Part I Pharmacology

1 Overview of Modern Research on Danshen .......... 3
   Guanhua Du and Juntian Zhang
1.1 General Situation of Application and Research
   of Danshen ........................................ 3
1.2 The Research on the Chemical Components
   of Danshen ........................................ 4
   1.2.1 Overview ..................................... 4
   1.2.2 Research on Liposoluble Components
      of Danshen ..................................... 5
   1.2.3 Research on the Hydrosoluble Chemical
      Components of Danshen ......................... 5
   1.2.4 Research Methods for the Chemical
      Components ..................................... 6
1.3 Research on the Active Components of Danshen
   and Their Pharmacological Actions ................. 6
   1.3.1 Pharmacological Actions
      of the Liposoluble Components of Danshen ... 6
   1.3.2 Pharmacological Actions of the Hydrosoluble
      Components of Danshen ....................... 7
1.4 Development of the Preparations of Danshen ...... 9
   1.4.1 Danshen Preparations Used for Research
      Purposes ...................................... 9
   1.4.2 Clinically Used Danshen Preparations ...... 10
1.5 Research on the Pharmacological Actions
   of Danshen ........................................ 10
   1.5.1 Circulatory System .......................... 10
   1.5.2 Liver Diseases ............................... 11
   1.5.3 Kidney Diseases ............................. 12
   1.5.4 Respiratory Diseases ....................... 12
   1.5.5 Cancers .................................... 12
   1.5.6 Effects on Immunologic Functions .......... 13
   1.5.7 Others .................................... 13
1.6 Clinical Applications of Danshen ................ 13
   1.6.1 Treatment of Cardiovascular
      and cerebrovascular Diseases .................. 13
   1.6.2 Treatment of Hepatic and Renal Diseases .... 14
1.6.3 Treatment of Respiratory Diseases.................. 14
1.6.4 Actions on Tumors............................... 14
1.6.5 Others ........................................ 14
1.6.6 Adverse Reactions of Danshen .................... 15
1.7 Summary ........................................... 15
References ........................................... 15

2 The Pharmacological Actions of Danshen ThemeD
Formulas .............................................. 19
Zhihao Jiang, Yi Wang, Xiumei Gao, Hongcai Shang
and Xiaoying Wang
2.1 Composite Danshen Dropping Pill ..................... 19
  2.1.1 Compatibility Studies on Compound
Dansen Dropping Pill (CDDP) ....................... 19
  2.1.2 Pharmacological Research ...................... 22
2.2 The Pharmacological Functions of Other
Danshen-Containing Prescriptions ................. 25
  2.2.1 Composite Danshen Injection ................... 25
  2.2.2 Dan-Qi Hemiplegia Capsules ................... 29
  2.2.3 Compound Radix Codonopsisis Tablet .......... 30
  2.2.4 Xinkening Capsules .......................... 32
  2.2.5 Fufang Xueshuantong Capsule
(Copound Xue-Shuantong Capsule) ............... 33
  2.2.6 Guanxinning Injection ......................... 35
  2.2.7 Bushenyishou Capsule ......................... 36
  2.2.8 Huganning Tablet ............................ 39
  2.2.9 Xinmaitong Tablet ........................... 39
  2.2.10 Ningxinanshen Capsule ....................... 41
  2.2.11 Ningshenbuxin Tablet ....................... 41
  2.2.12 Yangxinshi Tablet .......................... 42
  2.2.13 Rukuaixin Tablet ............................ 44
References ........................................... 46

3 Active Constituents in Danshen and Their
Pharmacological Actions ............................. 49
Ailin Liu, Yitao Wang, Guanhua Du, Xiuying Yang,
Juntian Zhang, Minke Tang, Ji Chen, Yonghong Chen,
Zhiwei Qu, Jie Wang, Xiaoying Wang, Yan Sun,
Ping Chen and Chuan Li
3.1 Major Constituents and Their Pharmacological
Actions .............................................. 49
  3.1.1 Liposoluble Constituents ...................... 49
  3.1.2 Water-Soluble Constituents ................... 52
  3.1.3 Other Constituents .......................... 54
3.2 Pharmacological Actions of Tanshinones ............. 55
  3.2.1 Overview of Studies on Tanshinones .......... 55
  3.2.2 Antibacterial Activity of Tanshinones ....... 57
  3.2.3 Anti-inflammatory Activity of Tanshinones ... 59
3.2.4 Estrogen-like Activity of Tanshinones .......................... 59
3.2.5 Effect of Tanshinones on Diseases of Cardiovascular System. .......................... 59

3.3 Effects of Salvianolic Acid on Myocardial Ischemia-Reperfusion Injury and Cardiac Muscle Cell .......................... 60
3.3.1 Protective Effect of Salvianolic Acid A in Rat Myocardial I/R Injury .......................... 60
3.3.2 Effect of Salvianolic Acid A on In Vitro Cultured Myocardial Cells of Rats .......................... 61

3.4 Studies on Treating Nervous Degenerative Diseases with Salvianolic Acid B .......................... 63
3.4.1 Effect of Salvianolic Acid B on Mitochondrial Injury and Nerve Cell Apoptosis Caused by Cerebral Ischemic Reperfusion .......................... 64
3.4.2 Inhibitory Effect of Salvianolic Acid B on Aβ1–40 Fibrogenesis and Its Protective Effect on Mitochondrial Damage and Cell Apoptosis of PC12 Cells Caused by Aβ1–40 Self-aggregation .......................... 65
3.4.3 Effect of Salvianolic Acid B on Neurogenesis in Rat Middle Cerebral Artery with Ischemic Reperfusion .......................... 66
3.4.4 Prospects of the Study on Salvianolic Acid B .......................... 70

3.5 Examples of the Effect of Salvianolic Acid on Focal Cerebral Ischemia .......................... 72
3.5.1 Objective .......................... 72
3.5.2 Experimental Materials .......................... 72
3.5.3 Experimental Method .......................... 72
3.5.4 Results .......................... 74
3.5.5 Conclusion .......................... 75

References .......................... 75

4 Effects of Danshen on the Cardiovascular System .......................... 79
Xiaoming Zhu, Lianhua Fang, Guanhua Du, Ran Zhang, Dongxia Wang, Jinglan Xu and Xiaoying Wang

4.1 The Protection of Danshen Over Heart .......................... 79
4.1.1 Improving the Blood Supply of Ischemic Cardiac Muscle .......................... 80
4.1.2 Improving the Energy Metabolism of Cardiac Muscle .......................... 81
4.1.3 Inhibition of Myocardial Hypertrophy .......................... 84
4.1.4 Anti-arrhythmia .......................... 86
4.1.5 Treatment of Viral Myocarditis .......................... 86
4.1.6 Summary .......................... 87

4.2 The Effects of Danshen on Atherosclerosis .......................... 87
4.2.1 Regulation of Lipid Metabolism .......................... 87
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.2 Prevention of Lipid Peroxidation</td>
<td>90</td>
</tr>
<tr>
<td>4.2.3 Improvement in Functional Disturbance of Blood Vessel Endothelium</td>
<td>93</td>
</tr>
<tr>
<td>4.2.4 The Inhibition of the Expression of Adhesive Molecules and the Antagonism of the Adhesion Between Cells</td>
<td>95</td>
</tr>
<tr>
<td>4.2.5 Inhibition of Vascular Smooth Muscle Cell Proliferation</td>
<td>97</td>
</tr>
<tr>
<td>4.2.6 Regulation of Antithrombotic System, Inhibition of Thrombosis</td>
<td>99</td>
</tr>
<tr>
<td>4.2.7 Calcium Antagonism</td>
<td>102</td>
</tr>
<tr>
<td>4.2.8 Treatment of Coronary Heart Disease and Heart-Stroke</td>
<td>103</td>
</tr>
<tr>
<td>4.2.9 Summary</td>
<td>104</td>
</tr>
<tr>
<td>4.3 The Effects of Danshen on Hypertension and Its Risk Factors</td>
<td>104</td>
</tr>
<tr>
<td>4.4 The Effects on Blood Vessel Endothelium and Smooth Muscle</td>
<td>108</td>
</tr>
<tr>
<td>4.4.1 Danshen’s Protective Effect on Vascular Endothelial Cells</td>
<td>108</td>
</tr>
<tr>
<td>4.4.2 The Effects of Danshen on the Proliferation and Migration of VSMC</td>
<td>112</td>
</tr>
<tr>
<td>4.4.3 Summary</td>
<td>115</td>
</tr>
<tr>
<td>4.5 The Molecular Mechanism of Danshen’s Protection on Myocardial Ischemia-Reperfusion Injuries</td>
<td>115</td>
</tr>
<tr>
<td>4.5.1 The Scavenging of Free Radicals and Prevention of Lipid Peroxidation</td>
<td>115</td>
</tr>
<tr>
<td>4.5.2 Protection of the Cell Membrane</td>
<td>117</td>
</tr>
<tr>
<td>4.5.3 The Prevention of Calcium Overload in the Cells</td>
<td>119</td>
</tr>
<tr>
<td>4.5.4 The Effects of Danshen on Post-ischemia-Reperfusion “No-Reflo”</td>
<td>121</td>
</tr>
<tr>
<td>4.5.5 The Effects of Danshen on Myocardial Energy Metabolism</td>
<td>122</td>
</tr>
<tr>
<td>4.5.6 The Effects of Danshen on the Apoptosis of Myocardial Cells and the Expression of Apoptosis Related Genes During Myocardial Ischemia-Reperfusion of Rats</td>
<td>124</td>
</tr>
<tr>
<td>References</td>
<td>124</td>
</tr>
</tbody>
</table>

5 Protective Effects of Danshen on Cerebral Vessels and the Nervous System 129
Guangliang Han, Yuehua Wang, Guanhua Du, Hongmei Guang and Xinrui Cheng
5.1 Pharmacological Action of Danshen to Treat Cerebral Hemorrhage 129
5.1.1 Overview of Cerebral Hemorrhage 129
5.1.2 Pharmacological Action of Danshen 130
5.1.3 The TCM Basis for Using Danshen to Treat Cerebral Hemorrhage.......................... 130
5.1.4 The Theoretical and Experimental Basis of Danshen’s Treatment of Cerebral Hemorrhage.......................... 130
5.1.5 Inseparable Relationship Between Cerebral Hemorrhage and Cerebral Ischemia.............. 131
5.1.6 Decreasing Intracranial Pressure and Promoting the Absorption of Cephalophyma............. 132
5.1.7 Improving Hemorheological Characteristics................................................. 132
5.1.8 The Timing of Danshen Treatment for Cerebral Hemorrhage......................... 133
5.2 The Effect of Danshen on Learning and Memory Abilities...................................... 134
  5.2.1 The Effect of Danshen on Promoting the Ability of Learning and Memory.............. 134
  5.2.2 The Effect of Tanshinone on Alzheimer’s-Like Disease in Rats......................... 135
  5.2.3 Effect of Compound Danshen Preparations on Learning and Memory in Dementia Rats... 140
5.3 Pharmacological Effects of Danshen for Treatment of Acute Ischemic Cerebrovascular Disease...... 144
  5.3.1 Mechanism of Action of Danshen in Ischemic Cerebrovascular Disease............... 144
  5.3.2 Summary and Prospect............................................................... 153
5.4 Protective Effect of Danshen on Cerebral Hemorrhage-Reperfusion Injury.................. 154
  5.4.1 Improving Energy Metabolism.................................................... 154
  5.4.2 Clearing Free Radicals............................................................. 155
  5.4.3 Reducing Calcium Overload...................................................... 156
  5.4.4 Inhibiting the Release of Excitatory Amino Acids (EAA)............................... 158
  5.4.5 Regulating Immunity and Effects on Cytokines....................................... 159
  5.4.6 Affecting the Expression of Heat Shock Protein..................................... 160
  5.4.7 Improving Hemorheology and Microcirculation....................................... 161
  5.4.8 Inhibiting Apoptosis................................................................. 161
  5.4.9 Improving Learning and Memory Disorders......................................... 162
References................................................................. 164
6 Effect of Danshen on the Blood System and Microcirculatory Function

Jingyan Han, Zhixin Guo, Jinhua Wang, Li Zhang and Guanhua Du

6.1 The Effect of Danshen on Microcirculatory Dysfunction Caused by I/R

6.1.1 Danshen Improved the Microcirculatory Dysfunction Caused by I/R

6.1.2 The Improving Effect of Danshen on I/R-Related Injury

6.2 Effect of Danshen on Microcirculatory Dysfunction Caused by Endotoxins

6.2.1 Effect on Diameter of Small Artery and Vein

6.2.2 Effect on Erythrocyte Velocity of the Small Veins

6.2.3 Effect on the Adhesion of Leukocytes to the Small Veins

6.2.4 Inhibitive Effect on Peroxides

6.2.5 Protective Effect on Endovascular Cell Injury

6.2.6 Effect on Mast Cell Degranulation

6.2.7 Inhibitory Effect on Serum Albumin Leakage

6.3 Improving Effects of Danshen on Microcirculatory Dysfunction Caused by Other Factors

6.3.1 Improving Effect on Microcirculatory Dysfunction Caused by Photochemical Reactions

6.3.2 Improving Effect on Microcirculatory Dysfunction Caused by Noradrenaline

6.3.3 Improving Effect on Microcirculatory Dysfunction Caused by Scalding

6.3.4 Improving Effect on Microcirculatory Dysfunction Caused by Noise

6.3.5 Improving Effect on Microcirculatory Dysfunction Caused by Dextran Polymer

6.3.6 Summary

6.4 Research Progress in Danshen’s Effects on the Blood System, Microcirculation, and Hemorheology

6.4.1 Anticoagulation, Promoting Fibrinolysis, and Antithrombosis

6.4.2 Effect on Lipids

6.4.3 The Function of Danshen on Improving Microcirculation and Promoting Hemorheology

6.4.4 Summary

References
7 Preventive and Therapeutic Effects of Danshen on Digestive System Diseases
Yanqiao Zang, Ying Dai, Guanhua Du and Mei Gao

7.1 Pharmacological Effects of Danshen on Diseases of Stomach and Intestine
7.1.1 Pharmacological Effects on Peptic Ulcers
7.1.2 Pharmacological Effects of Danshen on Intestinal Tract
7.1.3 Clinical Application of Danshen in Intestinal Tract Diseases

7.2 Pharmacological Effects of Danshen on Acute Pancreatitis and Its Mechanisms
7.2.1 Improving Hemorhheology
7.2.2 Antiplatelet Aggregation
7.2.3 Against Angiotensin II (Ang II)
7.2.4 Regulating Endothelin Level
7.2.5 Scavenging Free Radicals
7.2.6 Inhibitory Effects on Ca²⁺
7.2.7 AntiBacterial and Anti-Inflammatory Effects
7.2.8 Inhibiting the Aggregation of White Blood Cells
7.2.9 Protective Effects on Extrapancreatic Organs

7.3 Progress in the Study on Pharmacological Effects and Relevant Mechanisms of Danshen in the Liver
7.3.1 Pharmacological Effects of Danshen on the Liver
7.3.2 Mechanisms of the Effects of Danshen’s Chemical Components on the Liver

References

8 The Effects of Danshen on Respiratory Diseases and Their Mechanisms
Guorong He, Guanhua Du and Danshen Zhang

8.1 The Main Pharmacological Effects of Danshen’s Treatment of Respiratory Diseases
8.1.1 Scavenging Free Radicals
8.1.2 Improving Hemorrheological Indices
8.1.3 Calcium Antagonist
8.1.4 Regulating the Secretion of Cell Factors [18, 19]
8.1.5 Antiendotoxin Actions [23–25]
8.1.6 Others

8.2 Protective Effects of Danshen on Acute Lung Injury Caused by Various Factors
8.2.1 Protective Effects of Danshen on Traumatic Lung Injury
8.2.2 Protective Actions of Danshen Against Infectious Toxic Lung Injury ........ 223
8.2.3 Protective Effects of Danshen Against Chemical Lung Injury ............ 224
8.2.4 Protective Effect of Danshen on Mixed Lung Injury ....................... 228
References .................................................. 231

9 The Effects of Danshen on Kidney Diseases ............ 233
Bin Zhang, Tiantai Zhang and Guanhua Du
9.1 Preventive and Curative Effects of Danshen on Renal Inflammatory Diseases ........ 233
9.1.1 Definition of Renal Inflammatory Diseases and Pathogenesis .......... 233
9.1.2 Preventive and Curative Effects of Danshen on Renal Inflammatory Diseases .......... 234
9.2 Preventive and Curative Effects of Danshen on Renal Failure ............. 234
9.2.1 Classification and Clinical Manifestation of Renal Failure ............ 234
9.2.2 Protective Effects of Danshen Against Renal Failure .......... 235
9.3 Protective Effects of Danshen on the Ischemia and Ischemia-Reperfusion Injury in Kidneys ........ 235
9.3.1 Antioxidation ...................... 235
9.3.2 Affecting Inflammatory Factors .................... 236
9.3.3 Effects on Nitric Oxide Synthase .................. 236
9.4 Preventive and Curative Effects of Danshen Against the Impairment of Renal Functions Caused by Toxic Substances .......... 237
9.5 Preventive and Curative Effects of Danshen Against the Impairment of Renal Function Caused by Renal Interstitial Substance Injury ........ 237
References .................................................. 238

10 The Anti-tumor Effects of Danshen .............. 239
Xiuping Chen, Tiantai Zhang and Guanhua Du
10.1 Application of Danshen in Clinical Tumor Therapy ...... 239
10.1.1 Alleviating the Pain of Malignant Tumors ....... 239
10.1.2 Enhancing the Therapeutic Effects of Radiotherapy ............... 239
10.1.3 Prevention and Treatment of Radiotherapy and Chemotherapy-Induced Myelosuppression .......... 240
10.2 Actions of Danshen on Malignant Tumors and Possible Mechanisms .......... 240
10.2.1 Effects of Danshen on Tumorigenesis and Relevant Mechanisms .......... 240
10.2.2 Effects on the Development of Tumors ...... 241
11 Studies on the Antibacterial and Anti-inflammatory Actions of Danshen and Its Effects on the Immune System

Li Zhang and Guanhua Du

11.1 Pharmacological Effects of Danshen in Anti-inflammation and Immunity

11.1.1 Effects on Immunocyte Function

11.1.2 Effects on Cytokines

11.2 The Pharmacological Effects of Danshen in Antibacterial Activity

11.2.1 Effects on Staphylococcus Aureus

11.2.2 Effects on Helicobacter Pylori

11.2.3 Others

Part II Quality Control

12 Qualitative Research

Guoqiang Fan, Guoqing Wu, Xiaoqian Zhang, Xian Zhang, Rixin Liang, Manling Li, Fenglan Cao, Ming Zhu, Zhangzhao Jin, Bilian Chen, Linke Ma, Shen Ji, Qing Gong, Zhegliang Ye and Jun Gao

12.1 Identification of Medicinal Danshen

12.1.1 Morphological Identification

12.1.2 Microscopic Identification

12.1.3 Physical and Chemical Identification

12.1.4 Identification by Thin-Layer Chromatography (TLC)

12.1.5 Spectral Identification

12.2 Identification of Danshen Preparations

12.2.1 Qualitative Identification of Dantonic™

12.2.2 Qualitative Identification of Danshen Injection

12.2.3 Qualitative Identification of Compound Danshen Tablet and Danshen Tablet by TLC

12.2.4 Qualitative Identification of Xiangdan Injection

12.2.5 Identification of Guanxinning Injection by TLC

12.2.6 Identification of Danshen Total Phenolic Acid Injection (Lypholized)

References
13 General Quality Control Methods ........................................... 291
Xiaojian Zhang, Guoqing Wu, Rixin Liang, Manling Li,
Xiaoqian Zhang and Shen Ji
13.1 Determination of Water Content ................................. 291
13.2 Determination of Ash Content ........................................ 291
  13.2.1 Total Ash ........................................ 291
  13.2.2 Acid-Insoluble Ash .................................... 291
13.3 Determination of Extractives ...................................... 292
  13.3.1 Water-Soluble Extractives ............................. 292
  13.3.2 Alcohol-Soluble Extractives ......................... 293
13.4 Heavy Metals ..................................................... 294
  13.4.1 Overview ........................................... 294
  13.4.2 Detection and Determination of Heavy Metals ........ 295
  13.4.3 Detection of Heavy Metals in Danshen ............... 295
  13.4.4 Method Validation .................................... 296
13.5 Pesticide Residues ............................................... 297
  13.5.1 Overview ........................................... 297
  13.5.2 Organochlorine Pesticide Residues ................. 298
  13.5.3 Organophosphorus Pesticide Residues ............... 299
  13.5.4 Pyrethroid Pesticide Residues ....................... 301
13.6 Aflatoxin ....................................................... 302
  13.6.1 Overview ........................................... 302
  13.6.2 Determination of Aflatoxin .......................... 303
  13.6.3 Assay Results ....................................... 303
References ............................................................... 305

14 Content Determination .................................................. 307
Wanying Wu, Rongxia Liu, Dean Guo, Xiaoqian Zhang,
Guoqing Wu, Rixin Liang, Manling Li, Fengnan Cao,
Ming Zu, Zhangzhao Jin, Bilian Cheng, Linke Ma, Qing Gong,
Shen Ji, Ming Zhu, Zhengliang Ye, Jun Gao and Aihua Liu
14.1 Determination of Salvianolic Acid Content .................. 307
  14.1.1 Determination of Total Phenolic Acid
        Content in Compound Danshen Tablet ............ 307
  14.1.2 Determination of Salvianolic Acid Content
        in Danshen Herb ................................... 309
  14.1.3 Determination of the Water-Soluble
        Constituents in Dantonic™ ........................ 314
  14.1.4 Determination of Salvianolic Acids
        in Danshen Injection .............................. 318
  14.1.5 Determination of the Phenolic Components
        in Compound Danshen Tablet
        and Danshen Tablet .............................. 326
14.1.6 Determination of Salvianolic Acids in Xiangdan Injection .......................... 329
14.1.7 Determination of Salvianolic Acids in Lyophilized Danshen Total Phenolic Acid Injection ........................................ 334
14.1.8 Determination of the 6 Major Phenolic Acids in Danshen and Its Preparations ....................... 338

14.2 Determination of Tanshinone Contents ............................................. 347
14.2.1 Determination of Tanshinones in Danshen .................................. 347
14.2.2 Determination of 4 Tanshinones in Danshen and Danshen Preparations ...................... 348

References ........................................ 355

15 Fingerprint Study .......................................................... 357
Dean Guo, Jinlan Zhang, Ming Zhu, Xiaohui Fan, Yongjiang Wu, Aihua Liu, Min Yang and Haibing Qu
15.1 Study of Chromatographic Fingerprinting ..................................... 357
15.1.1 Study of the Chromatographic Fingerprinting of Salvianolic Acids ..................... 357
15.1.2 Chromatographic Fingerprints of Diterpene Quinone Constituents .................. 425
15.2 Study on Near Infrared Spectral Fingerprint .................................. 446
15.2.1 Introduction to Near Infrared Spectroscopy ................................ 446
15.2.2 The Near Infrared Spectral Fingerprints of Danshen .............................. 447
15.2.3 NIR Spectral Fingerprint Based on Wavelet Transform ......................... 453

References ........................................ 457

16 Quality Control of Dantonic™ ................................................ 459
Shunhang Liu, Jun Gao, Yan Liu, Shunnan Zhang, Haiou Dong, Xueming Zhang, Jianping Lin, Junquan Wang, Xuesong Liu, Haibin Qu and Xiaohui Fan
16.1 Quality Control of Raw Material Medicinals .................................. 459
16.1.1 Overview ............................................................ 459
16.1.2 Summary ............................................................ 462
16.2 Quality Control in the Extraction Process ...................................... 462
16.2.1 Strict Quality Standard for Crude Drug Materials ............................... 463
16.2.2 Advanced Techniques and Equipment ......................................... 463
16.2.3 Quality Control of Extraction Process: Implementation of CGEP Management .... 463
16.2.4 High Quality Standards for Extractum ........................................ 464
16.3 Quality Control in the Preparation Process .......................... 465
  16.3.1 Overview ........................................... 465
  16.3.2 Quality Control of the Production Process of Dantonic™ ........................................... 468
  16.3.3 The Application of Near-Infrared Spectroscopy in the Quality Control of Dantonic™ Production ........................................... 473

16.4 Dantonic™ Quality Control Technique Based on Multivariant HPLC Fingerprinting ..................... 494
  16.4.1 Acquisition of Multiple Chromatographic Fingerprints of Dantonic™ ........................................... 494
  16.4.2 Authentication of Dantonic™ Multiple Chromatographic Fingerprints .......... 495
  16.4.3 Validation of Dantonic™ Multiple Chromatographic Fingerprints .................. 496
  16.4.4 Multiple Chromatographic Fingerprinting Calculation Based on Information Fusion ........... 497

16.5 Method for Determining the Quality Uniformity of Compound Danshen Extract ......................... 502
  16.5.1 Mixing Uniformity Method ........................................... 502
  16.5.2 Mixing Uniformity Method Based on Multiple Fingerprinting ........................................... 504
  16.5.3 Experiment Part ........................................... 504
  16.5.4 Results and Discussion ........................................... 505

References ........................................... 509

17 In Vivo Metabolism of Danshen and Its Preparations .......................... 511
  Aihua Liu, Dean Guo, Jinlan Zhang and Jianghao Sun
  17.1 Pharmacokinetics and In Vivo Metabolism of Total Salvianolic Acids ........................................... 511
    17.1.1 Pharmacokinetics Study of Total Salvianolic Acids ........................................... 511
    17.1.2 The Metabolites of Total Salvianolic Acids from Danshen in Rats ........................................... 514
  17.2 Pharmacokinetics and In Vivo Metabolism of Danshen Preparations ........................................... 520
    17.2.1 Preliminary Pharmacokinetic Study of Compound Danshen Tablet ........................................... 520
    17.2.2 Metabolic Fingerprinting of Danshen Injection ........................................... 525
    17.2.3 The Metabolites of Danshen Injection in Rats After Intravenous Administration ...................... 528
  17.3 The Metabolism of Monomer Tanshinone Components ........................................... 530
    17.3.1 In Vivo Pharmacokinetics of Tanshinone IIₐ in Rats ........................................... 530
    17.3.2 The Metabolites in Rat Bile After Intravenous Administration of 7 Tanshinones ........................................... 549
17.3.3 Quantitative Analysis of Bile Excretion Following Intravenous Administration of 7 Tanshinones to Rats ............... 571
References......................................................... 582
Postscript.......................................................... 585
Index................................................................. 589
Dan Shen (Salvia miltiorrhiza) in Medicine
Volume 2. Pharmacology and Quality Control
Yan, X. (Ed.)
2015, XXXVI, 592 p. 254 illus., 65 illus. in color.,
Hardcover
ISBN: 978-94-017-9462-6