SCOPE
SCOPE OF THE STUDY

Analysis of nuclear protein interactions with genome may to some extent help in explaining cell type specific gene expression, which is usually brought about by DNA binding regulatory proteins. DNA binding proteins constitute both histones and non-histones. While histones are basic in nature and are established to have a role in the conformation of nucleosomes, non-histone nuclear proteins are the best candidates to probe into in such a study. In order to search for such regulatory proteins of brain, in this study DNA binding non-histone proteins were analyzed from rat brain. Working with a preparation of non-histone nuclear proteins, rather than whole cell protein extracts, should increase the chances of isolating DNA binding proteins involved in nuclear events.

Brain specific gene expression and gene regulation in different subsets of cells need a crucial involvement of non-histone nuclear (NHC) proteins. It has also been shown that NHC proteins in brain particularly in neurons exceed their ratio to either histones or DNA relative to other tissues (Wu et al., 1973). It is known that about 5000–10,000 new mRNAs appear during the course of post natal development of rodent brain, inclusive of brain specific mRNAs, while the number of proteins studied and characterized according to the present literature is an underestimate considering the various functions of the brain. A considerable number of these proteins could be DNA binding regulatory proteins. A better understanding of the functional
complexity of brain could be accessed by having a close insight into the properties and functions of these DNA binding proteins. With this background, an attempt is made in this study to characterize DNA binding proteins possibly specific to brain.

Evidence is also accruing now supporting NHC protein involvement in the development of CNS and brain specific functions (Utset et al., 1987). Expression of various homeobox-containing genes and proto oncogene encoding DNA binding proteins in CNS constitutes regional and cell type specific functions in brain at different stages of development (Ruppert & Wille, 1987). Similarly POU-domain genes are believed to encode transcriptional regulatory proteins in rat brain (He et al., 1989). Though homeobox gene products or POU gene products are expressed through out all the developmental stages in CNS, it is reported that NHC proteins may occur only in postmitotic brain cell types and at specific developmental stages (Heizmann et al., 1980). Once the specific target function is carried out, the NHC protein might not be synthesized in the cell through out the life span of the animal. As such, many of these developmental and stage specific NHC proteins exert their actions through transcriptional regulation by binding to DNA in a sequence-specific or non specific manner. Hence identification and characterization of proteins from brain binding to DNA becomes crucial in order to understand brain specific gene expression and function. There have been very few studies of NHC proteins in differentiated cells of mammalian central nervous system. Therefore primary goal of the present study is the identification and characterization of brain specific DNA binding proteins. This study reports the identification of
two nuclear non-histone proteins from brain, isolated and intensively characterized for their DNA binding property and function.