

# **AIMS AND OBJECTIVES**

## Aims and Objectives

Literature Survey revealed that treatment of arthritis (RA or OA) requires lifelong therapies thereby various strategies were developed to treat arthritis including development of drugs from different chemical classes and various drug delivery systems.

Oral drug delivery is a widely accepted delivery system but it produces side effects during treatment due to widespread distribution of the drug throughout the body, while arthritis may be associated only with one or more joints. So in order to avoid these side effects delivery systems with ability to deliver the drug to the required site is essential. Percutaneous delivery systems are used for mild to moderate pain associated with joints and produce negligible side effects due to local application but the drugs may have varying (<1 %) skin permeability as skin is the main barrier for this. In IA delivery systems drug is directly instilled into the joint cavity hence these are used only where cartilage damage occurs very fast. IA administered drugs have very low joint residence time so there is need to develop delivery systems which will have long residence time within the joint cavity and release the drug over a prolonged periods of time.

The present work was undertaken with the aim of developing various drug delivery systems of NSAIDs having long half life for the treatment of arthritis mainly RA and OA. The present work is classified mainly into the following four types as shown in Fig. 2.1

1. Intra-Articular Chemical Delivery Systems (IA-CDS)
2. Percutaneous Drug Delivery Systems (PDDS)
3. Intra-Articular Liposomal Drug Delivery Systems (IA-LDDS)
4. Oral Drug Delivery Systems (ODDS)

### 1. Intra-Articular Chemical Delivery Systems (IA-CDS)

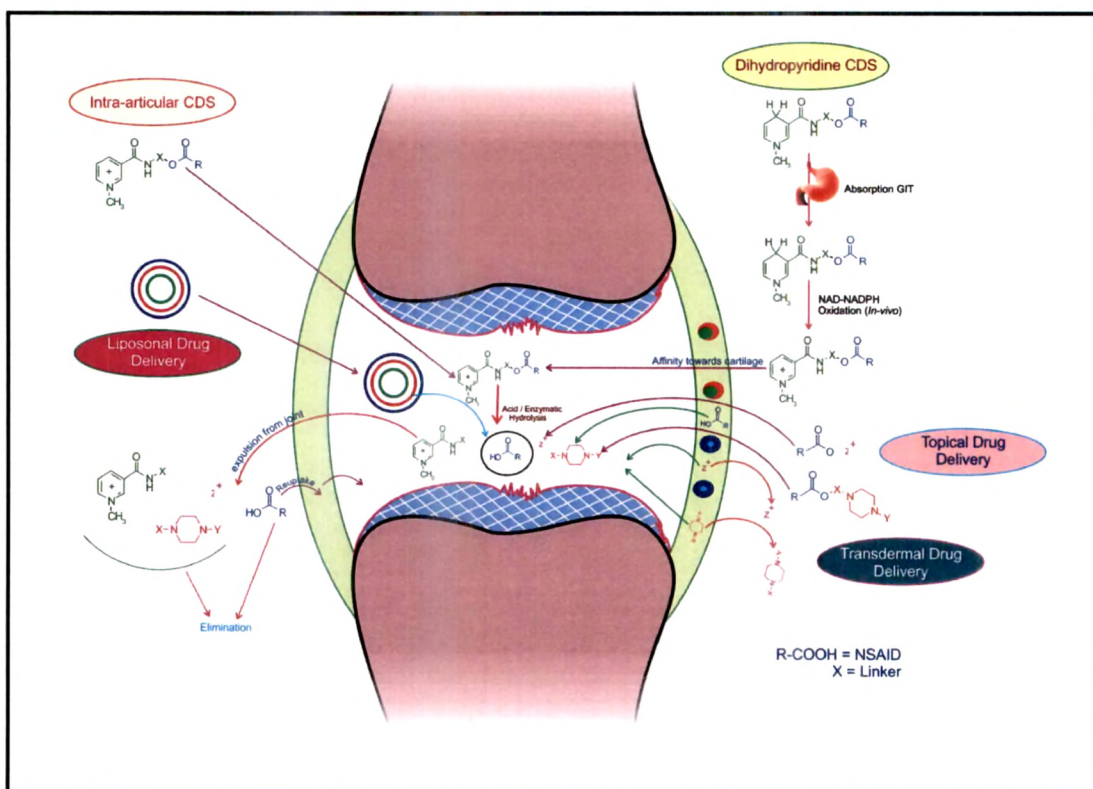
The aim of this work was to develop cationic chemical delivery systems (CDS) of various NSAIDs to improve drug residence time in joints on IA administration.

### 2. Percutaneous Drug Delivery Systems (PDDS)

The objective of this study was to investigate the usefulness of the salt formation and prodrug approaches to improve the percutaneous delivery of some NSAIDs such as 6-methoxy-2-naphthylacetic acid (6-MNA) and biphenylacetic acid (BPA) for the treatment of rheumatic diseases.

### 3. Intra-Articular Liposomal Drug Delivery Systems (IA-LDDS)

The aim of the current work was to develop cationic liposomal formulations containing NSAIDs having long half life, selectivity towards COX-II enzyme and affinity towards joint cavity so as to improve the overall therapeutic efficacy of these agents after encapsulating them into liposomal formulation.



**Fig. 2.1:** Strategies for delivery of NSAIDs and their fate after administration

### 4. Oral Drug Delivery Systems (ODDS)

The aim of this work was to prepare dihydropyridine derivatives of some NSAIDs. These derivatives would be initially non-ionic in nature but would get oxidized *in vivo* by NAD-NADPH co-enzyme system to generate pyridinium ion. Such derivatives would retain the advantages of quaternary ammonium compounds i.e. their site specificity but would solve the oral bioavailability problems of these agents when taken orally.

The basic principle behind the development of these CDS is further discussed in detail in the respective section.