

Contents

Preface — v

List of contributing authors — xi

Osamu Yamauchi

1	Noncovalent interactions in biocomplexes — 1
1.1	Introduction — 1
1.2	Noncovalent interactions in metal complexes — 2
1.2.1	Some historical backgrounds — 2
1.2.2	Types of interactions in and around metal complexes — 3
1.2.3	Characterisation of interactions — 5
1.2.4	Interactions within complex molecules — 5
1.2.4.1	Through-metal ligand–ligand interactions — 5
1.2.4.2	Through-space ligand–ligand and metal–ligand interactions — 6
1.2.5	Detection and evaluation of ligand–ligand interactions in solution — 7
1.2.5.1	Stability constants — 7
1.2.5.2	Spectral data — 8
1.2.6	Ligand–ligand interactions in ternary metal complexes involving amino acids — 11
1.2.6.1	Stability enhancement — 11
1.2.6.2	Structure and selectivity — 14
1.3	Structural and functional characterisation of noncovalent interactions in chemistry and biology — 19
1.3.1	Association of oppositely charged ions in Cu(II)–arginine complexes — 19
1.3.2	Interactions between metal complexes and surrounding groups — 20
1.3.2.1	Adduct formation and its effect — 20
1.3.2.2	Protein–small molecule interactions — 21
1.3.2.3	Interactions involving coordinated ligands at the metal site of proteins — 24
1.3.3	Close contact between the metal center and the side chain groups — 25
1.3.3.1	Metal–aromatic ring interactions — 25
1.3.3.2	Interactions involving a hydrogen atom — 28
1.4	Concluding remarks — 30
1.5	Abbreviations — 30
Acknowledgments — 32	
References — 32	

Bartosz Tylkowski, Renata Jastrz b and Monika Skroba ska

2 Photo-sensitive complexes based on azobenzene — 41

- 2.1 Azobenzene — 41
- 2.2 UV-sensitive complexes — 44
 - 2.2.1 Azobenzene with nickel (Ni) — 44
 - 2.2.2 Azobenzene with platinum (Pt) and palladium (Pd) — 46
 - 2.2.3 Azobenzene with cobalt (Co) — 49
 - 2.2.4 Azobenzene with manganese (Mn), rhenium (Re) and ruthenium (Ru) — 54
 - 2.2.5 Azobenzene with ferro (Fe) and zinc (Zn) — 55
 - 2.2.6 Azobenzene with Copper (Cu) — 61

Acknowledgment — 64

References — 64

Renata Jastrz b, Lechos aw  mozik and Bartosz Tylkowski

3 Complexes of biogenic amines in their role in living systems — 69

- 3.1 Introduction — 69
- 3.2 Polyamines in living systems — 70
- 3.3 Polyamines as tumour markers — 74
- 3.4 Weak interactions of polyamines — 77
- 3.5 Complex formation of bioamines — 81
- 3.6 Application of polyamine complexes in medicine — 88

References — 93

Ma gorzata T. Kaczmarek

4 Synthetic aspects, crystal structures and biological activities of d- and f-metal salen-type complexes — 107

- 4.1 Synthesis and crystal structure of d-metal salen-type complexes — 108
- 4.2 Synthesis and crystal structure of metal salen-type complexes — 110
- 4.3 Synthesis and crystal structure of the heteronuclear salen-type complexes of d- and f-metal ion — 113
- 4.4 Biological activities of d- and f-metal salen-type complexes — 115
- 4.5 Conclusions — 117

References — 118

Kazuma Ogawa

5 Biocomplexes in radiochemistry — 121

- 5.1 Introduction — 121
- 5.2 Bone-seeking complexes — 121
 - 5.2.1 Diagnostic bone-seeking radiopharmaceuticals — 121

5.2.2	Development of novel diagnostic bone-seeking technetium complexes —	123
5.2.3	Development of novel diagnostic bone-seeking gallium complexes for PET —	126
5.2.4	Bone-seeking radiopharmaceuticals for palliative therapy of bone metastases —	128
5.2.5	Development of novel bone-seeking complexes for palliation therapy of bone metastases —	130
5.3	Radio-complexes for imaging of apoptosis —	132
5.3.1	Technetium-labeled annexin A5 —	132
5.3.2	^{99m}Tc -4, 5-bis(thioacetamido)pentanoyl-annexin A5 (^{99m}Tc -BTAP-annexin A5) —	132
5.3.3	^{99m}Tc -HYNIC-annexin A5 —	133
5.3.4	^{99m}Tc -labeled annexin A5 constructed with histidine residues —	134
5.3.5	^{99m}Tc -C ₃ (BHam) ₂ -annexin A5 —	134
5.3.6	^{68}Ga -labeled annexin A5 —	135
5.3.7	Summary of radiolabeled annexin A5 for imaging of apoptosis —	137
5.4	Summary —	137
	References —	137

Hadi Khalil, Mathieu Heulot and David Barras

6	Peptides and biocomplexes in anticancer therapy —	143
6.1	General introduction on cancer —	143
6.1.1	Cancer and metastasis origins and global burden —	143
6.1.2	Genomic instability and the other side of the Darwinian coin —	143
6.1.3	The hallmarks of cancer —	145
6.1.4	Molecular basis of the metastatic cascade —	147
6.2	General used therapies of cancer —	149
6.2.1	Therapy against cancer and metastasis —	149
6.3	Biocomplexes in cancer therapy —	151
6.3.1	Photodynamic therapy (PDT) —	151
6.3.2	Metal complexes as platforms for cancer therapy —	152
6.3.2.1	Platinum-based cancer therapy: a start of a new phase —	152
6.3.2.2	Zinc in cancer therapy —	153
6.3.2.3	Copper in cancer therapy —	153
6.3.2.4	Peptide therapeutics —	154
6.3.2.5	Peptides in cancer therapy —	154
6.3.2.6	TAT-RasGAP ₃₁₇₋₃₂₆ as a dual sensitizer and anti-metastatic tool —	156
6.4	Conclusions —	157
	Acknowledgment —	157
	References —	158

Bartosz Tylkowski, Renata Jastrzb and Akira Odani

7 Developments in platinum anticancer drug — 160

7.1 Discovery of anticancer activity of cisplatin — **160**

7.2 Platinum complexes — **162**

7.2.1 Platinum (II) complexes — **162**

7.2.2 Platinum (IV) complexes — **166**

7.3 Anticancer drug delivery — **169**

References — 171

Index — 174