Hepatitis C Virus (HCV) Core Antigen Reliably Diagnoses HCV Infection in Injection and Non-injection Drug Users

Marija Zerenkski, Yang Chen, Roberto Zavala, Madeleine Mathis, Clivert Sylvester, Gavin A. Claberty, PhD, Lawrence S. Brown, Jr., Andrew H. Talal

1Well Cornell Medicine, New York, 2Department of Biostatistics, University at Buffalo, Buffalo, NY; 3START Treatment & Recovery Centers, Brooklyn, NY; 4Abbott Diagnostics, Des Plaines, IL. *Center for Clinical Care and Research in Liver Disease, University at Buffalo, Buffalo, NY

Objectives

The goal of this study was to evaluate the performance of the HCV core antigen in methadone maintained injection and non-injection drug users. Specific objectives are:

1. To evaluate the relationship between HCV core antigen (Abbott) and HCV RNA levels among PWID.
2. To determine factors that affect expression of HCV core antigen.

Background and Aim: HCV RNA detection, the standard method to confirm hepatitis C virology, can be difficult to perform among transient populations such as individuals with substance use disorders and the homeless. HCV core antigen (Ag), with the advantages of relative ease of sample handling compared to RNA detection methods, reduced cost, and potential as a point-of-care test (POCT), could be an alternative method to diagnosing chronic HCV infection. Since the test might have utility among difficult-to-engage populations, we sought to evaluate its performance in injection and non-injection drug users.

Methods: Levels of HCV core Ag (Abbott ARCHITECT) from 109 patients were compared to HCV RNA levels (Abbott Real-time M2000). Assay agreement and associations between baseline predictors were investigated using linear regression.

Results: Mean age was 53.8 ± 7.8 years, 59.6% were male, 68.8% American, and 28.4% were Hispanic. A history of injection and non-injection drug use was reported by 60% and 94% of patients, respectively. Active (i.e. previous six months) injection and non-injection drug use was reported by 10% and 50% of patients, respectively. HCV RNA was detected in 44%, the majority (77%) infected with HCV genotype 1. Among HCV RNA positive patients, 29% (14/48) were HCV/HIV co-infected. HCV core Ag was detectable in 47 of 48 HCV RNA positive patients. Core Ag was not detected in any HCV RNA negative patients or in one patient with detectable but low level (less than 500 IU/ml) HCV RNA. In comparison with HCV RNA levels, HCV core Ag had excellent performance with sensitivity = 97.9%, specificity = 100%, and positive predictive value = 100%. We found high correlation between HCV RNA and HCV core antigen assays (correlation coefficient of 0.93 (95% CI 0.94, 0.97, p < 0.01). Correlation: Among injection and non-injection drug users, the HCV core antigen has excellent performance for the diagnosis of active HCV infection. These data underscore its potential for development as a POCT for HCV among difficult-to-engage populations, such as those with substance use disorders.

Patients and Methods

• All patients were recruited from a methadone maintenance program and were on stable methadone maintenance.
• This project was part of a larger project assessing telemedicine-based treatment of HCV infection.
• After obtaining informed consent, blood was obtained for HCV RNA and HCV core antigen testing.
• Two separate HCV RNA testing strategies were employed.
• ROCHE COBAS Taqman performed by Labcorp
• Abbott real-time m2000
• HCV core antigen assay was performed on the ARCHITECT 2000SR
• Values were treated as follows:
  - < 3.00 fmol/L are considered nonreactive for HCV Ag
  - ≥3.00 fmol/L are considered reactive for HCV Ag
• HCV RNA was detected in 44%, the majority (77%) infected with HCV genotype 1. Among HCV RNA positive patients, 29% (14/48) were HCV/HIV co-infected. HCV core Ag was detectable in 47 of 48 HCV RNA positive patients. Core Ag was not detected in any HCV RNA negative patients or in one patient with detectable but low level (less than 500 IU/ml) HCV RNA. In comparison with HCV RNA levels, HCV core Ag had excellent performance with sensitivity = 97.9%, specificity = 100%, and positive predictive value = 100%. We found high correlation between HCV RNA and HCV core antigen assays (correlation coefficient of 0.93 (95% CI 0.94, 0.97, p < 0.01). Correlation: Among injection and non-injection drug users, the HCV core antigen has excellent performance for the diagnosis of active HCV infection. These data underscore its potential for development as a POCT for HCV among difficult-to-engage populations, such as those with substance use disorders.

Background

• Two-thirds of US HCV-infected individuals unaware of infection status.
• Although persons with substance use disorders (PWUS) have the highest HCV prevalence and incidence, many are medically disenfranchised and therefore remain with undiagnosed HCV infection.
• An additional obstacle is the frequent need for multiple, sequential diagnostic assays to determine active infection.
• Most often, HCV RNA testing is required after detection of a positive HCV antibody (i.e. two separate medical appointments).
• HCV core antigen could be an alternative strategy to HCV RNA testing.
• Cost may be substantially reduced in comparison to HCV RNA testing, which could be useful in many resource limited settings that are now attempting to have large increases in the number of treated patients.

Conclusions

• HCV core Ag is highly correlated with HCV RNA when measured by either the Abbott real-time PCR assay or by Roche Cobas.
• Association shown by correlation coefficient, linear regression, and graphically.
• None of the other factors significantly influenced the association between HCV RNA and HCV core antigen in this population of patients on opiate agonist therapy. These factors should promote development of the HCV core Ag test as a point-of-care test for medically disenfranchised individuals.