

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENT	III
ENGLISH ABSTRACT	IV
THAI ABSTRACT	V
LIST OF FIGURES	IX
ABBREVIATIONS	XI
CHAPTER I : INTRODUCTION	1
Transferrin receptor overexpression in cancer cells	2
Ferric-Desferoxaminemesylate complex	3
Application of ferrioxamine in MR imaging	4
Objectives	6
CHAPTER II : MATERIALS AND METHODS	7
Chemicals	7
Preparation of solutions	7
Cell culture and cytotoxicity assay	8
Measurements of T1- and T2-relaxation time of Proton	8
MR Imaging of ferrioxamine distribution in Wistar rats	11
Magnetic resonance angiography	11
Statistical methods	12

CHAPTER III : RESULTS	13
Physicochemical properties of DFO in an aqueous solution	13
Potentiometric Titration	14
Complexation of DFO-ferric ion	14
Spectrophotometric titration of DFO by ferric ion	15
Spectrophotometric and potentiometric titration of Fe ³⁺ - DFO complex	17
Measurement of T1 relaxation time and relaxivity of Fe(III)- DFO complex	19
Measurement of T2 relaxation time and relaxivity of Fe(III)- DFO complex	24
Bio-distribution in Wistar rats	28
CHAPTER IV : DISCUSSION AND CONCLUSION	33
CONCLUSION	37
CHAPTER V : REFERENCES	38
CURRICULUM VITAE	42

LIST OF FIGURES

Figure		page
1.1	chemical structure of desferoxaminemesylate and desferoxaminemesylate-ferric complex	3
2.1	Diagram of MRI sequence	10
3.1	Absorption spectra of DFO.	13
3.2	Variation of pH as a function of NaOH concentration	14
3.3	Absorption spectra of reaction products of DFO-Fe ³⁺ .	15
3.4	Variation of absorbance at 427 nm as a function of the ratio of Fe ³⁺ to DFO.	16
3.5	Variation of absorbance at 427 nm as a function of concentration of Fe ³⁺ or DFO. The initial [Fe ³⁺] = [DFO]	17
3.6	Absorption spectra of DFO-Fe ³⁺ in solution at indicated pH value	18
3.7	Variation of pH as a function of NaOH concentration. The initial [DFO] = [Fe ³⁺] = 5x10 ⁻⁴ M	19
3.8	Variation of T1 relaxation time as a function of Fe(III)-DFO concentration	21
3.9	The relaxivity value of Fe(III)-DFO concentration.	22
3.10	T1W-images of Wistar rats pre- and post administrated of Fe(III)-DFO	23

Figure		page
3.12	T1 fat suppression image of Wistar rat	24
3.13	Variation of T1 signal intensity as a function of time.	25
3.14	Variation of T2 signal intensity measured using (a) 3.7% agarose gel, (b) RPMI 1640 and (c) distilled water (Fe(III)-DFO).	26
3.15	Variation of T2 relaxation time as a function of Fe(III)-DFO concentration	27
3.16	The relaxivity value of Fe(III)-DFO concentration.	28
3.17	T1W-images of Wistar rats pre- and post administrated of Fe(III)-DFO and of Gd-DTPA	29
3.18	T2W-images of Wistar rats pre- and post administrated of Fe(III)-DFO and of Gd-DTPA	30
3.19	T1 fat suppression coronal and cross section image of Wistar rat with anatomy label	31
3.20	Variation of T1 signal intensity as a function of time	32

ABBREVIATIONS

MRI	Magnetic resonance imaging
TfR	Transferrin Receptor
Fe(III)-DFO	Ferric-Desferrioxamine complex
GLC4	Small cells lung carcinoma
IC ₅₀	The concentration of drug required to inhibit cell growth by 50%
T ₁	Longitudinal relaxation time constant of spin decay
T ₂	Transversal relaxation time constant of spin decay
ϵ	Molar extinction coefficient
MTT	Tetrazolium salt (3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-2H-tetrazolium bromide)
pKa	Proton dissociation constants
N ₂	Gases nitrogen
Gd	Gadolinium
MW	Molecular weight
EDTA	Ethyline dihydrotetraacetate
FOV	Field of view
TSE	T1-weighted Spin Echo
TE	Time Echo
TR	Time Repletion
ROI	Region of interest
SI	Signal intensity
StdDev	Standard deviation
SNR	Signal-to-noise ratio



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University
All rights reserved