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## Introduction

Liver Failure is : the inability of the liver to perform its normal synthetic and metabolic function as part of normal physiology .  
[ O,Grady J G ,et al. 1993]

Current medical therapy for end stage liver disease is focused on substitution of blood or plasma products , volume expansion or anti biotic treatment . The only specific treatment is liver transplantation , which is limited by available organs .[ **Gambro Lundia AB , 2008** ]

With the growing disparity between the numbers of suitable donor organs and patients waiting for transplantation , efforts have been made to optimize the allocation of organs ,to find alternatives to cadaveric liver transplantation and to develop extracorporeal methods to support or replace the failing organ .Moreover ,in the case of hepatic failure , patients with a capacity for liver recovery could be bridged to regeneration and would not require transplantation at all , in case of chronic liver failure , temporary extracorporeal liver support therapy may be beneficial in episodes of acute deterioration ( acute on chronic liver failure ) . The development of artificial liver has been complicated by the complex array of functions that the normal liver provides which includes : synthesis of co-agulation factors , opsonins , albumin and prohormones (e.g rennin substrate), gluconeogenesis ,amino acids and lipid metabolism and reticuloendothelial clearance of bacteria and

small particle debris via (van Kupffer cells and endothelium) The most difficult hepatic function to replace exogenously is detoxification, which is accomplished primarily through biotransformation and / or excretion of various toxic metabolites and exogenous agents .  
[**Sussman NL , et al. 1992**]

Although synthetic deficits may be ameliorated by the administration of fresh frozen plasma and nutrient preparation such as hyperalimination , an effective artificial liver must be able to detoxify . Moreover , the complexity of human metabolism is so great that the most efficient way to address this challenge may be the development of extracorporeal system .[ **Stange J , et al. 1993** ]

In liver failure , there is accumulation of water- soluble toxins ( e. g., ammonia and mercaptans ) and a number of albumin- bound water insoluble toxin ( e. g., bilirubin , bile acids , short chain fatty acids and aromatic amino acids ) , these toxins have been implicated as a cause of hepatic encephalopathy and organ dysfunction in patients with liver failure , conventional continuous veno-venous hemodiafiltration ( CVVHDF ) has been shown to be effective in the removal of water-soluble toxins , in order to clear the blood of albumin-bound hydrophobic substances , additional adsorber or acceptor substances are necessary to enhance mass exchange . Albumin is one of the potential acceptor substances.  
[**O,Grady JG , et al. 1988**]

The artificial extracorporeal liver support is a term that is used to describe : measures that are used to carry-out liver function and are outside of the body.

Devices that support liver function outside the body are :- Liver dialysis and bioartificial liver ( BAL ) devices .

[ **Ash SR , et al. 1992** ]

Liver dialysis is a detoxification treatment for liver failure with encephalopathy and has shown promise for patients with hepatorenal syndrome . It is similar to haemodialysis but haemodialysis removes only water-solubles substances . [ **Stange J , et al. 1993** ]

Liver dialysis acts through a process called hemodiabsorption , to selectively remove certain organic substances ( hydrophobic ) by binding them and decreasing their concentration on the dialysate side of the membrane .

The liver dialysis unit removes aromatic aminoacides more than branched-chain aminoacides , thus decreasing ammonium production and improving neurologic status .

Patients on liver dialysis have decreased jaundice due to improvement in intrinsic liver functions .

Acetaminophen levels (which may be the cause of acute liver failure) decrease on average of 73% per 4 to 6 hours treatment with liver dialysis .

Liver dialysis is generally administered for 4-6 hours per day for 3-6 days . End points include improvement in neurologic status , improvement in physiologic status or indication of irreversible damage . [ **Hughes R , et al. 1979** ]

Whilst the technology is in its infancy , the prognosis of patients with liver failure remains guarded .

Liver dialysis , currently , is only considered to be bridge to transplantation or liver regeneration ( in case of acute liver failure ) and unlike kidney dialysis ( for renal failure ) can not support a patient for an extended period of time

( months to years ) . [ **Falkenhagen D , et al. 1999** ]

The main indication for considering artificial liver support ( ALS ) systems in liver failure is to give additional time for liver regeneration or spontaneous recovery to occur . The usual situation includes :- 1- Acute fulminant hepatitis due to hepatitis ( A , B & C ) , toxicity due to acetaminophen , occasionally in sever acute alcoholic hepatitis and conditions producing an acute exacerbation of chronic liver disease like GIT bleed , SBP and sepsis .

2- In hepatorenal syndrome , sudden deterioration of liver function with ARF following precipitated events may warrant use of ALS systems as well as dialytic support . [ **Strange J , et al. 2002** ]

3 – In patients a waiting liver transplantation , ALS systems may be indicated to tide over complication like hepatic encephalopathy where accumulation of toxins could produce permanent brain damage due to cerebral edema . It may also employed in irreversible liver damage when there is a delay in procuring a suitable organ .[ **Kramel,2002**]

4- Following liver transplantation , ALS systems may be indicated in primary non function or delayed function of the graft. [**Mitzener SR, et al. 2000**]

5- Intractable pruritis may also be reversed by ALS . [**Kramel,2002**]

\* Its clear that survival post transplant is improved if patients are transplanted before they require hospitalization for treatment of complications of their disease , this approach is cost-effective as well , there for , if the use of artificial liver improved a patients condition and allowed recovery from some of the complications of chronic liver disease prior to transplantation , the artificial liver might well prove both medically effective and economical .

It might allow patients to leave the hospital and wait at home for elective liver transplantation . It would also end the practice of transplanting sickest patient first , a strategy which is very costly and results in a high incidence of retransplantation .[ **Sen S , et al. 2002**]

The liver dialysis devices include :-

- 1- Molecular Adsorbent Reticulating system ( MARS ) ,
- 2- Single Pass Albumin Dialysis ( SPAD ) ,
- 3- Prometheus system .

The real need for these complicated devices in patients with fulminant hepatic failure is to prevent or reverse the potentially fatal cerebral edema that occurs in this setting . [**Stange J , et al. 1993** ]

In fact , artificial livers will be tested initially in patients with fulminante hepatic failure from acute hepatitis , primary non function , or acute exacerbation of chronic injury patients . Survival will be the ultimate outcome parameter for these studies of the artificial liver .

[ **O,Grady JG, et al. 2006**]

## **Aim Of The Work**

**The aim of the work is to spot light on the liver dialysis and its importance in treatment of liver failure .**

**Liver failure basics :**

Liver failure can complicate almost of liver disease .Though the clinical picture differs ,the overall picture and the treatment remains the same . Liver failure may follow ( cirrhosis , viral