

Alginate Biomaterials for Treating Liver Dysfunction and Disease (BGN)

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Acute liver failure and chronic liver disease, such as hepatitis and cirrhosis, present a huge unmet medical need, with annual 1-2 million deaths worldwide. The liver is responsible for detoxification-removing and excreting body wastes and hormones, drugs and foreign substances, synthesis of plasma proteins, including most of the blood clotting factors and the production of immune factors, among other life sustaining functions. The liver is one of the body organs with the most remarkable capacity to regenerate after injury and to adapt its size to the host when transplanted. Partial hepatectomy, removing up to 2/3 of liver leads to proliferation of all cells within the liver, and is associated with changes in gene expression and initiation of DNA synthesis, allowing the liver to regain its original size and normal functions.. According to WHO estimates, ~12 million people worldwide suffer from severe liver disease, many of which require organ transplants or other liver support therapy. Alginate based device are produced as a tissue engineering therapeutic solution for acute and chronic liver indications. Biomaterials are currently in use or under investigation as implants to facilitate restoration and regeneration of defective or missing tissues in conditions caused by disease, trauma or reconstructive surgical procedures. In particular, injectable biomaterials are ideal for tissue restoration since the material may be delivered via a small incision, allowing minimally invasive access to the tissue space where appropriate.

The Technology

Alginate biomaterial in various forms (cross-linked as well as non- cross-linked) has been used for the induction of liver-like tissue in an animal model with acute liver failure due to extended hepatectomy. The biomaterial both in the solid or liquid form, decreased the cellular damage, promoted in vivo repair and regeneration of liver tissue by inducing differentiation of liver progenitors into functional liver tissue, restored liver functions such as detoxification and protected the cells from apoptotic and necrotic death.

Applications

Regeneration of liver tissue in various indications of hepatic disorder and liver damage:


Acute liver failure

Chronic liver disease

Patent Status

Patent pending

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