serum ACP and prostatic acid
Phosphatase activity

The term acid phosphatase (ACP) refers to a group of phosphatase that show maximum activity near pH 5.0 and catalyze the hydrolysis of an orthophosphoric monoester to yield an alcohol and a phosphate group.

Several ACP isoenzymes are found in human tissues and cells, including liver, spleen, kidney, prostate, platelet, erythrocytes, osteoclast, and hairy cell leukemia's. Heterogeneity in the carbohydrate portion of the molecule may result in 20 or more isoenzymes in human tissues, through the clinical relevance of most of these remains to be established, of the ACP isoenzymes currently identified, only prostatic acid phosphatase (PAP or ACP isoenzymes 2 by electrophoresis) and ACP1 and ACP5 from human spleen in Guacharo's disease are associated with demonstrated clinical utility. Prostatic tissue is unusually rich in PAP, which does not normally enter the circulation. Thus elevations in PAP are seldom associated with benign prostatic hypertrophy, whereas elevations are common in association with prostatic carcinoma. PAP is secreted into the semen and functions extracellularly. Its exact function is not known, but it is assumed to be important in fertilization. Testosterone increases, and estrogen decreases, its production. Normal human serum contains at least three ACP isoenzymes. Their sources have not been determined; several cells or tissues have been suggested: red blood cells, platelets, white blood cells, liver and spleen. It seems evident that the prostatic gland is not a source, since normal females have essentially the same serum ACP levels as normal men. Acid phosphatase from different tissues are not identical and the effects of inhibitors such as L(+)-tartrate can be used to differentiate prostatic acid phosphatase from other ACP, or the inhibitor L-tartrate was shown to be useful as a specific inhibitor of PAP, by this approach, the assay of ACP is run in the absence and presence of L-tartrate, and the difference in activity between the assays is attributed to the prostatic isoenzyme. Although this technique is simple to perform and widely used, its sensitivity and specificity have been criticized.

More recently, a variety of immunoassay techniques have been developed for the quantitation of PAP. Example of these techniques include radioimmunoassay (RIA), fluorescence immunoassay (FIA), and immunoenzyme assays. All these assay quantity the mass amount of immunological reactive PAP. All these techniques possess the advantage of increase sensitivity over the so-called functional techniques such as tartrate inhibition, though the specificity is dependent on the antiserum used, and elevated serum values have been reported in patients without apparent prostatic cancer.
Clinical significance:-

The greatest concentration of ACP are found in the liver, spleen, erythrocytes, platelet, and prostate gland. There are no disease states associated with decreased ACP activity in serum. Causes of increased ACP activity include the following:

Prostatic fraction:
1. carcinoma of prostate.
2. infarction of prostate.