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List of Abbreviations and Symbols

Curcumin	- CUR
Colorecral cancer	- CRC
Naringenin	- NAR
Soluthin MD®	- SMD
Eudragit E® 100	- EE100
Lipopolysaccharide nanocarriers	- LPNCs
Curcumin encapsulated lipopolysaccharide nanocarriers	- C-LPNCs
Naringenin encapsulated lipopolysaccharide nanocarriers	- N-LPNCs
Curcumin encapsulated eudragit E100 nanoparticles	- CENPs
Naringenin encapsulated eudragit E100 nanoparticles	- NENPs
Taguchi orthrogonal experimental design	- TOED
Signal-to-noise ratio	- S/N
Poloxamer 188	- PLX188
Physical mixture	- PM
Mean particle size	- PS
Polydispersilty index	- PDI
Zeta potential	- ZP
Percent entrapment efficiency	- %EE
Percent drug loading	- %DL
Fourier transform infrared spectroscopy	- FTIR
Differential scanning calorimetry	- DSC
Powder X-ray diffraction	- *p*XRD
Area under the curve	- AUC
Minimum inhibitory concentration	- MIC
Potassium bromide	- KBr
Glass transition temperature	- Tg
Differential scanning calorimetry	- DSC
Atomic force microscopy	- AFM

High resolution transmission elecron microscopy	- HR-TEM
Differential interference contrast	- DIC
Correlation coefficient	- R^2
Absorbance unit	- AU
Relative standard deviation	- RSD
Standard deviation	- SD
Standard errors mean	- SEM
High performance liquid chromatography	- HPLC
Limit of detection	- LOD
Limit of quantification	- LOQ
Coefficient of variance	- CV
Mean Residence Time	- MRT
Retention Time	- RT
Peak Plasma Concentration	- C_{max}
Time for Peak Concentration	- T_{max}
Biological half life	- $t_{1/2}$
Dimethylsulphoxide	- DMSO
Trichloroacetic Acid	- TCA
Acetonitride	- ACN
Butylated hydroxyl toluene	- BHT
Fetal Calf Serum	- FCS
Internal standard	- IS
Sulphorhodamine B	- SRB
Analysis of variance	- ANOVA
Degree of freedom	- DoF
Sum of squares	- SS
Mean of squares	- MS
Percent contribution	- %PC
Fischer test	- F
Optical density	- OD
Acid dissociation Constant	- pKa

Hour	- hr
Percentage	- %
Microgram	- µg
Microliter	- µl
Milligram	- mg
Kilogram	- Kg
Nanogram	- ng
Milliliter	- ml
Revolution per minute	- rpm
Degree	- ^{0}
Celsius	- C
Centimeter	- cm
Millimetr	- mm
Nanometer	- nm
Kilo volt	- kV
Miliampere	- mA
Angstrom	- Å
Wavelength	- λ
Growth inhibition to kill 50% of the cells	- GI_{50}
Phosphate buffer solution	- PBS
Volume by volume	- v/v
Weight by volume	- w/v
Minute	- min
Hertz	- Hz

PREFACE

Colorectal cancer (CRC) is the most common form of cancer. The incidence of CRC worldwide can vary up to 20-fold with the highest prevalence in areas such as North America, Europe, Australia, and New Zealand. The lowest incidence is seen in India and lesser developed areas such as South America and Africa. Epidemiological studies suggest that economic development and dietary habits are implicated in CRC incidence. Several areas of nutrition that have been suggested to increase CRC risk are low fiber intake, high fat diet, and low calcium/micronutrient intake.

The modern anticancer agents such as 5-flourouracil, oxaliplatin, leucovorin, and irinotecan have been used for several decades as a standard treatment for CRC but their toxicity issues and severe side effects overcome the efficacy of these drugs and remain one of the serious challenges in cancer treatment. Especially, life-threatening symptoms associated with oxaliplatin such as gastrointestinal tract toxicity, hematologic toxicity, hearing damage and neurotoxicity limits its extensive use. Therefore, to avoid these side effects, there is an urgent need to discover more potent anticancer agents with no side effects on normal organs/tissues.

The idea of the work done in the present thesis was conceived on the above discussed problems of available therapy of CRC and was designed with an objective to develop a new nano delivery system of drugs to effectively deliver to the CRC cells. In this context, a thorough literature survey was conducted with special emphasis on passive targeted drug delivery systems. An extra effort was made to collect details on the drugs- curcumin and naringenin in order to know about its therapeutic benefits and its relative efficacy over other established drugs.

The entire research work has been carried out systematically in four sequential steps. First, curcumin encapsulated lipopolysaccharide nanocarriers, second, curcumin encapsulated eudragit E 100 nanoparticles, third, naringenin

encapsulated lipopolysaccharide nanocarriers and fourth, naringenin encapsulated eudragit E 100 nanoparticles were prepared. All the formulations were optimized and have been subjected to detailed physicochemical characterizations, pharmacokinetic, cytotoxicity and anticancer efficacy studies in animals and the results have been discussed in-depth.

The purpose of this research opens new era of successful utilization of novel lipopolysaccharide and non-biodegradable polymer as a potential carrier to improve oral bioavailability as well as anticancer efficacy of hydrophobic chemotherapeutic drug(s) in the treatment of cancer, especially CRC.