RESULTS

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I- The results of measurements of systolic blood pressure in normotensive & hypertensive rats **are illustrated in Table (1) and Fig. (1).**

Neither normotensive enalapril treated rats for 3 weeks (group I_B) nor 6 weeks (group I_C) showed any significant changes in systolic blood pressure as compared to normotensive control rats (group I_A) ($P > O.O5$).

Hypertensive untreated rats (group II_B) induced by unilateral nephrectomy showed increase in systolic blood pressure from 116.1± 3.85 mmHg to 140 ± 9.75 and after injection of DOCA significant increase in systolic blood pressure to 152.3± 11.22 mmHg ($P < O.O5$).

Hypertensive rats treated with enalapril for 3 weeks (group II_C) showed significant decrease in systolic blood pressure from 152.3 ± 11.22 mmHg to 133± 7.79 mmHg ($P < O.O5$).

Hypertensive rats treated with enalapril for 6 weeks (group II_D) showed significantly decrease in blood pressure from 152.3 ± 11.22 mmHg to 120± 8.5 mmHg ($P < O.O5$).

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Hypertensive rats treated with enalapril for 3 weeks (group II_C) showed significant decrease in systolic blood pressure from 152.3 ± 11.22 mmHg to 133± 7.79 mmHg ($P < O.O5$).

Hypertensive rats treated with enalapril for 6 weeks (group II_D) showed significantly decrease in blood pressure from 152.3 ± 11.22 mmHg to 120± 8.5 mmHg ($P < O.O5$).

TABLE (1): THE SYSTOLIC BLOOD PRESSURE CHANGES IN NORMOTENSIVE & HYPERTENSIVE RATS.

Animal groups	Blood pressure (mm Hg)
Group I_A (Control normotensive rats)	116.1 ± 3.85
Group I_B (normotensive rats treated with enalapril for 3 weeks)	115.1 ± 3.48 NS
Group I_C (normotensive rats treated with enalapril for 6 weeks)	114.8 ± 2.94 NS
Group II_A (Control of hypertensive rats)	118.1 ± 3.65 NS
Group II_B (hypertensive untreated rats)	151.3 ± 11.22 S
Group II_C (hypertensive rats treated with enalapril for 3 weeks)	133.2 ± 7.79 S
Group II_D (hypertensive rats treated with enalapril for 6 weeks)	120.8 ± 8.5 S

N.B: Values represent mean of 10 rats ± S.D.
NS =Non significant difference from control values at (P > o.o5).
S = Significant difference from control values at (P < 0.05).

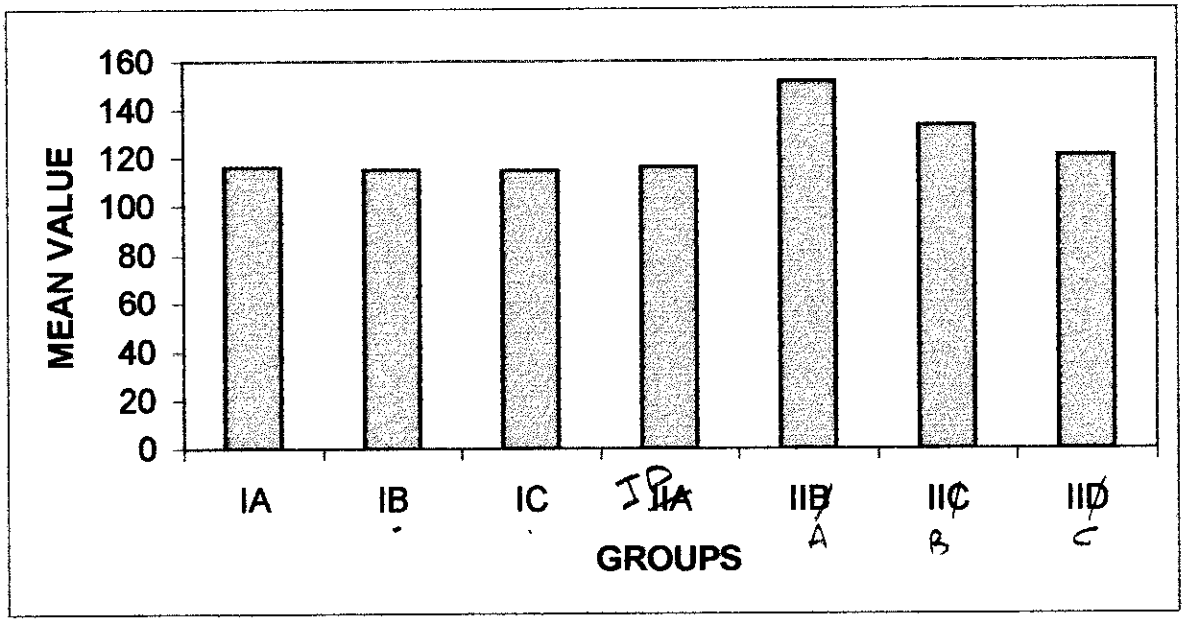

FIGURE (1): THE SYSTOLIC BLOOD PRESSURE CHANGES IN NORMOTENSIVE & HYPERTENSIVE RATS.

II- The results of measurements of left ventricular weight in normotensive & hypertensive rats **are illustrated in Table (2).**

Neither normotensive enalapril treated rats for 3 weeks (group I_B) nor 6 weeks (group I_C) showed any significant changes in left ventricular weight as compared to normotensive control rats (group I_A) ($P > O.O5$).

Hypertensive untreated rats (group II_B) showed significant increase in left ventricular weight from 1.89 ± 0.05mg to 2.49± 0.04 mg ($P < O.O5$).

Hypertensive rats treated th enalapril for 3 weeks (group II_C) showed significant decrease in left ventricular weight from 2.49± 0.04 mg to 2.41± 0.08 mg ($P < O.O5$).

Hypertensive rats treated th enalapril for 6 weeks (group II_D) showed significant decrease in left ventricular weight from 2.49± 0.04 mg to 2.19± 0.07 mg ($P < O.O5$).

III- The results of measurements of left ventricular weight / body weight ratio (ventricular index) in normotensive & hypertensive rats **are illustrated in Table (2) and Fig. (2).**

Neither normotensive enalapril treated rats for 3 weeks (group I_B) nor 6 weeks (group I_C) showed any significant changes in left ventricular weight / body weight ratio as compared to normotensive control rats (group I_A) ($P > O.O5$).

Hypertensive untreated rats (group II_B) showed significant increase in left ventricular weight/ body weight ratio from 2.24 ± 0.06 mg/g to 3.01± 0.04 mg/g ($P < O.O5$).

Hypertensive treated rats with enalapril for 3 weeks (group II_C) showed significant decrease in left ventricular weight / body weight ratio from 3.01± 0.04 mg/g to 2.84± 0.01 mg/g ($P < O.O5$).

Hypertensive treated rats with enalapril for 6 weeks (group II_D) showed significant decrease in left ventricular weight / body weight ratio from 3.01± 0.14 mg/g to 2.68± 0.07 mg/g ($P < O.O5$).

Table (2): LV WEIGHT & LV WEIGHT /BODY WEIGHT RATIO IN NORMOTENSIVE & HYPERTENSIVE RATS.

ANIMAL GROUPS	LV Weight	LV weight/Body weight Ratio (mg/gmBW)
GROUP I_A	1.89±0.05	2.24±0.06
GROUP I_B	1.91±0.03 NS	2.27±0.08 NS
GROUP I_C	1.93±0.07 NS	2.28±0.09 NS
GROUP II_A	1.89±0.05 NS	2.24±0.06 NS
GROUP II_B	2.49±0.04 S	3.01±0.14 S
GROUP II_C	2.41±0.08 S	2.84±0.01 S
GROUP II_D	2.19±0.07 S	2.68±0.07 S

N.B. : Values represent mean of 10 rats ± S.D.
NS =Non significant difference from control values at ($P > 0.05$).
S = Significant difference from control values at ($P < 0.05$).

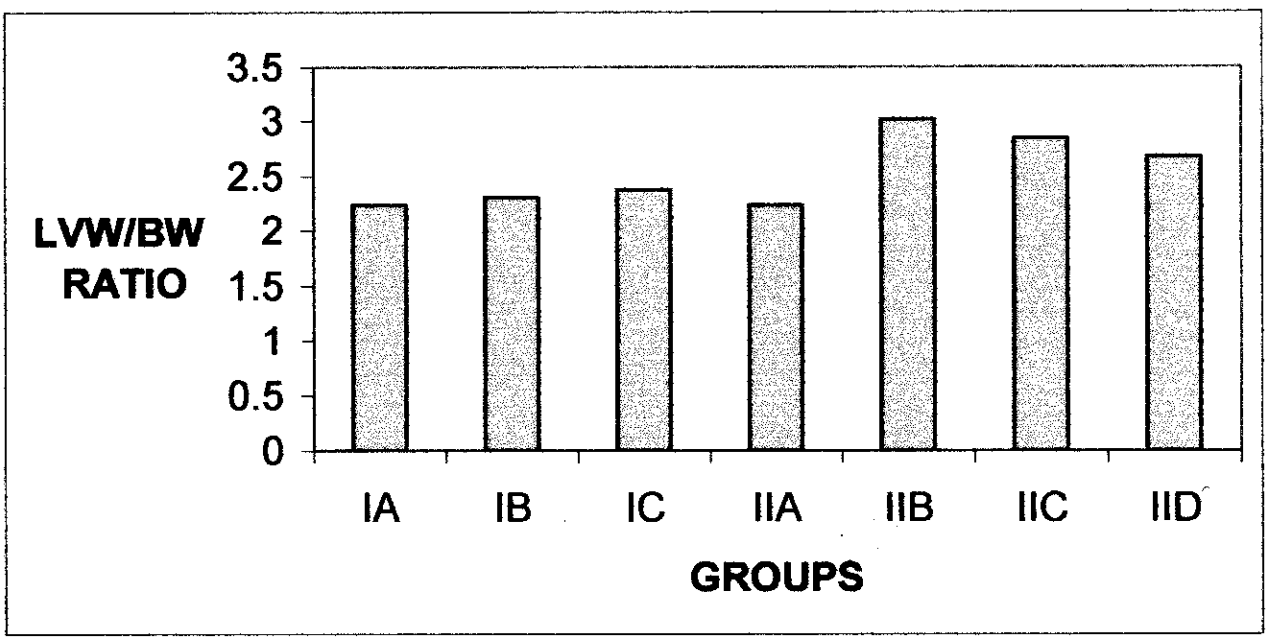

FIGURE (2): LV WEIGHT & LV WEIGHT /BODY WEIGHT RATIO IN NORMOTENSIVE & HYPERTENSIVE RATS.

Heart

I-HISTOLOGICAL PICTURE:

1- Haematoxylin and Eosin:

Group I_A (control untreated rats):

The heart of control rat was formed of branching and anastomosing muscle fibers surrounded by a very thin layer of loose connective tissue (endomysium). Muscles fibers were composed of cardiomyocytes connected together by intercalated discs. Cardiac muscles fibers were cut in different directions (longitudinal, transverse and oblique) in the same section. The longitudinal cut fibers appeared cylindrical in shape with transverse striations and were separated by slit like intercellular spaces containing small myocardial blood vessels. Cardiomyocytes had acidophilic cytoplasm and one or two oval, central nuclei ***(Fig.3).***

Group I_B (rats treated with enalapril for 3 weeks):

In this group no histological changes from that of (group I_A) were observed.

Group I_C (rats treated with enalapril for 6 weeks):

In this group slight disarrangement of the muscles fibers (whorly appreance) were observed. Their nuclei were oval and centrally located ***(Fig.4).***

Fig. (3): A photomicrograph of a section in the myocardium of a control adult male albino rat (group I_A) showing well formed anastomosing cardiac muscle fibers (M). Cardiac muscle fibers were separated from each other by intercellular spaces (S). Nuclei were central and oval (arrow).

(Hx & E Objective 40 Projective 10)

Fig. (4): A photomicrograph of a section in the myocardium of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing slight disarrangement of muscle fibers (whorly appreance) (M), their nuclei are large, vesicular and centrally located (arrow).

(Hx & E Objective 40 Projective 10)

Group II_A (control of hypertensive rats):

In this group the histological picture was similar to that of normotensive control rats (group I_A).

Group II_B (hypertensive untreaed rats):

This group revealed maximal histological changes, which appeared in the form of hypertrophy of myocardial fibers ***(Fig.5& 6).*** Other myocardial fibers showed degeneration and vacuolation. Interstitial hemorrhage and wide interstitial spaces (interstitial oedema) were seen between muscle fibers ***(Fig.7& 8).***

Some myocardial blood vessels showed thickening and infiltration of their walls by inflammatory cells and, while their lumens were dilated and packed with red blood cells ***(Fig.9).***

Group II_C (hypertensive rats treated with enalapril for 3 weeks):

In this group mild regression of myocardial hypertrophy and myocardial degeneration were observed. Blood vessels appeared with normal thickening and without infiltration of their walls by inflammatory cells ***(Fig.10).*** Interstitial hemorrhage was seen between muscle fibers ***(Fig.11).***

Group II_D (hypertensive rats treated with enalapril for 6 weeks):

In this group marked regression of myocardial hypertrophy and myocardial degeneration were observed. Some of the nuclei were enlarged, vesicular and centrally located. Small blood vessels were present between muscle fibers ***(Fig.12).***

Fig. (5): A photomicrograph of a section in the myocardium of hypertensive untreated adult male albino rat (group II_A) showing marked hypertrophy of myocardial fibers (arrow) and wide interstitial space present between muscle fibers (E).

(Hx & E Objective 40 Projective 10)

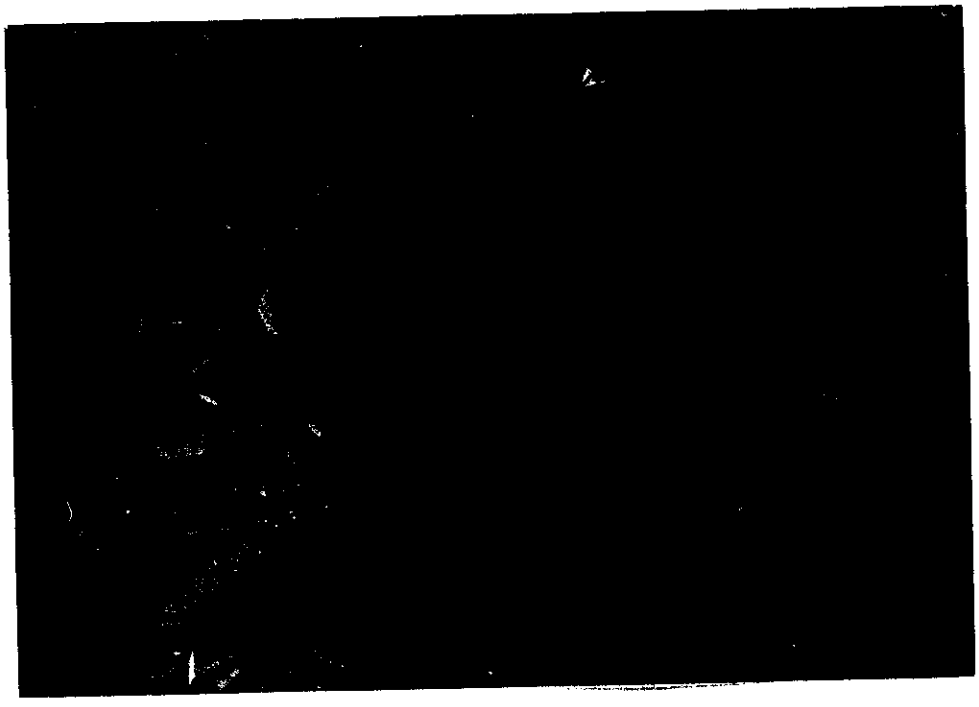

Fig. (6): A photomicrograph of a section in the myocardium of a hypertensive untreated adult male albino rat (group II_A) showing marked hypertrophy of myocardial fibers (arrow), thickening of the wall of myocardial blood vessels (Bv) with perivascular inflammatory cells infiltration (two arrows).

(Hx & E Objective 40 Projective 10)

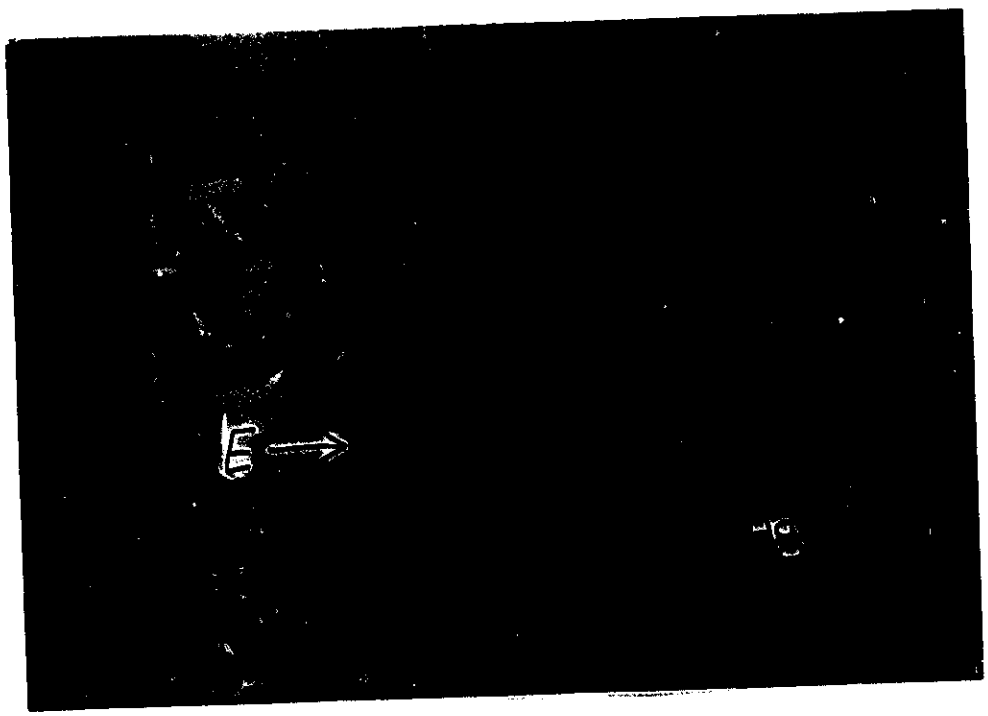

Fig. (7): A photomicrograph of a section in the myocardium of a hypertensive untreated adult male albino rat (group II_A) showing degeneration of muscle fibers (arrow) with wide interstitial spaces (E) and interstitial hemorrhage (Hg) present between muscle fibers.

(Hx & E Objective 40 Projective 10)

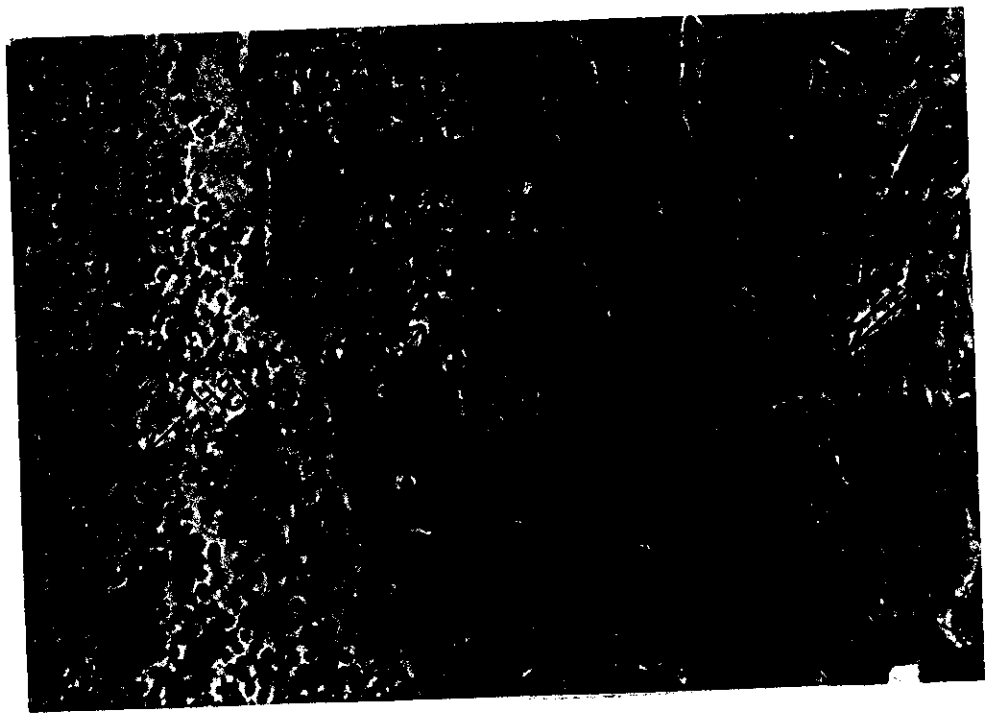

Fig. (8): A photomicrograph of a section in the myocardium of a hypertensive untreated adult male albino rat (group II_A) showing degeneration in the form of Cytoplasmic vacuolation of muscle fibers (arrow) with interstitial hemorrhage (Hg) present between muscle fibers and lymphocytic infiltration around dilated blood vessels (two arrows).

(Hx & E Objective 40 Projective 10)

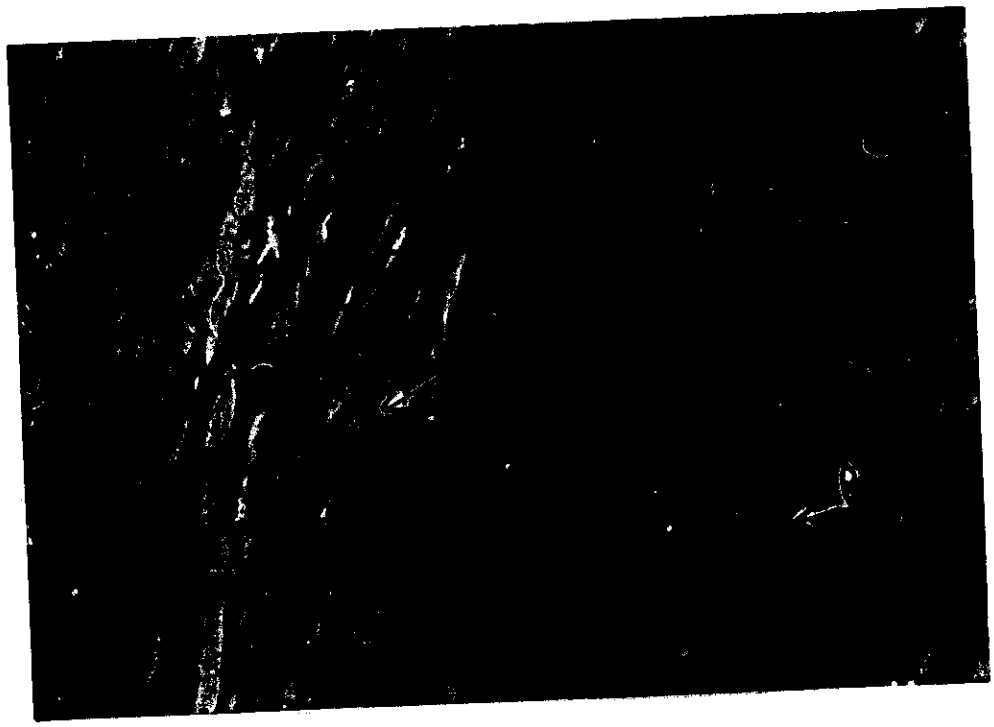

Fig. (9): A photomicrograph of a section in the myocardium of a hypertensive untreated adult albino rat male (group II_A) showing degeneration in the form of cytoplasmic vacuolation of muscle fibers (arrow). Myocardial blood vessels showed thickening and infiltration of their wall by inflammatory cells (two arrows) and dilated lumen and packed with R.B.Cs (R).

(Hx & E Objective 40 Projective 10)

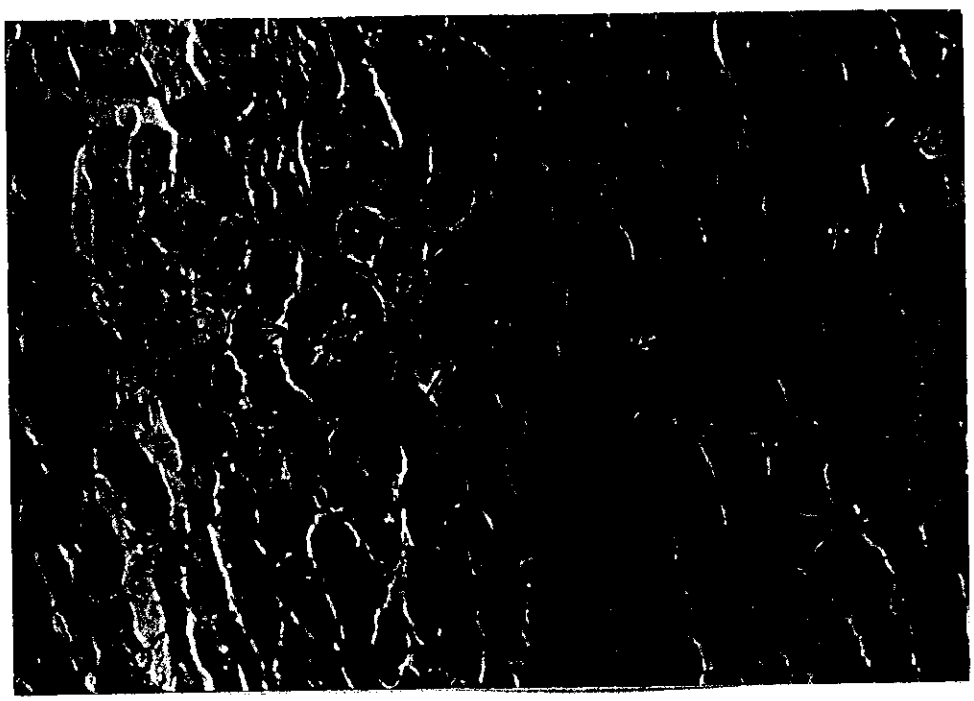

Fig. (10): A photomicrograph of a section in the myocardium of hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing mild regression of myocardial hypertrophy (arrow) and degeneration (D). Blood vessel appears between muscle fibers (b.v).

(Hx & E Objective 40 Projective 10)

Fig. (11): A photomicrograph of a section in the myocardium of hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing interstitial hemorrhage between muscle fibers (Hg).

(Hx & E Objective 40 Projective 10)

Fig. (12): A photomicrograph of a section in the myocardium of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing marked regression of myocardial hypertrophy and degeneration (arrow). Small blood vessel was present between myocardial fibers (b.v).

(Hx & E Objective 40 Projective 10)

2-Masson 's trichrome stain:

Group I_A (control untreated rats):

The heart had few connective tissue fibers in the intercellular space between myocardial muscle fibers and around the blood vessels ***(Fig.13).***

Group I_B (rats treated with enalapril for 3 weeks):

No detectable changes were observed in the distribution of connective tissue in the heart of this group.

Group I_C (rats treated with enalapril for 6 weeks):

There was slight disarrangement of muscle fibers with no change in the distribution of connective tissue in the heart of this group ***(Fig.14).***

Group II_A (control of hypertensive rats):

In this group the histological picture was similar to that of normotensive control rats (group I_A).

Group II_B (hypertensive untreated rats):

There was increase in the amount of collagen fibers between hypertrophied muscle fibers ***(Fig.15)*** and between focal degenerated and vacuolated muscle fibers ***(Fig.16)*** and also around dilated congested (packed with R.B.CS) blood vessels ***(Fig.17).***

Group II_C (hypertensive rats treated with enalapril for 3 weeks):

There was slight decrease in the amount of collagen fibers around the blood vessels and between myocardial fibers, which showed slight regression of myocardial hypertrophy ***(Fig.18).***

Group II_D (hypertensive rats treated with enalapril for 6 weeks):

The amount of collagen fibers between muscle fibers and around the blood vessels decreased. Hypertrophy of myocardial fibers markedly regressed. ***(Fig.19).***

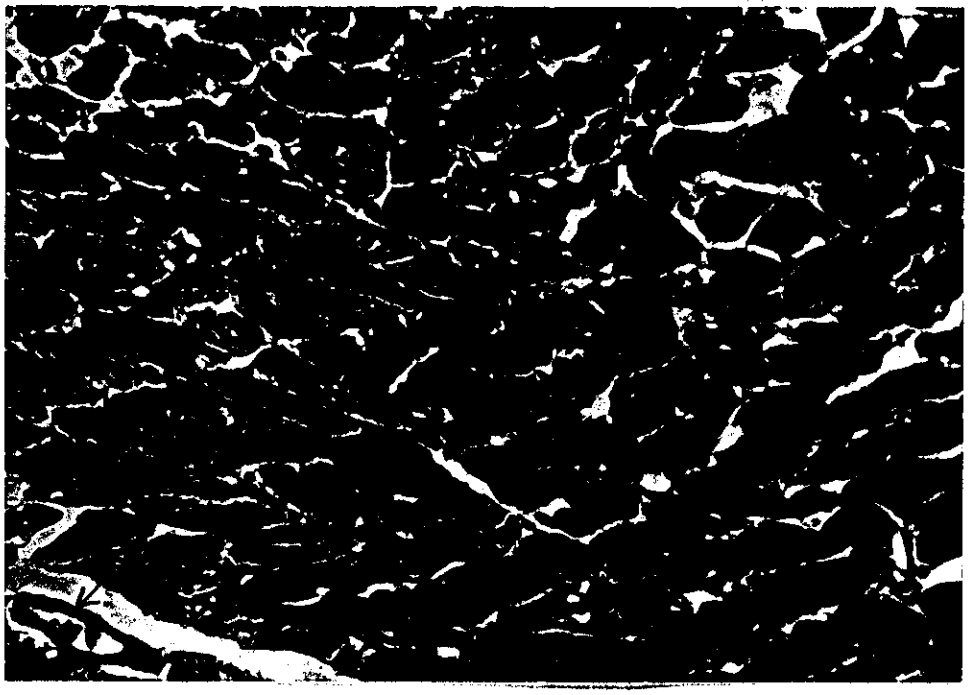

Fig. (13): A photomicrograph of a section in myocardium of a control adult male albino rat (group I_A) showing few connective tissue fibers around blood vessels (b.v) and in between the muscle fibers (M).

(Masson 's trichrome Objective 40 Projective 10)

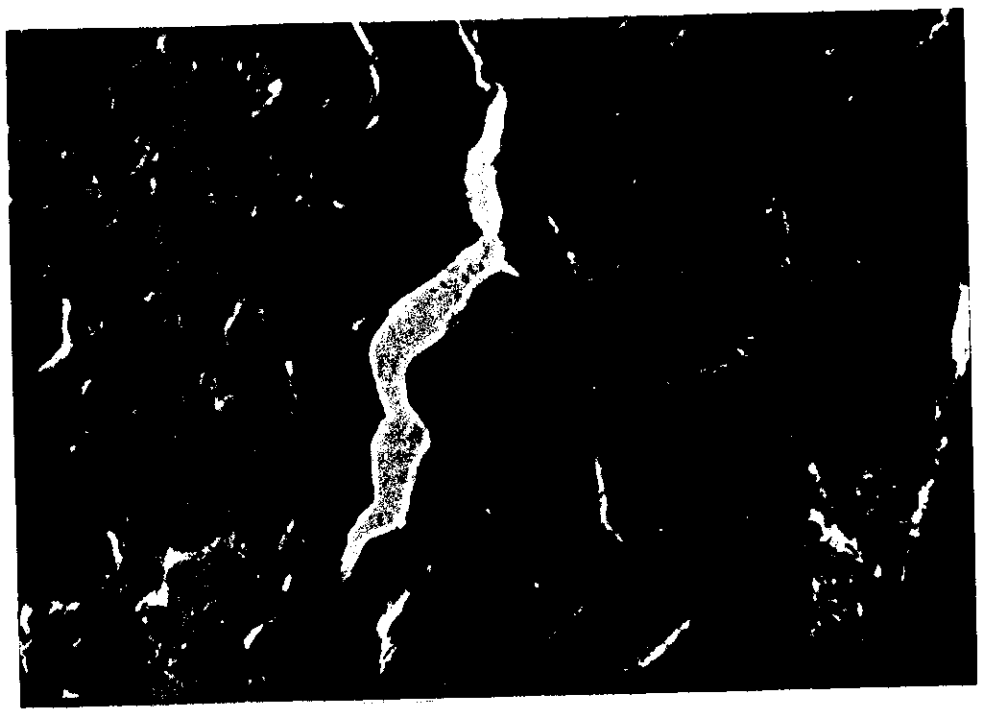

Fig. (14): A photomicrograph of a section in the myocardium of normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing slight disarrangement of muscle fibers (arrow) with no change in the distribution of connective tissues fibers between muscle fibers.

(Masson 's trichrome Objective 40 Projective 10)

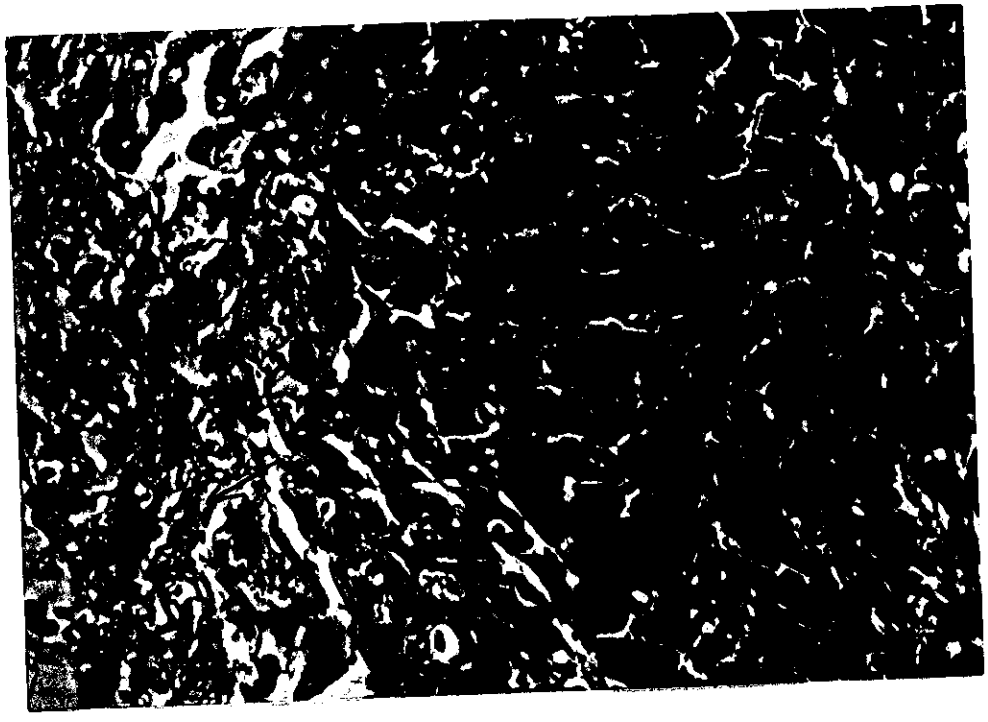

Fig. (15): A photomicrograph of a section in the myocardium of a hypertensive untreated adult male albino rat (group II_A) showing an increase in the amount of collagenous fibers (arrow) between hypertrophied muscle fibers (M).

(Masson 's trichrome Objective 40 Projective 10)

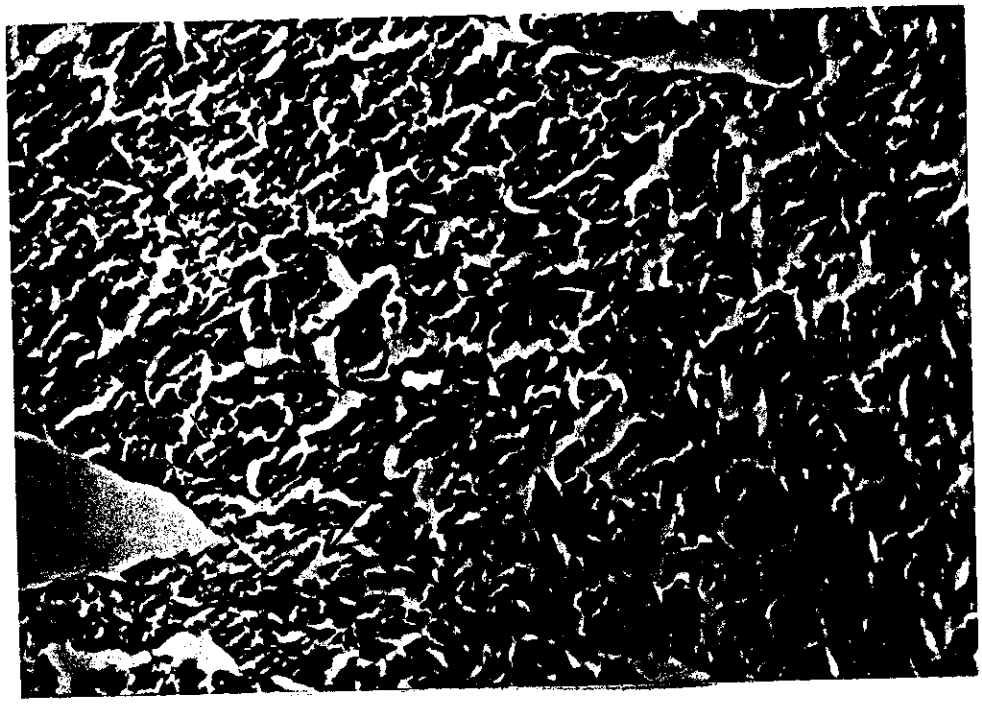

Fig. (16): A photomicrograph of a section in the myocardium of a hypertensive untreated adult male albino rat (group II_A) showing an increase in the amount of collagenous fibers (arrow) between degenerated and vacuolated muscle fibers (M).

(Masson 's trichrome Objective 40 Projective 10)

Fig. (17): A photomicrograph of a section in the myocardium of a hypertensive untreated adult male albino rat (group II_A) showing an increase in the amount of collagenous fibers around dilated congested blood vessels (Bv) and between degenerated and vacuolated muscle fibers (arrow).

(Masson 's trichrome Objective 40 Projective 10)

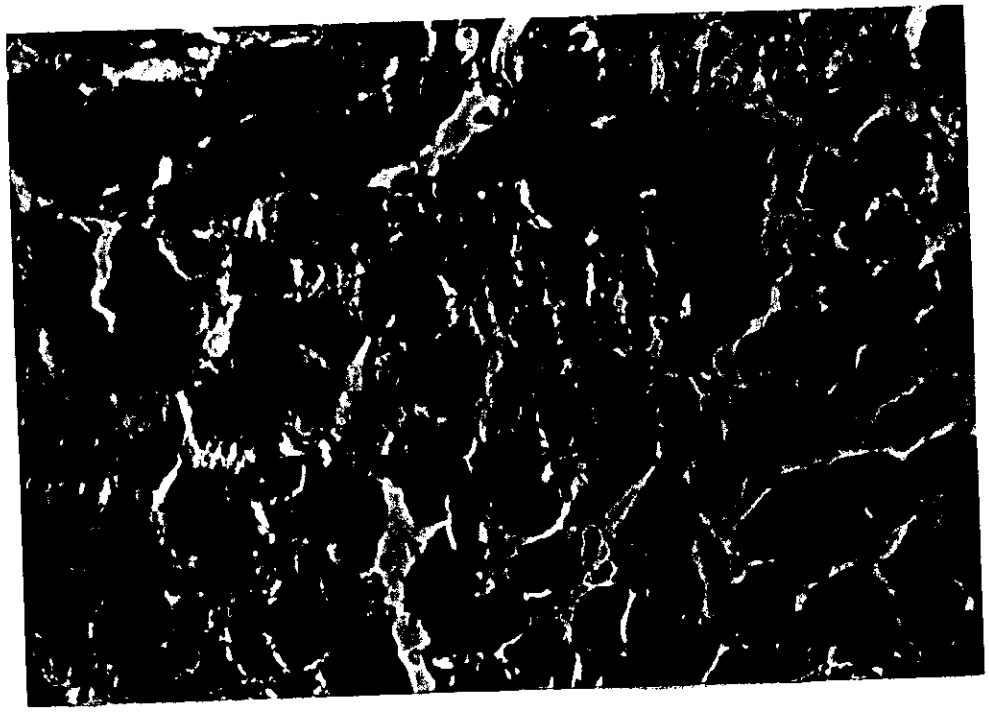

Fig. (18): A photomicrograph of a section in the myocardium of hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing slight decrease in the amount of collagenous fibers between myocardial fibers, which showed gradual regression of myocardial hypertrophy (arrow).

(Masson 's trichrome Objective 40 Projective 10)

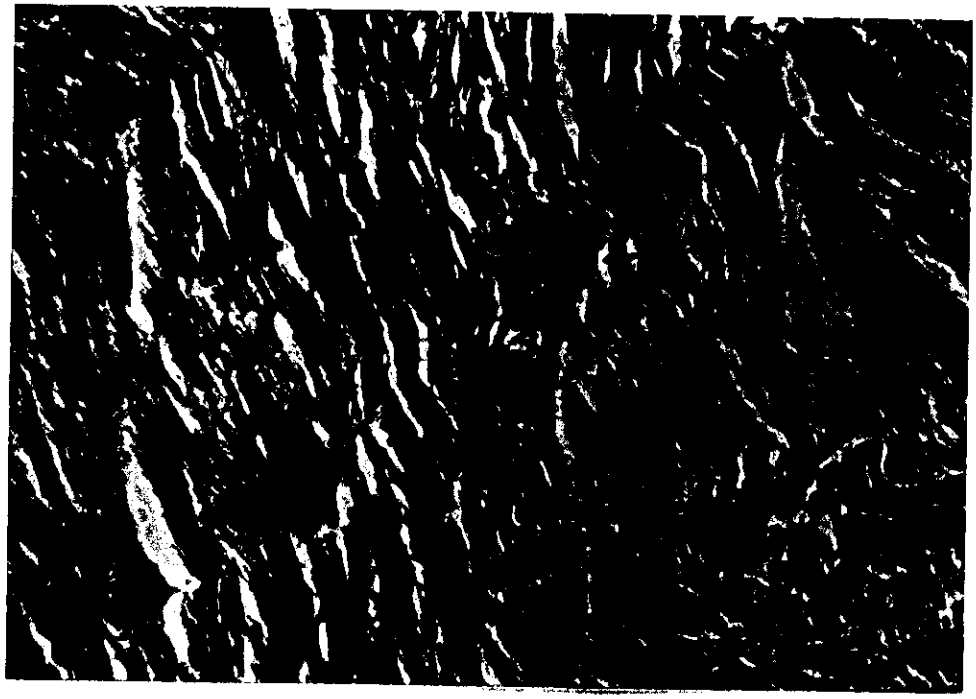

Fig. (19): A photomicrograph of a section in the myocardium of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing decrease in the amount of collagenous fibers around blood vessels (b.v) and between muscle fibers in which hypertrophy was regressed (arrow).

(Masson 's trichrome Objective 40 Projective 10)

II-ELECTRON MICROSCOPIC PICTURE:

Group I_A (control untreated rats):

Electron microscopic examination of myocardial sections of control rats showed cross striations formed by the myofibrils. Each myofibril was composed of sarcomeres that were bounded by 2 Z lines and formed of one dark band and 2 halves of light bands. The dark band shows a lighter zone in its center H zone, which is divided by a dark line called M line ***(Fig.20).***

The sarcoplasm of cardiomyocytes contains many mitochondria, which had a fingerprint appearance of their cristae, they were elongated or spherical in shape and arranged either in rows between the myofibrils ***(Fig.20 &21)*** and few lysosomes ***(Fig.20).***

Cardiac muscle fibers had oval central nuclei with scanty amount of peripheral heterochromatin and large amount of central euchromatin ***(Fig.21).***

Cardiac muscle fibers showed abundant rounded tubular sarcoplasmic reticulum; T tubules are rounded in shape and are situated at Z lines ***(Fig.22).***

The intercalated disc is an interdigitating junction with step like pattern and consists of three types of membrane-to-membrane contact. The predominant type of contact is fascia adherence where actin filaments insert into fascia adherent. Desmosomes occur less frequently. Gap junction is also present ***(Fig.22).***

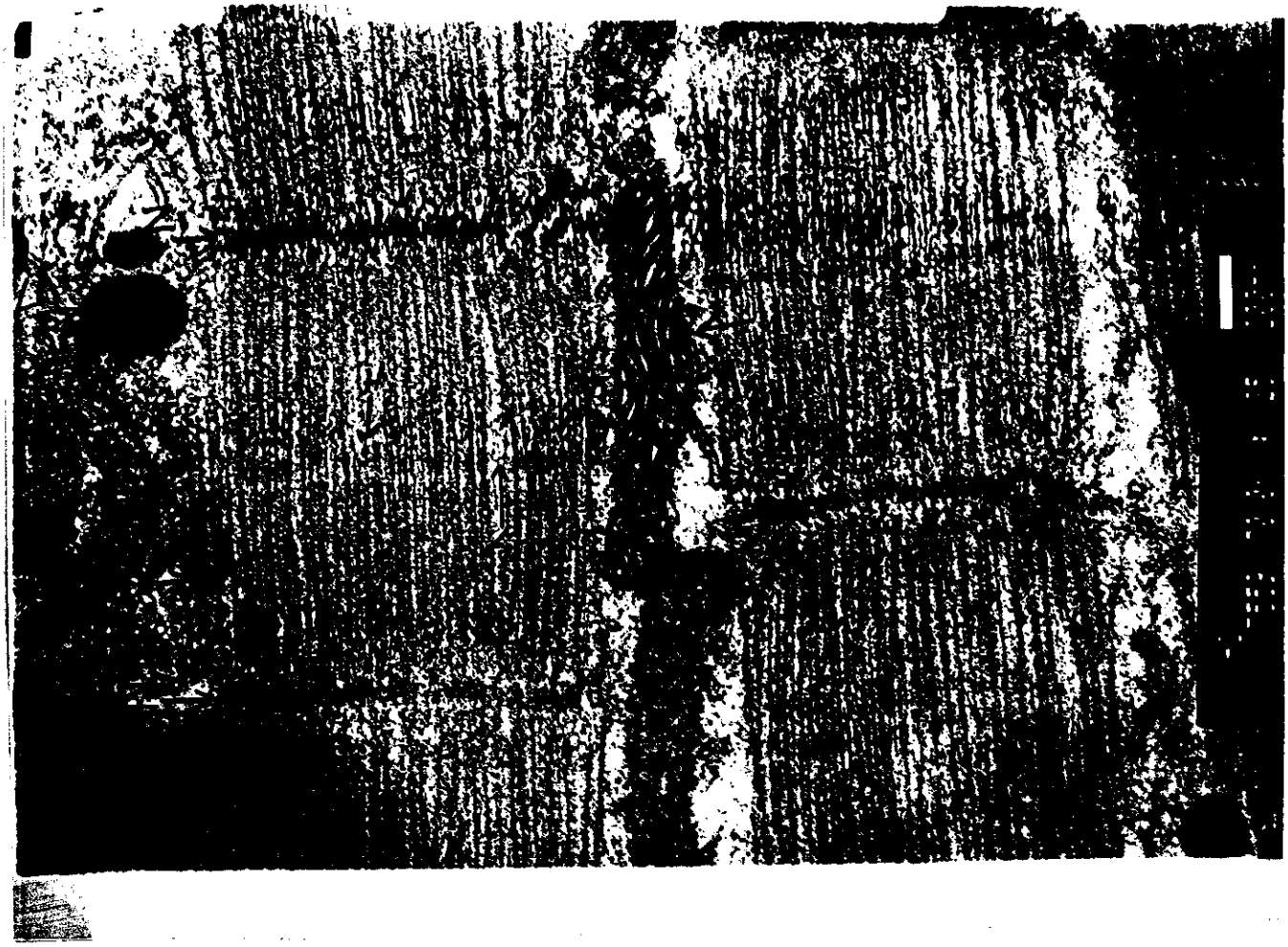

Fig. (20): An electron photomicrograph of LV cardiomyocytes of a control adult male albino rat (group I_A) showing cross striations of myofibrils. Each myofibril was composed of sarcomeres that are bounded by two Z lines (Z) and formed of one dark band (A) and two halves of light bands (I). The dark band shows a lighter zone in its center called H zone (H), which is divided by a dark line called M line (M). Sarcoplasm of cardiomyocytes present between myofibrils rich in mitochondria elongated in shape and arranged in rows (arrow) and few lysosomes (L).

(X 25000)

Fig. (21): An electron photomicrograph of LV cardiomyocytes of a control adult male albino rat (group I_A) showing parts of three cardiac muscle cells. C_2 showed central, oval nucleus (N) with scanty amount of peripheral heterochromatin (H) and large amount of central euchromatin (E), myofibrils (F) and mitochondria spherical or elongated in shape present between myofibrils (two arrows). Intercellular space (I) present between C_1&C_2 and C_2&C_3 contain capillary (arrow).

(X 7500)

Fig. (22): An electron photomicrograph of LV cardiomyocytes of a control adult male albino rat (group I_A) showing myofibrils (F), intercalated disc with step like appreance, it is composed of desmosomes and gap junction (arrow). Sarcoplasmic reticulum (S) and mitochondria presents between myofibrils (M).

(X 15000)

Group I_B (rats treated with enalapril for 3 weeks):

Electron microscopic examination of myocardial sections of rats in this group showed no changes from normotensive control rats (group I_A).

Group I_C (rats treated with enalapril for 6 weeks):

Electron microscopic examination of myocardial sections of rats in this group showed mild degree of myofibrils degeneration ***(Fig.23).*** The most important change in these animals was increased number of mitochondria (mitochondriosis) in some cardiomyocytes; mitochondria occupied a larger area than myofibrils. Most mitochondria were swollen and lost their normal fingerprint appreance of cristae ***(Fig.24).*** There was slight dilation of the smooth endoplasmic reticulum of these cardiomyocytes ***(Fig.23).***

The intercalated disc showed some irregularities with loss of their normal step like pattern ***(Fig. 23&25).***

Group II_A (control of hypertensive rats):

In this group the electron microscopic picture are similar to normotensive control rats (group I_A).

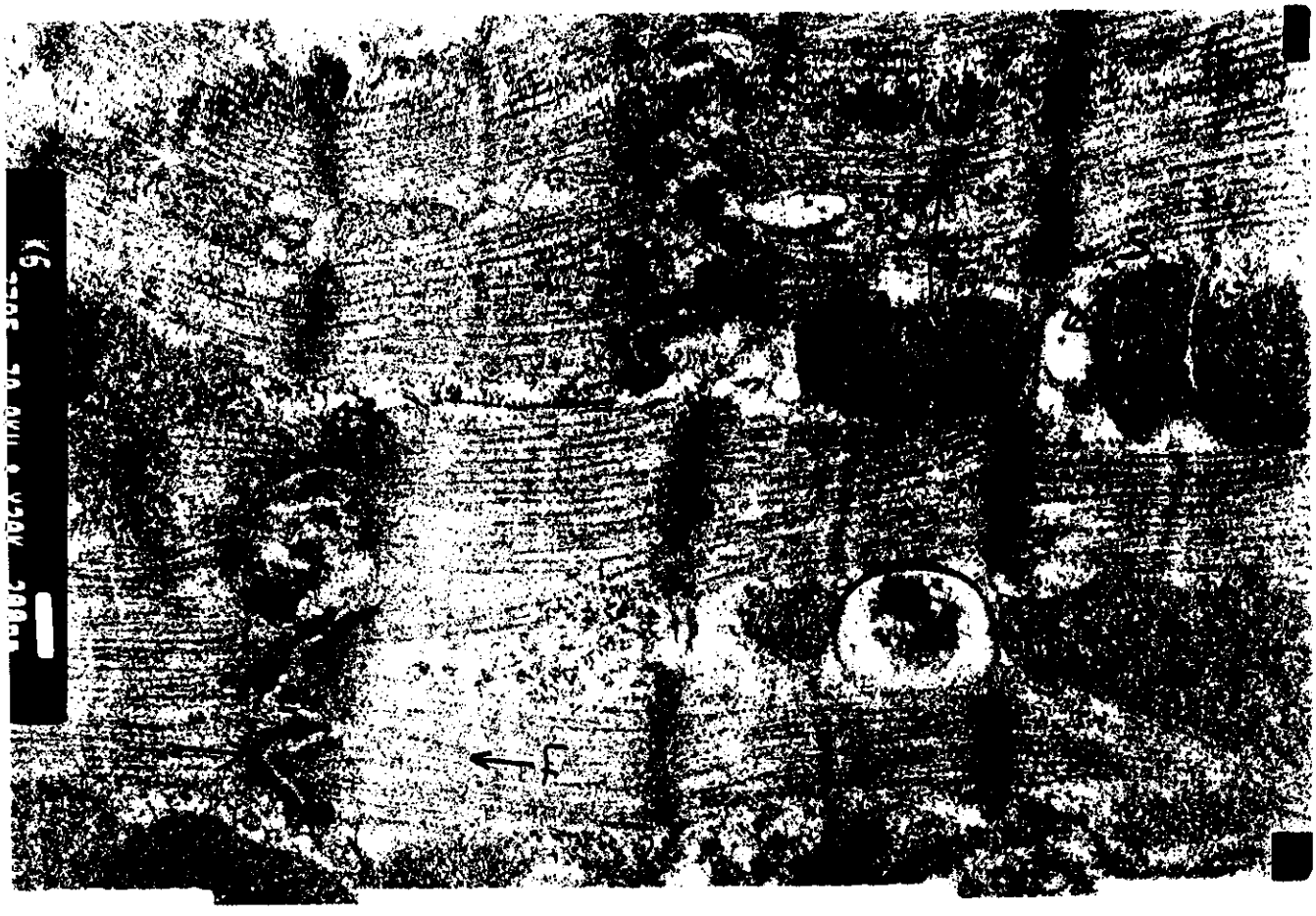

Fig. (23): An electron photomicrograph of LV cardiomyocytes of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing mild destruction of the myofibrils (F), swollen mitochondria (M) and dilated smooth endoplasmic reticulum (S). Also some irregularities of intercalated disc can be seen (arrow).

(X 20000)

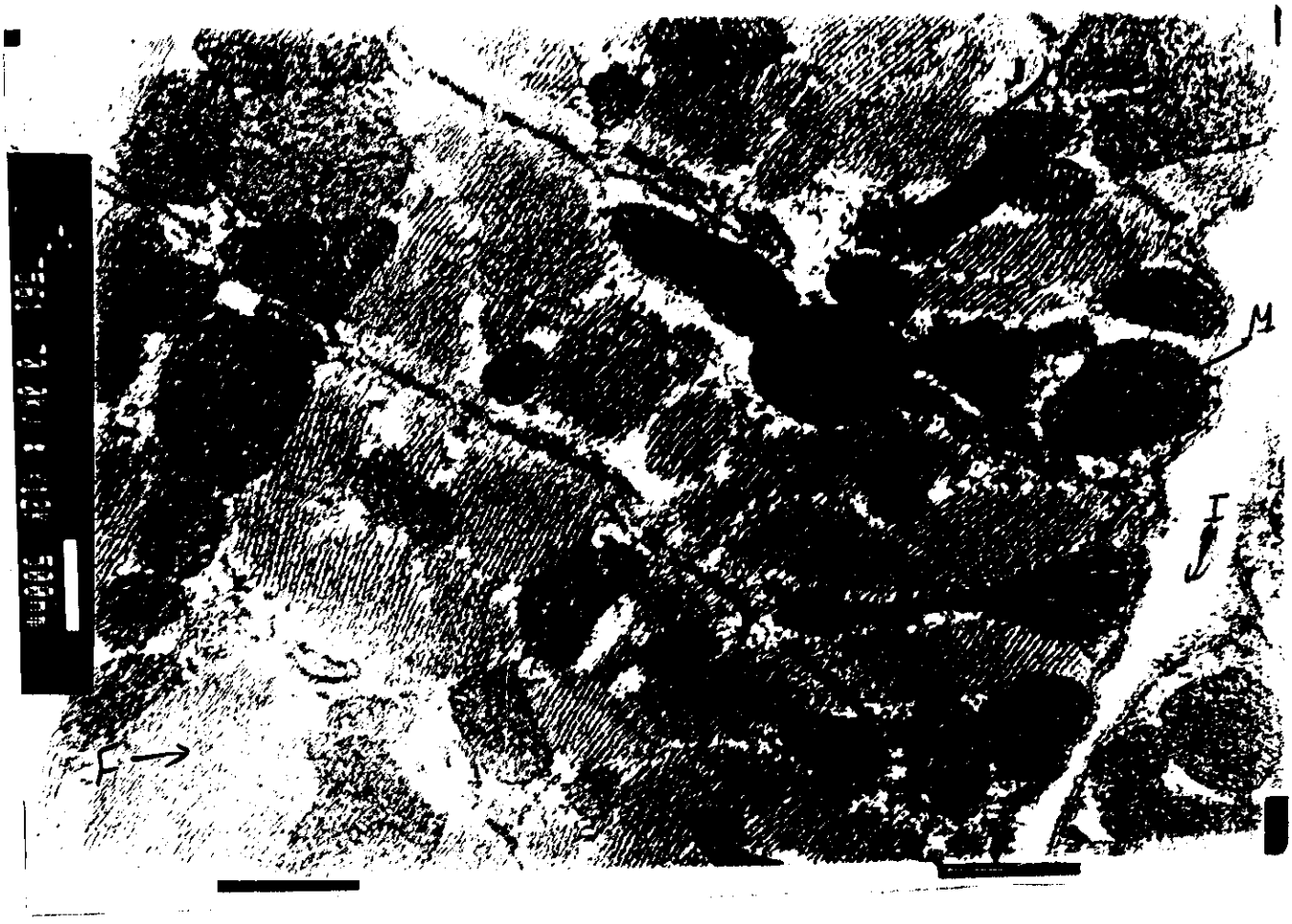

Fig. (24): An electron photomicrograph of LV cardiomyocytes of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing increased number of mitochondria (mitochondriosis) (M), most of them are swollen, variable in shape and present between mild degenerated myofibrils (F). Intercellular space can be seen between two cardiomyocytes (I).

(X 12000)

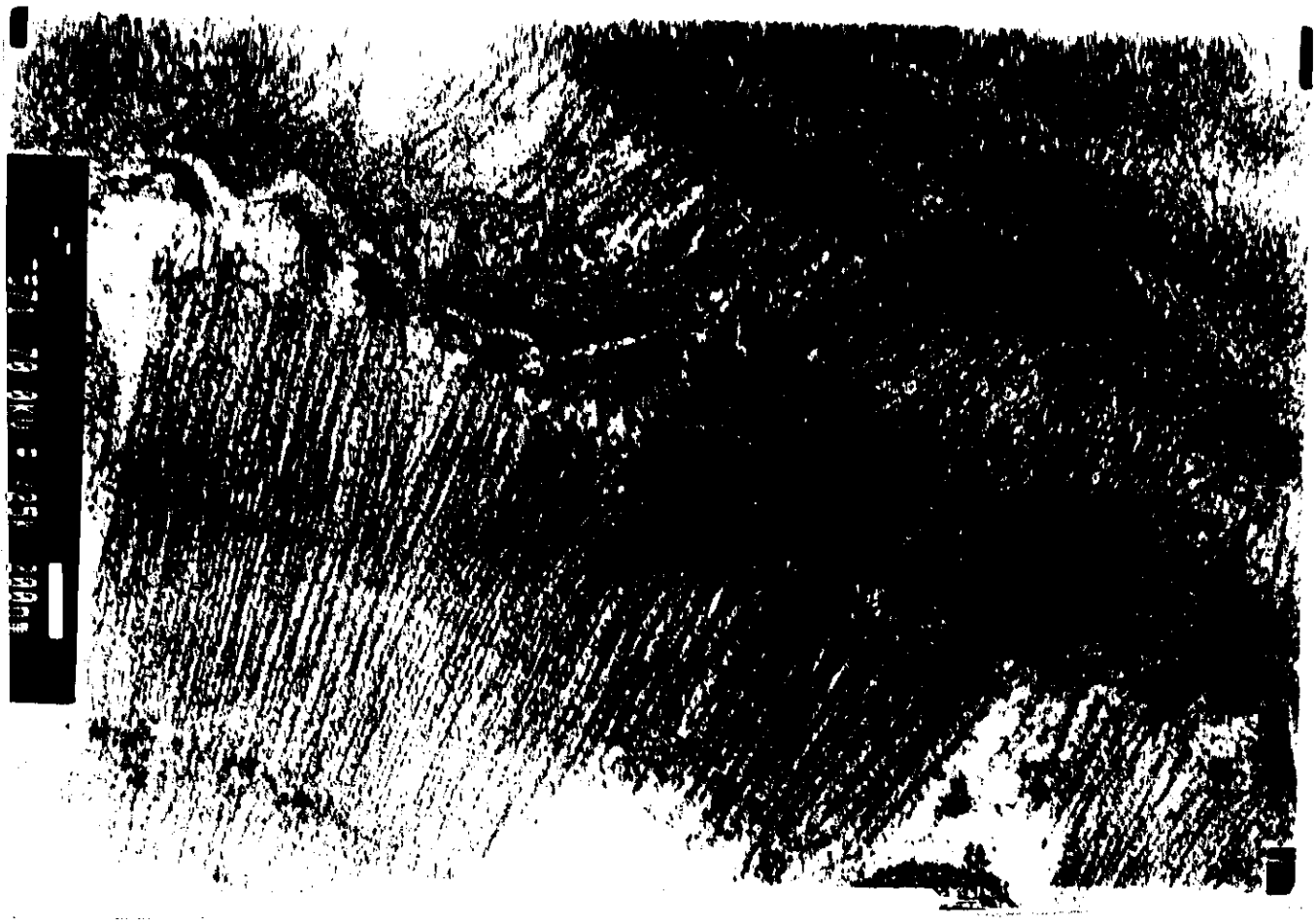

Fig. (25): An electron photomicrograph of LV cardiomyocytes of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing some irregularities of intercalated disc (arrow).

(X 25000)

Group II_B (hypertensive untreated rats):

Electron microscopic examination of myocardial sections of rats in this group showed marked distortion and degeneration of myofibrils leading to widening of myofibrillar space and appearance of intracytoplasmic vacuoles. Myofibrils showed marked distortion and degeneration, in some areas myofibrils were fragmented and interrupted by mitochondria. Z lines were very broad ***(Fig.26& 27&28).***

Some myofibrils were dissolved and disappeared and excess collagen fibers were present at the site of degenerated myofibrils ***(Fig.29).***

Mitochondria showed marked variation in size and distribution, as well as various degenerative changes including loss of cristae ***(Fig.27& 28).***

Some nuclei were enlarged, lobulated with corrugated nuclear membrane ***(Fig.30).***

Fig. (26): An electron photomicrograph of LV cardiomyocytes of a hypertensive untreated adult male albino rat (group II_A) showing marked distortion and degeneration of myofibrils (F), in some area myofibrils were fragmented (arrow) and interrupted by mitochondria. Mitochondria were variable in size (M) and intracytoplasmic vacuoles can be seen (V). Notice presence of broad Z lines (Z).

(X 10000)

Fig. (27): An electron photomicrograph of LV cardiomyocytes of a hypertensive untreated adult male albino rat (group II_A) showing degenerated myofibrils (F) and widening of myofibrils space (S), in some areas myofibrils were fragmented and interrupted by mitochondria. Mitochondria were variable in size and lost of their cristae (M). Notice presence of broad Z lines (Z).

(X 10000)

Fig. (28): Higher magnification of the previous one showing degenerated myofibrils (F), broading of Z lines (Z) and widening of myofibril space (S). Myofibrils were interrupted by large mitochondria and their cristae were lost (M).

(X 20000)

Fig. (29): An electron photomicrograph of LV cardiomyocytes of a hypertensive untreated adult male albino rat (group II_A) showing excess collagen fibers (arrow) at site of degenerated myofibril (F).

(X 7500)

Fig. (30): An electron photomicrograph of LV cardiomyocytes of a hypertensive untreated adult male albino rat (group II_A) showing degenerated myofibrils (F), mitochondria of variable size (M). The nucleus appears enlarged, lobulated with corrugated nuclear membranes (N).

(X 7500)

Group II_C (hypertensive rats treated with enalapril for 3 weeks):

Electron microscopic examination of myocardial sections of rats in this group showed improvement of most ultrastructural changes observed in the previous groups. Their myofibrils showed cross striation, but in some area intracytoplasmic vacuoles were still present in some areas. Plenty of mitochondria, variable in shape were observed between myofibrils ***(Fig.31).***

Group II_D (hypertensive rats treated with enalapril for 6 weeks):

Electron microscopic examination of myocardial sections of rats in this group showed marked improvement of ultrastructural changes observed in the previous groups. Most of myofibrils showed normal pattern of striation and regular sarcomeres but in some areas still present mild degeneration still present ***(Fig.32 &33).***

Sarcoplasm of cardiomyocytes contained mitochondria normal in size and shape and arranged in rows between myofibrils (Fig.32&33 &34). Nuclei were oval, central with normal distribution of their chromatin and mild corrugation of their membrane (Fig.32&34).

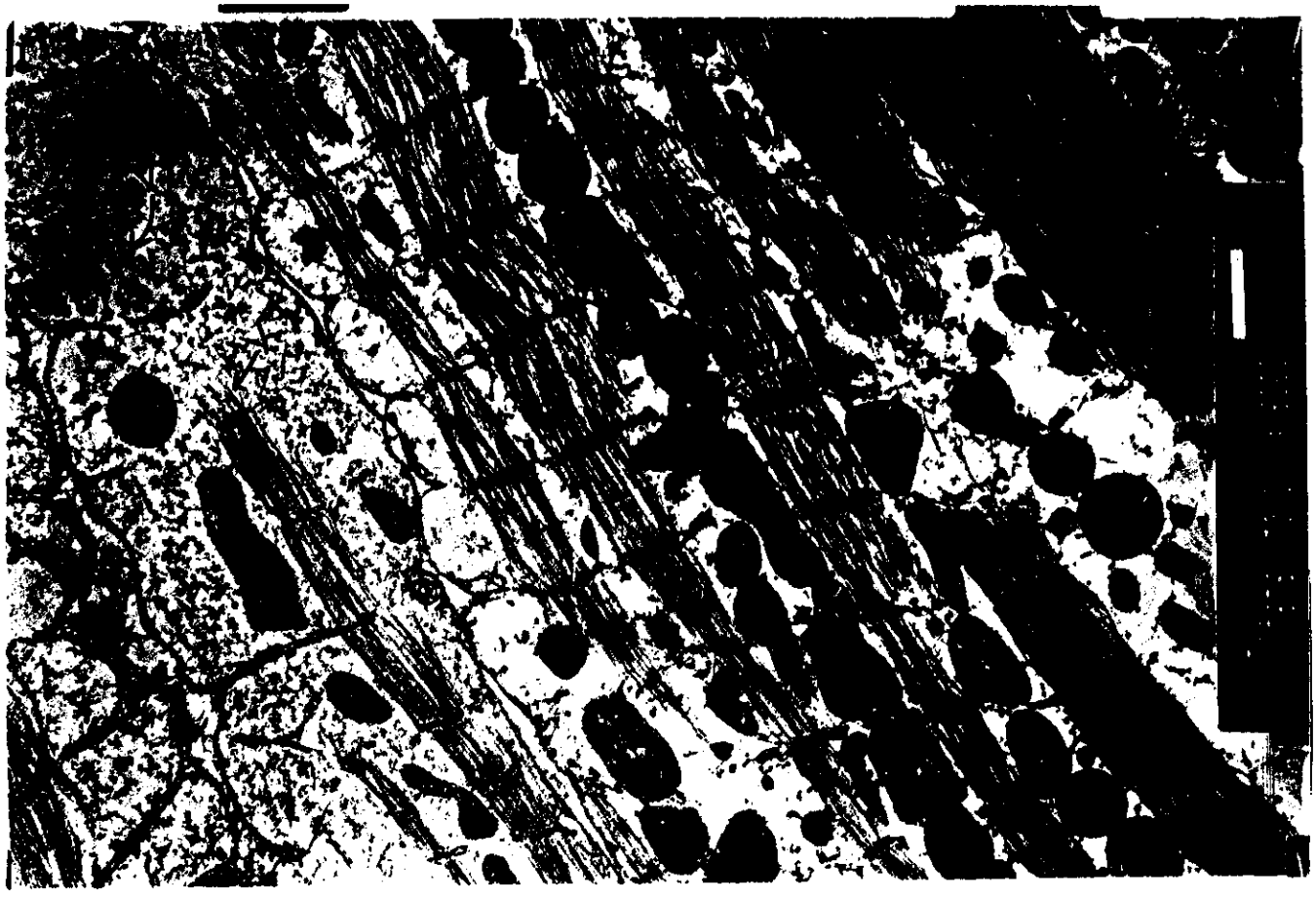

Fig. (31): An electron photomicrograph of LV cardiomyocytes of hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing cross striation of myofibrils, some of them still degenerated (F), mitochondria were variable in shape and arranged between myofibrils (M) and intracytoplasmic vacuoles were still present in some area (V).

(X 6000)

Fig. (32): An electron photomicrograph of LV cardiomyocytes of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing myofibrils (F) with normal pattern of striation and regular sarcomeres and mild degeneration appeared in some area (D). Mitochondria appeared normal and arranged between myofibrils (M) and nucleus was oval with normal distribution of chromatin and mild corrugation of its membrane (N).

(X 6000)

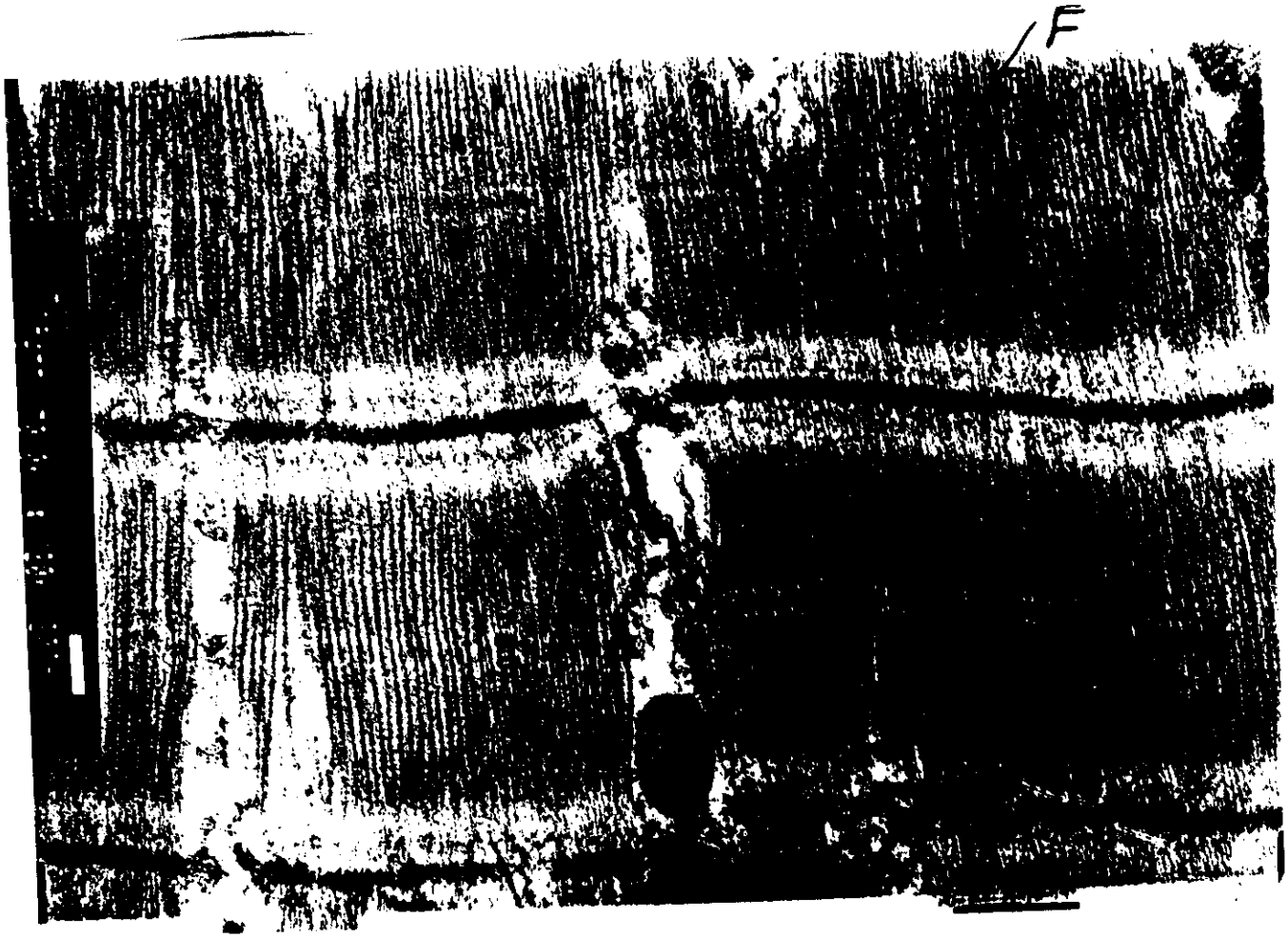

Fig. (33): Higher magnification of the previous one showing cross-striated banding pattern of most myofibrils (F) and mitochondria can be seen (M).

(X 20000)

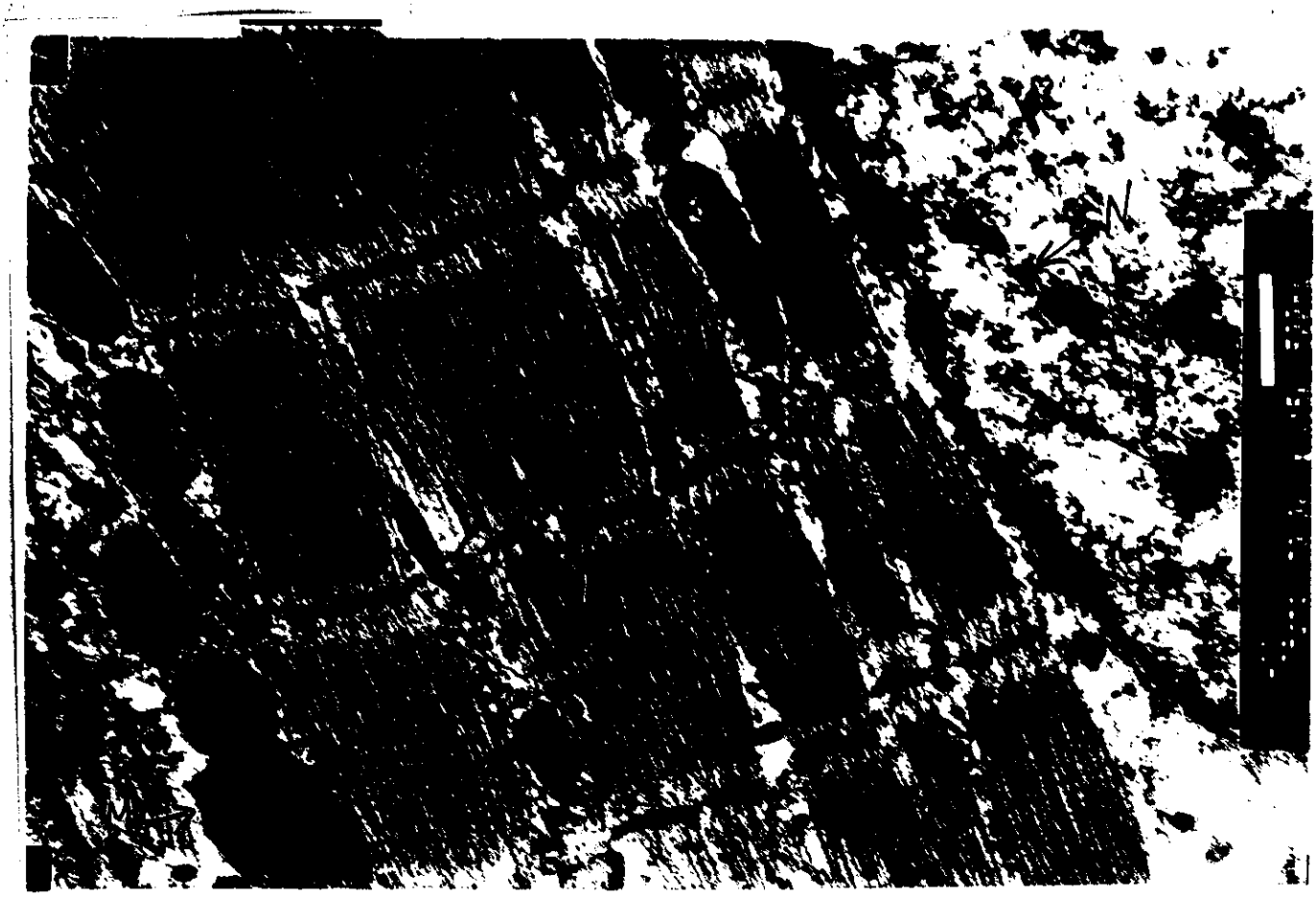

Fig. (34): An electron photomicrograph of LV cardiomyocytes of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing part of nucleus with its normal distribution of its chromatin (N) and myofibrils and their sarcomeres appeared normal (F), the mitochondria appeared normal in shape and size and arranged in rows between myofibrils (M).

(X 15000)

KIDNEY

I-HISTOLOGICAL PICTURE:

1- Haematoxylin and Eosin:

Group I_A (control untreated rats):

The kidney of control rat was formed of an outer cortex and inner medulla and was surrounded by connective tissue capsule. The cortex of the kidney was formed of renal corpuscles, proximal convoluted tubules, loop of Henle and distal convoluted tubules. Renal corpuscles appeared as dense rounded structures, narrow Bowman's capsules surrounded the glomeruli. The glomerulus consisted of network of capillaries, while Bowman's capsules were a double wall cup around glomerulus, which was composed of parietal layer and visceral one. Proximal convoluted tubules were numerous and lined with simple cuboidal epithelium, those cells were larger, more acidophilic and in cross section appeared wide and triangular with basal spherical nuclei. Distal convoluted tubules were less numerous and lined with simple cuboidal epithelium, those cells were not large or as acidophilic as those of proximal convoluted tubules and in cross section appeared to have a wide lumen with numerous basal spherical nuclei. Loop of Henle had thin segments or descending part lined by simple squamous epithelium while the ascending segment was lined by simple cuboidal epithelium ***(Fig.35).***

Group I_B (rats treated with enalapril for 3 weeks):

In this group no changes were observed in the proximal convoluted tubules & distal convoluted tubules and glomeruli.

Fig. (35): A photomicrograph of a section in the cortex of a kidney of a control adult male albino rat (group I_A) showing renal corpuscle formed of glomerules (G) surrounded by group of proximal convoluted tubules (P), distal convoluted tubules (D) and some collecting tubules (C).

(Hx & E Objective 40 Projective 10)

Group I_C (rats treated with enalapril for 6 weeks):

In this group the main histological deviation was represented by swelling of epithelial cells lining of some proximal convoluted tubules with no changes in the distal convoluted tubules. There was mild hypercellularity of glomeruli ***(Fig.36).***

Group II_A (control of hypertensive rats):

In this group the histological picture was similar to normotensive control rats (group I_A).

Group II_B (hypertensive untreated rats):

This group revealed maximal histological changes, which appeared in the form of necrosis of tubular epithelium with pyknotic or swollen nuclei. Some glomeruli showed sclerosis characterized by collapse of capillary loops and adhesion of the tuft to Bowman's capsules and widening of capsular spaces ***(Fig.37).*** While others showed segmental distention of capillary loops and decreased glomerular cellularity ***(Fig.38).*** The cells lining convoluted tubules showed necrosis ***(Fig.39)*** and vacuolation of the cytoplasm ***(Fig.38).***

Wide interstitial spaces (interstitial oedema) ***(Fig.40)*** and interstitial hemorrhage were observed between convoluted tubules ***(Fig.41).***

There were dilated and congested (packed with R.B.Cs) blood vessels with thickening and infiltration of their walls by inflammatory cells ***(Fig.42).***

Fig. (36): A photomicrograph of a section in the cortex of a kidney of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing swelling of epithelial lining of some proximal convoluted tubules (P) with mild hypercellularity of glomerulus (G).

(Hx & E Objective 40 Projective 10)

Fig. (37): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing necrosis of proximal convoluted tubules (P), destruction of some distal convoluted tubules (D) and sclerotic glomeruli (S).

(Hx & E Objective 40 Projective 10)

Fig. (38): A photomicrograph of a section in the cortex of a kidney of hypertensive untreated adult male albino rat (group II_A) showing segmental distension of capillary loops (C). Vacuolation of the cytoplasm of cells lining convoluted tubules can be seen (arrow).

(Hx & E Objective 40 Projective 10)

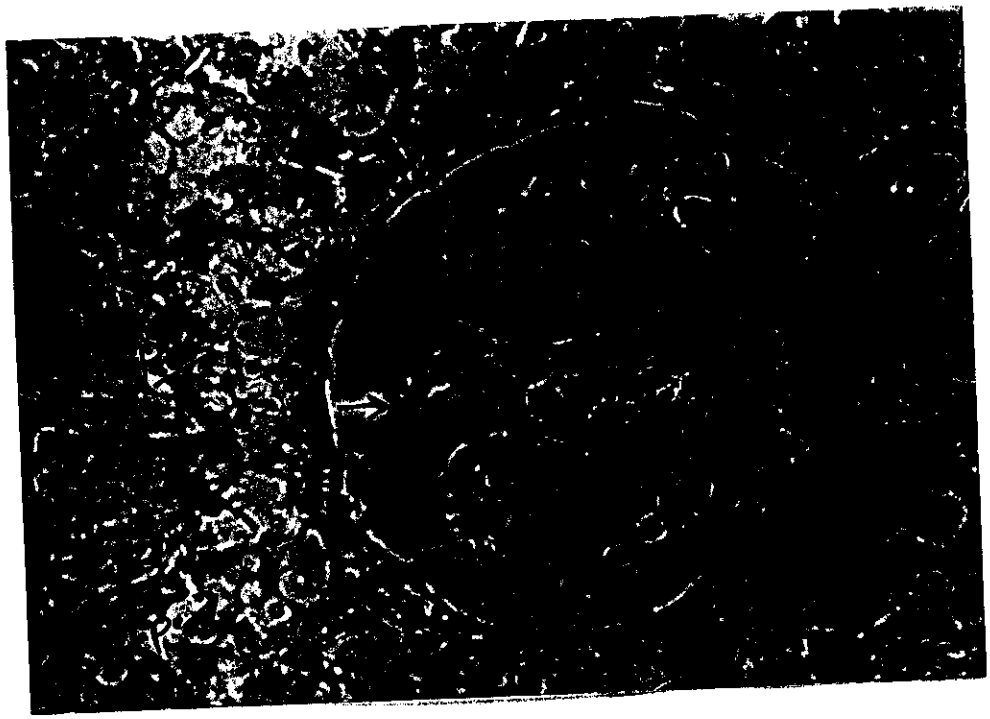

Fig. (39): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing necrosis of the epithelium lining the convoluted tubules (P) and increase capsular space of the glomerulus (arrow).

(Hx & E Objective 40 Projective 10)

Fig. (40): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing necrosis of the epithelium lining the convoluted tubules (P) and wide interstitial spaces can be seen between convoluted tubules (arrow).

(Hx & E Objective 40 Projective 10)

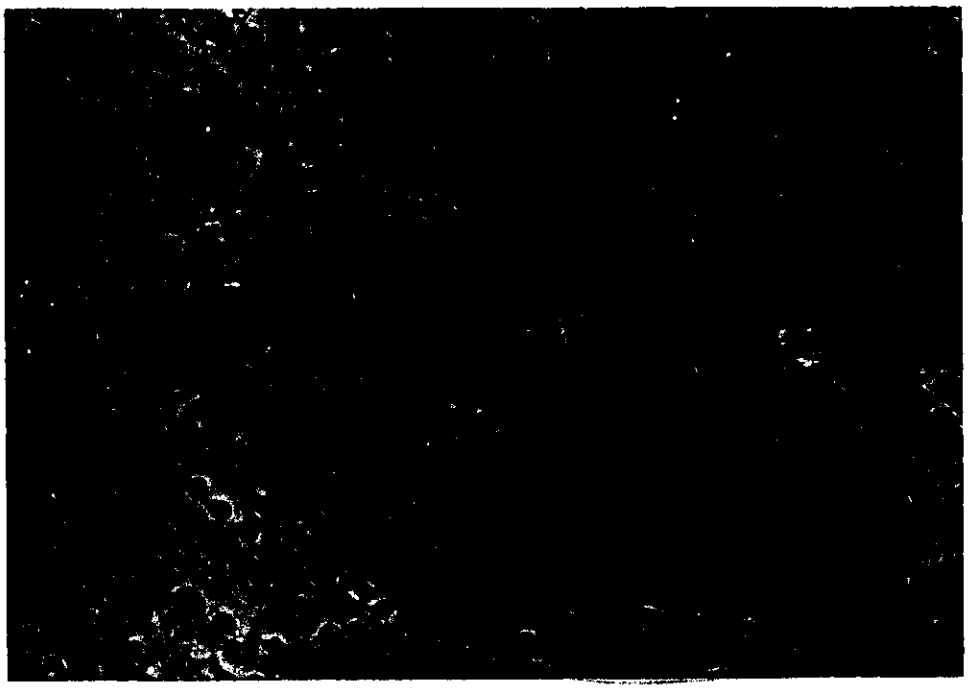

Fig. (41): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing interstitial hemorrhage between convoluted tubules (arrow).

(Hx & E Objective 40 Projective 10)

Fig. (42): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing dilated blood vessels and packed with RBCs (V) with thickening (arrow) and infiltration of their wall by inflammatory cells (two arrows).

(Hx & E Objective 40 X Projective 10)

Group II_C (hypertensive rats treated with enalapril for 3 weeks):

In this group there was sclerosis of some glomeruli characterized by collapse of capillary loops and adhesion of the tuft to Bowman's capsules and widening of capsular spaces, while others showed mild hypercellularity ***(Fig.43).***

Some convoluted tubules started to regenerate ***(Fig.44)*** while others still degenerated ***(Fig.43).***

The small arteries showed mild thickening and mild infiltration of their wall by inflammatory cells ***(Fig.44).***

Group II_D (hypertensive rats treated with enalapril for 6 weeks):

In this group there was marked hypercellularity of glomeruli and most of the convoluted tubules were regenerated, while few of them degenerated ***(Fig.45).***

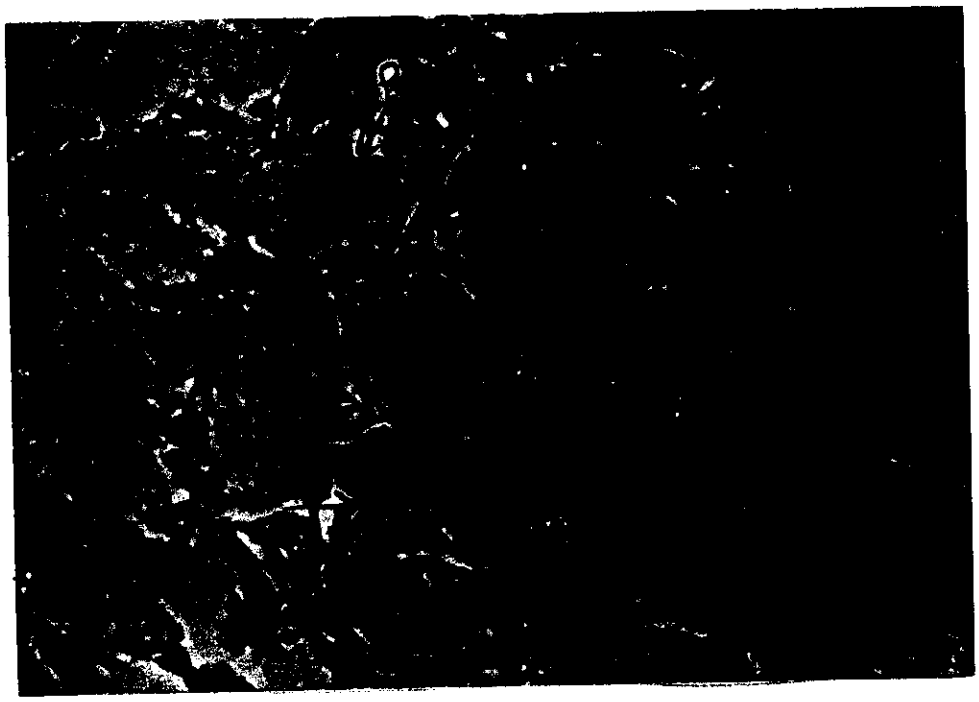

Fig. (43): A photomicrograph of a section in the cortex of a kidney of a hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing collapse of capillary loops of some glomeruli (arrow) while other showed mild hypercellularity (G) and degeneration of some convoluted tubules (P).

(Hx & E Objective 40 Projective 10)

Fig. (44): A photomicrograph of a section in the cortex of a kidney of a hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing mild thickening of the wall of small arteries (arrow) with mild degree of lymphocytic perivascular infiltration (S). Some convoluted tubules regenerated (R) while other still degenerated (D).

(Hx & E . Objective 40 Projective 10)

Fig. (45): A photomicrograph of a section in the cortex of a kidney of a hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing marked hypercellularity of glomeruli (G) and regeneration of most convoluted tubules (arrow).

(Hx & E Objective 40 Projective 10)

2-Masson's trichrome stain:

Group I_A (control untreated rats):

There were minimal amount of loose connective tissue around renal tubules, Bowman's capsules and capillary tuft of glomeruli ***(Fig.46).***

Group I_B (treated rats with enalapril for 3 weeks):

No detectable changes were observed in the distribution of connective tissue in the kidney of this group.

Group I_C (treated rats with enalapril for 6 weeks):

There was swelling of epithelial lining of proximal convoluted tubules and mild hypercellularity of glomeruli with no changes in the distribution of connective tissue in the kidney of this group ***(Fig.47).***

Group II_A (control of hypertensive rats):

In this group the histological picture are similar to normotensive control rats (group I_A).

Group II_B (hypertensive untreated rats):

There was an increase in the amount of collagen fibers around degenerated convoluted tubules, segmental distention of glomerular capillary and around Bowman's capsules of sclerotic glomeruli with decreased glomerular cellularity ***(Fig.48)*** and also around dilated congested blood vessels (interstitial fibrosis) ***(Fig.49).***

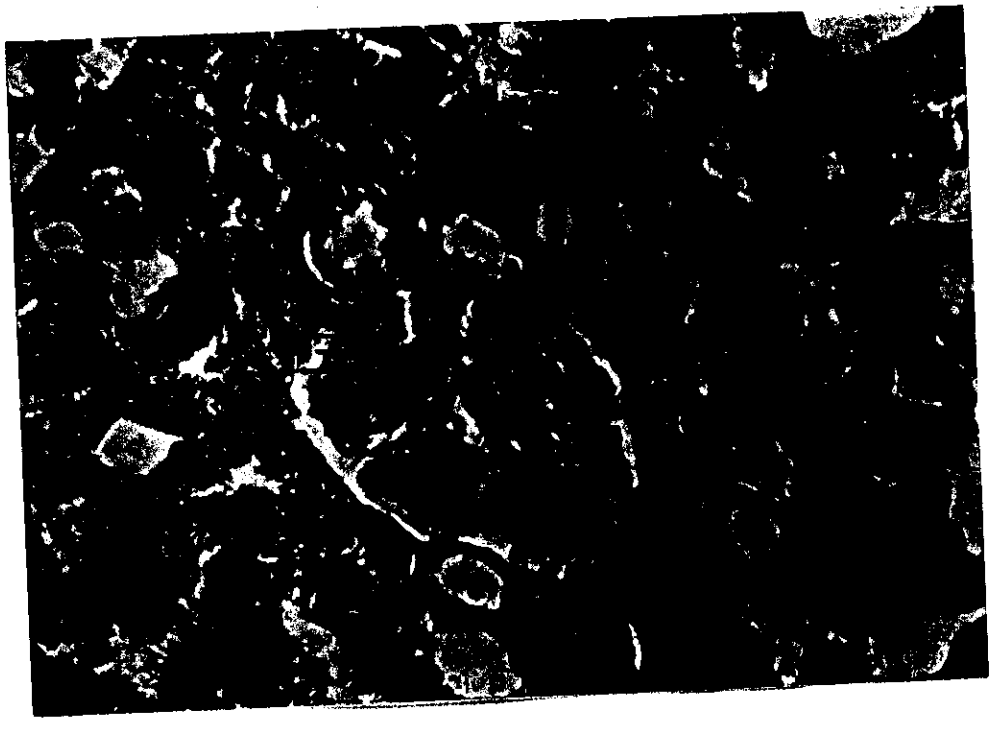

Fig. (46): A photomicrograph of a section in the cortex of a kidney of a control adult male albino rat (group I_A) showing normal structures of both glomeruli (G) and tubules (T) with minimal amount of connective tissue around renal tubules (one arrow), Bowman's capsules (two arrows) and capillary tuft of glomeruli (three arrows).

(Masson 's trichrome Objective 40 Projective 10)

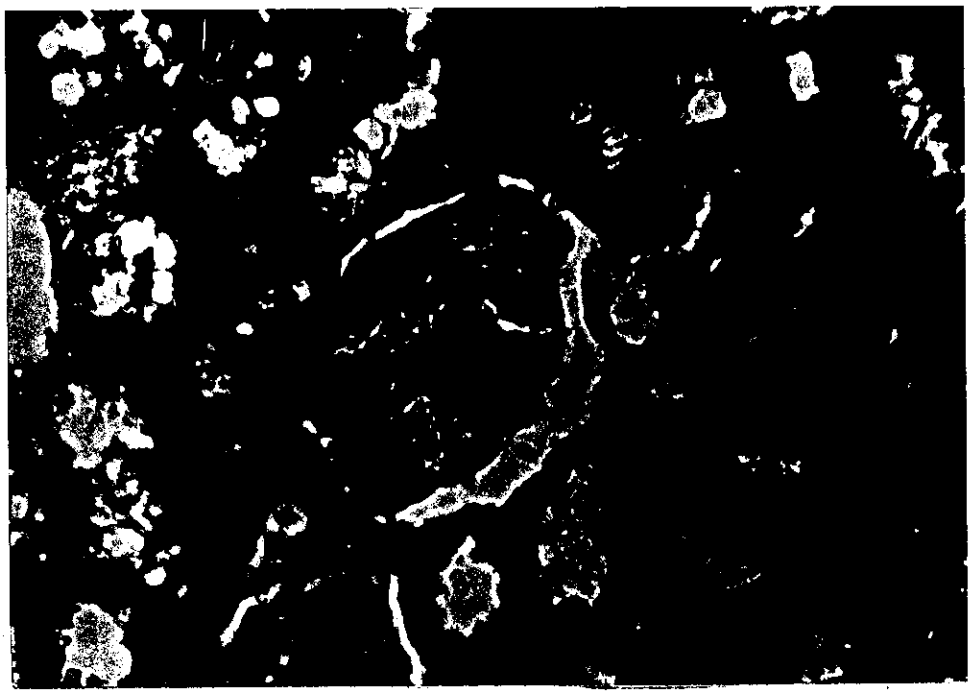

Fig.(47): A photomicrograph of a section in the cortex of a kidney of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing normal distribution of connective tissues around swollen proximal convoluted tubules (P) with mild hypercellularity of glomerulus (G).

(Masson 's trichrome Objective 40 Projective 10)

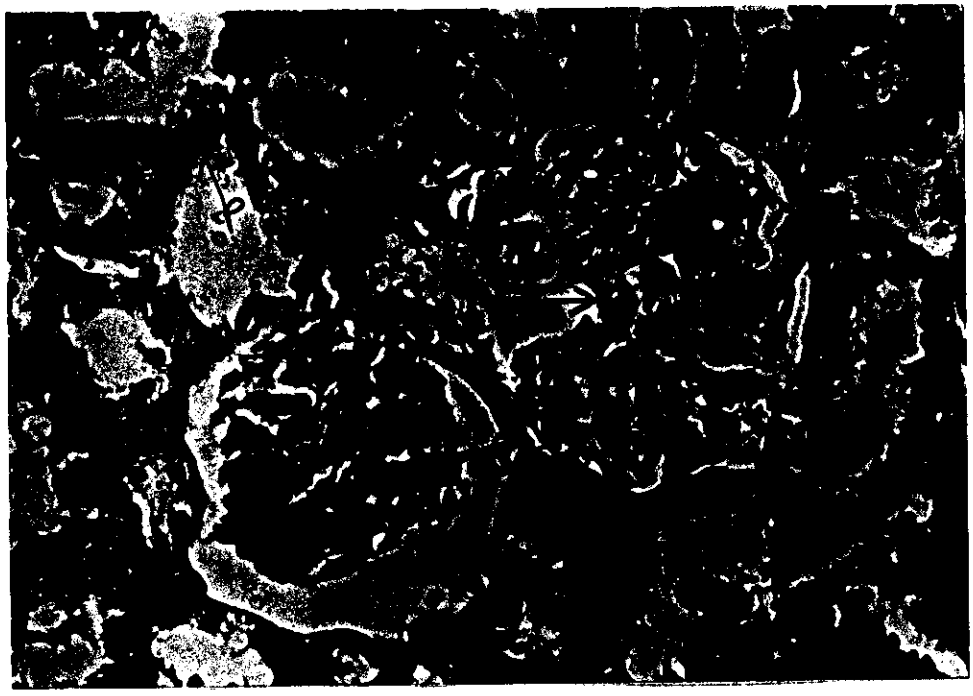

Fig. (48): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing an increase in the amount of collagen fibers around degenerated convoluted tubules (P), segmental distension of capillary loops of glomeruli (arrow) and Bowman's capsule of sclerotic glomeruli (two arrows).

(Masson 's trichrome Objective 40 Projective 10)

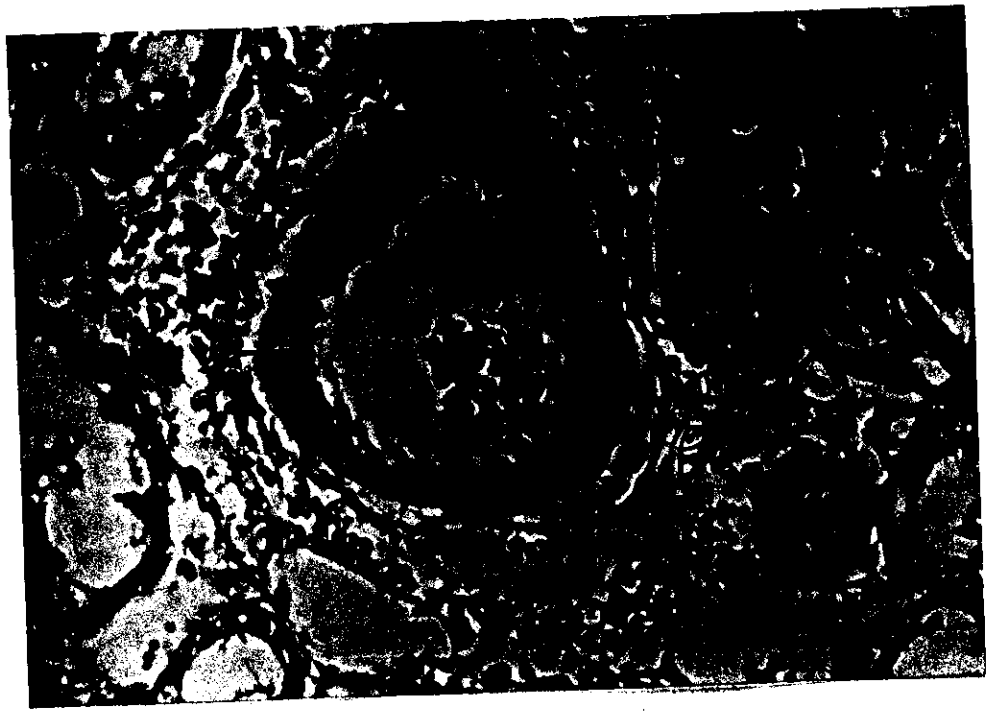

Fig. (49): A photomicrograph of a section in the cortex of a kidney of a hypertensive untreated adult male albino rat (group II_A) showing an increase in the amount of collagen fibers around dilated congested blood vessels (V) and degenerated convoluted tubules (P).

(Masson 's trichrome Objective 40 Projective 10)

Group II_C ((hypertensive rats treated with enalapril for 3 weeks):

The amount of collagen fibers around degenerated convoluted tubules and sclerotic glomeruli were decreased. Glomeruli showed decreased cellularity and their capillary were distended ***(Fig.50).***

Group II_D (hypertensive rats treated with enalapril for 6 weeks):

There was marked decrease in the amount of collagen fibers around swollen glomeruli and regenerated convoluted tubules and also around blood vessels ***(Fig.51).***

Fig. (50): A photomicrograph of a section in the cortex of a kidney of a hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing gradual decrease in the amount of collagen fibers around degenerated convoluted tubules (P) and glomeruli which showed decrease of their glomerular cellularity and distension of glomerular capillary (G).

(Masson 's trichrome Objective 40 Projective 10)

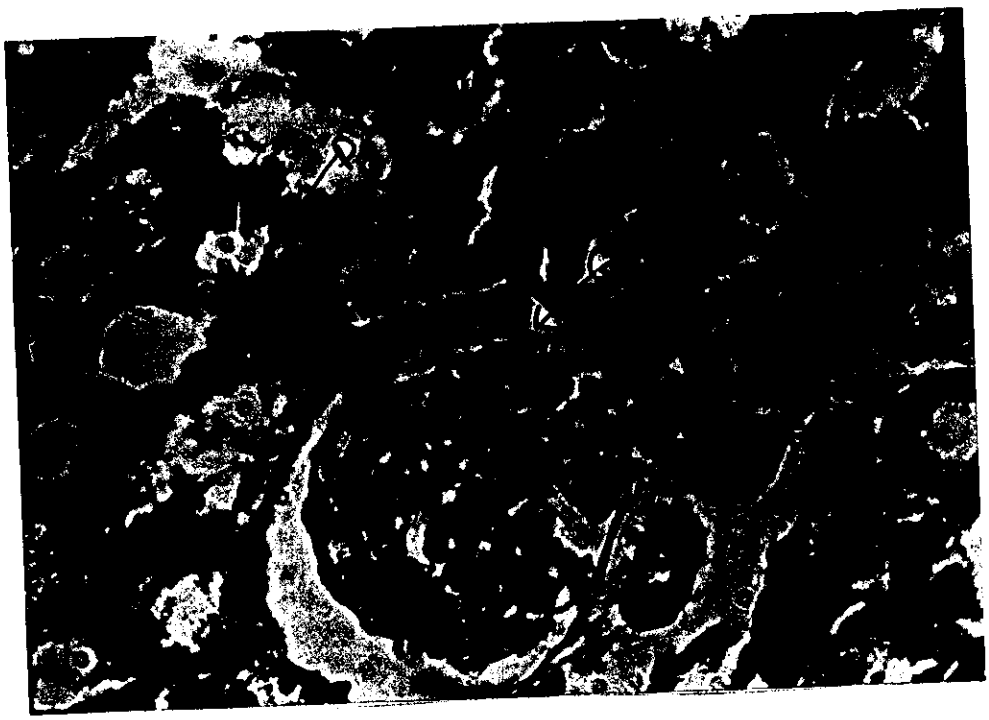

Fig. (51): A photomicrograph of a section in the cortex of a kidney of a hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing marked decrease in the amount of collagen fibers around regenerated convoluted tubules (P) and swollen glomeruli (G).

(Masson 's trichrome Objective 40 Projective 10)

II-ELECTRON MICROSCOPIC PICTURE:

Group I_A (control untreated rats):

Electron microscopic examination of renal cortex of a control adult rats revealed that renal corpuscles were formed of capillary tuft surrounded by double walled epithelial capsules (Bowman's capsules). The latter was formed of two continuous layers of epithelium, an outer parietal layer and inner visceral layer, enclosing in between a wide space (capsular space). The parietal layer was formed of thin layer of simple squamous cells and the visceral layer was formed of modified simple squamous cells (podocytes). The podocytes appeared stellate in shape with Cytoplasmic extensions that form primary processes. From these primary processes delicate minor processes or pedicles called secondary processes, arise and terminated by feet like expansions on the dense basal laminae of capillary wall. There were minute gaps inbetween minor processes called filtration slits and closed by diaphragms ***(Fig.52).*** The cytoplasm of podocytes contains oval central nuclei, well-developed Golgi apparatus, numerous free ribosomes and rough endoplasmic reticulum.

The glomerular blood capillaries were formed of fenestrated flat endothelial cells resting on glomerular basement membrane. The glomerular basement membrane appeared homogenous and trilamellar, being formed of outer and inner electron lucent layers and middle electron dense layer ***(Fig.53 & 54).***

The mesangial cells were seen in between the adjacent capillaries with densely stained cytoplasm due to the presence of large number of dense granules with indented nucleus and normal distribution of chromatin. ***(Fig.53).***

Fig. (52): An electron photomicrograph of a renal corpuscle in kidney of control adult male albino rat (group I_A) showing several capillary loops (C) contain erythrocytes (E) and are lined by a thin layer of fenestrated endothelium (e) with bulging nuclei (N) into capillary lumina and also cell body of podocytes (P), their primary processes (P1) giving rise to numerous secondary processes (P2) separated by filtration slits (FS), these processes rest on glomerular basement membrane (BM).

(X 4000)

Fig. (53): An electron photomicrograph of a renal corpuscle in kidney of control adult male albino rat (group I_A) showing glomerular capillary(C) with R.B.CS (R) and mesangial cells (m) with normal nucleus and normal distribution of its chromatin, its cytoplasm contains mitochondria (M), mesangial matrix (MM), processes (P) and foot processes of podocytes (F) these processes rest on glomerular basement membrane (BM). Notice filtration slits between foot processes (FS).

(X 4000)

Fig. (54): An electron photomicrograph of renal corpuscle in kidney of control adult male albino rat (group I_A) showing three components of glomerular filter. The fenestrated capillary endothelium (e) was closely applied to the luminal surface of the glomerular basement membrane (BM). On the opposite side appeared podocytes with secondary foot processes (P2) separated by filtration slits (FS), of uniform width and bridged by fine electron dense diaphragms (D).

(X 15000)

Cells lining the proximal convoluted tubules showed numerous microvilli at the apical surface of the tubular cells, which had single rounded nuclei with moderately extended chromatin and smooth regular envelope ***(Fig.55 &56 &57).***

The cytoplasm of cells lining the proximal tubules contained large number of narrow elongated mitochondria situated in basal part of the cells and arranged parallel to cell axis in between the basal infoldings. Mitochondria with variable shape and sizes were also seen in the rest of cytoplasm ***(Fig.58&59).***

The basal plasma membrane appeared thin with numerous infoldings dividing the basal part of the cells into compartment enclosing in between the elongated mitochondria. The intercellular space was normal with the presence of lateral interdigitations in between the cells of proximal convoluted tubules ***(Fig.58&59).***

Cells lining the distal convoluted tubules appeared cuboidal with short microvilli on their free surfaces. The basal surface of the plasma membrane was deeply invaginated and enclosing in between the elongated mitochondria. Each cell contained central nucleus, small Golgi complex around the upper pole of the nucleus, there were a few rough endoplasmic reticulum and moderate number of free ribosomes. The nuclei appeared rounded or ovoid and displaced towards the lumen with less extended chromatin and large nucleoli ***(Fig.60).***

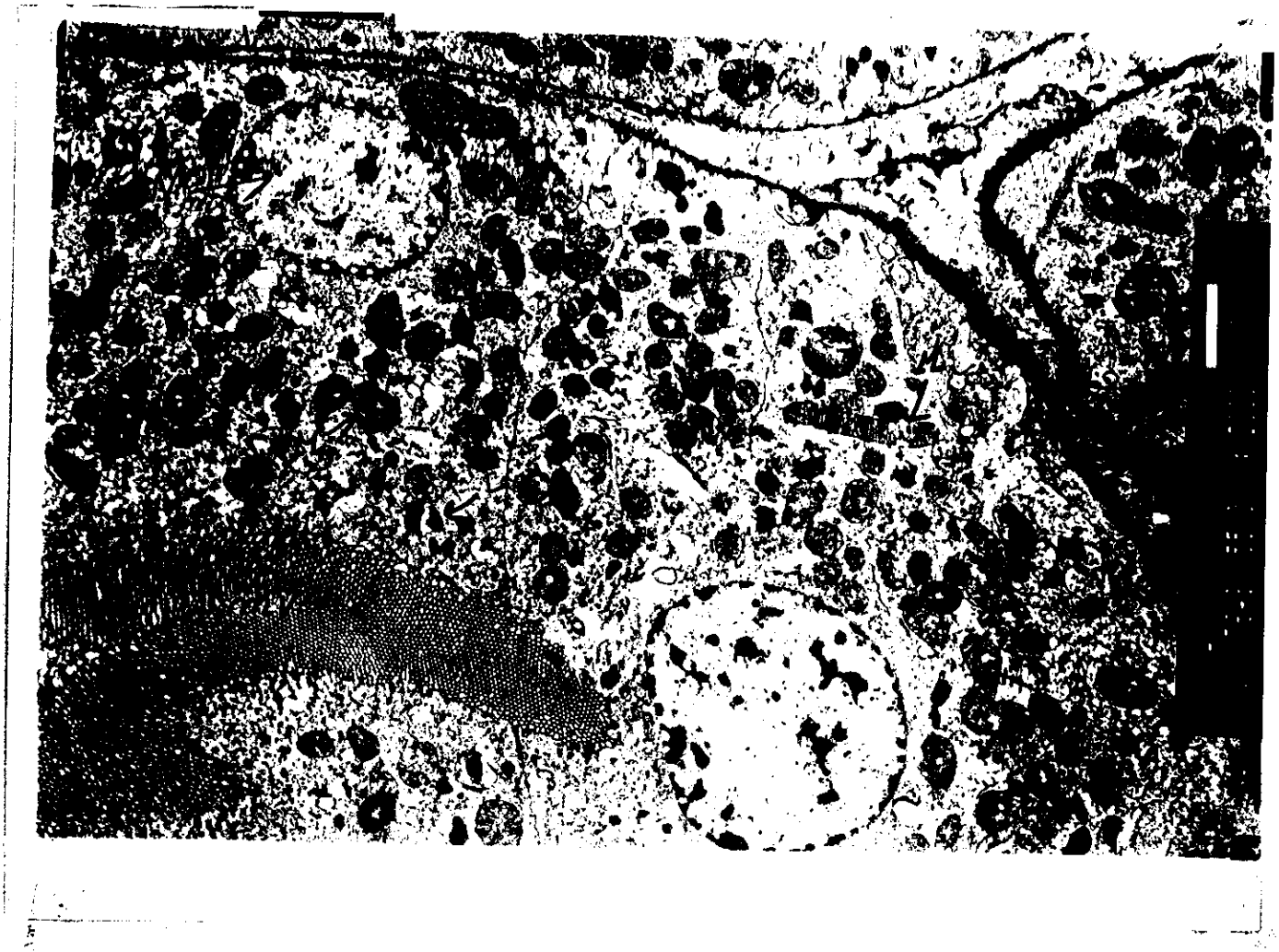

Fig. (55): An electron photomicrograph of proximal convoluted tubule cells in kidney of control adult male albino rat (group I_A) showing numerous thin microvilli (mv) forming their brush border, their cytoplasm contains many lysosomes (L). Also there were many mitochondria (M). Nuclei appear rounded, central with normal distribution of nuclear chromatin (N). Notice the junction between two cells (arrow).

(X 3000)

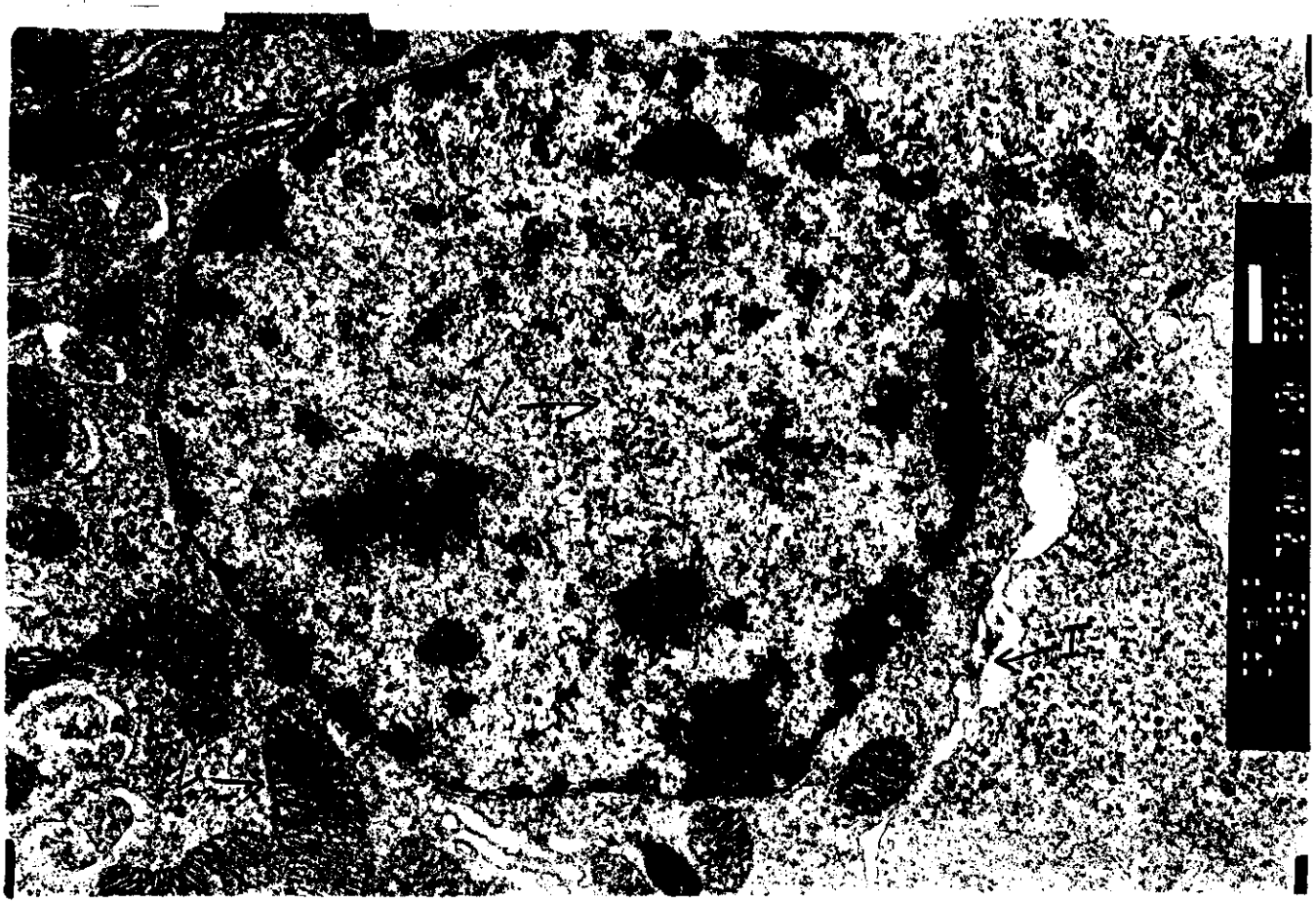

Fig.(56): An electron photomicrograph of a proximal convoluted tubule cell in kidney of control adult male albino rat (group IA) showing spherical nucleus of epithelial cell with normal distribution of its chromatin (N), many mitochondria (M) and lateral cell interdigitations can be seen (I).

(X 10000)

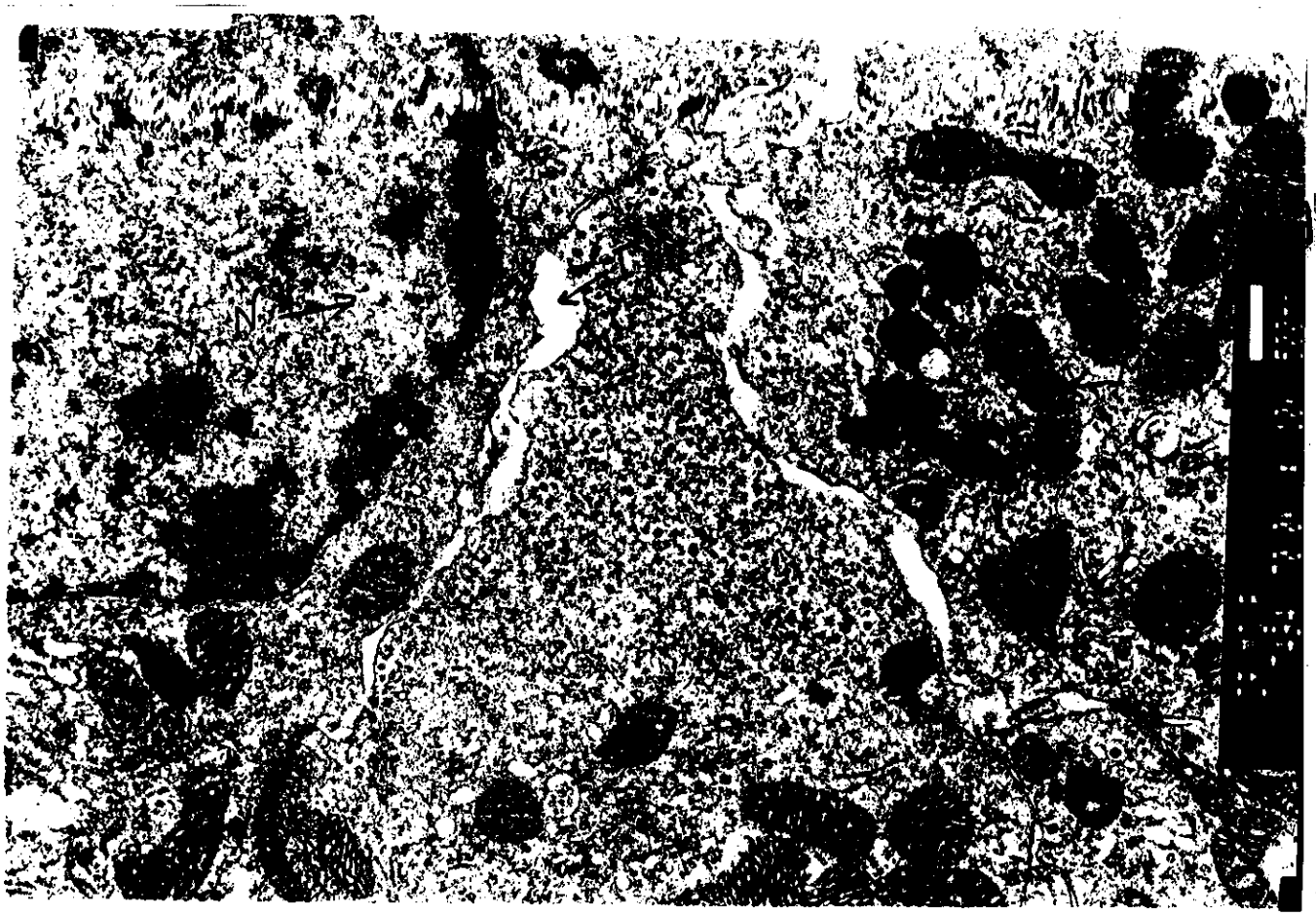

Fig. (57): An electron photomicrograph of proximal convoluted tubule cells in kidney of control adult male albino rat (group I_A) showing spherical nucleus of epithelial cell with normal distribution of its chromatin (N), many mitochondria (M) and lateral cell interdigitations (I).

(X 10000)

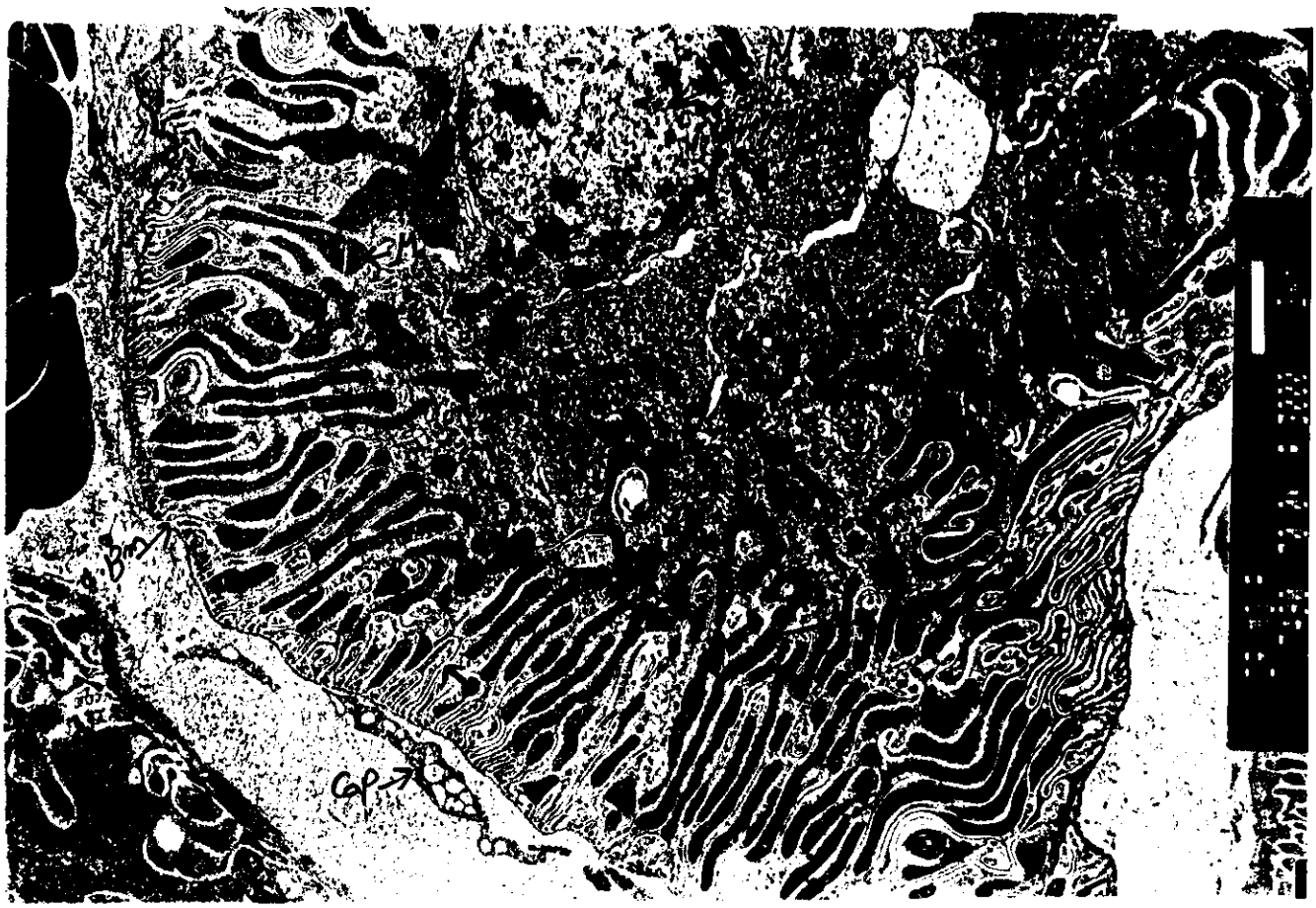

Fig. (58): An electron photomicrograph of proximal convoluted tubule cell of kidney of control adult male albino rat (group I_A) showing lateral cell interdigitations (I), spherical nucleus with normal distribution of chromatin (N) and many elongated mitochondria (M) in between basal infolding (arrow). Notice presence of peritubular capillary (cap) lie near the basement membrane of the tubules (BM).

(X 3000)

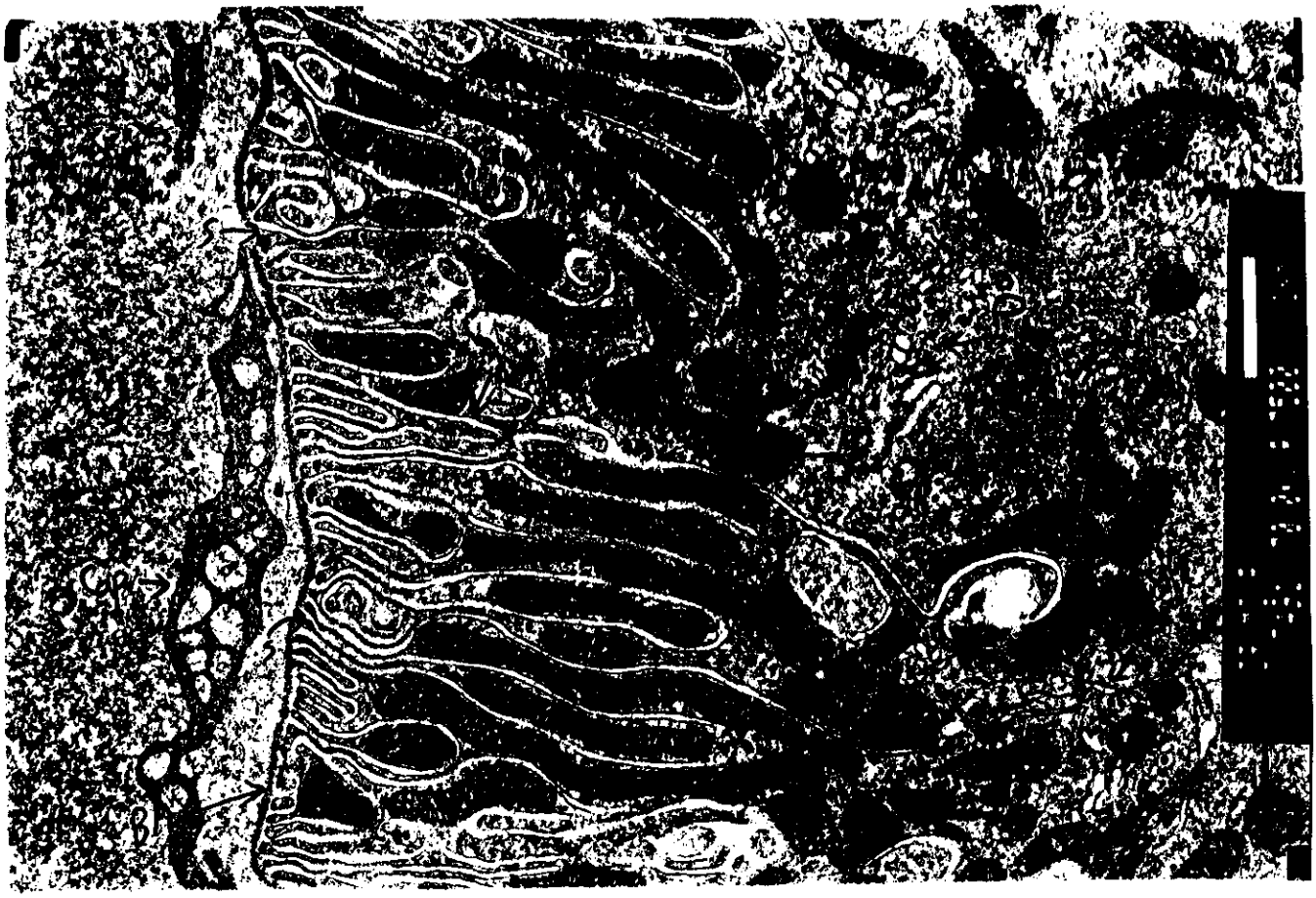

Fig.(59): Higher magnification of the previous section of proximal convoluted tubule cell in kidney of control adult male albino rat (group I_A) showing a basal part of proximal convoluted tubule cell (P) with basal infoldings of plasma membrane (arrow) separated by columns of cytoplasm containing elongated mitochondria (M). The basement membrane of the tubules (BM), lining cell lie near peritubular capillary (cap). Notice normal intercellular space (S) and lateral cell interdigitation (I).

(X 7500)

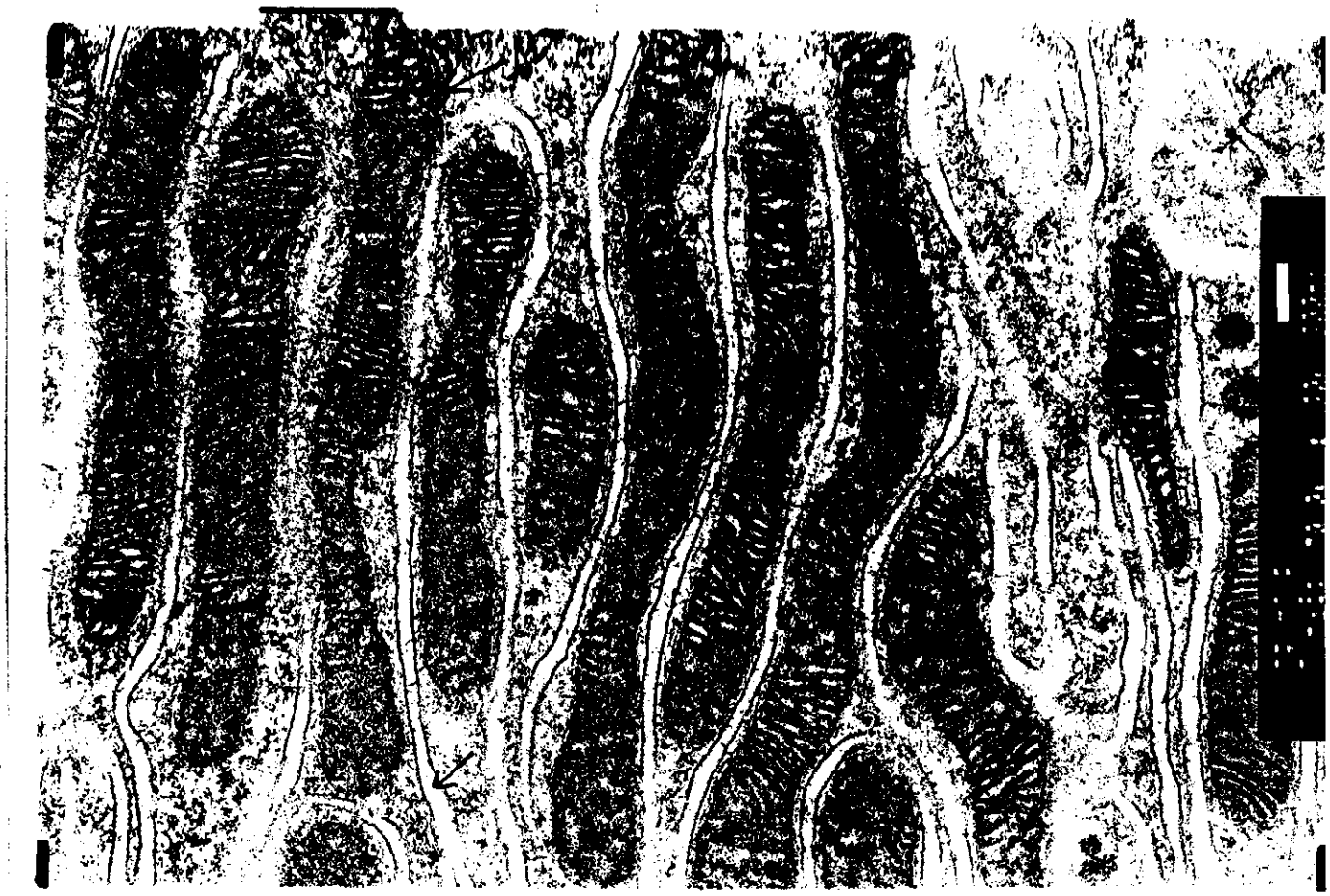

Fig. (60): Higher magnification of the previous section showing basal infoldings of plasma membrane (arrow) separated by columns of cytoplasm containing elongated mitochondria (M).

(X 20000)

Group I_B (rats treated with enalapril for 3 weeks):

Electron microscopic examination of renal cortex of adult rats in this group showed no changes in structure of glomeruli, podocytes foot processes and glomerular basement membrane and also proximal and distal convoluted tubules.

Group I_C (rats treated with enalapril for 6 weeks):

Electron microscopic examination of renal cortex of adult rats in this group showed no changes in structure of glomeruli, podocytes foot processes and glomerular basement membrane.

Cells lining the proximal convoluted tubules showed partial destruction of microvilli, which form the brush border of tubular cells. Their cytoplasm contained multiple vacuoles, enlarged mitochondria and lysosomes ***(Fig.61).***

Some cells lining distal convoluted tubules showed mild thickening of basement membrane with disturbance in the basal infoldings and their cytoplasm contained mitochondria more or less normal in shape and size. The nuclei of some cells lining distal convoluted tubules showed mild irregularities in their membrane ***(Fig.62).***

Group II_A (control of hypertensive rats):

In this group the electron microscopic picture are similar to normotensive control rats (group I_A).

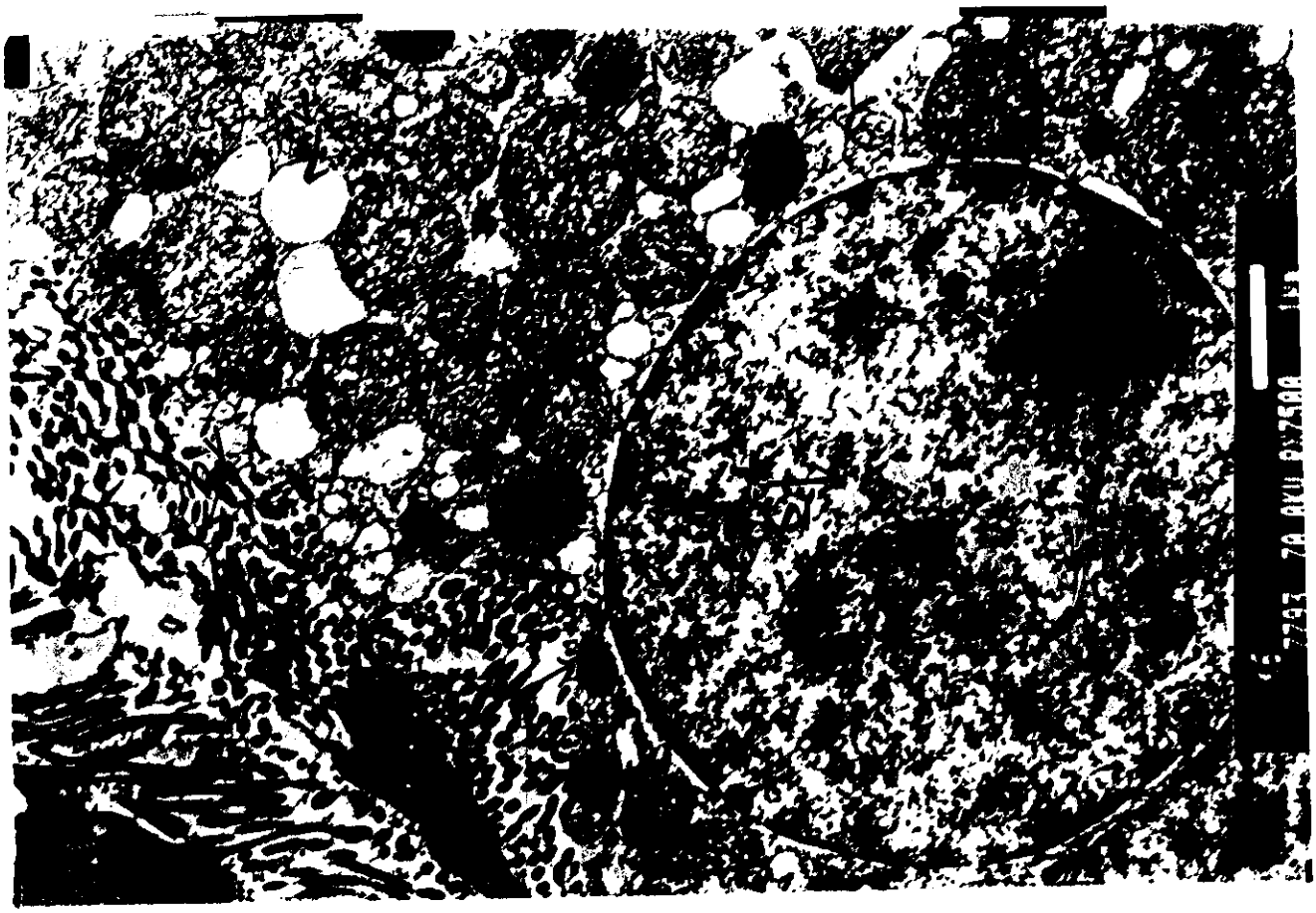

Fig.(61): An electron photomicrograph of a proximal convoluted tubule cell in kidney of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing partial destruction of microvilli forming the brush border (Mv), the cytoplasm of the tubular cell contained few vacuoles(V), mild enlarged spherical mitochondria (M) and few lysosomes (L), its nucleus is rounded with normal distribution of chromatin (N).

(X 7500)

Fig. (62): An electron photomicrograph of a distal convoluted tubule cell in kidney of a normotensive adult male albino rat treated with enalapril for 6 weeks (group I_D) showing mild thickening of basement membrane (BM) with disturbance of the basal infolding (arrow). The cytoplasm of cell contained mitochondria more or less normal in shape and size (M), there was mild irregularities of its nucleus (N).

(X 6000)

Group II_B (hypertensive untreated rats):

Electron microscopic examination of renal cortex of adult rats in this group showed marked thickening of glomerular basement membrane and its trilaminar structure was not clear and multiple vacuoles were observed in the cytoplasm ***(Fig.63).***

Some podocyte processes of the affected glomeruli appeared large other podocyte foot processes lost their normal arrangement and fused together with occlusion of filtration slits. Fragmentation of the podocytic processes was observed in the capsular space, which was filled with necrotic debris ***(Fig.64 &65).*** The nuclei of affected podocytes were deeply folded ***(Fig.66).***

The endothelium of blood capillaries of the affected glomeruli became destructed or swollen with large irregular nuclei ***(Fig.67 &68).*** The mesangial cells had large indented nuclei ***(Fig.69).***

The cells lining the proximal and distal convoluted tubules showed marked thickening of basement membrane with widely separated basal infoldings ***(Fig.7o&71).*** There was focal loss of microvilli, which form the brush border of affected tubular cells ***(Fig.72&73).***

The cytoplasm of cells lining the proximal and distal convoluted tubules contained mitochondria irregular in shape and variable in size, multiple large lysosomes and multiple vacuoles and irregular nuclei ***(Fig.70&71&72).***

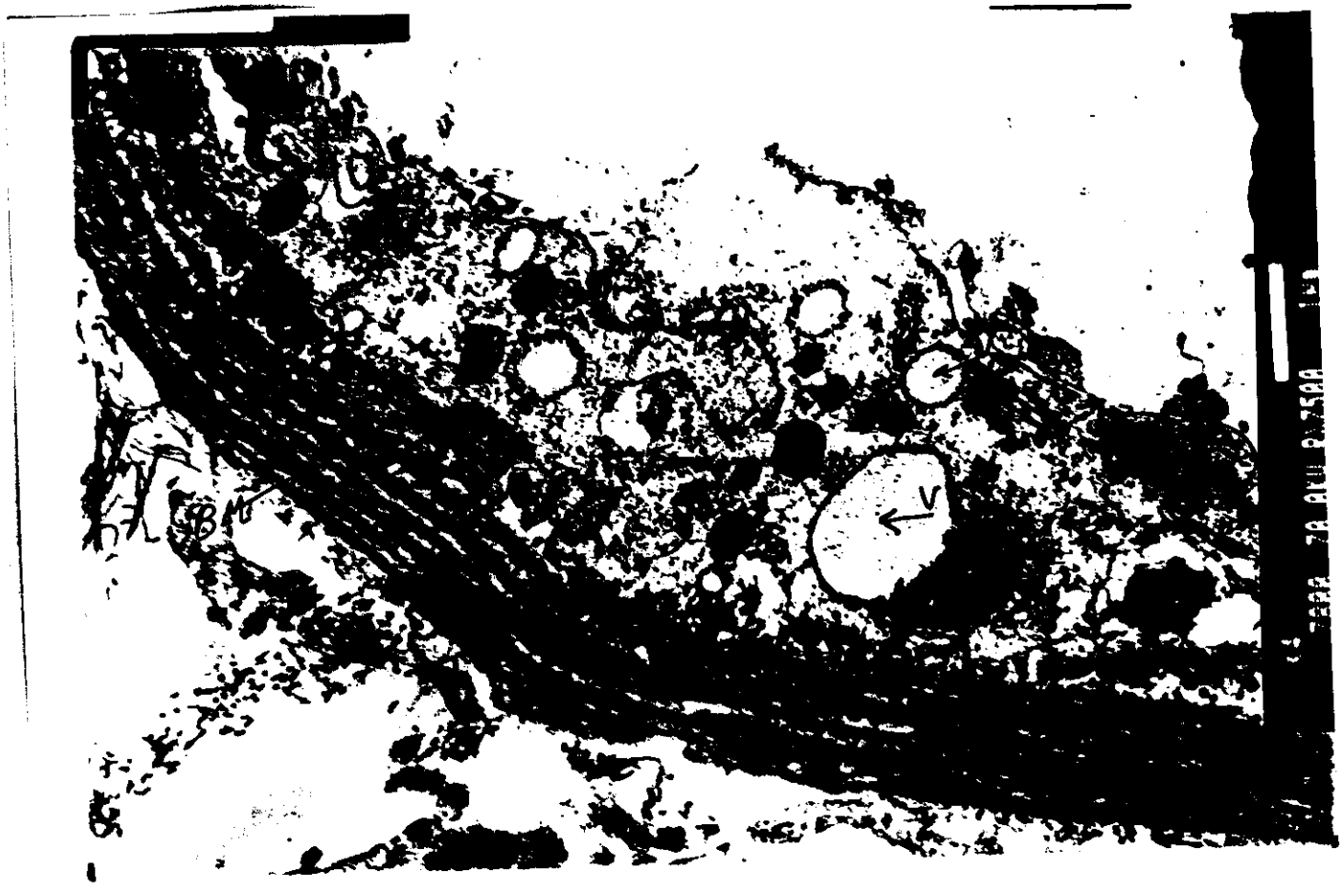

Fig. (63): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing marked thickening of glomerular basement membrane (BM) and its trilaminar structure was not clear. Notice presence of multiple vacuoles in the cytoplasm (V).

(X 7500)

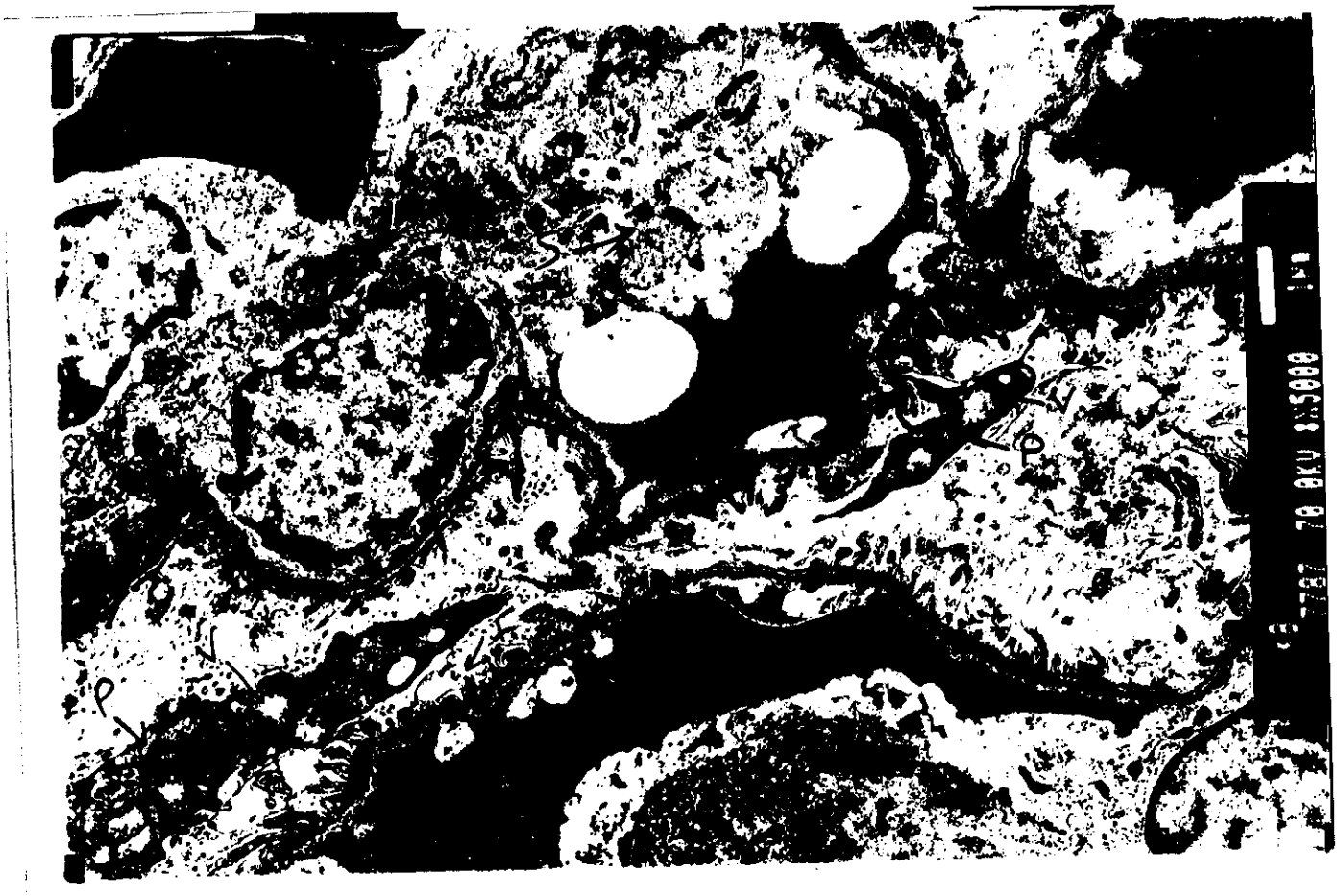

Fig. (64): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing podocytes cell body (P), which had multiple vacuoles (V), with loss of normal arrangement of its foot processes (F). The capsular space had necrotic debris (S).

(X 5000)

Fig. (65): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing some foot processes of podocytes which appeared large and protruded while others lost its normal arrangement with fusion of some foot processes (arrow). Notice the occlusion of filtration slits (FS) and thickened glomerular basement membrane (BM).

(X 12000)

Fig. (66): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing podocytes cell body (P) with deeply folded nucleus (N), loss of normal foot processes arrangement (F) and fusion of some foot processes (arrow). Notice the occlusion of filtration slits (FS), which became in contact with glomerular basement membrane (BM).

(X 5000)

Fig. (67): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing primary processes (P1) from which numerous secondary processes (P2) arsises and occlusion of filtration slits (FS) appeared in between. The trilamellar structures of thickened glomerular basement membrane (BM) were lost. The endothelial cell nucleus was large with irregular contour (N)

(X 7500)

Fig. (68): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing capillary loop (C) containing an erythrocytes (E). The endothelial cell nucleus was large and indented (N). The foot processes of podocytes appear distorted and fused (F).

(X 7500)

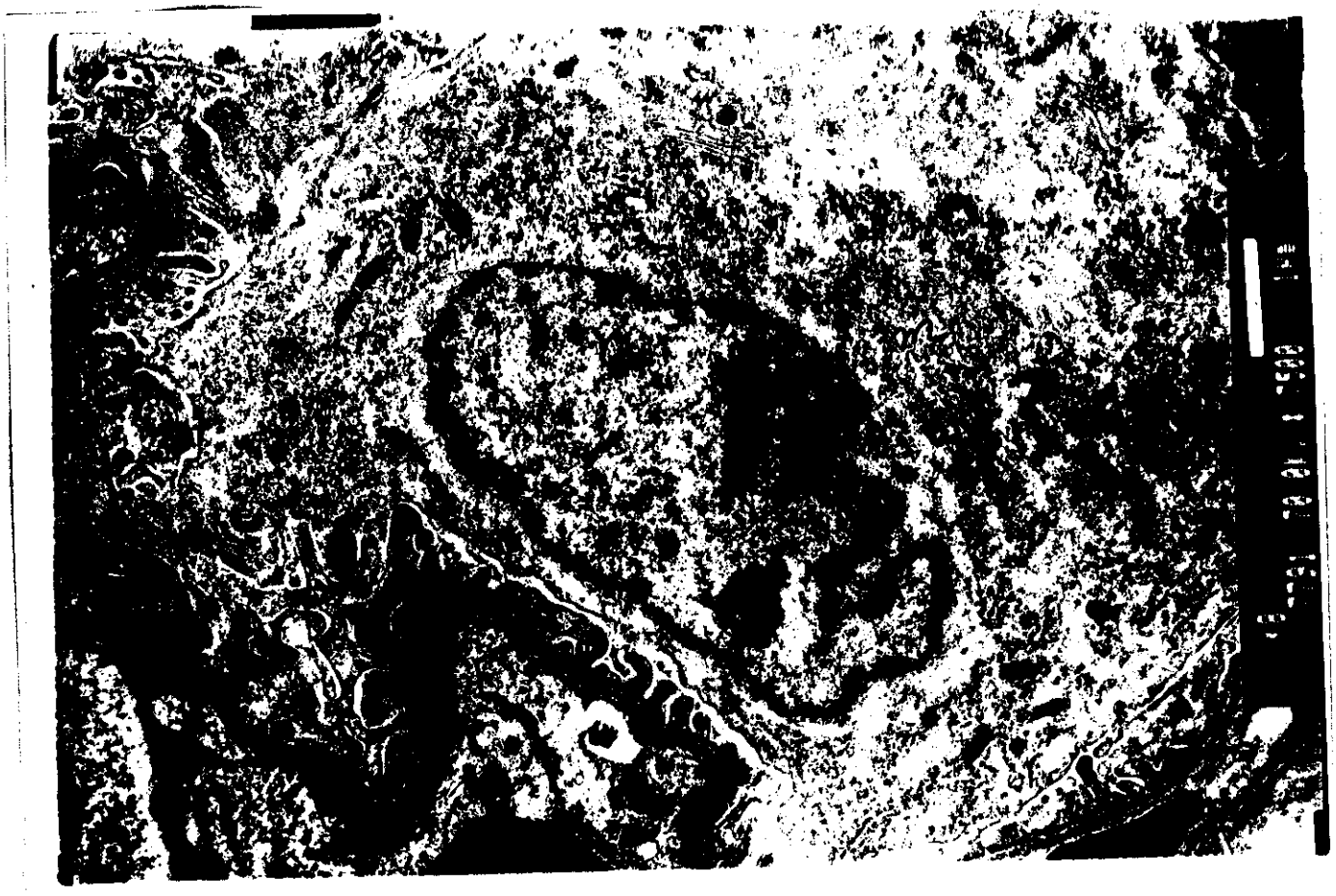

Fig. (69): An electron photomicrograph of a renal corpuscle in kidney of hypertensive untreated male adult albino rat (group II_A) showing mesangial cell (m) with large indented nucleus (N) and foot processes of podocytes appear distorted and fused (F).

(X 7500)

Fig.(70): An electron photomicrograph of a proximal convoluted tubule cell in kidney of hypertensive untreated male adult albino rat (group II_A) showing thickened basement membrane (BM) with widely separated basal infoldings of the plasma membrane (arrow), the cytoplasm had mitochondria irregular in shape and variable in size (M) with multiple large lysosomes (L).

(X 6000)

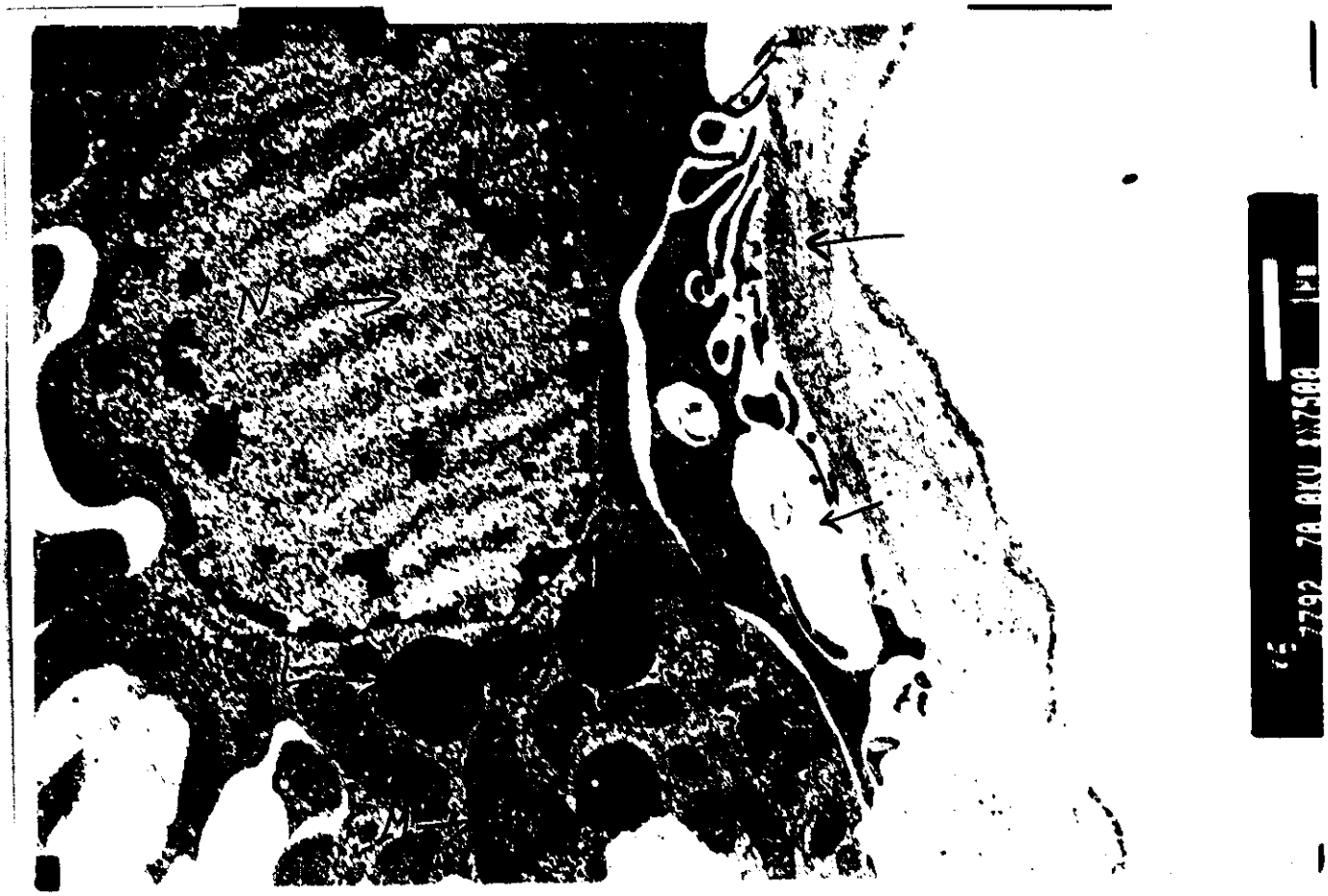

Fig.(71) An electron photomicrograph of a proximal convoluted tubule cell in kidney of hypertensive untreated male adult albino rat (group II_A) showing marked thickening of the basement membrane (BM) with loss of basal infoldings of plasma membrane (arrow). The cytoplasm of tubular cells had mitochondria with irregular shape and variable size (M), multiple large lysosomes (L) and irregular outline nucleus (N).

(X 7500)

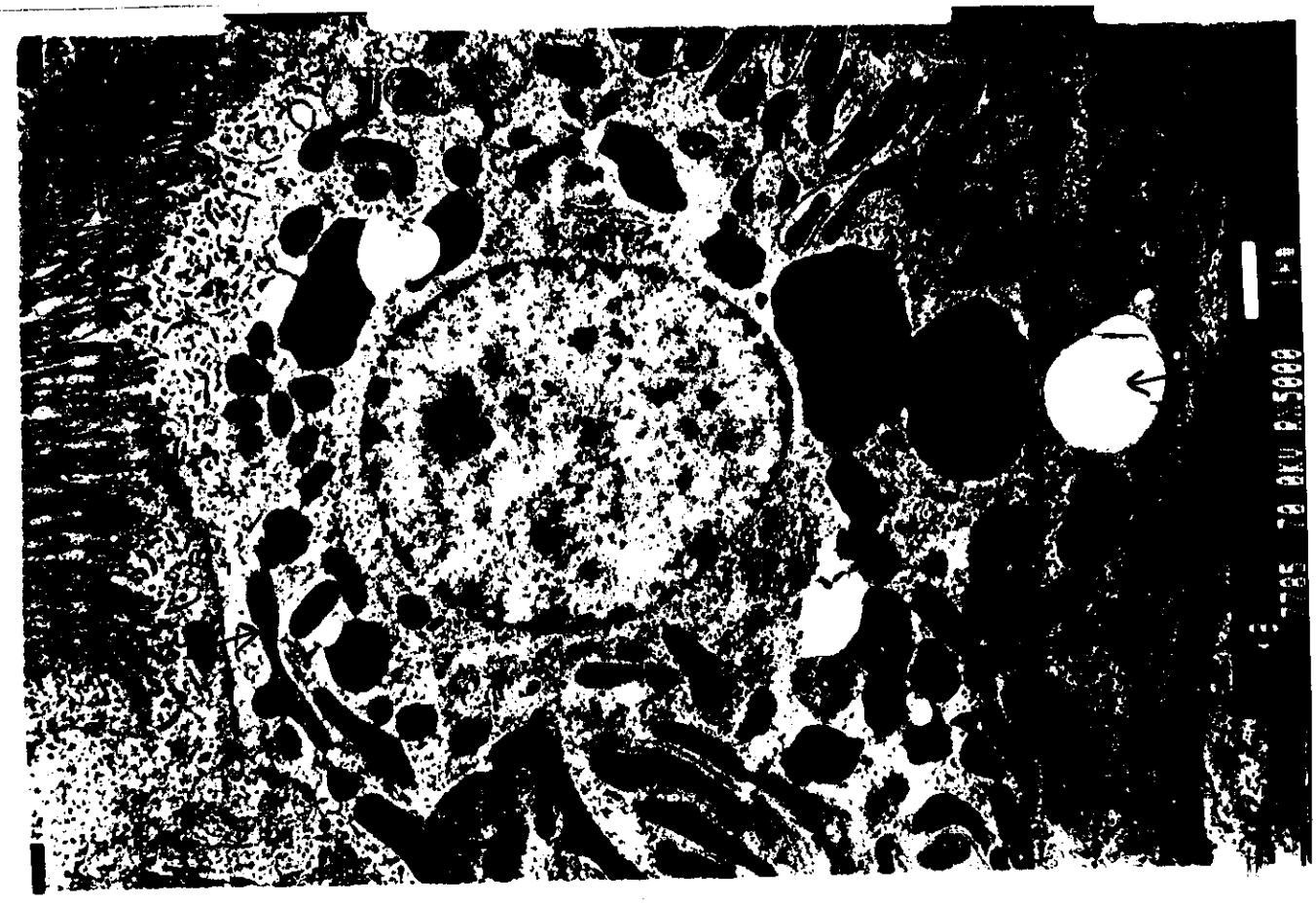

Fig.(72) An electron photomicrograph of a proximal convoluted tubule cell in kidney of hypertensive untreated male adult albino rat (group II_A) showing focal loss of microvilli which forming the brush border (mv), the cytoplasm of tubular cell showed multiple vacuoles (V), mitochondria were irregular in shape and variable in size (M) and large lysosomes (L).

(X 5000)

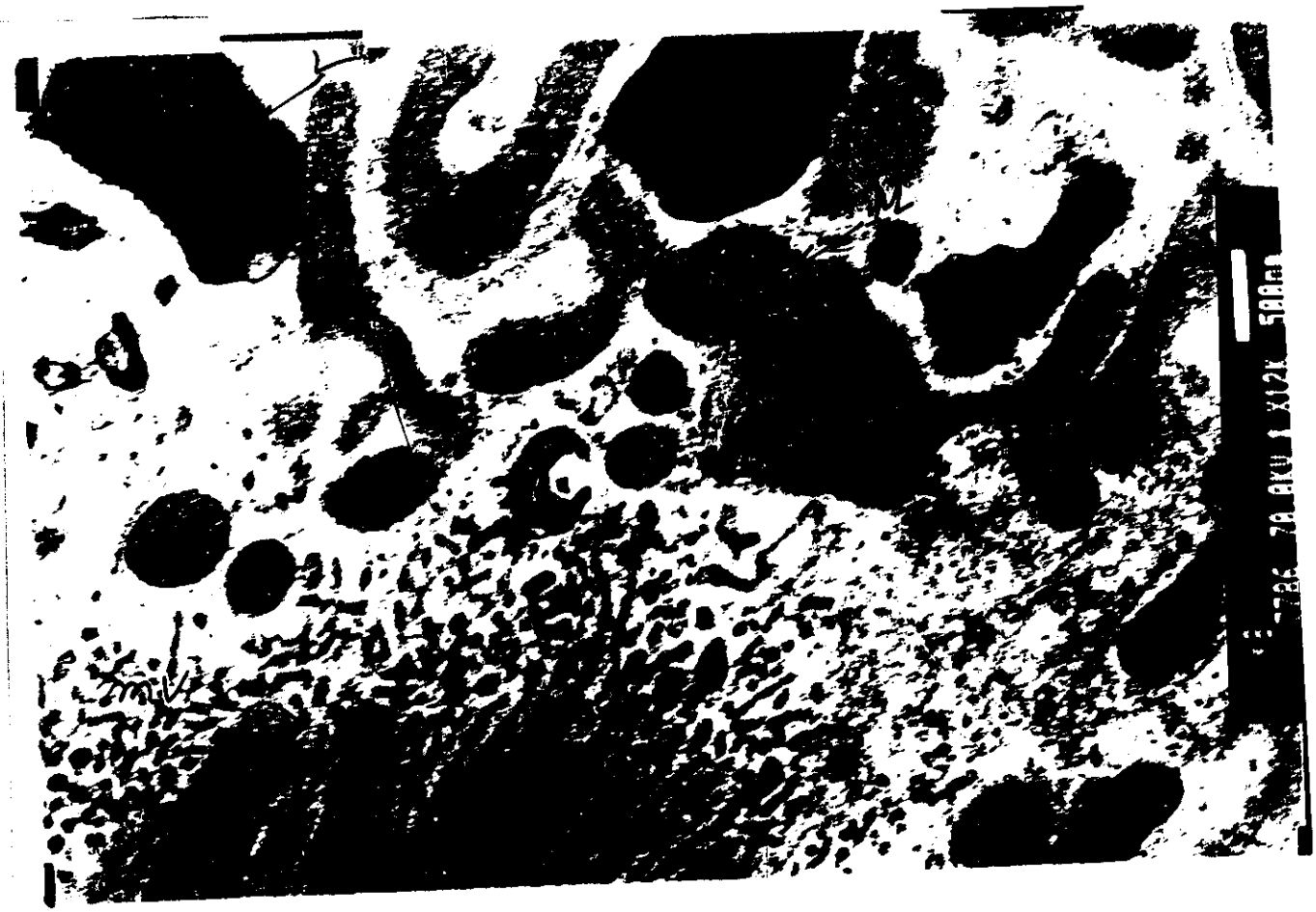

Fig. (73): Higher magnification of the previous one showing focal loss of microvilli forming the brush border (mv), the cytoplasm of tubular cell had mitochondria with irregular shape and variable size (M) and multiple large lysosomes (L).

(X 12000)

Group IIc (hypertensive rats treated with enalapril for 3 weeks):

Electron microscopic examination of renal cortex of adult rats in this group showed improvement in cell body of the podocytes of affected glomeruli which became large with large nucleus and folded nuclear membrane, its foot processes were more or less normal but there was still fusion of foot processes in some areas, they rest on glomerular basement membrane and there was a decrease in thickening of glomerular basement membrane ***(Fig. 74).***

The glomerular capillaries had wide lumen, erythrocytes were observed at their lumen and nuclei of endothelial cells lining Bowman's capsules had irregular contour and appeared at one side ***(Fig. 75).***

The cells lining the proximal and distal convoluted tubules showed irregular thickening of the basement membrane with widely separated basal infoldings and also dilated intercellular spaces. There was an improvement in the appreance of microvilli, which form the brush border of the affected tubular cells. The nuclei of affected cells were basal and had irregular outline ***(Fig. 76).***

Fig. (74): An electron photomicrograph of a renal corpuscle in kidney of hypertensive adult male albino rat treated with enalapril for 3 weeks (group II_B) showing enlarged cell body of podocytes (P) with large nucleus and folded nuclear membrane penetrating into karyoplasm (N), its foot processes (F) rest on thickened glomerular basement membrane (BM).

(X 7500)

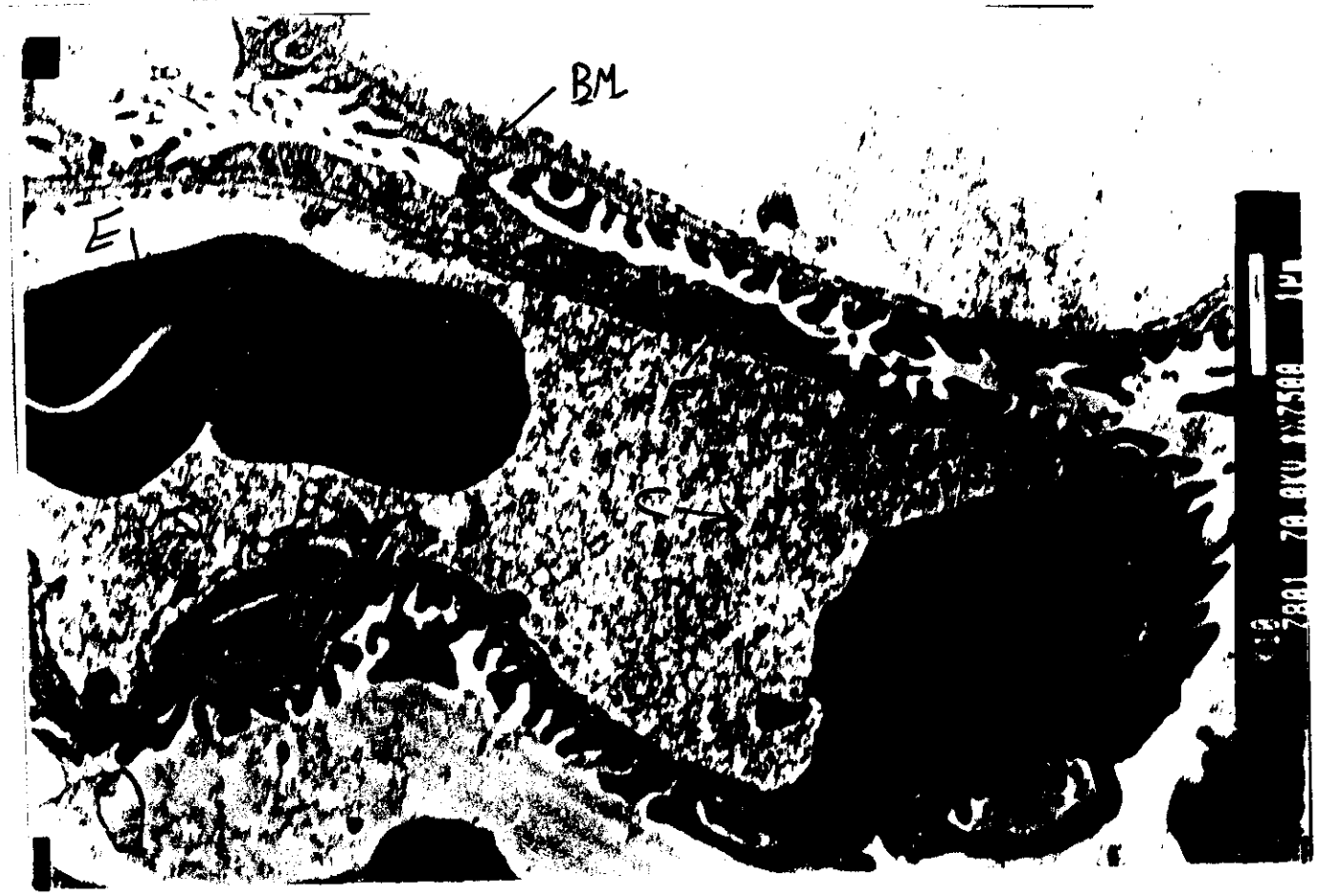

Fig. (75): An electron photomicrograph of a renal corpuscle in kidney of hypertensive male adult albino rat treated with enalapril for 3 weeks (group II_B) showing two capillary loops (C) containing erythrocyte (E). The endothelial cell nucleus was large with irregular contour and present at one side (N). Irregular thickening of glomerular basement membrane appear (BM). The foot processes of podocytes were fused in some areas (F).

(X 7500)

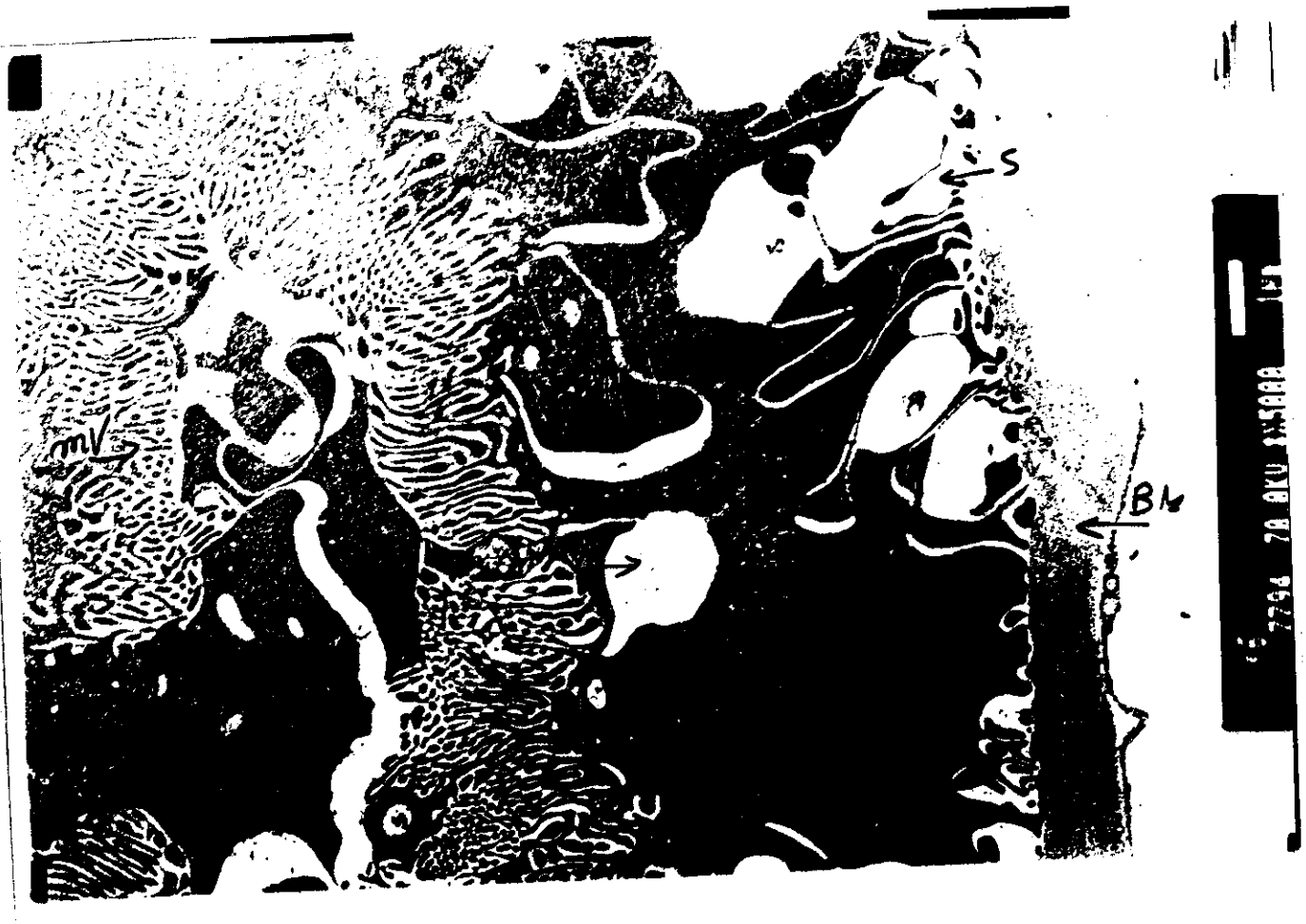

Fig.(76): An electron photomicrograph of a proximal convoluted tubule cell in kidney of hypertensive adult male albino rat treated with enalapril for 3 weeks(group II_B) showing irregular thickening of the basement membrane (BM) with widely separated basal infoldings of plasma membrane (arrow), dilated intercellular space (S) and reappreance of microvilli forming the brush border (mv). Their cytoplasm had multiple vacuoles of different sizes (V) with basal irregular nucleus (N).

(X 5000)

Group II_D (hypertensive rats treated with enalapril for 6 weeks):

Electron microscopic examination of renal cortex of adult rats in this group showed fenestrated endothelium closely applied to luminal surface of glomerular basement membrane. Foot processes more or less normal but there was still fusion of foot processes in some area ***(Fig.77&78).***

The cells lining affected convoluted tubules showed an improvement of most ultrastructural changes such as appreance of microvilli, which form the brush border of the affected tubular cells. Their cytoplasm contained mitochondria more or less normal, few vacuoles and lysosomes, while basement membrane was more or less normal. Their nuclei were rounded in shape and normal in size with normal distribution of its chromatin ***(Fig.79& 80).***

Fig. (77): An electron photomicrograph of renal corpuscle in kidney of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing fenestrated endothelium (E) is closely applied to luminal surface of the glomerular basement membrane (BM). Foot process of podocytes more or less normal (F) but was still fusion of foot process in some area (arrow), part of Bowman's capsules (BC) and few collagen fibers were seen (C).

(X 10000)

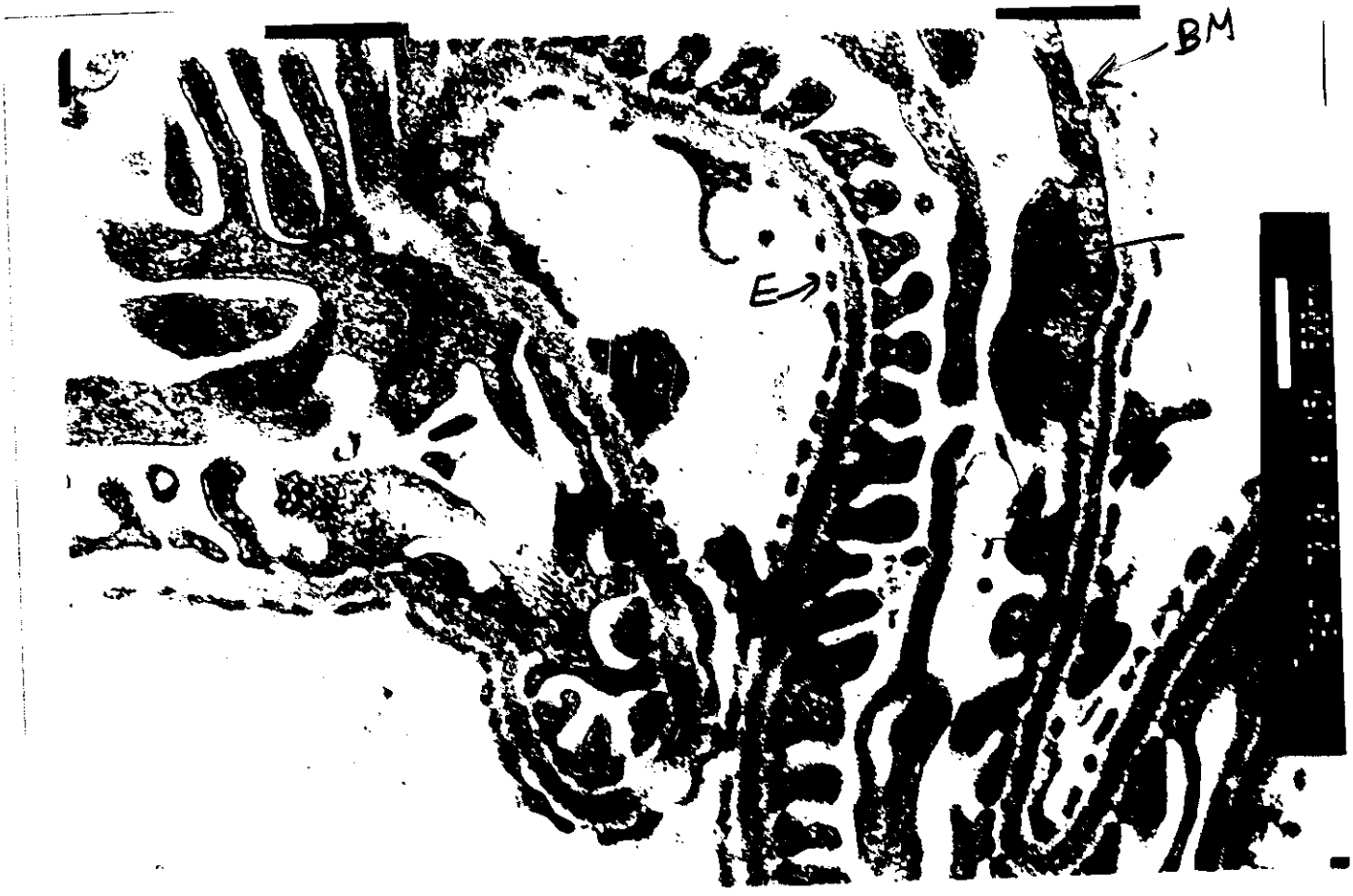

Fig. (78): Higher magnification of the previous one showing fenestrated endothelium (E) closely applied to luminal surface of the glomerular basement membrane (BM) with fusion of some foot process of podocyte (arrow).

(X 15000)

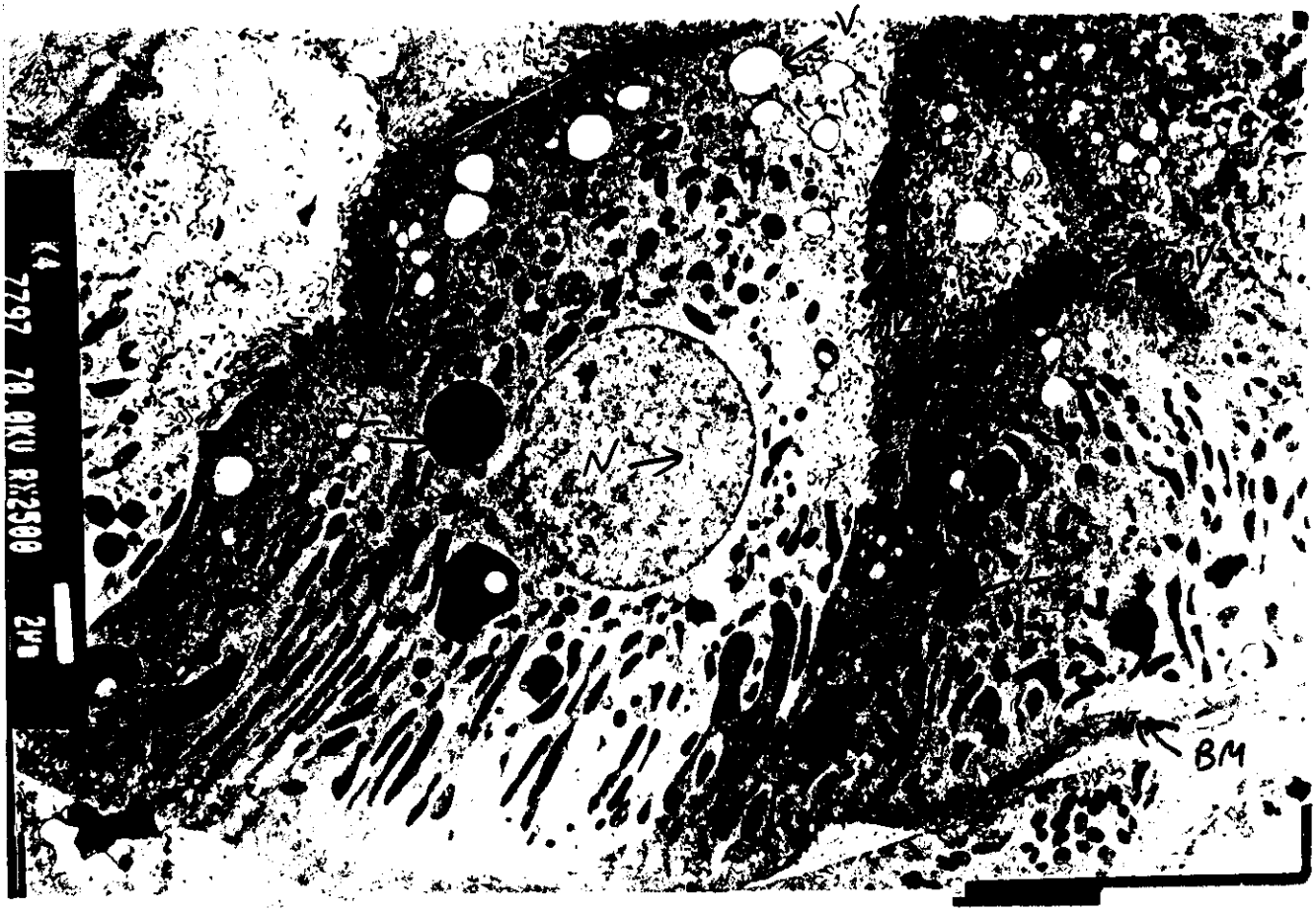

Fig.(79) An electron photomicrograph of a proximal convoluted tubule cell in kidney of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_C) showing microvilli forming the brush border (mv), the cytoplasm of tubular cells contained vacuoles (V), mitochondria more or less normal in shape and size (M), few lysosomes (L) and rounded normal nucleus (N). The basement membrane appeared more or less normal (BM).

(X 2500)

Fig.(80) An electron photomicrograph of a proximal convoluted tubule cell in kidney of hypertensive adult male albino rat treated with enalapril for 6 weeks (group II_c) showing the basement membrane appearing more or less normal (BM), the cytoplasm of tubular cells contained mitochondria more or less normal in shape and size (M), few lysosomes (L) and part of normal nucleus can be seen (N).

(X 5000)