INDIAN INSTITUTE OF SCIENCE
BANGALORE

INSTITUTE COLLOQUIUM

(Chemical Sciences)

By

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On

"Design of Synthetic Transporters of DNA"

Date : Monday, 22nd August 2011

Time : 4-00 p.m

Venue : Faculty Hall, Main Building

Professor P. Balaram, Director

Will preside

Tea: 5-00 p.m

ALL ARE WELCOME

ABSTRACT

Ion permeation across cell membranes is a highly restricted process. DNA and RNA are poly-ionic macromolecules (polyelectrolytes). Transport of such macromolecules across cellular barrier requires development of special strategies and design of appropriate molecular entities. This is an important goal in medicine as attempts to cure a disease could be initiated by supplementing an aberrant gene (DNA) or by the delivery of a suicide gene or via transfer of genes for the synthesis of new therapeutic proteins.

Traditionally, DNA delivery systems are broadly based on either viral or non-viral vectors. Viral vectors are significantly more efficient in delivering the gene as well as in inducing gene expression as a result of their highly evolved and specialized components. However, their use in clinic is limited due to inherent drawbacks, such as adverse immunogenic reactions, restricted targeting of specific cell types, size limitation on DNA, and potential for mutagenesis. Among the non-viral vectors, cleverly designed lipids and lipopeptides have shown excellent potential for gene delivery applications.

Of these the cationic lipid-mediated DNA delivery is one of the most promising approaches for gene delivery and much progress have been made in the development of various cationic liposomes for gene delivery to mammalian cells in vitro and in vivo. Various parameters affecting the aggregation properties of lipids or related molecules, their complexation with DNA and further application toward gene delivery have been optimized. The factors such as lipid architecture, composition, lipid/DNA charge ratios, lipoplex structures, role of different cell types, ionic strength, and presence of serum have been considered for the successful and efficient gene delivery. I shall present efforts made by us towards this end.