

Chapter - 1

I N T R O D U C T I O N

INTRODUCTION

Cancer is the second leading cause of death today, and extensive research is being conducted towards the cure of cancer. Amongst the earliest treatments for cancer, surgery and radiotherapy are effective but they are able to cure only about one-third to one-half of the total cancer cases. More and more hopes are pinned on **cancer chemotherapy** which unfortunately has not been able to fill the void completely. The reason is that, unlike microbial cells, which are metabolically, nutritively and structurally different from their host cells, the cancer cells are similar to, and in fact, originate from, the host cells. Hence, therapeutically effective doses of the anticancer drugs are toxic, both to the neoplastic, as well as to the normal cells.

Hence, the present day cancer chemotherapy aims at selective toxicity i.e. toxicity to the tumour cells without adversely affecting the host cells. This is achieved by **drug targeting** or **site specific drug delivery**, which involves preferential delivery of the drug to the desired site of action.

Out of a number of approaches available for achieving site specific delivery of drugs, carriers like **liposomes**, **erythrocyte ghosts**, **monoclonal antibodies**, **microspheres**, **nanospheres** and **macromolecules** are being widely used. Depending on their size, surface properties and surface charge, colloidal or particulate carriers can be conveniently used to achieve either active or passive targeting of drugs.

In the present study, various polymeric materials have been used as carriers for the widely used anticancer drug, 5-fluorouracil, and their efficacy towards achieving site specific delivery of 5-fluorouracil has been tested.

Three different types of polymeric carriers were chosen for the study. They include : the readily biodegradable polymer, Poly (alkyl-2-cyanoacrylate), the potentially biodegradable Polyamides and the non-biodegradable Polyacrylamide. Microcapsules of these polymers containing 5-fluorouracil were prepared using the interfacial polycondensation and the emulsion polymerisation processes. After optimising the formulation conditions, these microcapsules were evaluated for various properties like particle size and size distribution, drug entrapment efficiency, in vitro drug leaching rate, in vitro drug release profile and in vivo drug distribution. The in vivo studies were conducted on healthy rats after intravenous injection of the microcapsule suspension and estimating the drug content in various organs like liver, lungs, kidneys, intestine and spleen.