

The Artificial Liver

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Abstract- The liver is one of the most complex organs in the human body. It is responsible for filtering blood, producing cholesterol, maintaining glucose levels, and storing vitamins and minerals. However, one of the liver's most unique qualities is that it can regenerate its own damaged cells. This is important because the liver can be subjected to liver diseases, which can lead to death. The only current solution to liver disease is a liver transplant. However, human livers are not easy to come by and the wait list is exceedingly long. Thus, in the case people already have damage to their liver, they may be able to live off an artificial liver until their original liver heals and regenerates itself.

I. Introduction- Vital Therapies has claimed that they have created the first cell-based, bio-artificial liver designed to stabilize liver function in patients with life-threatening acute liver failure. The product they have created is called Extracorporeal Liver Assist Device or ELAD. Although this device does not substitute all the functions of the liver, it is able to process toxins, synthesize proteins, and give patients a longer survival time while waiting for a liver transplant. This device uses human liver cells that are derived from a liver tumor that are grown in cartridges.

II. Method- The ELAD device filters blood through a set of four cartridges and a glucose pump. The liver cells (that are derived from a liver tumor) are located in the cartridges and mounted on a bedside unit. These cells can perform most of the metabolic functions of the human liver and these cartridges last up to seventeen days. The ELAD system is also comprised of a dialysis type pump, which first separates plasma out of the patient's blood. Then, the

glucose pump adds glucose to the plasma. Once patient's plasma runs through these cartridges, the cells filter the toxins before the plasma is returned to the patient's bloodstream. This current treatment involves three to five days of therapy.

III. Experiment- In September of 2012, the company announced that they had enough funds to carry ELAD through three pivotal phase studies in a total of 375 patients with acute alcohol hepatitis. The studies are to take place in the USA, New Zealand, and Australia. Phase 1 has already begun, with the other two phases to take place next year. If the company is successful with these phase research trials, the device could most likely launch by the end of 2016.

IV-Results- Currently, Vital Therapies only extends the survival of a liver and does not cure liver disease. However, a pivotal trial in China with people affected with Hepatitis B showed interesting results. The results showed significant improvement in transplant-free survival among patients treated with ELAD compared to the group that was not treated. While the transplant-free survival for control patients was only 37 days, the median transplant-free survival among the ELAD-treated group was still not reached, even after three years of a follow-up.

V. References-

<http://www.vitaltherapies.com>

<http://medcitynews.com/2012/11/supported-by-an-86-million-round-first-bio-artificial-liver-moves-toward-pivotal-trials/>

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