enabling confirmation of the diagnosis and commencement of adequate treatment. In patients clinically suspected of presenting with TB or with suggestive endoscopic lesions, a possible recommendation is the performance of a PCR study for *M. tuberculosis* in intestinal tissue because it favors rapid diagnosis and has a high diagnostic yield.

Ethical considerations

The study was approved by the scientific ethics committee of the *Hospital Clínico Universidad de Chile* and the patient gave his written statement of informed consent. The authors declare that the present article contains no personal information that would enable patient identification.

Financial disclosure

No financial support was received in relation to this article.

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Seo H, Lee S, So H, et al. Temporal trends in the misdiagnosis rates between Crohn's disease and intestinal tuberculosis. World J Gastroenterol. 2017;23:6306–14.
2. Almadi MA, Ghosh S, Aljebreen AM. Differentiating intestinal tuberculosis from Crohn's disease: a diagnostic challenge. Am J Gastroenterol. 2009;104:1003–12.
3. Huang X, Liao WD, Yu C, et al. Differences in clinical features of Crohn's disease and intestinal tuberculosis. World J Gastroenterol. 2015;21:3650–6.
4. Jung Y, Hwangbo Y, Yoon SM, et al. Predictive factors for differentiating between Crohn's disease and intestinal tuberculosis in Koreans. Am J Gastroenterol. 2016;111:1156–64.
5. Pan American Health Organization. Health in the Americas+, 2017 edition. Summary: Regional outlook and country profiles. Washington, D.C.: OPS; 2017.
6. Ministerio de Salud, Gobierno de Chile. Tuberculosis: Informe de Situación Chile 2014. Programa Nacional de Control y Eliminación de la Tuberculosis. Santiago: Departamento de Enfermedades Transmisibles. División de Prevención y Control de Enfermedades; junio de 2015. p. 5 [accessed 1 Aug 2018]. Available from: www.minsal.cl/sites/default/files/Informe_tbc_2014.pdf
7. González-Puga C, Palomeque-Jiménez A, García-Saura PL, et al. Colonic tuberculosis mimicking Crohn's disease: an exceptional cause of massive surgical rectal bleeding. Med Mal Infect. 2015;45:44–6.
8. Singh J, Puri AS, Sachdeva S, et al. Rectal tuberculosis after infliximab therapy despite negative screening for latent tuberculosis in a patient with ulcerative colitis. Intest Res. 2016;14:183–6.
9. Babafemi EO, Cherian BP, Banting L, et al. Effectiveness of real-time polymerase chain reaction assay for the detection of *Mycobacterium tuberculosis* in pathological samples: a systematic review and meta-analysis. Syst Rev. 2017;6:215–31.
10. Perez-Risco D, Rodríguez-Temporal D, Valledor-Sanchez I, et al. Evaluation of the Xpert MTB/RIF ultra assay for direct detection of *Mycobacterium tuberculosis* complex in smear-negative extrapulmonary samples. J Clin Microbiol. 2018;56:e00659–718.

M. Gompertz[a], L. Carreño[b], L.C. Gil La Rotta[a,*]

[a] *Sección de Gastroenterología, Departamento de Medicina Interna, Hospital Clínico Universidad de Chile, Santiago, Chile*
[b] *Departamento de Anatomía Patológica, Hospital Clínico Universidad de Chile, Santiago, Chile*

* Corresponding author at: Sección Gastroenterología, Hospital Clínico Universidad de Chile, Santos Dumont 999, Independencia, Santiago 8380456, Chile. Tel.: +56229788350.
E-mail address: drlcgill@yahoo.com (L.C. Gil La Rotta).

2255-534X/

What do we know about detectable viremia at the end of hepatitis C virus treatment and the subsequent sustained virologic response?☆

¿Qué sabemos acerca de la carga viral detectable al final del tratamiento de virus de hepatitis C con respuesta viral subsecuente?

The treatment of hepatitis C virus (HCV) infection with regimens based on second generation direct-acting antivirals (DAAs) has been associated with high rates of sustained virologic response (SVR) and few secondary effects (1%). However, there is little information about the impact of detectable viral load on the SVR at the end of treatment with DAAs.[1] Thus, we refer to the case of a 49-year-old Mexican man that had a history of failed treatment in 2006 with pegylated interferon and ribavirin for 48 weeks. The liver biopsy taken at that time reported grade 2 fibrosis (METAVIR F2). In 2016, the patient received 12 weeks of paritaprevir/ritonavir/ombitasvir/dasabuvir (3 D), with complete adherence, and no significant adverse events. Viral load at the end of treatment was detectable (Abbott Real Time PCR assay [ART]), with SVR 3 months later (Table 1).

Previous analyses have reported a 5–7% detectable viral load at the end of treatment with SVR after different DAA regimens.[1–4] We found 6 reports in relation to that interesting phenomenon, which are summarized in Table 1. To explain the viremia at the end of treatment, some authors suggest a mechanism involving viral kinetics, in which

☆ Please cite this article as: Toapanta-Yanchapaxi L, Páez-Zayas VM, Cuevas-Castillejos JE, Lizárraga-Gómez E, García-Juárez I. ¿Qué sabemos acerca de la carga viral detectable al final del tratamiento de virus de hepatitis C con respuesta viral subsecuente? Rev Gastroenterol Méx. 2019;84:526–528.

Table 1 Characteristics of patients with detectable viral load at the end of treatment and later sustained virologic response.

Reference	n	Fibrosis	Genotype	Previous treatment	Detection	Treatment	Baseline	Week 4	EOT	SVR4	SVR12	SVR24
Ancha et al.[8]	5	Cirrhosis (n = 1)	1a (n = 4) 1b (n = 1)	Experienced (n = 2)	CTM	SOF/LDV – 12 weeks (n = 4) SOF/SIM – 12 weeks (n = 1)	-	-	<15–235 IU/mL	-	ND	ND
Maasoumy et al.[2]	471	Cirrhosis (n = 120)	1	Experienced (n = 231)	CTM ART	SOF/LDV ± RBV (8, 12, 24 weeks)	6.4 log 10 IU/mL	-	n = 33 18 IU (12–62)	-	ND (n = 32)	-
Malespin et al.[4]	5	Cirrhosis (n = 4) F2-F4 (Fibro-spect)	1a (n = 3) 1a or 1b (n = 2)	Naïve (n = 2) Experienced (n = 3)	ART	SOF/SIM -12 weeks (n = 4) SOF/LDV – 12 weeks (n = 1)	-	-	EOT+	ND	ND	ND
Shteyer et al.[3]	1	-	1b	-	ART	SOF/LDV – 12 weeks (n = 1)	Log 7.0	-	Log 1.0	ND[a]	ND	ND
Sidharthan et al.[5]	6	-	1	Naïve	ART	SOF/LDV – 6 weeks + GS-9669 (n = 5) SOF/LDV – 6 weeks + GS-9451 (n = 1)	-	-	14–64 IU/mL	ND (n = 2)[b] 14 IU/ml (n = 1)[c]	ND (n = 2)	-
Childs-Kean and Hong[1]	5	Cirrhosis (n = 2)	1a	Naïve (n = 4) Experienced (n = 1)	ART	3D + RBV 12 weeks (n = 1) SOF/LDV – 8 weeks (n = 3) SOF/LDV – 12 weeks (n = 1)	2,000,000 and 7,000,000 IU/mL	780–49 IU/mL	25–13 IU/mL	23 IU/mL (n = 1) ND (n = 4)	ND	-
Current case[c]	1	F2 (Biopsy)	1b	Experienced (n = 1)	ART	3D	802380 IU/mL Log 5.9	56 IU/mL Log 1.75	14 IU/mL Log 1.14	ND	ND	ND

3D: paritaprevir/ritonavir/ombitasvir/dasabuvir; ART: Abbott RealTime PCR assay; CTM: Cobas TaqMan HCV Test; EOT: end of treatment; ND: not detected; RBV: ribavirin; SOF/LDV: sofosbuvir/ledipasvir; SOF/SIM: sofosbuvir/simeprevir.

[a] Shteyer et al. describe cases of patients with acute hepatitis C.

[b] In Sidharthan et al., 2 patients achieved RNA < the detection limit at 8 weeks after treatment.

[c] Viral load measured using the Abbott m2000r Real-time System (Abbot Laboratories, Germany), with a detection threshold of 12 IU/mL.

noninfectious viral particles or defective virions can be detected transitorily at the end of treatment.[5] In addition, HCV infection is known to affect cell immunity, and a decrease in viral load after an effective treatment could subsequently restore the immune mechanisms that enable the clearance of residual viruses at the end of antiviral therapy.[1,4] Strikingly, the majority of cases with positive viremia that later achieve SVR were described through the use of highly sensitive assays, such as real-time polymerase chain reaction.[1,2] HCV virion clearance occurs at a rate of 10–12 virions per day, but apoptosis of the infected cells has been observed to extend for more than 70 days.[6] We believe that our patient is not a case of a false positive, given that the viral loads were determined using the same method and they were not detectable 24 weeks after having finished treatment.

At present, predictors associated with detectable viral load at the end of treatment have not been reported. In the largest case series, conducted by Maasoumy et al.,[2] neither the baseline viral load nor the regimen utilized, were associated with said phenomenon. The available information suggests that having a detectable viral load at the end of treatment is not clinically relevant, given that almost all the patients in the case series cited above, reached SVR (Table 1). In the recommendations of the 2018 EASL guidelines,[7] the determination of viral load at the end of treatment is omitted, evaluating response 12 weeks later. That is based on the fact that efficacy of the DAA regimens is close to 100%.

Ethical disclosures

Informed consent was requested from the patient to receive the treatment. The present scientific letter meets the current bioethical research norms and was authorized by the ethics committee of the *Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán*. The patient cannot be recognized or identified through the images or data contained in the article.

Financial disclosure

No financial support was received in relation to this article.

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Childs-Kean LM, Hong J. Detectable viremia at the end of treatment with Direct-Acting antivirals can be associated with subsequent clinical cure in patients with chronic hepatitis C: a case series. Gastroenterology. 2017;125:1165–6.
2. Maasoumy B, Buggisch P, Mauss S, et al. Clinical significance of detectable and quantifiable HCV RNA at the end of treatment with ledipasvir/sofosbuvir in GT1 patients. Liver Int. 2018;38:1906–10.
3. Shteyer E, Dahari H, Gafanovich I, et al. End of treatment RNA-positive/sustained viral response in an individual with acute hepatitis C virus infection treated with direct-acting antivirals. Ther Adv Gastroenterol. 2017;10:429–30.
4. Malespin M, Benyashvili T, Uprichard SL, et al. Prevalence of end of treatment RNA-positive/sustained viral response in HCV patients treated with sofosbuvir combination therapies. Ther Adv Gastroenterol. 2017;10:68–73.
5. Sidharthan S, Kohli A, Sims Z, et al. Utility of hepatitis C viral load monitoring on direct-acting antiviral therapy. Clin Infect Dis. 2015;60:1743–51.
6. Neumann AU, Lam NP, Dahari H, et al. Hepatitis C viral dynamics in vivo and the viral efficacy of interferon-alpha therapy. Science. 1998;282:103–7.
7. European Association for the Study of the Liver. EASL Recommendations on treatment of hepatitis C 2018. J Hepatol. 2018;69:461–511.
8. Ancha N, Gonzalez S, Ashfaq M, et al. Effect of low positive end-of treatment viral load with DAA therapy on sustained virologic response. Gastroenterology. 2017;152 Suppl. 1:S1102.

L. Toapanta-Yanchapaxi[a], V.M. Páez-Zayas[b], J.E. Cuevas-Castillejos[a], E. Lizárraga-Gómez[a], I. García-Juárez[a,*]

[a] *Departamento de Gastroenterología, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico City, Mexico*
[b] *Departamento de Donación y Trasplantes, Hospital General de México Dr. Eduardo Liceaga, Mexico City, Mexico*

* Corresponding author at: Vasco de Quiroga 15, Colonia Belisario Domínguez, Sección XVI, C.P. 14080, Mexico City, Mexico. Tel.: 55 5487 0900.
E-mail address: drinter77@gmail.com (I. García-Juárez).

2255-534X/