

## **PROBLEM STATEMENT**

The liver has many functions such as glucose synthesis and storage, detoxification, production of digestive enzymes, erythrocyte regulation, protein synthesis, and various other features of metabolism. Chronic liver diseases include chronic hepatitis, fibrosis, and cirrhosis. Hepatitis can occur from viral infection (e.g., hepatitis c virus) or auto-immune origin. Inflammation from hepatitis infection can cause tissue damage and scarring to occur in the liver. Moderate scarring is classified as fibrosis, while severe liver damage/scarring is classified as cirrhosis. Fibrosis and cirrhosis can also occur from alcoholism and nonalcoholic fatty liver disease. When liver disease is diagnosed at an earlier stage, in between infection and fibrosis but before cirrhosis, liver failure can be avoided. Tests, such as a CMP and biopsy, can be conducted to diagnose all forms of liver disease. A CMP with a liver function panel can detect albumin (ALB), alkaline phosphatase (ALP), alanine amino-transferase (ALT), aspartate amino-transferase (AST), gamma glutamyl-transferase (GGT), creatine (CREA), total protein (PROT), and bilirubin (BIL).

The use of artificial intelligence and machine learning in combination with clinical findings has further improved disease detection. Statistical machine learning algorithms based on specific problems can assist one to make decisions. Machine learning (ML), data-driven algorithms can be utilized to validate existing methods and help researchers to make potential new decisions. Our project will be a helping hand in detecting the right disease based on the patient's information.

Who does the problem affect?	An abnormal gene inherited from one or both of your parents can cause various substances to build up in your liver, resulting in liver damage.
What are the boundaries of the problem?	Diagnosis of a certain liver disease and discovery of its origin are made by interpreting the patterns and ratios of circulating liver-associated molecules measured with the CMP test and compared to values normalized with a patient's age, sex, and BMI.
What is the issue?	Over time, liver disease can cause <b>cirrhosis (scarring)</b> . As more scar tissue replaces healthy liver tissue, the liver can no longer function properly. Left untreated, liver disease can lead to liver failure and liver cancer.
When does the issue occur?	Parasites and viruses can infect the liver, causing inflammation that reduces liver function. The viruses that cause liver damage can be spread through blood or semen, contaminated food or water, or close contact with a person who is infected.
Where is the issue occurring?	Pain in your liver itself can feel like a dull throbbing pain or a stabbing sensation in your <b>right upper abdomen just under your ribs</b> . General abdominal pain and discomfort can also be related to swelling from fluid retention and enlargement of your spleen and liver caused by cirrhosis
Why is it important that we fix the problem?	Liver performs around 500 functions in our body. If left untreated , it may lead to chronic liver disease and malfunction