

TABLE OF CONTENTS

	Page No.
Abstract	i–ii
Preface	iii–iv
List of Tables	xi–xii
List of Figures	xiii–xxvi
List of Schemes	xxvii
List of Appendices	xxviii
Appendix A: List of Research Publications	xxix–xxx
Appendix B: Oral and Poster Presentations	xxxi
Abbreviation	xxxii–xxxiii

INTRODUCTION

1 - 52

Brief introduction of two important aspects of lipidic components: lung surfactant and solid lipid nanoparticles as a novel drug delivery system

1. Fatty acids	1
2. General classification of lipid	3
2.1. Simple Lipids or Homolipids	3
2.1.1. Glycerides	4
2.1.2. Monoglyceride	4
2.1.3. Diglyceride	4
2.1.4. Triglyceride	5
2.1.5. Waxes	6
2.2. Compound Lipids or Heterolipids	6
2.2.1. Phospholipids (phosphatides)	6
2.2.2. Glycolipids (cerebrosides)	7
2.3. Derived Lipids	8
2.3.1. Steroids	8
2.3.2. Cholesterol	8
3. Lung surfactant (LS)	9
3.1. Composition of LS	10

3.2. Surfactant Proteins and Lung Disease	11
3.3. Inhibition of LS in Disease	14
3.4. Cholesterol Function in LS	15
3.5. Serum Protein Role in ARDS	19
3.6. LS and Interaction with Whole Fetal Calf Serum	21
4. The interest in new drug delivery systems	24
5. Drug delivery systems	25
5.1. Nanocapsules and polymeric nanoparticles	25
5.2. Liposomes	26
5.3. Microemulsions and nanoemulsions	28
6. Solid Lipid Nanoparticles	29
6.1. Definitions and Physical Structure of Solid Lipid Nanoparticles	29
6.2. Models for incorporation of active compounds into SLN	30
6.2.1. Homogeneous model	30
6.2.2. Drug-enriched shell model	31
6.2.3. Drug-enriched core model	31
7. Nanostructure Lipid Carriers	32
7.1. Definitions and Physical Structure of Nanostructured Lipid	32
7.2. Structure of Nanostructured Lipid Carriers	32
7.2.1. NLC type I or “Imperfect crystal” type	32
7.2.2. NLC type II or “Multiple” type	33
7.2.3. NLC type III or “Amorphous” type NLC	33
8. Preparation Techniques for Lipid Nanoparticles	34
8.1. High Pressure Homogenization (HPH)	34
8.2. Production of SLN via Microemulsions	35
8.3. Preparation by Solvent Emulsification-Evaporation or –Diffusion	35
8.4. Preparation by W/O/W Double Emulsion Method	36
8.5. Preparation by High Speed Stirring and/or Ultrasonication	36
9. Characterization of Nanostructured Lipid Carrier	37

9.1. Dynamic Light Scattering	37
9.2. Particle charge and zeta potential	39
9.3. Morphology	40
9.4. Crystallization	42
9.5. Drug incorporation into SLN and NLC	44
9.6. Controlled drug delivery	45
10. Applications	47
10.1. NLCs in brain delivery	48
10.2. NLCs for topical delivery	48
10.3. NLCs as cosmeceuticals	49
10.4. NLCs as a targeted carrier for cancer	49
10.5. Oral NLCs in anti-tubercular chemotherapy	50
10.6. NLCs for potential applications in agriculture	50
CHAPTER I	53 - 88

**Effect of Serum, Cholesterol and Low Density Lipoprotein on the
Functionality and Structure of Lung Surfactant Films**

1. Introduction	53
2. Materials and methods	56
2.1. Materials	56
2.2. Lipid extraction of samples	57
2.3. Methods	58
2.3.1. Adsorption kinetics studies	58
2.3.2. Langmuir surface balance studies	58
2.3.3. Atomic force microscopy (AFM)	59
2.3.4. Raman spectroscopy	60
2.3.5. MALDI-TOF MS	61
3. Results and discussion	61
3.1. Composition of Serum and Surfactant	61
3.2. Adsorption isotherms	63
3.3. Langmuir surface balance studies	67

3.4. Atomic force microscopy (AFM) Studies	72
3.5. Raman spectroscopy studies	80
4. Summary and conclusions	85
5. References	88
CHAPTER II	89 - 110
Physicochemical studies on local anaesthetic loaded second generation nanolipid carriers	
1. Introduction	89
2. Materials and methods	93
2.1. Materials	93
2.2. Methods	94
2.2.1. Preparation of NLCs	94
2.2.2. Instrumentation	94
3. Results and discussions	96
3.1. DLS studies	96
3.2. Transmission electron microscopy (TEM) study	99
3.3. Differential scanning calorimetric (DSC) studies	100
3.4. UV-visible absorption spectral studies	104
3.5. Entrapment efficiency (EE) and loading content studies	106
3.6. <i>In vitro</i> release kinetics	106
4. Summary and conclusion	110
5. References	110
CHAPTER III	111 - 134
Influence of lipid core material on physicochemical characteristics of ursolic acid loaded nanostructured lipid carrier: an attempt to enhance anticancer activity	
1. Introduction	111
2. Materials and methods	114
2.1. Materials	114

2.2.Methods	115
2.3. <i>In vitro</i> cytotoxicity study of UA-NLCs	117
3. Results and discussion	117
3.1.Interfacial behavior of the monomolecular films	117
3.2.Dispersions / solution behavior of the NLCs	123
3.2.1. Dynamic light scattering (DLS) studies	123
3.3.Morphological studies	126
3.4.Differential scanning calorimetric (DSC) studies	127
3.5.Determination of UA entrapment efficiency and drug loading	131
3.6. <i>In vitro</i> release kinetics of ursolic acid from NLC	131
3.7. <i>In vitro</i> cytotoxicity studies	132
4. Summary and conclusions	133
5. References	134
<hr/>	
CHAPTER IV	135 - 158
Oral administration of orcinol glucoside loaded polymer – lipid hybrid nanoparticles for gastrointestinal tract cancer targeting and improved <i>in vitro</i> cytotoxicity against GIT cell lines	
<hr/>	
1. Introduction	136
2. Materials and methods	139
2.1Materials	139
2.2.Methods	140
2.3. <i>In vitro</i> cytotoxicity study	141
3. Results and discussion	141
3.1.Dispersions / solution behavior of the NLCs	141
3.1.1. DLS Studies	141
3.2.Morphology studies	145
3.2.1. TEM, SEM and AFM Studies	145
3.3.DSC investigations	147
3.4.Drug entrapment efficiency and loading capacity	151

3.5. <i>In vitro</i> release studies	152
3.6. <i>In vitro</i> cytotoxicity of OG-NLCs	154
4. Summary and conclusions	158
5. References	158
<hr/>	
Summary and conclusion	159 - 161
<hr/>	
Bibliographic References	
<hr/>	
References for introduction	162 – 173
References for chapter I	173 – 176
References for chapter II	176 – 179
References for chapter III	180 – 183
References for chapter IV	183 - 187
<hr/>	
Index	
<hr/>	
Reprints	
<hr/>	