scarce. We found that transfusion of blood/blood products was responsible for infection in 17.5% (n=11) of genotype 1 patients. Among patients with genotype 1b, transfusion of blood/blood products was the main route of transmission (n=7, 35%), although a comparable percentage of patients were infected by injection drug use (n=6, 30%). Overall, injection drug use was the mode of infection in 47.6% of genotype-1-infected patients. Likewise, a total of eight out of ten genotype 1a patients were infected via this route. As described before, genotype 2 was prevalent in patients originating from Suriname; two out of three patients originating from Suriname were infected with genotype 2 and one with the combination genotype 2+4. Injection

drug use was the mode of infection for 58.8% of genotype 3 and 59.1% of genotype 3a infected patients. Some six out of ten genotype 4 patients originated from Egypt. The routes of transmission were transfusion of blood/blood products (20%) or medical treatment (*Schistosomiasis* vaccination, 20%). As reported for other European countries, we found that genotype 4 has entered the intravenous drug scene in the Netherlands, as three genotype 4 patients were infected by injection drug use in the Netherlands.⁴ The two patients infected with genotype 6 originated from and were infected in Asia (China and Korea). A minority of eight patients were known to be co-infected with HIV; they had genotype 1 or 3 in all cases and injection drug use was the major mode of transmission. We retrieved data on viral load for 115 patients. Some 55% had a high viral load, similar for genotypes 1 to 4.

This survey confirms the shift in genotype distribution amongst unselected HCV patients seen by Dutch physicians.^{1,2} Moreover, it confirms and extends our knowledge of the demographic and epidemiological characteristics of HCV patients in the Netherlands, in particular in relation to their genotype.

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