

PCR-3 (Cepheid Xpert Flu) is diagnostically accurate and cost-effective. The PCR-20 (Respiratory FilmArray) test is the more expensive test and is not usually used as the sole influenza test; ideally, it should be used in patients with negative RIDT and PCR-3 (Cepheid Xpert Flu) tests. Duplicative PCR testing is unnecessary and expensive. The money saved from not doing the PCR-20 (Respiratory FilmArray) for patients that were already PCR-3 (Cepheid Xpert Flu) positive could have been used for further PCR-3 (Cepheid Xpert Flu) testing in patients with negative RIDTs.

We conclude that RIDT should have been done in 25 cases and that PCR-3 should have been done in 30 cases inadequately tested and 18 other cases, for a total of 48 cases. PCR-20 was not necessary in 28 cases ($\$150 \times 29 = \$4,200$). These resources could have been used for 25 RIDTs and 48 PCR-3 tests. In hospitals experiencing higher testing volumes, our findings have greater cost implications.

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Acupuncture Needles Can Carry Hepatitis C Virus

To the Editor—It has been suggested but not definitively proven that acupuncture can be a possible source of hepatitis C virus (HCV) infection^{1,2} because it uses large needles that penetrate the skin and muscles, often with residual blood.³ Our study was designed to assess the potential of acupuncture needle contamination.

After approval of the protocol by the Ethics Committee, we offered acupuncture treatment to outpatients in the Viral Hepatitis Clinic at Rio Preto Medical School, Brazil, who had primarily musculoskeletal pain and wanted to undergo therapy. All patients were infected with HCV, as confirmed by liver biopsy or polymerase chain reaction (PCR). All had quantitative viremia measured in blood. Eight patients were selected for this study and signed a consent form. Four patients had not been treated for hepatitis, and the other 4 were treated but had persistent HCV viremia. Another 3 patients, 2 men (aged 62 and 55 years) and 1 woman (aged 51 years), were known to be HCV serology negative, and they were used as negative controls.

Three acupuncture sessions were performed in all 11 patients, with a total of 10 needles for each patient. Preference was given for deep muscle insertion, as this had resulted in traces of blood on needles in previous work.³ Needles used for each patient treatment were submerged immediately in 100 μ L of TRIzol reagent (Life Technologies) after removal and then sent to the Genomic Study Laboratory of the State University of São Paulo, Brazil.

A total of 23 samples from the 8 infected patients and the 3 controls were analyzed by real-time PCR. Total RNA was extracted using standard methods, and 2 μ g of the RNA was used for synthesis of complementary DNA by reverse transcription (Thermo Scientific). cDNA amplification and analysis of gene expression were performed with 300 nM forward primer, 900 nM reverse primer, and 200 nM probe to evaluate HCV and glyceraldehyde-3-phosphate dehydrogenase (GAPDH) expression.

In 4 (50%) of the 8 HCV-positive patient samples, HCV RNA was detected. However, the cycle threshold for these samples was high—close to 40 cycles—indicating that RNA was present at low levels. In the other 4 patients' samples, the viral genome could not be detected, despite amplification

TABLE 1. Contamination of Acupuncture Needles with Viral RNA from 8 Patients with Known Hepatitis C Virus (HCV) Infection: Summarized Data

Patient	Sex	Age, years	Viremia	Quantitative viral load, IU/mL (log)	Treatment	HCV RNA detection (samples)	GAPDH RNA detection ^a
1	M	46	+	3.14 × 10 ⁶ (6.8)	+	+	+
2	F	52	+	8.25 × 10 ⁶ (7.1)	+	–	+
3	M	42	+	1.24 × 10 ⁶ (6.0)	–	–	+
4	M	57	+	23.1 × 10 ⁶ (7.3)	+	+	+
5	M	35	+	5.53 × 10 ⁶ (6.7)	–	+	+
6	F	50	+	20.2 × 10 ⁶ (6.9)	–	–	+
7	F	39	+	12.03 × 10 ⁶ (7.3)	+	+	+
8	M	65	+	>69 × 10 ⁶ (>7.8)	+	–	+
9 ^b	M	55	–	–	–	–	+
10 ^b	M	62	–	–	–	–	+
11 ^b	F	51	–	–	–	–	+

NOTE. GAPDH, glyceraldehyde-3-phosphate dehydrogenase; IU, international units.

^a Presence of biological material.

^b Controls.

of the constitutive gene *GAPDH*. In the control patients' samples, viral RNA could not be amplified (Table 1).

Infection with HCV through activities such as piercings and sharing of needles, syringes, or nail clippers is responsible for a 2%–3% incidence of chronic HCV infections.^{4,5} Many articles cite acupuncture as a possible cause of infection, and single cases of possible infection associated with acupuncture due to hepatitis C or B (and even AIDS) have been reported.^{1,6,7} However, no prior work has specifically assessed whether acupuncture needles harbor HCV or can transmit the disease.

This study demonstrates the possible presence of HCV genetic material on needles from patients known to be carriers of the virus. Although the contact surfaces of these needles are small and visual inspection rarely shows indications of visible blood, detection of viral RNA reinforces the importance of biohazard procedures to prevent potential transmission of HCV infection from patient to patient or even healthcare workers.

It was not possible to quantitate HCV load on the needles used on known HCV-positive patients. All 3 samples for patients 2, 3, 6, and 8 were negative, which may mean that there was actually no viral material in these samples. Alternatively, it may indicate a lack of sensitivity of the technique.

In this small sample, patient HCV load was apparently not predictive of finding virus on needles, as seen in Table 1. Despite the huge load in patient 8, for example, virus was not found. The presence of virus on needles was also not linked to prior treatment or to no prior treatment. Three patients (1, 4, and 7) were treated and had virus detected, 2 (2 and 8) were treated and had no virus found, patient 5 was not treated and was positive in our analysis, and patients 3 and 6 were not treated and were negative in our examinations.

Use of disposable needles prevents the spread of HCV infection as well as other viral diseases transmitted by contact with infected blood. On the other hand, if the use of disposable needles is reassuring to patients,¹ the presence of HCV

RNA on those needles still poses a risk to the practitioner.⁸ The healthcare worker must still meticulously adhere to needle-handling procedures to avoid needlestick injuries; HCV possesses the ability to survive in ambient temperatures⁹ and be transmitted by fomites like medical devices.¹⁰

In conclusion, acupuncture needles from individuals known to be HCV carriers can potentially be contaminated with viral genetic material.

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