Alcoholic Hepatitis: Current Challenges and Future Directions

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Alcoholic hepatitis is a distinct clinical syndrome among people with chronic and active alcohol abuse, with a potential for 30%–40% mortality at 1 month among those with severe disease. Corticosteroids or pentoxifylline are the current pharmacologic treatment options, but they provide only about 50% survival benefit. These agents are recommended for patients with modified discriminant function (mDF) ≥32 or Model for End-Stage Liver Disease score ≥18. The Lille score is used to determine response to steroids. Currently, a minimum of 6 months of abstinence from alcohol use is required for patients to receive a liver transplant, a requirement that cannot be met by patients with severe alcoholic hepatitis nonresponsive to steroids (Lille score ≥0.45). Data are emerging on the benefit of liver transplantation in select patients with first episode of severe alcoholic hepatitis. This review also focuses on recent treatment trials in alcoholic hepatitis including liver transplantation and its associated controversies, as well as possible future targets and pharmacologic treatment options for patients with alcoholic hepatitis that are being pursued through upcoming consortium studies.

Keywords: Alcoholic Hepatitis; Apoptosis; MELD; Liver Injury.

Diagnosis of Alcoholic Hepatitis

In the absence of confirmatory tests, eliciting an accurate history of alcohol use is one of the major challenges in diagnosing AH. In an obese patient who drinks excessively, when it is unclear whether the etiology is alcoholic steatohepatitis or nonalcoholic steatohepatitis, the alcohol-non-alcohol index (ANI) may be used to determine the etiology. The ANI uses body mass index, mean corpuscular volume, aspartate aminotransferase (AST)/alanine aminotransferase (ALT) ratio, and gender to determine whether alcohol is the etiology of liver disease. A high mean corpuscular volume, AST/ALT ratio >1, low body mass index, and male gender favor alcohol as the etiology, and this is reflected as a positive numerical ANI score; a negative score favors nonalcoholic steatohepatitis. The ANI calculator is available online (http://www.mayoclinic.org/gi-rst/mayomodel10.html) and is helpful in convincing patients who are skeptical that the “minimal amounts” of alcohol they claim they are taking is actually excessive and harmful. Blood alcohol levels can confirm alcohol use only within the previous few hours, depending on the amount and rapidity of alcohol consumption (alcohol elimination rate of about 7 g/h). Urinary ethyl glucuronide may be used to detect alcohol use during the preceding 3–4 days. Especially provocative is the potential to measure ethyl glucuronide in hair samples because this may correlate with alcohol use over months. An objective

Abbreviations used in this paper: ABIC, Age Bilirubin INR Creatinine; AH, alcoholic hepatitis; ALT, alanine aminotransferase; ANI, alcohol-non-alcohol index; AST, aspartate aminotransferase; GAHS, Glasgow Alcoholic Hepatitis Score; HCV, hepatitis C virus; HRS, hepatorenal syndrome; IL, interleukin; INR, international normalized ratio; LPS, lipopolysaccharide; LT, liver transplantation; mDF, Maddrey discriminant function; MELD, Model for End-Stage Liver Disease; NAC, N-acetylcysteine; RCT, randomized controlled trial; TNF, tumor necrosis factor.

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Assessment of Disease Severity

Various scores have been developed with the goal of determining which patients are at high risk for mortality. All current scoring systems for evaluation of AH severity have limitations (Table 1), but the Maddrey discriminant function (mDF) score has been the most widely used. Inclusion of the prothrombin time expressed in seconds is a drawback of the calculation of the mDF score because the prothrombin time can vary greatly depending on the sensitivity of the thromboplastin reagent used for the test. In addition, patients with a DF less than 32 are deemed not to have severe disease, yet they are at risk for mortality. The Model for End-Stage Liver Disease (MELD) score, which uses international normalized ratio (INR), serum creatinine, and serum bilirubin as variables, has the advantage over the Maddrey score of being able to predict probability of survival in the individual patient irrespective of the score. The American Association for the Study of Liver Disease guidelines recommend a MELD score >18 threshold to initiate therapy, similar to other studies that suggest a score of >20. Studies have found that both MELD and mDF scores perform with similar accuracy. The Glasgow Alcoholic Hepatitis Score (GAHS) and Age Bilirubin INR Creatinine (ABIC) score are limited by lack of international validation but may be used to further stratify patient risk. A Lille score (calculated from age, renal function, albumin, prothrombin time, serum bilirubin, and change of serum bilirubin at day 7) of >0.45 after 1 week of therapy is associated with 75% mortality at 6 months. In clinical practice, mDF ≥32 or MELD ≥20 is used to guide initiation of treatment with steroids, and the Lille score is used to trigger discontinuation of steroids.

When matched for disease severity, patients with AH and HCV infection have a worse outcome than patients with AH alone. None of the current survival models incorporate HCV as a variable. In addition, alcohol use >120 g/day, infection, and gastrointestinal bleeding are also associated with poor prognosis.

Supportive Treatment of Alcoholic Hepatitis

Abstinence From Alcohol

The major focus of attention is prevention of alcohol use. Abstinence is the most important factor in predicting long-term outcome of patients surviving the acute

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**Table 1. Scoring Systems to Assess Severity of AH**

<table>
<thead>
<tr>
<th>Scoring system</th>
<th>Variables</th>
<th>Severe disease</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>mDF&lt;sup&gt;24&lt;/sup&gt;</td>
<td>4.6 × (patient’s PT-control PT in seconds) + serum bilirubin</td>
<td>32</td>
<td>Simple to use, validated internationally, and guides treatment initiation</td>
<td>Does not guide treatment response</td>
</tr>
<tr>
<td>MELD&lt;sup&gt;29&lt;/sup&gt;</td>
<td>SB, INR, serum creatinine</td>
<td>21</td>
<td>Validated internationally</td>
<td>Variable cutoff across studies</td>
</tr>
<tr>
<td>GAHS&lt;sup&gt;32&lt;/sup&gt;</td>
<td>Age, BUN, WBC, SB, and INR each scored 1-3</td>
<td>9</td>
<td>Simple to use and stratifies DF &gt;32 patients for treatment</td>
<td>Not validated worldwide and needs day 7 laboratory values</td>
</tr>
<tr>
<td>ABIC&lt;sup&gt;33&lt;/sup&gt;</td>
<td>Age, SB, INR, serum creatinine</td>
<td>9</td>
<td>Stratifies patients to low, intermediate, and high risk</td>
<td>Only validated in Spain</td>
</tr>
<tr>
<td>Lille&lt;sup&gt;35&lt;/sup&gt;</td>
<td>Age, SB, serum albumin, PT, change in SB at day 7</td>
<td>0.45</td>
<td>Identifies nonresponders to steroids</td>
<td>Complex to use and does not guide treatment initiation</td>
</tr>
</tbody>
</table>

BUN, blood urea nitrogen; PT, prothrombin time; SB, serum bilirubin.
AH episode. Evaluation by a team experienced in the treatment of alcoholism is recommended during the hospitalization for AH and is helpful in increasing abstinence rates after hospital discharge. Tools used to maintain abstinence from alcohol include motivational interviewing and cognitive behavioral therapy. Motivational interviewing is the process of encouraging behavioral change and is aimed at lifestyle modifying. Cognitive behavioral therapy, which is a structured goal-directed form of psychotherapy aimed at understanding how the thought process has contributed to unhealthy behaviors, has an important role in maintaining alcohol abstinence. Inpatient therapy for alcoholism is recommended in patients with a history of withdrawal complications, in the presence of severe coexisting psychiatric disorders, and if the home situation is unstable. Inpatient therapy is also recommended if outpatient therapy for alcoholism fails. Even though inpatient detoxification may be cost-effective, such intervention is usually limited by insurance coverage. The incidence of recidivism after recovery from initial AH episode ranges between 10% and 70%. Regular attendance of meetings at Alcoholics Anonymous, which is a voluntary program based on a spiritual basis for recovery, is also helpful in maintaining abstinence. However, patients who have had their driving license revoked find compliance with this recommendation difficult.

The role of pharmacologic agents in maintaining abstinence is unclear and not often recommended. Baclofen, a \( \gamma \)-aminobutyric acid antagonist, is associated with both efficacy and safety in maintaining higher abstinence rates, longer durations of abstinence, reduced hospital readmission rates, and improved liver function in patients with cirrhosis in randomized studies when compared with placebo-treated patients. However, in one randomized controlled trial (RCT) in patients with alcoholic cirrhosis, baclofen and placebo were similar in achieving abstinence. Use of intense psychological intervention in both groups and the percent of heavy drinking days rather than any alcohol use as an end point may explain differences between this and other studies. Baclofen is not widely used in clinical practice but may be considered in patients who are unable to comply with behavior modification–based interventions. The dose of baclofen is 5 mg 3 times daily, and if tolerated, the dose is increased to 10 mg 3 times daily. Because most data on use of baclofen are in patients with alcoholic cirrhosis, studies are required to examine the benefit of baclofen use among survivors of acute AH, with the primary end point being long-term survival or need for liver transplantation (LT).

Supportive Care and Nutrition

Patients with AH and mDF score <32 are currently treated for withdrawal symptoms and supportive care for complications of portal hypertension. Although a specific prognostic score value does not necessarily dictate hospitalization, patients with severe AH as determined by presence of complications require hospital-based therapy; these include especially the presence of infection, gastrointestinal bleeding, hepatic encephalopathy, and acute kidney injury. Future studies focused on whether specific scoring systems can assist in hospitalization and discharge management would be very topical.

The enteral route is preferred for supplementing nutrition because it is less expensive, maintains gut mucosal integrity, and consequently is associated with a decreased risk of bacterial translocation and infections. Pooled data from 5 RCTs among patients with AH have shown improved nutritional status with enteral supplementation compared with standard dietary intake, but without survival benefit. Protein intake should not be restricted unless patients are intolerant.

Pharmacotherapy for Alcoholic Hepatitis

Corticosteroids

Corticosteroids are the most widely used agents for the treatment of severe AH. However, the 13 RCTs evaluating corticosteroids for treating AH reported during the past 40 years have shown mixed results. Meta-analysis of individual patient data from 5 RCTs that used corticosteroids for severe AH showed an approximately 50% relative survival benefit at 1 month (65% vs 85% survival among untreated vs treated), with the number needed to treat being 5 patients to reduce 1 death. Despite this documented benefit, practice surveys have shown that physicians in the United States prefer pentoxifylline over steroids for managing AH; there is no consensus on how to manage AH in the presence of concomitant HCV. When steroids are used, oral prednisolone 40 mg daily or parenteral methylprednisolone (for patients unable to take orally) 32 mg per day is the usual initial dose and is administered for 4 weeks. The steroid is tapered off usually during the next 4 weeks, although the ideal taper has not been studied.

A continued increase in the serum bilirubin level in the 5–10 days before initiating steroid therapy and a Lille score >0.45 after 1 week of steroid therapy are associated with worse outcome. However, in another study, only the Lille score but not pretreatment increase in bilirubin was predictive of survival. About 25% of patients with severe AH are infected at presentation. If appropriately treated with antibiotics, these patients have about 71% survival with steroids, similar to uninfected patients. About one-fourth of patients develop infection after starting steroids, especially if they are nonresponders to steroids (42% vs 11%, \( P < .0001 \)). Therefore, discontinuation of steroids is recommended in patients who are nonresponders after a week of therapy. HRS should be treated before initiating steroids because patients in whom HRS is not reversible have a poor response to corticosteroids as compared
with patients with reversal of HRS (0% vs 44%, P < .001). Of note, histologic changes in the liver may persist for several months after clinical and biochemical resolution of AH.

**Pentoxifylline**

Pentoxifylline, a phosphodiesterase inhibitor, in a dose of 400 mg 3 times daily for 28 days was associated with approximately 50% survival benefit in a pivotal study in 101 patients with severe AH and was superior to corticosteroids in another study. However, a meta-analysis of 5 RCTs has failed to show any benefit with pentoxifylline therapy. One consistent finding is the beneficial effect of pentoxifylline in prevention of HRS, but the mechanism of action of pentoxifylline in AH is unclear. Because there is reduction in tumor necrosis factor (TNF) levels, it is speculated that pentoxifylline acts by neutralizing TNF receptors or regulating cyclic nucleotide levels in mediating its beneficial effects in AH and prevention of HRS. Pentoxifylline did not show benefit when combined with steroids compared with steroids alone in pooled data from 5 RCTs or when used as salvage option in steroid nonresponders. Currently, pentoxifylline remains an option when corticosteroids are contraindicated, but in many centers, this drug is first-line treatment for severe AH patients. A large multicenter clinical trial in the United Kingdom entitled Steroids or Pentoxifylline for AH (www.stopah.com) that proposes to recruit 1200 patients (300 each in 4 arms: corticosteroids, pentoxifylline, corticosteroids and pentoxifylline, and no treatment) is currently in progress, and results of this study will hopefully determine the status of steroids and pentoxifylline in the management of severe AH.

**Tumor Necrosis Factor-α Inhibitors**

Because TNF-α is thought to be a major player in the pathogenesis of AH, 2 anti-TNF-α agents, infliximab and etanercept, were evaluated for treatment of AH but did not show benefit. In fact, the study assessing etanercept had to be closed prematurely because of increasing number of deaths in the treatment arm, mostly from superimposed infections. Apart from activating inflammatory pathways, TNF-α also stimulates genes for hepatocyte growth factor and regeneration. Inhibition of these pathways probably makes patients more susceptible to infections and a poor outcome. Hence, anti-TNF-α agents are not recommended for the treatment of AH.

**Antioxidants**

Alcohol increases reactive oxygen species and oxidative stress. Initial studies that used an antioxidant cocktail of vitamin E and N-acetylcysteine (NAC) did not show any benefit. In a recent RCT on 174 patients with AH, use of NAC in combination with corticosteroids was found to be associated with better patient survival only at 1 and 2 months when compared with steroids alone. Nonetheless, patients receiving adjuvant NAC died less often from infections. However, the beneficial effect of the combination may be because of the seemingly high mortality rate of 35% in the steroid-treated arm as compared with the expected mortality of 15%. Further studies are needed before recommending routine addition of NAC to steroids in clinical practice.

**Miscellaneous Drugs and Strategies**

Oxandrolone, an anabolic steroid, improves muscle strength and nutritional status. In an RCT, oxandrolone was beneficial in improving long-term but not short-term survival in patients with moderate AH. Nonetheless, some authors suggest this drug for corticosteroid refractory AH on the basis of their anecdotal experience. Granulocytapheresis, a technique that removes up to 60% of activated granulocytes and monocytes from circulating blood, was well-tolerated in a series on 6 patients with severe AH (5 of them steroid nonresponders). Albumin dialysis by using the molecular adsorbent recirculating system improved hepatic and renal function, hemodynamics, and hepatic venous pressure gradient but without clear benefit on survival.

**Liver Transplantation for Alcoholic Hepatitis**

Controversy exists on use of LT for AH that relates to both medical and ethical issues. On the basis of a rationale that AH may improve with medical management and that duration of abstinence can predict abstinence after transplant, many transplant centers require a period of 6-month abstinence before considering transplant in patients with AH. However, data on 6-month pre-transplant abstinence and risk of relapse after LT are conflicting. In a pooled analysis of 32 studies, 6-month pre-transplant abstinence did not emerge as a predictor of recidivism, and other factors such as patient’s insight, social support, and comorbid psychiatric disorders were stronger predictors. Although recidivism after transplantation occurs in about 60%–70% of cases, harmful drinking (>2 drinks/day) is reported in only 15%–20%. Furthermore, risk of graft loss or recurrent cirrhosis is only about 20% among people with harmful drinking (<5% of patients receiving LT). A disease complex like alcohol addiction and abuse is unlikely to be defined by a single parameter in regard to relapse; therefore, the 6-month rule is overly simplistic. Better insight into the behavioral aspects of this disease is needed to guide transplant policies for this disease. With this backdrop, French investigators recently challenged the 6-month rule and demonstrated the
benefit of LT in a case-control prospective study of 26 patients with severe AH who were not early responders to medical therapy. Patients were selected after very thorough psychosocial evaluation by social workers, transplant hepatologist, anesthesiologist, and transplant surgeon. Compared with 52 matched patients, those receiving transplant had better survival at 1 month (96% vs 85%) and at 1 year (73% vs 26%, \(P < .05\)). Only 3 patients had self-reported relapse, 2 with social drinking at 45 and 366 days, and a third reported harmful drinking at 965-day follow-up. There was no graft loss related to alcohol drinking. Additional data supporting the benefit of LT for severe AH are reported by using the United Network of Organ Sharing database. In this study, 55 patients transplanted for AH compared with 165 matched patients transplanted for alcoholic cirrhosis had similar 5-year liver graft survival (85% vs 87%, \(P = .21\)) and patient survival (91% vs 89%, \(P = .35\)). Although these studies indicate that LT may be effective in a highly selected cohort of patients with AH, further studies will be required to validate and refine the criteria by which AH patients should undergo LT.

### Suggested Approach for Management of Alcoholic Hepatitis

A high index of suspicion is needed for diagnosis of AH among patients with chronic and active alcohol abuse and recent onset of jaundice (Figure 1). Diagnosis is often made clinically, and liver biopsy is recommended when clinical diagnosis is uncertain. Patients with mild disease are treated with nutritional supplementation, management of alcohol withdrawal, counseling for abstinence, and supportive care for liver disease complications. Patients with severe disease (mDF >32 or MELD ≥20) should be considered for pharmacotherapy in addition to supportive care. This may include corticosteroids or pentoxifylline, depending on patient and provider preference and presence of contraindications to

![Figure 1. Suggested algorithm in diagnosis and management of AH. CXR, chest x-ray; DM, diabetes mellitus; ECBL, early change in bilirubin level; LCP, liver chemistry panel; PSE, portal systemic encephalopathy; PTX, pentoxifylline; SB, serum bilirubin; SIRS, systemic inflammatory response syndrome.](image-url)
Corticosteroids (Figure 1). Corticosteroids should be discontinued at 1 week in nonresponders (Lille score >0.45). These nonresponders may be enrolled in clinical trials for newer targets for AH, or selected patients may be evaluated for LT.

Future Directions

Because of the current limitations and therapeutic options for patients with AH, there remains a critical need for newer, more effective agents for treating this condition. Until recently, there were scarce clinical resources from government or industry aimed at identifying new therapies for AH. However, more recently, a major initiative from the National Institute on Alcohol Abuse and Alcoholism has spearheaded large multi-institutional consortia with the task of identifying new therapeutic targets and performing early-phase clinical studies to develop and test new drugs for managing AH (http://projectreporter.nih.gov/reporter.cfm: U01 AA 021883 and U01 AA 021902) (Figure 2). Broadly, these

Figure 2. Pathogenesis of AH with identification of newer therapeutic targets. (1) Alcohol increases gut permeability and allows translocation of bacterial LPS, which stimulates Toll-like receptor (TLR)-4 receptors in liver. Antibiotics, probiotics, and immunoglobulin to LPS may attenuate this response. (2) Kupffer cells stimulate inflammatory cascades including production of IL-1, which recruits white blood cells. Anakinra is an antagonist of IL-1 receptor. Macrophage inflammatory factor is another target. (3) TNF-α mediates cell death via caspase-8 (apoptosis) and caspase-1 (sterile necrosis). Caspase inhibitor emricasan is a potential agent blocking final common pathway without affecting hepatic regeneration as seen with anti-TNF agents, corticosteroids, and other cytokine modulation. FXR agonists may also have hepatoprotective effects through multiple mechanisms. DAMP, damage-associated molecular patterns. Adapted from a image courtesy of Dr Vikas Verma.
is increased in patients with AH (Figure 2). Selective in-

ded U01 projects and consortia were added after this 

tion that leads to bacterial and endotoxin translocation, 

hepatocellular apoptosis, necrosis, and injury. These are 

described further below. Several additional NIAAA fund-
ded U01 projects and consortia were added after this 

carticle was accepted and could not all be comprehen-
sively reviewed here.

Intestinal permeability to gut-derived microorganisms 
is increased in patients with AH (Figure 2). Selective in-
testinal decontamination with nonabsorbable and systemic 

antibiotics such as rifaximin and norfloxacin respectively 
decrease plasma endotoxin levels and improve clinical 

outcomes in patients with alcoholic cirrhosis. Furthermore, 

probiotics such as bifidobacterium and lactobacillus restore bowel flora and improve neutrophil 

phagocytic activity, liver enzymes, and prognostic scores 
among alcoholic cirrhotic patients and patients with 
mild alcohol-related steatohepatitis. With this back-
ground in mind, several consortia studies will explore 
this area in further depth. One will focus on anti-

lipopolysaccharide (LPS) antibody contained within 

bovine colostrum (Imm 124-E). The test agent will be 

administered in combination with corticosteroids (com-
pared with corticosteroids alone) in patients with severe 

AH. Another consortium study will examine the efficacy of 

probiotic therapy against placebo in patients with moder-

ate severity AH. Yet a third consortium study will focus on 

additive effects of zinc, a mineral that improves gut 

 barrier function, on a multidrug cocktail in patients with 

severe AH. Thus, restoration of gut barrier function and 

attenuation of the effects of gut endotoxin represent 

important future directions of possible therapies in AH.

It is now increasingly recognized that activation of the 
native immune response, especially Kupffer cells, is a key 

step in the process of alcohol-induced liver injury. Indeed, 
inhibition of macrophage function is beneficial in 

animal models of alcoholic liver injury. The macrophage 

plays a key role in amplifying LPS-induced liver injury 
because LPS activates Kupffer cells, leading to increased 

production of interleukin (IL)-1/β, which in turn recruits 

other inflammatory cells. One of the compounds that will 

be tested in consortia trials is anakinra, which is an IL-1 

receptor antagonist. Recent work showed impressive 

benefits of this agent in preclinical models of AH. This 

compound will be tested in combination with pentox-
iyline and zinc in patients with severe AH. An additional 

approach in consortia investigations will focus on 

another macrophage regulatory protein, macrophage 

migration inhibitory factor. Thus, targeting macrophage 

activation is a promising trajectory direction for future 

AH treatment therapies.

Approaches to attenuate ethanol-induced hepatocel-

lular injury have represented a long-standing target in AH. 

Indeed, recent genome-wide association studies have 

identified several up-regulated target genes in this 

pathway. Major initiatives have focused especially 
on the TNF-α pathway; however, a variety of approaches 
to directly inhibit the TNF-α pathway have not been suc-

cessful. With this in mind, a number of consortia 

studies will focus on alternative cell injury pathways. One 

study focuses on a new class of drugs that inhibit caspases. 

Caspases are death induction molecules that are situated 
downstream from TNF-α in the hepatocyte injury 
signaling cascade. Targeting these molecules should 
theoretically block alcohol-induced hepatocyte injury but 
avoid blocking the beneficial effects of TNF-α on liver 
regeneration and on immune cell function. Furthermore, 
because caspases are also important in the stimulation of 
the sterile necrosis response whereby injured hepatocytes, 
macrophage, and other cells recruit inflammatory 
cells to sites of injury, caspase inhibition has potential to 
dampen necroinflammation and innate immune cell activation. 
The pancaspase inhibitory compound proposed for 
future investigation in AH through the consortium is 
emricsan, which will be compared with placebo in 
patients with severe AH who have contraindications to corticosteroid therapy. Another test compound focused on 
this pathway is the FXR agonist obeticholic acid. FXR 
activation has been shown to be potentially beneficial in a 
number of liver diseases including primary biliary 
cirrhosis. The mechanism of benefit is not certain but may 
relate to reduced oxidative stress and/or improved bile 
salt metabolism. Multiple consortia studies will test this 
compound in early-phase clinical trials including in pa-

tients with moderate severity of AH.

Another intriguing molecule for the treatment of AH is 
IL-22. This cytokine is hepatoprotective and exerts 
potent antioxidant, antipapoptotic, and anti-steatotic ef-

fects in preclinical models of liver diseases. Its use in the 
treatment of AH has been proposed and may be pursued 
in 1 of 2 additional AH consortia that are soon likely to 
activate. In summary, increasing resources are being 
allocated to advance management approaches for alco-

holic liver disease, especially AH. It is anticipated that 
these initiatives will lead to treatment advances for this 
devastating condition in the foreseeable future.

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Conflicts of interest
The authors disclose no conflicts.

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1. True statements regarding the use of steroids for severe AH include:
   a. Dose is 40mg of prednisolone for 4 weeks with a taper over the next 4 weeks
   b. About 25% develop an infection during steroid therapy, higher if no response to steroid
   c. Renal insufficiency, if present needs to be corrected prior to initiation of steroids
   d. Steroids are contraindicated if the patient has coexistent HCV

2. A 52 year old obese male who “drinks socially” but not excessively according to him (his wife disagrees) has cirrhosis. Transplant is being considered, but the distinction between ASH and NASH is important, as your transplant center does not transplant alcoholics. Factors that would favor alcohol as an etiology in this patient includes:
   a. his age
   b. an MCV of 110
   c. An ALT of 98 and AST of 85
   d. A BMI of 45
   e. His gender

3. General interventions that may help in alcoholic hepatitis include
   a. Total parenteral nutrition instead of oral nutrition
   c. Low protein diet
   d. Zinc replacement therapy
   e. non-absorbable antibiotics or probiotics

4. Patients admitted with severe AH and infection may benefit from steroid therapy once the infection is under control

5. A patient with alcoholic hepatitis should be considered a candidate for therapy if the MELD score is >20.

6. The Lille score can be used instead of the Maddrey score to select patients that may benefit from initiation of therapy

7. More than 6 month of alcohol abstinence before transplant is the best predictor for low likelihood or relapse post-transplant.

8. Based on studies using corticosteroids to treat severe AH, the number needed to treat to prevent one death is 5

9. Corticosteroid therapy of AH is equally effective even with HCV infection is present

10. Pentoxyfylline main value seems to be the prevention of encephalopathy in patients with severe AH.