A brief summary of the important findings is given below:

1. Effect of administration of β-alanine and taurine on the concentration of taurine in serum and tissues

β-alanine lowered taurine level in tissues and the extent of lowering varies in different tissues. There was no significant lowering of taurine in serum. Maximum lowering effect of taurine on administration of β-alanine was obtained in liver and kidney, while brain and heart showed only small decrease. Administration of taurine elevated the level of taurine in the serum and tissues, the increase in the heart and brain being much lower than that in the other tissues.

Results obtained on the subcellular distribution of taurine indicate that most of the taurine is present in the cytosol fraction and the decrease in the taurine level brought by β-alanine is also found to be in the cytosol fraction.

The level of protein in the diet has significant influence on the taurine lowering effect of β-alanine,
lowest taurine levels being observed in rats fed 5% casein and highest in 16% casein.

2. **Effect of administration of β-alanine and taurine on the metabolism of cholesterol**

Both β-alanine and taurine produced similar changes in the concentration of cholesterol, triglycerides and phospholipids in the heart and liver of rats. Concentration of cholesterol in the heart in both β-alanine and taurine groups showed a decrease when compared to the control group while it was not significantly altered in the liver. Total phospholipids decreased in the heart in both groups but increased in the liver. Triglycerides on the other hand were found to be decreased in the liver, but increased in the heart in both groups.

Both β-alanine and taurine caused increased cholesterol synthesis in the liver as was evident from the increased incorporation of $^{14}$C-acetate into liver cholesterol and higher activity of HMG-CoA reductase. There was increased concentration of biliary bile acids and biliary cholesterol in both the groups. Lipoprotein lipase activity was significantly increased in the heart by both substances and decreased in the adipose tissue. Both taurine and β-alanine caused decrease in the release of lipoproteins into the circulation. Both the substances decreased the activity of plasma LCAT.
Thus these results indicate that though \( \beta \)-alanine reduce the level of taurine in the tissues, it replaces taurine in the cells functionally as far as the effect on cholesterol metabolism is concerned. Thus producing taurine deficiency by \( \beta \)-alanine does not appear to be useful for the study of the metabolic role of taurine.

3. **Effect of administration of taurine on the metabolism of glycosaminoglycans (GAG)**

Concentration of GAG in the tissues was influenced by administration of taurine. While concentration of total GAG and many of the individual GAG fractions increased in liver and kidney, there was decrease in aorta and heart.

Results of more detailed study on the metabolism of GAG carried out in liver indicated that activity of glucosamine 6-phosphate isomerase and UDPG-dehydrogenase increased significantly in the liver in rats administered taurine. These are important enzymes in the biosynthetic pathway of precursors of GAG.

The activity of enzymes involved in the degradation of GAG was also affected by taurine. Taurine administration caused decrease in the activity of hyaluronidase, aryl-sulfatase and cathepsin. Activity of \( \beta \)-glucuronidase and
β-hexosaminidase however increased on administration of taurine.

Sulfate metabolism in the liver was also affected by taurine. Concentration of PAPS and activity of sulfate activating system which includes sulfate adenyl transferase and adenyl sulfate kinase increased, but the activity of sulfotransferase decreased.

4. Effect of administration of taurine on the metabolism of glycoproteins (GP)

The concentration of all the carbohydrate components studied - total hexose, fucose and sialic acid - in the GP of aorta, heart, kidney and liver decreased in the rats administered taurine. The activity of glycohydrolases studied viz., β-glucosidase, β-galactosidase, β-fucosidase and β-hexosaminidase - which cleave the carbohydrate moieties in the GP, was increased in taurine administered rats.

5. Effect of administration of taurine to rats fed magnesium deficient diet on the metabolism of cholesterol

Magnesium deficiency caused decrease in the concentration of taurine in serum and tissues and administration of taurine along with magnesium deficient diet increased the concentration of taurine. Concentration of
magnesium in serum, liver and kidney decreased in the rats fed magnesium deficient diet. Feeding taurine to rats fed magnesium deficient diet counteracted the effect of magnesium deficiency and increased the concentration of magnesium in the serum and these tissues.

The effect of administration of taurine to rats fed magnesium deficient diet on the concentration of cholesterol, phospholipids and triglycerides in serum and tissues was also seen to be opposite to the effect of magnesium deficiency alone. While magnesium deficiency showed increase in the concentration of total cholesterol in the serum and aorta and decrease in the liver, taurine counteracted this effect and decreased the concentration of cholesterol in serum and aorta and increased that in the liver.

Concentration of cholesterol increased in the VLDL and LDL in magnesium deficient rats, while administration of taurine along with magnesium deficient diet decreased the concentration of cholesterol in these lipoprotein fractions.

Taurine administration along with magnesium deficient diet does not seem to counteract the effect of magnesium deficiency on cholesterogenesis. Cholesterogenesis in the liver as assessed by the activity of HMG-CoA reductase
and incorporation of label into cholesterol is increased in magnesium deficiency. Administration of taurine along with magnesium deficient diet also seems to cause a similar increase.

While magnesium deficient rats showed significant decrease in the concentration of hepatic bile acids, administration of taurine along with magnesium deficient diet, overcame this effect and caused increased hepatic concentrations of bile acids.

Magnesium deficient rats showed decrease in the activity of lipoprotein lipase in heart and adipose tissue. Taurine administration counteracted this decrease and caused increase in this enzyme activity. On the other hand, taurine administration had no effect on the activity of plasma LCAT.

Taurine also counteracted the increase in the release of lipoproteins into circulation observed in magnesium deficiency.

Taurine also counteracted the effect of magnesium deficiency on the fecal excretion of bile acids. While magnesium deficient rats showed decrease in the concentration of fecal bile acids, taurine counteracted this effect and caused an increase in the fecal excretion of bile acids.
But it had no effect on the increased excretion of fecal sterols observed in magnesium deficient rats.

6. **Effect of administration of taurine to rats fed magnesium deficient diet on the metabolism of GAG.**

Magnesium deficiency produced increase in the concentration of total GAG in the aorta and heart, and decrease in the liver. Administration of taurine to magnesium deficient rats counteracted these changes and produced a decrease in the total GAG in the aorta and heart and increase in the liver.

The effect on individual GAG fractions in the aorta, liver and heart was also found to be opposite in rats fed magnesium deficient diet and in those given taurine along with magnesium deficient diet. In the aorta while magnesium deficiency caused decrease in HA, HS and H and increase in Chon.4S+6S and DS, taurine administration counteracted these effects and produced the opposite changes. In the liver magnesium deficiency produced decrease in all GAG fractions, taurine administration caused an increase. In the heart while magnesium deficiency produced an increase in all the GAG fractions, taurine administration produced a decrease.

The effect of magnesium deficiency on the activity of biosynthetic enzymes was also seen to be counteracted
by administration of taurine along with magnesium deficient diet. While magnesium deficiency caused decrease in the activity of both the biosynthetic enzymes studied, viz., glucosamine 6-phosphate isomerase and UDPG-dehydrogenase, taurine administration counteracted this decrease and caused an increase.

The activity of enzymes involved in the degradation of GAG in the liver was also significantly affected by magnesium deficiency. While activity of hyaluronidase, β-N-acetyl hexosaminidase and arylsulfatase showed increase, and that of β-glucuronidase and cathepsin-D decreased in magnesium deficiency, taurine administration counteracted these changes and produced the opposite effect. The effect of taurine on the activity of degrading enzymes in the other tissues was also generally opposite to that seen in magnesium deficiency alone.

The influence of magnesium deficiency on the sulfate metabolism was also seen to be counteracted by administration of taurine. While activity of sulfate activating system (which includes sulfate adenyl transferase and adenyl sulfate kinase) and concentration of PAPS in liver decreased in magnesium deficient rats, taurine administration caused an increase in both cases. The activity of sulfotransferases increased in magnesium
deficiency and taurine administration counteracted this increase.

Thus administration of taurine generally counteracts the effect of magnesium deficiency on the metabolism of GAG.

7. Effect of administration of taurine along with magnesium deficient diet on the metabolism of GP

Magnesium deficiency generally caused an increase in the concentration of carbohydrate components of tissue glycoproteins while administration of taurine to magnesium deficient rats caused a decrease in most cases. In some tissues for example, in the kidney where concentration of fucose and sialic acid decreased in magnesium deficiency, taurine counteracted this decrease and caused an increase. Similarly, sialic acid in the liver showed decrease in magnesium deficiency, while administration of taurine caused an increase. The activity of many glycohydrolases in the tissues decreased in magnesium deficient rats and administration of taurine caused an increase.

Thus administration of taurine also counteracts the effect of magnesium deficiency on the metabolism of GP also.
8. Effect of administration of taurine on the severity of myocardial infarction induced by isoproterenol in rats.

Rats in which myocardial infarction was induced by isoproterenol administration showed increased activity of serum enzymes, viz., CPK, LDH, GOT and GPT and increase in the concentration of malondialdehyde, hydroperoxides and conjugated dienes in the heart, increase in concentration of cholesterol, triglycerides, phospholipids and free fatty acids in serum, aorta and heart, increase in total GAG in serum and heart and in the concentration of total hexose, fucose and sialic acid in these tissue GP. Pretreatment of rats with taurine before and during isoproterenol administration caused significant decrease in the activity of these enzymes and in the various other biochemical parameters.

Thus administration of taurine seems to reduce significantly the severity of myocardial infarction induced by isoproterenol in rats.