Hepatic Encephalopathy Update: Reports from the 2012 International Liver Conference

HEPATOLOGY Centers of Educational Expertise

Project ID: 12-0008-NL-1

Credit Designation

Purdue University College of Pharmacy designates this enduring material for a maximum of *1.0 AMA PRA Category 1 Credit(s)*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Release: June 25, 2012 **Expiration:** June 25, 2013

Accreditation Statement

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of Purdue University College of Pharmacy and the Chronic Liver Disease Foundation (CLDF). Purdue University College of Pharmacy, an equal access/equal opportunity institution, is accredited by the ACCME to provide continuing medical education for physicians.

Disclosure of Conflicts of Interest

All faculty and staff involved in the planning or presentation of continuing education activities sponsored/provided by Purdue University College of Pharmacy are required to disclose to the audience any real or apparent commercial financial affiliations related to the content of their presentation or enduring material. Full disclosure of all commercial relationships must be made in writing to the audience prior to the activity. Focus Medical Communications staff and Purdue University College of Pharmacy staff have no relationships to disclose.

Objectives:

- Recognize the debilitating effects of hepatic encephalopathy in patients with cirrhosis, including both covert and overt hepatic encephalopathy
- Assess the results of selected studies relating to the diagnosis and treatment of hepatic encephalopathy presented at the 2012 Conference of the European Association for the Study of the Liver

The occurrence of a first episode of acute hepatic encephalopathy (HE) in a patient with cirrhosis is a foreboding event in the natural history of advanced liver disease. Without a liver transplant, 1-year survival is 42%, whereas 3-year survival is only 23%.[1] It is now recognized that cognitive impairment in many cirrhotic patients begins before there are any detectable signs and symptoms of overt hepatic encephalopathy (OHE). These subtle neurocognitive changes can only be detected with psychometric/neurophysiological testing and have been referred to as subclinical HE or minimal HE. Recently, the International Society for Hepatic Encephalopathy and Nitrogen Metabolism (ISHEN) has endorsed using the term covert HE (CHE) for cirrhotic patients who are diagnosed with neurocognitive impairment using psychometric or neurophysiological testing but who do not exhibit any signs or symptoms of mental impairment.[2] A diagnosis of CHE is significant in that more than 50% of those diagnosed with CHE will develop OHE within 30 months.[2] Although the neurocognitive changes associated with OHE have long been considered reversible following recovery, recent studies suggest that this may not be the case, even with liver transplant.[3-5] This has sparked renewed interest in research directed at better diagnosing early stages of HE, prophylactic treatment for preventing a first occurrence of OHE (primary prophylaxis), and prophylactic therapy following an occurrence of OHE to prevent a recurrence (secondary prophylaxis).[6] This newsletter will review selected research related to HE reported at the 47th Annual Meeting of the European Association for the Study of the Liver, which took place in Barcelona, Spain, on April 18-22, 2012.[7]

Advances in the Diagnosis of Hepatic Encephalopathy

OHE can be diagnosed based on clinical recognition of the distinctive neurologic features of HE, knowledge that underlying cirrhosis is present, exclusion of all other etiologies of neurologic and/or metabolic abnormalities, and identification of precipitating factors. Severity of OHE can be assessed using West Haven Criteria.[8] In contrast, patients with CHE have no clinical signs or symptoms; diagnosis of CHE is only possible through specialized psychometric and neurological testing.[9] Unfortunately, no consensus on diagnostic criteria or diagnostic tests for CHE has been established.[10]

Montagnese and colleagues reported results of a study aimed at investigating the degree of agreement and the prognostic value of neurophysiological (EEG), psychometric (Psychometric Encephalopathy Score, PHES), and psychophysical (Critical Flicker Frequency, CFF) test results in 132 cirrhotic outpatients.[11] Forty-seven patients (36%) were clinically diagnosed as having mild OHE, and 85 patients

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

(64%) did not have OHE on the day of the study. EEG, PHES, and CFF test results were abnormal in a greater percentage of those clinically diagnosed as having OHE than in those diagnosed as non-OHE.

Cirrhotic Outpatients (N=132)			
Clinical Assessment on study day, n (%)	Mild OHE; 47 (36%)	Non-OHE; 85 (64%)	*P* value
Abnormal EEG, n (%)	34 (72)	22 (26)	
EEG Theta Power (%)	43 ± 17	26 ± 17	<.0001
Abnormal PHES, n (%)	30 (64)	14 (16)	
PHES score	-5.2 ± 4.0	-0.9 ± 3.0	<.0001
Abnormal CFF, n (%)	20 (43)	26 (31)	
Flicker Fusion Threshold (Hz)	40 ± 5	42 ± 5	<.05

Table 1. Comparison of neurophysiological (EEG), psychometric (Psychometric Encephalopathy Score, PHES), and psychophysical (Critical Flicker Frequency, CFF) test results in cirrhotic outpatients clinically diagnosed as having mild overt hepatic encephalopathy (OHE) or not having OHE.[11]

Of the 85 patients with no OHE, 22 (26%) had an abnormal EEG, 14 (16%) had an abnormal PHES, and 26 (31%) had abnormal CFF test results. The test results suggest that 16% to 31% of the non-OHE patients could be diagnosed as having CHE, depending on which test is utilized for diagnosis. Interestingly, only 15 (18%) non-OHE patients had more than one abnormal test result, indicating that agreement between EEG, PHES, and CFF as diagnostic tools for CHE is poor. Patients with a history of OHE had slower EEG (theta power; 37±19 vs 25±16%, *P*<.001) and worse PHES scores (-2.9±3.9 vs -1.5± 3.5, *P*=.05) than their counterparts with no history of OHE; CFF test results were comparable regardless of the OHE history. Patients were followed prospectively for 11±7 months; during this time, 10 patients died, 10 were transplanted, and 29 developed OHE. The presence of OHE (P=.004), abnormal EEG (P=.008), and an abnormal PHES (P=.04) at baseline predicted the subsequent occurrence of OHE; CFF did not. The authors concluded that the agreement between neurophysiological, psychometric, and psychophysical test results for the diagnosis of HE is poor. EEG alterations appear to be most strongly associated with both previous and subsequent OHE episodes.

A poster presentation reported on the feasibility of using a blood biomarker for diagnosing the presence of CHE in patients with cirrhosis as an alternative to neuropsychological testing.[12] Different amino acids, cyclic guanosine monophosphate (cGMP), nitrites and nitrates, and 3-nitrotyrosine were selected for analysis based on studies in animal models of HE. These were measured in 63 controls, 43 cirrhotic patients without CHE, and 44 patients with CHE. CHE was diagnosed utilizing PHES. Of the compounds tested, three of the blood biomarkers – 3-nitrotyrosine, citrulline, and methionine – demonstrated significantly increased levels in patients with CHE compared to patients without CHE.

	Controls	Cirrhotic patients without CHE	Cirrhotic patients with CHE	*P* value Patients with vs. without CHE)
3-Nitrotyrosine (nM)	3.1 ± 0.3 (n=63)	6.3 ± 0.7 (n=42)	54 ± 5 (n=35)	*P*<.0001
Citrulline (μM)	16.2 ± 1.3 (n=63)	30 ± 3 (n=43)	52 ± 5 (n=44)	*P*<.001
Methionine (μM)	18 ± 1.5 (n=63)	45 ± 4 (n=43)	78 ± 7 (n=41)	*P*<.0001

Table 2. Concentrations of 3-nitrotyrosine, citrulline, and methionine in cirrhotic patients with CHE compared to cirrhotic patients without CHE and control subjects with normal liver function.[13] CHE = covert hepatic encephalopathy.

Receiver operating characteristic (ROC) curve analysis demonstrated an area under the curve value of 0.96 (95% confidence interval [CI] 0.93-0.99) for 3-nitrotyrosine. At a cutoff value of 14 nM, specificity was 93%, sensitivity was 94%, and the positive and negative predictive values were both 91%. The authors concluded that the determination of serum 3-nitrotyrosine may be useful in identifying patients with CHE but that the results should be validated in a larger cohort. This study has been published.[13]

Advances in the Treatment of Hepatic Encephalopathy

Although lactulose has been used in the treatment of OHE and as secondary prophylaxis to prevent recurrent episodes of OHE, its use in primary prevention of HE in cirrhotic patients who have never had an episode of HE has not been studied. In the poster presentation by Agrawal et al, 120 cirrhotic patients who never had an episode of HE were randomized to receive lactulose or no lactulose.[14] All patients were assessed by psychometry (number connection test A and B, figure connection test A and B if illiterate, digit symbol test, serial dot test, line tracing test, and CFF test) at study inclusion and after 3 months. Patients were followed monthly for development of OHE over a median follow-up of 12 months. Significantly fewer patients receiving lactulose prophylactically developed an episode of OHE compared with the untreated control group.

	Lactulose	No Lactulose	*P Value*
N at baseline	60	60	
Number of patients with CHE at baseline n/N (%)	32/60 (53)	36/60 (60)	
Developed episode of OHE, n/N (%)	6/55 (11)	15/50 (30)	*.02*
Died, n/N (%)	5/55 (9)	10/50 (20)	*.16*

Table 3. Development of an episode of OHE or death in cirrhotic patients treated with prophylactic lactulose compared to controls who did not receive lactulose over a median follow-up of 12 months.[14] None of the patients in either arm of the study had experienced an episode of OHE prior to the start of the study. CHE = covert hepatic encephalopathy; OHE = overt hepatic encephalopathy.

CLDF Chronic Liver Disease Foundation

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

While not statistically significant, fewer patients in the treated group died during follow-up than in the control group. Primary treatment with lactulose improved CHE in 66% of patients who presented with CHE at baseline. The authors concluded that lactulose is effective for primary prevention of OHE in patients with cirrhosis.

A retrospective study of 198 patients with well-characterized cirrhosis presented by Ampuero et al found that metformin use appeared to be protective against HE in a subgroup with concomitant diabetes.[15] The study included 46 patients classified as insulin sensitizer experienced (metformin with or without pioglitazone), 25 patients with type 2 diabetes mellitus treated with insulin, and 126 nondiabetics or diabetics with dietetic treatment. The patients treated with metformin received the drug for 35.5 ± 26.6 months. The primary end-point for the study was an episode of OHE; secondary end-points were death and liver transplantation. OHE developed in 31.8% (48/151) patients who did not receive metformin and in 2.2% (1/46) patients who were treated with metformin. In univariate analysis, metformin use decreased OHE (log rank 13.35; *P*=.000), decreased orthotopic liver transplant (log rank 5.1; *P*=.024), and improved survival (log rank 4.3; *P*=.38). In multivariate analysis by Cox regression, metformin use [H.R. 10.27 (95% CI: 1.4-75.24); *P*=.022], diagnosis age [H.R. 1.05 (95% CI: 1.02-1.08); *P*=.001], Child-Pugh [H.R. 1.30 (95% CI: 1.04-1.63); *P*=.022], and MELD index [H.R. 1.13 (95% CI: 1.04-1.24); *P*=.005] were independently associated with OHE. The authors concluded that metformin use seems to be protective against OHE, but these preliminary observations should be followed up with a randomized double-blind, placebo-controlled clinical trial.

In a 6-month randomized, double-blind, placebo-controlled trial of rifaximin in patients who were in remission from recurrent HE, Bass et al reported that a breakthrough episode of HE occurred in 22.1% of patients in the rifaximin group compared with 45.9% of patients in the placebo group. Hospitalization involving HE was also lower in the rifaximin-treated patients (22.6%) compared with the placebo group (13.6%).[16] During a long-term open-label maintenance follow-up to the study published by Bass et al, a poster presentation by Sanyal et al reported rates of commonly occurring infections in rifaximin-treated patients.[17] The open-label maintenance trial included 152 rollover patients from the original randomized trial along with 128 new patients. Median long-term rifaximin exposure was 427 (2-1427) days, or 510 person exposure years. The overall infection rate in patients using rifaximin long term was lower when compared with both the placebo and the rifaximin randomized control trial groups. Rates of commonly occurring infections in cirrhotic patients were either lower or remained stable during long-term administration.

	RCT Patients		All Rifaximin Patients (n=392) PEY = 510 n (rate*)
	Placebo (n=159) PEY = 46 n (rate*)	Rifaximin (n=140) PEY = 50 n (rate*)	
Any infection	49 (1.32)	46 (1.12)	214 (0.72)
Cellulitis	3 (0.066)	3 (0.060)	34 (0.071)
C. *difficile* infection	0	2 (0.040)	6 (0.012)
Peritonitis	6 (0.131)	3 (0.060)	22 (0.044)
Pneumonia	1 (0.022)	4 (0.080)	42 (0.084)
Sepsis/septic shock	5 (0.109)	2 (0.040)	31 (0.062)
Urinary tract/kidney	14 (0.320)	9 (0.187)	83 (0.193)

Table 4. Infection rates during the 6-month randomized controlled trial (RCT) for patients receiving either placebo or rifaximin and rates for all rifaximin patients during the randomized trial and the open-label maintenance follow-up trial. *Rate is calculated as number of subjects/person exposure years (PEY).

The use of antibiotics, both oral and intravenous, remained the same or decreased over time. The authors concluded that long-term treatment with rifaximin did not adversely affect infection rates or increase the use of antibiotics in cirrhotic patients with HE.

Embolization of large portal-systemic shunts was the topic of a poster presentation by Simón-Talero et al.[18] Embolization of one dominant shunt was performed in 15 patients with portal-systemic shunts secondary to hepatic cirrhosis. The patients had exhibited episodes of OHE (<2 in 6 months) or persisting manifestations and were considered at low risk of gastrointestinal bleeding. A favorable outcome was defined as increased patient autonomy and a marked decrease in the number of episodes of HE during more than 6 months of follow-up. There were no complications following the procedure. Nine patients had a favorable response (8 completely autonomous, 1 partially dependent) and 6 had poor outcomes (1 death at 1 month, 1 partially dependent, 4 fully dependent) following shunt embolization. In the group with a favorable outcome, the number of days of HE decreased from 11 per 100 days to 0.15 per 100 days (follow-up 44 ± 41 months). HE did not decrease in the patients with a poor outcome (18 per 100 days vs 20 per 100 days) after a follow- up of 11 ± 9 months. Only one patient experienced an episode of gastrointestinal bleeding 5 years following embolization. Patients with a Child-Pugh score ≤7 (n=9) had a favorable response with the exception of one 83-year-old patient; all patients but one with Child-Pugh >7 had poor results following embolization (P=.01). The authors concluded that embolization of large portal-systemic shunts in patients with low risk of gastrointestinal bleeding is a safe procedure that causes an important improvement of HE in those with a Child-Pugh score ≤7.

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

Persistence of Cognitive Impairment After OHE

Evidence continues to grow that cognitive dysfunction may persist as a sequela despite apparent recovery from an OHE episode. Bajaj and colleagues utilized psychometric testing [PHES (number connection test A/B, digit symbol test, line drawing test) and block design test] and the computerized inhibitory control test to evaluate cognitive dysfunction in cirrhotics with prior OHE (n=32; median 2 episodes; all on lactulose) versus patients without prior OHE (n=131).[19] Patients with prior OHE had significantly impaired test results in all tests except line drawing test errors, the serial dotting test time, and inhibitory control test lure rates.

	Prior OHE Patients (n=32)	Non-OHE Patients (n=131)	*P* value
Number connection test-A	65	44	.02
Number connection test-B	146	102	.01
Digit symbol test	32	45	<.0001
Line Drawing			
Time	130	100	.02
Errors	49	31	.1
Serial dotting test	86	74	.2
Block design test	13	34	<.0001
Inhibitory control test			
Lures	16	15	.6
Weighted Lures	31	18	.01
Targets	77%	92%	.001

Table 5. Comparison of psychometric test results and inhibitory control test results in cirrhotic patients who had prior OHE episodes versus non-OHE cirrhotic patients.[19] OHE = overt hepatic encephalopathy.

In addition, patients without prior OHE showed improvement in the second-half inhibitory control test results (decreased lure and weighted lure rates and an increased percentage of targets), whereas second-half test results for those with prior OHE did not improve. The inhibitory control test results suggest that patients without OHE were able to learn and improve from the first half to the second half, but those with prior OHE were unable to learn from their first-half experience. The authors concluded that cirrhotics with prior OHE exhibit persistent cognitive impairment that is not present in those without prior OHE. They suggest that this persistence could have important implications for transplant listing and for prevention of the first episode of OHE.

Summary. Without a liver transplant, 1-year survival following an episode of overt hepatic encephalopathy (OHE) is 42%, whereas 3-year survival is only 23%. Cognitive impairment in patients with cirrhosis begins before any signs or symptoms of OHE are actually apparent, a condition now called covert hepatic encephalopathy (CHE). CHE has previously been called subclinical HE or minimal HE. CHE can only be diagnosed with specialized testing, but guidelines have not yet been established for testing. Two EASL presentations dealt with the diagnosis of CHE: one suggested that EEG may be better than psychometric (PHES) or psychophysical (CFF) testing, and another proposed using serum levels of 3-nitrotyrosine as an alternative to neuropsychological testing.

Several presentations dealt with treatment of HE. Significantly fewer cirrhotic patients who had never experienced an episode of OHE, when treated prophylactically with lactulose, developed OHE. The interesting observation that cirrhotic patients who were also diabetic and who received metformin appeared to be protected from the development of OHE warrants further study. A long-term open-label study of rifaximin used prophylactically in patients who had experienced an episode of OHE for the prevention of recurrent episodes found that the long-term use did not adversely affect infection rates or increase antibiotic use. For cirrhotic patients who had experienced multiple episodes of OHE or who had persistent symptoms, embolization of large portal-systemic shunts was found to be an effective intervention in 9 of 15 patients.

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

References

1. Bustamante J, Rimola A, Ventura P-J et al. Prognostic significance of hepatic encephalopathy in patients with cirrhosis. *J Hepatol* 1999;30:890-895.

2. Mullen KD, Prakash RK. Management of covert hepatic encephalopathy. *Clin Liver Dis* 2012;16:91-93.

3. Ferenci P. Treatment options for hepatic encephalopathy: a review. *Semin Liver Dis* 2007;27(Suppl 2):10-17.

4. Bajaj JS, Schubert CM, Heuman DM et al. Persistence of cognitive impairment after resolution of overt hepatic encephalopathy. *Gastroenterology* 2010;138:2332-2340.

5. Frederick RT. Extent of reversibility of hepatic encephalopathy following liver transplantation. *Clin Liver Dis* 2012;16:147-158.

6. Sharma BC, Sharma P, Agrawal A, Sarin SK. Secondary prophylaxis of hepatic encephalopathy: an open-label randomized controlled trial of lactulose versus placebo. *Gastroenterology* 2009;137:885-891.

7. EASL, The International Liver Congress™ 2012. 47th Annual Meeting of the European Association for the Study of the Liver. Available at http://www2.kenes.com/liver-congress/pages/home.aspx. Accessed 05/31/12.

8. Mullen KD. Pathogenesis, clinical manifestation, and diagnosis of hepatic encephalopathy. *Semin Liver Dis* 2007;27(Suppl 2):3-9.

9. Bajaj JS, Wade JB, Sanyal AJ. Spectrum of neurocognitive impairment in cirrhosis: Implications for the assessment of hepatic encephalopathy. *Hepatology* 2009;50:2014-2021.

10. Mullen KD. Review of the final report of the 1998 Working Party on definition, nomenclature and diagnosis of hepatic encephalopathy. *Aliment Pharmacol Ther* 2006;25(Suppl 1):11-16.

11. Montagnese S, Schiff S, De Rui M et al. Agreement and predictive validity of neurophysiological, psychometric and psychophysical indices of hepatic encephalopathy (HE). *J Hepatol* 2012;56(Suppl 2):S252-S253.

12. González-Lopez O, Urios A, Cauli O et al. 3-Nitro-tyrosine as a peripheral biomarker of minimal hepatic encephalopathy in patients with liver cirrhosis. *J Hepatol* 2012;56(Suppl 2):S253.

13. Montoliu C, Cauli O, Urios A et al. 3-Nitro-tyrosine as a peripheral biomarker of minimal hepatic encephalopathy in patients with liver cirrhosis. *Am J Gastroenterol* 2011;106:1629-1637.

14. Agrawal A, Sharma P, Sharma BC, Sarin SK. Primary prophylaxis of hepatic encephalopathy in patients with cirrhosis: an open labeled randomized controlled trial of lactulose versus no lactulose. *J Hepatol* 2012;56(Suppl 2):S239.

15. Ampuero J, Maraver M, Aparcero R et al. Metformin prevents overt hepatic encephalopathy (HE) in cirrhotics: a retrospective observational study. *J Hepatol* 2012:56(Suppl 2):S240.

16. Bass NM, Mullen KD, Sanyal A et al. Rifaximin treatment in hepatic encephalopathy. *N Engl J Med* 2010;362:1071-1081.

17. Sanyal A, Mullen KD, Bass NM et al. Rates of commonly occurring infections in cirrhosis patients remain stable during long-term rifaximin treatment. *J Hepatol* 2012;56(Suppl 2):S255-S256.

18. Simón-Talero M, Ventura-Cots, Pérez M et al. Embolization of large portal-systemic shunts is safe and effective in chronic hepatic encephalopathy with Child-Pugh <=7. *J Hepatol* 2012;56(Suppl 2):S256.

19. Bajaj JS, Prakash R, Pasquale C et al. Persistence of cognitive impairment after overt hepatic encephalopathy: an international multi-center prospective study. *J Hepatol* 2012:56(Suppl 2):S242.

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

Intentionally Left Blank

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

Project ID: 12-0008-NL-1

HEPATOLOGY Centers of Educational Expertise

Hepatic Encephalopathy Update: Reports from the 2012 International Liver Conference

Required with 70% passing.

1. **Without a liver transplant, the estimated 1-year survival rate of cirrhotic patients following a first episode of overt hepatic encephalopathy is:**
   a. <20%
   b. 42%
   c. 77%
   d. >90%

2. **In the study by Montagnese and colleagues, which diagnostic test appeared to be most strongly associated with both previous and subsequent overt hepatic encephalopathy episodes?**
   a. Psychometric Encephalopathy Score (PHES)
   b. Critical Flicker Frequency (CFF)
   c. Inhibitory Control Test
   d. EEG

3. **What compound has been proposed as a potentially useful biomarker for diagnosing covert hepatic encephalopathy in patients with cirrhosis?**
   a. Cyclic guanosine monophosphate
   b. 3-nitrotyrosine
   c. Alanine
   d. Ammonia

4. **Which group of cirrhotic patients with concomitant diabetes appeared to be protected from developing overt hepatic encephalopathy?**
   a. Patients receiving metformin with or without pioglitazone
   b. Patients receiving pioglitazone monotherapy
   c. Patients receiving dietetic treatment
   d. Patients receiving insulin

5. **In the study by Simón-Talero et al., which treatment/procedure was found to be effective for controlling hepatic encephalopathy in patients exhibiting multiple episodes or persistent manifestations?**
   a. Lactulose monotherapy
   b. Rifaximin monotherapy
   c. Lactulose and rifaximin combination therapy
   d. Embolization of large portal-systemic shunts

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

Project ID: 12-0008-NL-1

HEPATOLOGY Centers of Educational Expertise

Hepatic Encephalopathy Update: Reports from the 2012 International Liver Conference

Purdue University College of Pharmacy respects and appreciates your opinions. To assist us in evaluating the effectiveness of this activity and to make recommendations for future educational offerings, please take a few minutes to complete this evaluation form.

	This learning objective did (or will) increase/improve my:	*High Impact*	*Moderate Impact*	*No Impact*	*Not Applicable*
• Recognize the debilitating effects of hepatic encephalopathy in patients with cirrhosis, including both covert and overt hepatic encephalopathy	***Knowledge***	❑	❑	❑	❑
	Competence	❑	❑	❑	❑
	Performance	❑	❑	❑	❑
	Patient Outcomes	❑	❑	❑	❑
• Assess the results of selected studies relating to the diagnosis and treatment of hepatic encephalopathy presented at the 2012 Conference of the European Association for the Study of the Liver	***Knowledge***	❑	❑	❑	❑
	Competence	❑	❑	❑	❑
	Performance	❑	❑	❑	❑
	Patient Outcomes	❑	❑	❑	❑

Impact of the Activity

- Please indicate which of the following American Board of Medical Specialties/Institute of Medicine core competencies were addressed by this educational activity *(select all that apply)*:

❑ Patient care or patient-centered care
❑ Practice-based learning and improvement
❑ Interpersonal and communication skills
❑ Employ evidence-based practice
❑ Interdisciplinary teams
❑ Professionalism
❑ Quality improvement
❑ Medical knowledge
❑ System-based practice
❑ Utilize informatics
❑ None of the above

- The content of this activity matched my current (or potential) scope of practice.

❑ No
❑ Yes, please explain _____

- Was this activity scientifically sound and free of commercial bias* or influence?

❑ Yes
❑ No, please explain _____

** Commercial bias is defined as a personal judgment in favor of a specific product or service of a commercial interest.*

CLDF Chronic Liver Disease Foundation

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

Project ID: 12-0008-NL-1

HEPATOLOGY Centers of Educational Expertise

Hepatic Encephalopathy Update: Reports from the 2012 International Liver Conference

	Strongly Agree	*Agree*	*Disagree*	*Strongly Disagree*	*Not Applicable*
• The educational activity has enhanced my professional effectiveness in treating patients	❑	❑	❑	❑	❑
• The educational activity will result in a change in my practice behavior	❑	❑	❑	❑	❑

• How will you change your practice as a result of participating in this activity *(select all that apply)*?

❑ Create/revise protocols, policies, and/or procedures
❑ Change the management and/or treatment of my patients
❑ This activity validated my current practice
❑ I will not make any changes to my practice
❑ Other, please specify: _____

• What new information did you learn during this activity?

_____
_____
_____

• Please indicate any barriers you perceive in implementing these changes.

❑ Lack of experience
❑ Lack of resources (equipment)
❑ Lack of time to assess/counsel patients
❑ Lack of consensus of professional guidelines
❑ Lack of opportunity (patients)
❑ Lack of administrative support
❑ Reimbursement/insurance issues
❑ Patient compliance issues
❑ No barriers
❑ Cost
❑ Other _____

• If you indicated any barriers, how will you address these barriers in order to implement changes in your knowledge, competency, performance, and/or patients' outcomes?

_____
_____
_____

• Comments to help improve this activity?

_____
_____

• Recommendations for future CME/CPE topics.

_____
_____

To assist with future planning, please attest to time spent on activity:

I spent _____ hours on this program

_____
_____
_____
_____

CLDF Chronic Liver Disease Foundation

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.

REQUEST FOR CREDIT

If you wish to receive acknowledgement of participation for this activity, please fill in your contact information and fax back pages 7-10 to (973) 939-8533.

Please do not use abbreviations.
We need current and complete information to assure delivery of participation acknowledgement.

Degree *(please mark appropriate box and circle appropriate degree)*

❑ MD/DO ❑ PharmD/RPh ❑ NP/PA ❑ RN ❑ Other _____

Full Name *(please print clearly)*
Last Name: First Name: Middle Initial:

Street Address:

City: State or Province: Postal Code:

Phone: – – Ext. Fax: – –

Specialty:

E-mail Address:

Signature is required to receive statement of credit

Signature: _____ Date: _____

Attestation to time spent on activity is required

Purdue University College of Pharmacy designates this enduring material for a maximum of *1 AMA PRA Category 1 Credit(s)*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

❑ I participated in the entire activity and claim *1 AMA PRA Category 1 Credit(s)*™.

❑ I participated in only part of the activity and claim _____ credits

This material was supported by an educational grant from Salix Pharmaceuticals, Inc.