SUMMARY AND CONCLUSIONS:

The data obtained in the present study using rat aorta for the understanding of the rat vascular smooth muscle contraction and supersensitivity occurring in hypertension to various contractile agents revealed that:

i) Rat aorta responded to NE and tyramine but not to electrical stimulation or to amphetamines. Neither cocaine and DMI nor reserpine and 6-OHDA-treatment significantly altered the sensitivity to tyramine. Further, equal degree of antagonism by phentolamine against NE and tyramine giving similar pA2 values indicates that the innervation of the aorta is scant and tyramine acts predominantly directly.

ii) The differential degree of antagonism of phentolamine and BOL against sympathomimetic amines on one hand and 5-HT on the other giving different pA2 values of phentolamine and BOL, indicates that rat aorta contains both alpha-adrenergic and serotonergic receptors.

iii) The sensitivity of the aorta to NE increased by the presence of 5-HT at subthreshold concentrations, it may be that 5-HT and NE show synergism to each other though not acting on common receptors.

iv) Unlike in rabbits reserpine treatment of rats did not induce supersensitivity of the aorta to the contractile agents, not even to NE.

v) However, reserpine treatment of rats did induce supersensitivity in the aorta when the medium lacked Mg++ suggesting that reserpine increases permeability to Mg++ and Ca++.
vi) SKF 525-A selectively blocked KCl-induced contractile responses rather than 5-HT and NE-induced contractile responses. The selective inhibition by SKF 525-A of KCl-induced contractile responses seems to be through removal of membrane bound and/or loosely bound Ca++. 

vii) The rat aorta when incubated in Ca++ and Na+-free solution failed to respond even to NE indicating that it fails to retain Ca++ and Na+. 

viii) Vascular smooth muscle from acutely hypertensive rats showed spontaneous activity and was supersensitive to NE, 5-HT and KCl. SKF 525-A antagonized this supersensitivity suggesting that the supersensitivity may be due to efficient utilization of Ca++ by the contractile machinery which in turn may be dependent upon the membrane permeability to extracellular Ca++. 

ix) Nephrotensin was isolated from plasma of acutely hypertensive rats and dogs. Unlike Angio I and II, nephrotensin induced a consistent pressor action and sensitizing action to NE on rabbit ear artery perfusion pressure and rat arterial blood pressure. Further, nephrotensin also sensitized to Angio II. Moreover, it was found also to be differently acting from Angio I since Angio I antibody failed to inhibit pressor action and smooth muscle sensitizing action of nephrotensin to Angio II and NE. 

Finally, it may be generalized that the increased sensitivity of the smooth muscle to agonists is mainly due to its increased efficiency in utilization of Ca++ by the contractile machinery which is dependent upon the membrane permeability to extracellular Ca++. 

Based on the present study, one might predict that an agent which selectively inhibits increased membrane permeability to Ca++ might rescue an individual suffering from hypertension.