1. Shifts in the activity of lipase and in the levels of total lipids, total fatty acids, free fatty acids and glycerol have been studied in the gill, kidney, intestine, brain, liver and muscle of the fish *C. carpio*, at 1, 2, 3 and 4 days on exposure to lethal and 1, 7, 15 and 30 days on exposure to sublethal concentrations of mercury, so as to assess the involvement of lipid metabolism in the fish exposed to mercury toxicity.

2. The total lipids and total fatty acids decreased in the organs of the fish at all the four exposure periods in lethal concentration and this decrease progressed with the increase in exposure period. Contrary to this, the total lipids and total fatty acids increased in the organs of the fish at all the four exposure periods in sublethal concentration, and this increase also progressed with the increase in exposure period up to 15 days, however, relative to 15 days a decrease was observed at 30 days. This indicated a step-wise breakdown of lipids in the organs of the fish exposed to lethal concentration and synthesis of them in the organs of those exposed to sublethal one. The high concentration of metal might have activated the lipolytic activity in the organs of the fish, whereas, the low concentration of the metal might have stimulated the lipogenesis as a strategis step to fortify the organs to meet the low toxic stress.
3. The coinciding shifts in the lipase activity, involving its very high increase in the organs of the fish exposed to lethal concentration and very low increase in the organs of those exposed to sublethal concentration supports that the high increase was for a direct action of it on lipids for their breakdown, lipolysis, whereas, the low increase for lipogenesis, due to its reversible action.

4. The shifts in the total lipid content in the organs of the fish would suggest substantial alterations in the permeability properties of the cell membranes. Thus, more entry of the metal into the cell and binding of it to the active sites of the cell may be possible in lethal concentration, less penetration of the metal into the cells of the organs and more elimination of it from the body may be possible in those of the fish exposed to sublethal concentration.

5. One of the products of fat hydrolysis are free fatty acids. The high increase of them observed in the organ of the fish exposed to lethal concentration may indicate their less utilisation for metabolic energy production, compared to the degree of fat hydrolysis. However, part of them might have been channelled for the production of acetyl-CoA. The decrease in free fatty acid levels observed in the organs of the fish exposed to sublethal concentration may clearly indicate their participation both in the production of metabolic energy and
in the synthesis of lipids. The probable course of fatty acid utilization may have been through $\beta$-oxidation. Part of the acetyl-CoA produced might have been diverted into TCA cycle for energy production and part of it might have been utilized for the synthesis of lipids.

6. The other product of fat hydrolysis is glycerol. The increase in it in the organs of the fish exposed to lethal concentration of mercury may indicate its less utilization, relative to its formation. However, part of this might have been utilized for metabolic energy production via glycolysis. The decrease observed in it in the organs of the fish at 7 and 15 days of exposures to sublethal concentration may indicate its maximum utilization, partly for metabolic energy production either via oxidative metabolic pathway or via glycolysis. Rest of the glycerol might have been utilized for the synthesis of phospholipids, and glycerol is known to be the precursor in phospholipid synthesis.

7. Among all the organs studied, lipolytic activity was more in the brain, as indicated by more lipid breakdown and high lipase activity, in the fish exposed to lethal concentration. This may be to meet high energy expenditure to integrate the various processes involved under acute toxic stress. Whereas, in sublethal concentration the stress on the brain may be relatively less, compared to the organs which are directly
involved in the metal detoxification and elimination processes, and hence less increase in total lipids may be justifiable.

8. The gill, kidney and intestine being the osmoregulatory organs which are directly involved in osmo- and iono-regulatory processes, shifts in lipid metabolism in these organs of the fish may be possible in lethal and sublethal concentrations of mercury. Lipid breakdown in these organs might have been triggered by stimulating the lipase activity by high concentrations of the metal. This may loosen the osmo- and iono-regulatory function of these organs, which is one of the reasons for the death of the animal under acute concentrations. Whereas, lipid synthesis was dominant over breakdown under sublethal concentration may be to fortify these organs to prevent the entry of the metal into organ systems and also to maintain the perfect osmo- and iono-regulatory activity.

9. Liver is an important centre for metabolism including lipid storage and synthesis of lipid substances. The less decrease in lipid content in this organs of the fish exposed to lethal concentration may indicate its high storage capacity, and more increase in lipase activity may indicate its high synthetic capacity. Further, in sublethal concentration a high increase observed in lipid content in this organ may be helpful for the activation of detoxification mechanisms. However, with the limited information available, the exact role is a matter of conjuncture.
10. The lipid utilization and synthesis respectively in the muscle of the fish exposed to lethal and sublethal concentrations of mercury can be taken to suggest its role under toxic stress. The lipid breakdown may be to supply the required energy to it for maintaining proper synaptic transmittory activity at myoneural junctions and lipid synthesis may be to stabilize the membrane permeability for active muscular movements.

11. On the whole, the drastic lipolytic activity in the organs of the fish exposed to lethal concentration of mercury may cause greater imbalance in the homeostatic mechanism of the fish, which is one of the reasons for the death of the animal under acute toxicity, and the increased lipogenesis in the organs of the fish exposed to sublethal concentration may indicate the stabilization of organ systems for metal detoxification and elimination processes to achieve a compensatory mechanism to overcome the sublethal toxic stress.