**PART A**

A well-researched resource, the UCI Heart Disease dataset contains 16 variables that reflect clinical, diagnostic, and demographic information. Investigating the complex causes of heart disease, a major worldwide health concern, requires the utilization of this dataset. In order to predict the presence of heart disease (num), this report examines the interactions between several important characteristics, including age, sex, the type of chest pain (cp), resting blood pressure (trestbps), cholesterol levels (chol), fasting blood sugar (fbs), resting electrocardiographic results (restecg), maximum heart rate attained (thalach), exercise-induced angina (exang), ST depression (oldpeak), slope of the ST segment (slope), number of major vessels (ca), and thalassemia results (thal). A categorical label designating the presence or absence of cardiac disease is the expected characteristic (num). Finding trends and insights that can enhance early diagnosis and treatment plans is the goal of the analysis.  
  
Every element adds to our knowledge of cardiovascular health. Two basic demographic factors that have a major impact on the incidence and presentation of cardiac disease are age and sex. For instance, post-menopausal women are more at risk for heart disease because of hormonal changes, but men have historically demonstrated a higher risk in younger age groups (Mozaffarian et al., 2016). Diagnosing typical versus atypical presentations requires the ability to differentiate cardiac symptoms, which are aided by chest pain type (cp). Since elevated levels are associated with hypertension and hyperlipidemia, variables like resting blood pressure (trestbps) and cholesterol levels (chol) are well-known cardiovascular risk factors (WHO, 2021). Restecg and thalach show the electrical activity and physical stress tolerance of the heart, whereas fasting blood sugar (fbs) detects diabetes, a major comorbidity of cardiovascular disorders.  
  
In order to investigate the connections between these variables and how they collectively affect the outcomes of heart disease, this study will concentrate on descriptive and inferential analysis. For example, examining the effects of oldpeak and slope in conjunction with exercise-induced angina (exang) can reveal information about heart vulnerabilities connected to stress. Similarly, structural heart abnormalities can be shown by comparing the number of main vessels (ca) seen during fluoroscopy with other clinical signs. Finding predicted patterns and interactions that provide a thorough understanding of heart disease, and its risk factors, is the goal of this paper. These discoveries have the potential to improve predictive modeling methods and, in turn, guide preventative healthcare plans.

References:

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3. UCI Machine Learning Repository: Heart Disease Dataset. Retrieved from [UCI Repository](https://archive.ics.uci.edu/ml/datasets/Heart+Disease).