Alloxan-induced hyperglycemic levels strongly suggest the diabetic/insulin deficient status of the animals. The decrease in body weight clearly shows a loss or degradation of structural proteins due to diabetes/insulin deficiency. The structural proteins are known to contribute for the body weight (Maurel et al., 1978). Hence, any alterations in these proteins will be reflected in the body weight. Earlier reports on diabetic rats show a similar situation (Maurel et al., 1978; Sahebjami and Denholm, 1987).

The decrease in dermal collagen concentration may be due to reduced synthesis or increased degradation. Mohanam and Bose (1982) have reported that increased crosslinking of collagen led to an increased susceptibility of collagen to degradation by decreasing the solubility of collagen in diabetic rat skin. It has also been reported that there is increased activity of dermal collagenase and other collagenolytic enzymes in diabetic rats (Reynolds et al., 1977; Schneir et al., 1984). Further, more recent observation on the decreased dermal collagen production due to diabetes (Spanheimer et al., 1988) strengthen the present postulation of enhanced dermal collagen degradation and diminished collagen synthesis due to diabetes. All kinds of collagens (acid soluble, neutral salt soluble and acid insoluble) were found to be decreased in diabetic rat skin (Ramamurthy, et al., 1979; Behera and Patnaik, 1979; Schnider...
and Kuhn, 1982). Thus, the foregoing observations are well in correlation with the diminution of dermal collagen in the present investigation in diabetic rats.

The altered hormonal status may be attributed as a reason for the decrease in dermal collagen content of rat under diabetic conditions. Insulin has been shown to increase dermal collagen production (Bembenek et al., 1982; Kream et al., 1985). Since there is an insufficiency of insulin in alloxan-induced diabetes mellitus, it may account for the decreased production of dermal collagen in the diabetic rats.

Glucagon, a hyperglycemic agent has been shown to inhibit dermal collagen synthesis (Canalis et al., 1977). In vitro observation on the inhibitory effect of glucose on the dermal collagen formation (Lien et al., 1984) argue in favour of this contention. The decrease in dermal collagen recorded in diabetic rats may be attributed to the inhibitory effect of elevated blood glucose on dermal collagen synthesis.

It has also been demonstrated that testosterone has a positive influence on dermal collagen synthesis (Centol et al., 1988). The reduction in serum testosterone due to diabetes (Centol et al., 1988) may also be a reason for the decrease in skin collagen concentration observed in the present investigation.
The main enzymes involved in the biosynthesis of collagen are prolyl hydroxylase and lysyl oxidase (Kivirikko et al., 1972; Cardinale and Udenfriend, 1974). Robert et al. (1985) reported a suppression of these enzymes in diabetes, which resulted in net reduction of collagen content of the skin.

It has also been well established that lysosomal enzymes possess the capacity to degrade completely the components of connective tissue such as collagen (Lazarus et al., 1968; Anderson, 1969; Woessner, 1971), proteoglycans (Kochar and Larson, 1977), glycoproteins (Mahadevan et al., 1969) and elastin (Janoff and Zeligs, 1968). The elevated specific activities of lysosomal enzymes viz., α and β-galactosidases and glucosidases, acid phosphatase and aryl sulfatases as demonstrated in the present investigation might have also contributed for degradation of dermal collagen.

Tulsiani et al. (1977) demonstrated an increase in β-glucoronidase and β-N-acetyl glucosaminidase in diabetic rats. In addition to these, other lysosomal enzymes like α-D-galactosidase, α-D-mannosidase, α-galactosidase, cathepsin B₁ and cathepsin D were also elevated in diabetes mellitus (Bomback et al., 1976; Kohler et al., 1979; Price and Foster, 1979; Merimee et al., 1981; alhadeff and Holzinger, 1982; Mohanam and Bose, 1983).
Increased activities of these enzymes as observed in the skin of diabetic rats may be due to decreased stability of the lysosomal membrane (Belforé et al., 1973). Insulin is said to play a significant role in the maintenance of lysosomal membrane stability. As it is well recognized that insulin preferentially localizes itself to the lysosomal membrane (Carpentier et al., 1979) it is implicated in the lysosomal membrane stabilization. Insulin by stabilizing the lysosomal membrane may prevent the leakage of lysosomal enzymes. Mohanam and Bose (1983) suggest that there is an increase in the fragility of the lysosomes which leads to the increased activities of lysosomal enzymes in experimentally induced diabetes mellitus.

The data obtained on pulmonary collagen and lysosomal enzymes are quite opposite to the observations made in the skin of diabetic rats. The increment in lung collagen concentration due to diabetes is in agreement with earlier investigations (Sahebjami and Denhom, 1987, 1988; Ofulve et al., 1988; Ofulve and Thurlbeck, 1988).

The elevated levels of lung collagen may be due to either enhanced collagen synthesis or reduced collagen degradation. The recent observation of Ofulve and Thurlbeck (1988) swing in favour of the reduced breakdown of collagen and other connective tissue proteins under diabetic
conditions. Ofulve et al. (1988) have reported an increment in the lung DNA and elastin content in diabetic rats. In lungs, it has been shown that whenever the elastin network extends, the collagen network follows as a coiled collagenous fibre around the elastin strand (Orsons, 1907). Probably the increase in elastin in the lung of diabetic rats indicate the follow up increase in collagen too, as evident from the enhanced collagen content in the present investigation.

A decreased crosslinking of pulmonary collagen is found in diabetic rat (Reisner et al., 1987). Mohanam and Bose (1982) have reported that increased crosslinking of collagen makes it insoluble and susceptible for degradation. Hence, the increase in pulmonary collagen may be due to reduced collagen crosslinking, which is in agreement with the work of Reisner and co-workers (1987).

The increase in collagen content of lungs of diabetic rats may be due to altered activities of enzymes involved in biosynthetic and catabolic systems. To date, no information is available on these enzyme machinery in the lungs. However, the low levels of collagenase synthesis in the leukocytes, (Nicoll et al., 1981) and reduced collagenolytic activity in the kidney (Lubec et al., 1982) of diabetic rats prompt to draw a correlation to the observed increased collagen concentration in the lung of diabetic rats.
Furthermore, the enhanced lysyl oxidase (Cohen and Khalifa, 1977) and UDP glucose-galactosyl hydroxylsine transferase (Haft and Reddi 1979) (enzymes involved in the synthesis of collagen) enzyme activities, enhanced collagen and non-collagen protein synthesis in the kidney and heart (Hasslacher and Wahl, 1980, Regan et al., 1980) of diabetic rats. This lends support to the contention of increased collagen synthesis in the lungs of diabetic rats.

The significant decline in the activities of lysosomal enzymes viz., α and β galactosidases and glucosidases and acid phosphatase in the lung of diabetic rats suggest the unaltered stabilization of lysosomes in these animals. The decrease in the activities of these enzymes can be correlated to the enhanced pulmonary collagen concentration in these diabetic rats.

Information pertaining to the lung lysosomal enzymes are lacking under diabetic conditions. Nevertheless, the available reports on the decreased renal lysosomal enzyme activities in rats (Fushimi and Tarui, 1976), mice (Fushimi et al., 1980) and Chinese hamsters (Chang, 1978) due to spontaneous diabetes are noteworthy to strike a correlation to the present findings in the lungs of diabetic rats. Thus, the possible existence of an inverse relationship between the enzymatic systems involved in the degradation and synthesis
of collagen in the lung of diabetic rats may account for the increased collagen concentration.

The data obtained on the skin and lung collagen and lysosomal enzyme reveal some unique and differential response to diabetes. Both in skin and lung the concentration of collagen and the activity of lysosomal enzymes show inverse relationship during diabetic condition. The reasons(s) for the differential response of these organs is not clear at present. Different types of collagens have been shown in skin and lung. While type I collagen is predominant (80%) in the skin, type III collagen (80-85%) constitute a major portion in lung collagen. Probably the differential response of these tissues to diabetes may be due to the differential distribution of collagen types. Nevertheless, this postulation needs further experimental investigations.