## Contents

<table>
<thead>
<tr>
<th>List of Contributors</th>
<th>XXI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td></td>
</tr>
<tr>
<td>Andrology: Definition, Clinical Issues and Prevalence</td>
<td>1</td>
</tr>
<tr>
<td>W.-B. Schill, F. Comhaire, T.B. Hargreave</td>
<td>1</td>
</tr>
<tr>
<td>References</td>
<td>3</td>
</tr>
<tr>
<td>Layout and How to Use the Book</td>
<td>4</td>
</tr>
<tr>
<td>F. Comhaire</td>
<td>4</td>
</tr>
<tr>
<td><strong>General Considerations</strong></td>
<td></td>
</tr>
<tr>
<td>Evidence-Based Medicine in Reproductive Medicine and Andrology</td>
<td>5</td>
</tr>
<tr>
<td>F. Comhaire, A. Mahmoud</td>
<td>5</td>
</tr>
<tr>
<td>References</td>
<td>6</td>
</tr>
<tr>
<td>Economic Cost and Cost-Effectiveness</td>
<td>7</td>
</tr>
<tr>
<td>F. Comhaire, A. Mahmoud</td>
<td>7</td>
</tr>
<tr>
<td>References</td>
<td>9</td>
</tr>
<tr>
<td>Ethics of Reproductive Research and Treatment</td>
<td>9</td>
</tr>
<tr>
<td>T.B. Hargreave</td>
<td>9</td>
</tr>
<tr>
<td>Introduction</td>
<td>9</td>
</tr>
<tr>
<td>Basic Principles Underlying Ethical Considerations</td>
<td>10</td>
</tr>
<tr>
<td>Consent</td>
<td>10</td>
</tr>
<tr>
<td>Applying the Principles to Reproductive Medicine</td>
<td>11</td>
</tr>
<tr>
<td>Conclusion</td>
<td>13</td>
</tr>
<tr>
<td>References</td>
<td>13</td>
</tr>
<tr>
<td>Human Tissue for Research</td>
<td>14</td>
</tr>
<tr>
<td>T.B. Hargreave</td>
<td>14</td>
</tr>
<tr>
<td><strong>I Diagnosing and Solving Clinical Problems</strong></td>
<td></td>
</tr>
<tr>
<td><strong>I.1 Problem: Gender Dysphoria and Disorders of Sexual Differentiation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>I.1.1 Gender Dysphoria</strong></td>
<td>19</td>
</tr>
<tr>
<td>G.G.R. T’Sjoen</td>
<td>19</td>
</tr>
<tr>
<td>I.1.1.1 Definition</td>
<td>19</td>
</tr>
<tr>
<td>I.1.1.2 Aetiology and Pathogenesis</td>
<td>19</td>
</tr>
<tr>
<td>I.1.1.3 Clinical Findings</td>
<td>19</td>
</tr>
<tr>
<td>I.1.1.4 Treatment</td>
<td>20</td>
</tr>
<tr>
<td><strong>I.1.5 Prognosis</strong></td>
<td>22</td>
</tr>
<tr>
<td>References</td>
<td>22</td>
</tr>
<tr>
<td><strong>I.1.2 Disorders of Sexual Differentiation</strong></td>
<td></td>
</tr>
<tr>
<td>G.G.R. T’Sjoen</td>
<td>23</td>
</tr>
<tr>
<td>I.1.2.1 Definition</td>
<td>23</td>
</tr>
<tr>
<td>I.1.2.2 Aetiology and Pathogenesis</td>
<td>23</td>
</tr>
<tr>
<td>I.1.2.3 Classification of Intersex</td>
<td>23</td>
</tr>
<tr>
<td>I.1.2.4 Clinical Findings</td>
<td>24</td>
</tr>
<tr>
<td>I.1.2.5 Management</td>
<td>24</td>
</tr>
<tr>
<td>I.1.2.6 Prevention</td>
<td>25</td>
</tr>
<tr>
<td>References</td>
<td>25</td>
</tr>
<tr>
<td><strong>I.2 Problem: Abnormal Pubertal Development</strong></td>
<td></td>
</tr>
<tr>
<td>S.A. Wudy</td>
<td>27</td>
</tr>
<tr>
<td>I.2.1 Physiology</td>
<td>27</td>
</tr>
<tr>
<td>I.2.2 Precocious Puberty</td>
<td>27</td>
</tr>
<tr>
<td>I.2.3 Delayed Puberty</td>
<td>28</td>
</tr>
<tr>
<td>References</td>
<td>28</td>
</tr>
<tr>
<td><strong>I.3 Male Factor Fertility Problems</strong></td>
<td></td>
</tr>
<tr>
<td><strong>I.3.1 Consensus-Based Approach to Standardized Diagnosis and Management of the Infertile Male</strong></td>
<td></td>
</tr>
<tr>
<td>F. Comhaire, A. Mahmoud</td>
<td>29</td>
</tr>
<tr>
<td>References</td>
<td>30</td>
</tr>
<tr>
<td><strong>I.3.2 WHO Recommended Diagnostic Flow Chart</strong></td>
<td></td>
</tr>
<tr>
<td>F. Comhaire, A. Mahmoud</td>
<td>31</td>
</tr>
<tr>
<td><strong>I.3.3 Implications of Multifactorial Aetiology in the Diagnosis and Management of Male Infertility</strong></td>
<td></td>
</tr>
<tr>
<td>F. Comhaire, A. Mahmoud</td>
<td>33</td>
</tr>
<tr>
<td>References</td>
<td>35</td>
</tr>
<tr>
<td><strong>I.3.4 Sexual Dysfunction and Male Fertility</strong></td>
<td></td>
</tr>
<tr>
<td>T.B. Hargreave</td>
<td>35</td>
</tr>
<tr>
<td>I.3.4.1 Definition of the Disease</td>
<td>35</td>
</tr>
<tr>
<td>I.3.4.2 Aetiology and Pathogenesis</td>
<td>35</td>
</tr>
<tr>
<td>I.3.4.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings</td>
<td>36</td>
</tr>
</tbody>
</table>
I.4.2.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings

I.4.2.2 Aetiology and Pathogenesis

I.4.2.1 Definition of the Disease

I.4.1.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings

I.4.1.2 Aetiology and Pathogenesis

I.4.1.1 Definition of the Disease

I.4.1 Problem: Sexual Dysfunction

I.3.15 Oligo-Astheno-Teratozoospermia with no Demonstrable Cause (Idiopathic O-A-T)

F. Comhaire, A. Mahmoud

I.3.15.1 Definition of the Disease

I.3.15.2 Aetiology and Pathogenesis

I.3.15.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings

I.3.15.4 Differential Diagnosis

I.3.15.5 Treatment

I.3.15.6 Results of Treatment

I.3.15.7 Prognosis

I.3.15.8 Prevention

I.3.15.9 Other

References

I.3.16 Azoospermia

G.R. Dohle

I.3.16.1 Definition

I.3.16.2 Introduction

I.3.16.3 Investigations

References

I.4.3 Ejaculatory Dysfunction. Premature Ejaculation, Delayed Ejaculation, Anejaculation, Low-Volume Ejaculation, Retrograde Ejaculation and Painful Ejaculation

T.B. Hargreave

I.4.3.1 Definition of the Disease

I.4.3.2 Aetiology and Pathogenesis

I.4.3.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings

I.4.3.4 Treatment

I.4.3.5 Prognosis

I.4.3.6 Prevention

References

I.4.4 Orgasm Dysfunction

T.B. Hargreave

I.4.4.1 Definition of the Disease

I.4.4.2 Aetiology and Pathogenesis

I.4.4.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings

I.4.4.4 Treatment

References

I.4.5 Abnormal Libido

B. Brosig

I.4.5.1 Definition

I.4.5.2 Epidemiology

I.4.5.3 Aetiology and Pathogenesis

I.4.5.4 Clinical Findings

I.4.5.5 Therapy

I.4.5.6 Prognosis

References

I.4.6 Sexual Deviation and Paraphilias

M. Beutel

I.4.6.1 Definition

I.4.6.2 Aetiology and Pathogenesis

I.4.6.3 Paedophilia as an Example of Paraphilia

I.4.6.4 Diagnosis and Treatment

References

I.5 Problem: Male Contraception

I.5.1 Controversies Regarding Post-Vasectomy Management

J. Shah, H. Fisch

I.5.1.1 Introduction

I.5.1.2 Definition

I.5.1.3 Prevalence

I.5.1.4 Treatment

I.5.1.5 Results of Treatment

I.5.1.6 Conclusion

References

I.4.2 Erectile Deformity, Including Peyronie’s Disease

T.B. Hargreave

I.4.2.1 Definition of the Disease

I.4.2.2 Aetiology and Pathogenesis

I.4.2.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings

I.4.2.4 Treatment

I.4.2.5 Results of Treatment

I.4.2.6 Prevention

References
I.5.2 Vasectomy Reversal
A. Belker .................................. 119
I.5.2.1 Indications ......................... 119
I.5.2.2 Contraindications ................. 119
I.5.2.3 Vasectomy Reversal Techniques 119
I.5.2.4 Postoperative Care ............... 120
I.5.2.5 Complications .................... 120
I.5.2.6 Results ............................ 120
I.5.2.7 Conclusions ....................... 120
I.5.3 Male Contraception
D. Handelsman, G. Waites ............... 121
I.5.3.1 Introduction .......................... 121
I.5.3.2 Hormonal Methods .................. 121
I.5.3.3 Nonhormonal Methods ............... 121
I.5.3.4 Vaccines ............................ 121
I.5.3.5 Conclusions ....................... 122
I.5.4 Traditional Methods
D. Handelsman, G. Waites ............... 122
I.5.4.1 Introduction .......................... 122
I.5.4.2 Conclusions ....................... 124
I.6 Problem: Reproductive Tract Infections
I.6.1 Reproductive Tract Infections/Sexually Transmitted Diseases
F.R. Ochsendorf ............................ 125
I.6.1.1 Definition of the Disease ............... 125
I.6.1.2 Aetiology and Pathogenesis .......... 125
I.6.1.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings ............... 126
I.6.1.4 Differential Diagnosis ............... 129
I.6.1.5 Treatment ............................ 129
I.6.1.6 Results of Treatment ............... 129
I.6.1.7 Prognosis ............................ 129
I.6.1.8 Prevention ............................ 129
I.6.1.9 Other ................................ 129
I.6.2 HIV Infection
F.R. Ochsendorf ............................ 131
I.6.2.1 Definition of the Disease ............... 131
I.6.2.2 Aetiology and Pathogenesis .......... 131
I.6.2.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings ............... 131
I.6.2.4 Treatment ............................ 131
I.6.2.5 Results of Treatment ............... 132
I.6.2.6 Prognosis ............................ 132
I.6.2.7 Prevention ............................ 132
I.6.2.8 Other ................................ 132
I.7 Problem: Emergencies in Andrology
I.7.1 Testicular Torsion
C.F. Heyns, A.J. Visser ..................... 134
I.7.1.1 Definition ............................. 134
I.7.1.2 Aetiology and Pathogenesis .......... 136
I.7.1.3 Clinical Findings ..................... 138
I.7.1.4 Differential Diagnosis ............... 145
I.7.1.5 Treatment ............................ 146
I.7.1.6 Results of Treatment ............... 150
I.7.1.7 Prognosis ............................. 151
I.7.1.8 Prevention ............................ 155
I.7.1.9 Conclusions ....................... 156
I.7.2 Blunt Testicular Trauma
J. Vale .................................. 162
I.7.2.1 Definition ............................. 162
I.7.2.2 Aetiology and Pathogenesis .......... 162
I.7.2.3 Diagnosis ............................. 162
I.7.2.4 Treatment – Conservative Versus Surgical ............... 163
I.7.2.5 Postoperative Follow-up ............... 163
I.7.3 Penile Fractures
W.D. Aiken ............................... 164
I.7.3.1 Definition of the Disease ............... 164
I.7.3.2 Aetiology and Pathogenesis .......... 164
I.7.3.3 Clinical Findings ..................... 164
I.7.3.4 Physical Examination ............... 165
I.7.3.5 Investigations ....................... 165
I.7.3.6 Differential Diagnosis ............... 165
I.7.3.7 Treatment ............................ 165
I.7.3.8 Results of Treatment ............... 166
I.7.3.9 Prognosis ............................. 166
I.7.3.10 Prevention ............................ 166
I.7.4 Priapism
P. Kumar, D.J. Ralph ...................... 166
I.7.4.1 Definition ............................. 166
I.7.4.2 Aetiology and Pathogenesis .......... 166
I.7.4.3 Clinical Findings, Technical Investigations and Laboratory Findings ............... 167
I.7.4.4 Treatment ............................ 168
I.7.4.5 Conclusion ......................... 169
I.7.4.6 References ......................... 169
I.7.5 Testicular Pain and Related Pain Syndromes
T.B. Hargrave, L. Turner-Stokes .......... 170
I.7.5.1 Definition of the Disease ............... 170
I.7.5.2 Aetiology and Pathogenesis .......... 170
I.7.5.3 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings ............... 173
I.7.5.4 Differential Diagnosis ............... 174
I.7.5.5 Treatment ............................ 174
I.8.1 Scrotal Benign Lesions, Epididymal Cysts, Epididymal Tumours

K. Turner ............................................. 179

I.8.1.1 Hydrocele ....................................... 179
I.8.1.2 Epididymal Cysts ................................. 181
I.8.1.3 Epididymal Tumours .............................. 181
I.8.1.4 Other Benign Epididymal Lesions: Sperm Granuloma ................................. 182
I.8.1.5 Other Benign Epididymal Lesions: Tuberculosis of the Epididymis ................................. 182

I.8.2 Testicular Cancer, CIS, Microcalcifications, TNM Classification

O. Stähl, J. Eberhard, A. Giwercman 183

I.8.2.1 Testicular Cancer ................................. 183
I.8.2.2 Carcinoma-in-Situ of the Testis ................................. 187

I.8.3 Penile Inflammations

F.-M. Köhn ............................................. 190

I.8.3.1 Introduction ...................................... 190
I.8.3.2 Pearly Penile Papules .......................... 190
I.8.3.3 Sclerosing Lymphangitis of the Penis .......................... 191
I.8.3.4 Balanitis and Balanoposthitis .......................... 191
I.8.3.5 Lichen Sclerosus et Atrophicus .......................... 193
I.8.3.6 Balanitis Circumscripta Plasmacellularis (Zoon's Balanitis) .......................... 193
I.8.3.7 Balanitis Circinata ................................ 194
I.8.3.8 Psoriasis Vulgaris ................................ 195
I.8.3.9 Lichen Planus .................................... 196
I.8.3.10 Fixed Drug Eruption .......................... 197
I.8.3.11 Other Drug-Induced Lesions of the Penis .......................... 198
I.8.3.12 Allergic and Irritant Contact Dermatitis of the Penis .......................... 198
I.8.3.13 Atopic Dermatitis ................................ 199
I.8.3.14 Seborrhoeic Dermatitis .......................... 199

I.8.4 Penile Cancer

I.D.C. Mitchell ........................................... 201

I.8.4.1 Definition ...................................... 201
I.8.4.2 Aetiology and Pathogenesis ........................ 201
I.8.4.3 Clinical Findings ................................ 201
I.8.4.4 Differential Diagnosis ............................ 202
I.8.4.5 Treatment ................................……….. 202
I.8.4.6 Results of Treatment .............................. 203
I.8.4.7 Prognosis ................................……….. 203
I.8.4.8 Prevention ................................……….. 203
I.8.4.9 Other ................................……….. 203

I.8.5 Circumcision

C.F. Heyns, J.N. Krieger ................................ 203

I.8.5.1 Introduction ...................................... 204
I.8.5.2 Epidemiology of Circumcision ........................ 204
I.8.5.3 Embryology and Function of the Foreskin ........................ 204
I.8.5.4 Indications for Circumcision ........................ 205
I.8.5.5 Contraindications for Circumcision ........................ 206
I.8.5.6 Complications of Circumcision ........................ 207
I.8.5.7 Current Controversies About Circumcision ........................ 208
I.8.5.8 Alternatives to Circumcision ........................ 210
I.8.5.9 Conclusions ................................……….. 210

I.8 References ................................……….. 211

I.9 Problem: Diseases of the Prostate (Infection, Benign Prostatic Hyperplasia, Cancer)

I.9.1 Benign Prostatic Hyperplasia and Prostatic Cancer

S.A. McNeill, S.K.W. Leung ................................ 213

I.9.1.1 Introduction ...................................... 213
I.9.1.2 Aetiology and Pathogenesis ........................ 213
I.9.1.3 Prostate Cancer ................................……….. 214
I.9.1.4 Symptoms, Diagnosis and Treatment ........................ 214

I.9 References ................................……….. 216

I.10 Problem: Male Breast Disorder

I.10.1 Gynaecomastia and Benign Breast Hyperplasia Including Iatrogenic Causes

W. Krause ................................……….. 225

I.10.1.1 Definition, Epidemiology ........................ 225
I.10.1.2 Aetiology and Pathogenesis ........................ 226
I.10.1.3 Clinical Features ................................……….. 227
I.10.1.4 Histopathology ................................……….. 227
I.10.1.5 Genetic Risk Factors .............................. 228
I.10.1.6 Diagnostic Procedures .............................. 228
I.10.1.7 Prevention and Treatment ........................ 230

I.10.2 Skin Diseases of the Male Nipple

W. Krause ................................……….. 232

I.10.2.1 General Skin Diseases .............................. 232
I.10.2.2 Localized Inflammatory Diseases ........................ 232
I.10.2.3 Tumours ................................……….. 233
I.10.2.4 Malformations ................................……….. 235
I.10.2.5 Surgical Interventions .............................. 236

I.10 References ................................……….. 236
I.10.3 Male Breast Cancer
   P.S.H. Soon, J.M. Dixon ...................... 237
I.10.3.1 Incidence .............................. 237
I.10.3.2 Risk Factors ............................. 237
I.10.3.3 Pathology .............................. 238
I.10.3.4 Presentation ............................ 239
I.10.3.5 Investigation ............................ 239
I.10.3.6 Management of Early Breast Cancer ... 239
I.10.3.7 Management of Metastatic Breast Cancer . 240
I.10.3.8 Follow-up .............................. 240
I.10.3.9 Conclusion ............................ 240

I References .............................. 240

I.11 Problem: Male Ageing

I.11.1 Neuroendocrine Regulation of Testicular Function
   J.M. Kaufman .............................. 241
   I.11.1.1 Definition ............................. 241
   I.11.1.2 Aetiology and Pathogenesis ........... 241
   I.11.1.3 Clinical Findings, Technical Investigations and Laboratory Findings ... 246
   I.11.1.4 Differential Diagnosis ............... 246
   I.11.1.5 Treatment ............................ 246
   I.11.1.6 Results of Treatment ................. 246
   I.11.1.7 Summary and Conclusions ............ 246
   References ................................ 246

I.11.2 Male Ageing: Wear and Tear
   E. Comhaire, A. Mahmoud ................. 249
   I.11.2.1 Definition and Pathogenesis ......... 249
   I.11.2.2 Clinical Findings: History, Physical Examination, Technical Investigations, Laboratory Findings ....... 249
   I.11.2.3 Treatment and Prevention .......... 250
   I.11.2.4 Other ................................ 250
   References ................................ 250

I.11.3 Organ Failure and Common Disease of the Ageing Male
   E.J.H. Meuleman, E. Comhaire ............ 251
   I.11.3.1 Introduction and Definition of the Disease ................... 251
   I.11.3.2 Aetiology and Pathogenesis ........... 251
   I.11.3.3 Clinical Findings: History, Physical Examinations and Laboratory Findings 253
   I.11.3.4 Differential Diagnosis ............... 254
   I.11.3.5 Treatment ............................ 254
   I.11.3.6 Prevention ............................ 255
   References ................................ 255

II Rationale

II.1 Understanding Normal Anatomy and Function

II.1.1 Anatomy and Histology of the Male Genital Tract
   A. Meinhardt ...................... 259
II.1.1.1 Testis and Scrotum ...................... 259
II.1.1.2 Epididymis ............................. 260
II.1.1.3 Spermatic Cord and Ductus Deferens .... 261
II.1.1.4 Prostate .............................. 262
II.1.1.5 Seminal Vesicle, Bulbourethral Gland ... 263
II.1.1.6 Penis and Urethra ........................ 263
   Suggested Reading ...................... 266

II.1.2 Sexual Differentiation and Development
   Y.L. Giergman, A. Nordenskjold ........... 266
   II.1.2.1 Introduction ...................... 266
   II.1.2.2 Genes Involved in Male Sex Differentiation .................. 268
   II.1.2.3 Diagnosis of Sexual Ambiguity ....... 271
   References ................................ 271

II.1.3 Physiology of Spermatogenesis
   M. Bergmann ...................... 272
   II.1.3.1 Spermatogenesis ................... 272
   II.1.3.2 Seminiferous Tubules ............... 272
   II.1.3.3 Spermatogonia ...................... 274
   II.1.3.4 Spermatocytes/Meliosis ........... 274
   II.1.3.5 Spermatids/Spermiogenesis ....... 274
   II.1.3.6 Spermatozoont .............. 276
   II.1.3.7 Sertoli Cell ....................... 276
   II.1.3.8 Apoptosis and Spermatogenesis .... 278
   II.1.3.9 Kinetics of Spermatogenesis ....... 278
   II.1.3.10 Pathophysiology of Spermatogenesis and Infertility ............ 279
   References ................................ 280

II.1.4 Physiology of Sexual Function
   O. Baldo, I. Eardley ...................... 281
   II.1.4.1 Penile Erection ................... 282
   II.1.4.2 Ejaculation and Orgasm ............. 285
   References ................................ 288

II.1.5 Endocrine Regulation
   F. Comhaire, A. Mahmoud ................. 288
   II.1.5.1 Hypothalamo–Pituitary–Testicular Axis ....................... 288
   References ................................ 290

II.1.6 Immunology of the Testis and Excurrent Ducts
   H.-C. Schuppe, A. Meinhardt ............. 292
   II.1.6.1 Immune Privilege of the Testis ....... 292
   II.1.6.2 Immune Cells in the Testis .......... 292
   II.1.6.3 Blood–Testis Barrier ................ 293
   II.1.6.4 Mechanisms of Immune Tolerance in the Testis ............... 294
   II.1.6.5 Local Factors of Testicular Immuno-regulation – The Dual Role of Cytokines 294
   II.1.6.6 Inflammation of the Testis .......... 296
   II.1.6.7 Immunobiology and Pathology of the Excurrent Ducts ............ 297
   References ................................ 298
II.1.7 Male Contributions to the Biology of Conception and Fertilization
H.J. Tournaye .......................... 300
II.1.7.1 The Foreplay ........................ 300
II.1.7.2 Paternal Contributions to Conception . . . . 301
II.1.7.3 Other Spermatozoal Attributes . . . . 303

II.2 Mechanisms of Dysfunction and Pathology
II.2.1 Disorders of Prenatal Sexual Development
P. Wieacker .............................. 305
II.2.1.1 Introduction ........................ 305
II.2.1.2 Primary Disorders of Gonadal Development . . . . 305
II.2.1.3 Disorders of Steroid Hormone Biosynthesis . . . . 309
II.2.1.4 Androgen Insensitivity .......................... 310
II.2.1.5 Disorders of AMH Action .......................... 311
II.2.1.6 Disorders of the Hypothalamic – Pituitary – Gonadal Axis . . . . 311
II.2.1.7 Hypospadias and Undescended Testis . . . . 311

II.2.2 Endocrine Disorders and the Role of Hormone Disrupters
A. Mahmoud, Frank Comhaire .......................... 313
II.2.2.1 Introduction ........................ 313
II.2.2.2 Endocrine Disorders ........................ 313
II.2.2.3 The Role of Hormone Disrupters . . . . 315

II.2.3 Infection/Inflammation of the Male Genital Tract as Cause of Abnormal Spermatozoa
C. Depuydt, A. Mahmoud, K. Everaert .......................... 322
II.2.3.1 Introduction ........................ 322
II.2.3.2 Causal Factors and the Role of Cytokines . . . . 323
II.2.3.3 White Blood Cells and Reactive Oxygen Species . . . . 325
II.2.3.4 Obstruction of Sperm Transport and Anti-sperm Antibodies . . . . 325

II.2.4 Urethritis, Sexually Transmitted Diseases (STD), Acquired Immunodeficiency Syndrome (AIDS)
F.R. Ochsendorf .............................. 327
II.2.4.1 Introduction ........................ 327
II.2.4.2 Urethritis ........................... 328
II.2.4.3 STD ............................... 331
II.2.4.4 HIV ............................... 331

II.2.5 Disorders of Blood Flow: Arterial and Venous/Sexual Dysfunction and Varicocele
G.M. Colpi, M. Mancini, G. Piediferro, F.I. Scroppo .......................... 338
II.2.5.1 Erectile Dysfunction and Vascular Disease .......................... 339
II.2.5.2 Varicocele ........................... 340
II.2.5.3 Testicular Torsion .......................... 342
II.2.5.4 Undescended Testis .......................... 343

II.2.6 Effects of Lifestyle and Toxicants
J. P. Bonde .............................. 348
II.2.6.1 Introduction ........................ 348
II.2.6.2 Lifestyle Factors .......................... 349
II.2.6.3 Workplace Factors . . . . 350
II.2.6.4 Environmental Exposures . . . . 354
II.2.6.5 Male-Mediated Developmental Toxicity . . . . 354
II.2.6.6 Conclusion .......................... 354

II.2.7 Influence of Systemic Diseases and Iatrogenic Factors on Sexual and Reproductive Functions
R. Bornman .............................. 358
II.2.7.1 Introduction ........................ 358
II.2.7.2 Sexual and Reproductive Function . . . . 358
II.2.7.3 Systemic Diseases and Fertility . . . . 362

II.2.8 Mechanisms of Pathogenesis of Uro-Genital Cancers
T.F. ’Aho, D.E. Neal .......................... 362
II.2.8.1 Pathogenesis of Cancer in General .......................... 362
II.2.8.2 Pathogenesis of Prostate Cancer . . . . 366
II.2.8.3 Pathogenesis of Testis Cancer . . . . 368
II.2.8.4 Pathogenesis of Penile Cancer . . . . 369
II.2.8.5 Future .............................. 370

II.3 Diagnostic Tools
II.3.1 History and Examination for Andrological Problems
T.B. Hargreave .............................. 371
II.3.1.1 History Taking .......................... 371
II.3.1.2 Scheme for History Taking . . . . 371
II.3.1.3 Problem-Specific Special History Taking . . . . 372
II.3.1.4 Clinical Examination for Andrological Conditions . . . . 376

II.3.2 Semen Analysis and Sperm Function Tests
F. Comhaire, A. Mahmoud .......................... 381
II.3.2.1 Introduction ........................ 381
II.3.2.2 Sample Collection and Delivery . . . . 381
II.3.2.3 Initial Macroscopic Examination .......................... 382
II.3.2.4 Initial Microscopic Investigation . . . . 382
II.3.2.5 Evaluation of Morphological Characteristics . . . . 385
II.3.2.6 Testing for Antibody-Coated Spermatozoa . . . . 386
II.3.2.7 Counting of Spermatozoa . . . . 387

II.2.7.4 Obstruction of Sperm Transport and Anti-sperm Antibodies . . . . 325
II.2.7.5 Male-Mediated Developmental Toxicity . . . . 354
II.2.7.6 Conclusion .......................... 354

II.2.8.2 Pathogenesis of Prostate Cancer . . . . 366
II.2.8.3 Pathogenesis of Testis Cancer . . . . 368
II.2.8.4 Pathogenesis of Penile Cancer . . . . 369
II.2.8.5 Future .............................. 370

II.3.1.2 Scheme for History Taking . . . . 371
II.3.1.3 Problem-Specific Special History Taking . . . . 372
II.3.1.4 Clinical Examination for Andrological Conditions . . . . 376

II.3.2.5 Evaluation of Morphological Characteristics . . . . 385
II.3.2.6 Testing for Antibody-Coated Spermatozoa . . . . 386
II.3.2.7 Counting of Spermatozoa . . . . 387
II.3.2.8 Semen Culture .......................... 388
II.3.2.9 Summary of Basic Testing .............. 388
II.3.2.10 Advanced Assessment of Basic Sperm
Characteristics ............................ 388
II.3.2.11 Sperm Function Tests ................. 389
II.3.2.12 Biological and Biochemical Tests
on Semen .................................. 390
II.3.3 Cytomorphological Semen Analysis
G. HAIDL, H.-C. SCHUPPE ................. 395
II.3.3.1 Introduction .......................... 395
II.3.3.2 Methodological Aspects ............... 395
II.3.3.3 Predictive Value of Sperm Morphology
In Vivo and In Vitro ........................ 397
II.3.3.4 Clinical Relevance of Cytomorphological
Semen Analysis ........................... 398
II.3.3.5 Sperm Morphology and ICSI .......... 399
II.3.4 Clinical Microbiology
H.G. SCHIEFER, A. VON GRAEVENITZ .... 401
II.3.4.1 Normal Flora of the Male Urogenital
Tract ....................................... 401
II.3.4.2 Diagnosis of Pathogens in the Male
Urogenital Tract ............................ 401
II.3.4.3 Microbiological Examinations in the
Diagnosis of Male Urogenital Infections
References ................................ 407
II.3.5 Hormonal Evaluation in Infertility and
Sexual Dysfunction
D. KLINKMÜLLER, N. BLIESENER,
G. HAIDL .................................. 408
II.3.5.1 Introduction .......................... 408
II.3.5.2 Total Testosterone ..................... 409
II.3.5.3 Free Testosterone ...................... 409
II.3.5.4 Luteinizing Hormone (LH) and Follicle-
Stimulating Hormone (FSH) .............. 409
II.3.5.5 Inhibin B ................................ 410
II.3.5.6 Anti-Müllerian Hormone .............. 410
II.3.5.7 Oestradiol ............................ 410
II.3.5.8 Sex Hormone Binding Globulin (SHBG)
411
II.3.5.9 Prolactin ............................. 411
II.3.5.10 Dihydrotestosterone ................ 411
II.3.5.11 Hormonal Evaluation of Sexual
Dysfunction ................................ 411
II.3.5.12 Human Chorionic Gonadotrophin (hCG)
Stimulation Test ............................. 412
II.3.5.13 Gonadotrophin Releasing-Hormone
(GnRH) Stimulation Test .................... 412
II.3.5.14 Stimulation Tests ...................... 413
II.3.6 Tumour Markers in Andrology
M. E. BRACKE .............................. 415
II.3.6.1 Introduction .......................... 415
II.3.6.2 Markers for Prostatic Carcinoma:
Prostate-specific Antigen (PSA)
and Others ................................. 415
II.3.6.3 Markers for Testicular Carcinoma:
\(\alpha\)-Fetoprotein, Human Chorionic
Gonadotrophin and Others ............ 418
II.3.7 Technical Investigations Including
Imaging Procedures: Doppler, MRI, PET,
Echo for Tumours
E.L.F. NIJS, R.H. OYEN ................. 425
II.3.7.1 Ultrasound (US) ....................... 425
II.3.7.2 Doppler .............................. 437
II.3.7.3 MRI (Magnetic Resonance Imaging) .... 439
II.3.7.4 PET (Positron Emission Tomography) . 441
II.3.7.5 Emergencies in Andrology .......... 442
II.3.7.6 Tumours ............................. 445
II.3.8 Technical Investigations Including
Imaging Procedures: Colour Flow Doppler
and Thermography for the Detection
of Reflux in Varicocele
Y. GAT, M. GORNISH .................... 447
II.3.8.1 Introduction on the Bilaterality
of the Disease ............................ 447
II.3.8.2 How to Use Contact Scrotal
Thermograph ............................. 448
II.3.8.3 Medical Importance of the Complete and
Accurate Diagnosis of Varicocele .... 449
II.3.8.4 Is There a Relationship Between Varicocele
and Male Infertility? ...................... 450
II.3.8.5 Is Subclinical Varicocele Relevant to
Male Infertility? .......................... 450
II.3.8.6 Is Ultrasonography a Better Diagnostic
Tool because Venography is Subject to
Technical Variations? ...................... 451
II.3.8.7 Why Right Varicocele Could Not be
Detected ................................. 451
II.3.8.8 Goren-Gat Technique for Detection and
Treatment of Right and Left Varicocele 451
II.3.8.9 “Recurrent” Varicocele After Left High
Ligation is Actually “Survived” Varicocele
452
II.3.9 Evaluation of Testicular Biopsy Samples
from the Clinical Perspective
M. BERGMANN ............................. 454
II.3.9.1 Indication ............................ 454
II.3.9.2 Preparation ........................... 455
II.3.9.3 Evaluation ............................ 455
II.3.10 Genetics and Male Infertility
T.B. HARGREAVE, D.J. ELLIOTT .......... 462
II.3.10.1 Introduction ........................ 462
II.3.10.2 Basic Information about the Human
Genetic Code .................................. 462
II.3.10.3 Chromosomal Abnormalities and Male
Fertility ........................................ 463
II.3.10.4 Genetic Defects and Male Fertility .... 465
II.3.10.5 DNA Methylation and Gene Imprinting
and Ageing Changes .......................... 473
II.3.10.6 Mitochondrial Abnormalities .......... 473
II.3.10.7 Inherited Cytoplasmic Disorders and
Male Fertility ................................... 473
II.3.10.8 Chromosomal and DNA Abnormalities
in Sperm ....................................... 474
II.3.10.9 Chromosomal Abnormalities in Sperm 474
II.3.10.10 Risks of Intracytoplasmic Sperm
Injection ......................................... 475
II.3.10.11 Ethical Considerations, Genetic Counselling
and Intracytoplasmic Sperm Injection . 475
II.3.10.12 Conclusion ............................. 475

II.3.11 Tumour Genetics (Prostate/Testis/Penis)
O. Tatarov, D. Kilk ................. 481
II.3.11.1 Genetic Aspects of Prostate Cancer .. 481
II.3.11.2 Genetics of Testicular Cancer ....... 481
II.3.11.3 Genetics of Penile Cancer .......... 482
II.3.11.4 Genetic Testing ........................ 482
References ................................. 482

II.4 Therapeutic Options

II.4.1 Introduction to Surgical Section ..... 484
II.4.2 Surgical Procedures in Andrology
C. Evans ..................................... 484
II.4.2.1 Scrotal Surgery ......................... 484
II.4.2.2 Anaesthesia for Scrotal, Inguinoscrotal
and Penile Surgery ......................... 485
II.4.2.3 Surgical Procedures on the Scrotum .. 485
II.4.2.4 Surgery for Adult Hydrocele ....... 486
II.4.2.5 Excision of Epididymal Cyst/
Spermatocele .................................. 487
II.4.2.6 Undescended Testis in the Adult .... 488
II.4.2.7 Circumcision in Adults ............... 489
II.4.2.8 Insertion of Penile Prosthesis ....... 491
Suggested Reading .......................... 494
References .................................. 494

II.4.3 Vasectomy Technique
T.B. Hargrave ......................... 495

II.4.4 Vasovasostomy and Vasoepididymostomy
A.M. Belker ......................... 500
II.4.4.1 Indications .............................. 501
II.4.4.2 Contraindications ...................... 501
II.4.4.3 Alternative Procedures ............... 501
II.4.4.4 Factors That Influence Choice of Vaso-
vasostomy or Vasoepididymostomy .... 501
II.4.4.5 Surgical Techniques ................. 502
II.4.4.6 Postoperative Care .................... 508
II.4.4.7 Complications .......................... 508
II.4.4.8 Results ................................. 508
II.4.4.9 Conclusions ............................ 509
References ................................. 509

II.4.5 Nonsurgical Cure of Varicocele by
Transcatheter Embolization of the Internal
Spermatic Vein(s) with a Tissue Adhesive
J. Kunnen, M. Kunnen .......... 510
II.4.5.1 Introduction ............................ 510
II.4.5.2 Diagnostic Venography ............... 510
II.4.5.3 Treatment by Embolization .......... 510
II.4.5.4 General Information ................. 510
II.4.5.5 Specific Information on Superselective, Co-
axial Catheterization and Embolization . 512
II.4.5.6 Data on Tissue Adhesives and Sclerosing
Agents ....................................... 514
II.4.5.7 Results in 3043 Consecutive Patients .. 514
II.4.5.8 Effect on Semen and Pregnancies .... 515
II.4.5.9 Conclusion ............................. 515
References ................................. 515

II.4.6 Hormonal Treatment of Infertility
F. Comhaire, A. Mahmoud .......... 516
II.4.6.1 Introduction ............................ 516
II.4.6.2 Androgens ............................. 516
II.4.6.3 Gonadotrophins ....................... 517
II.4.6.4 Luteinizing Hormone Releasing Hormone
(LHRH) ...................................... 517
II.4.6.5 Treatments Interfering with Oestradiol . 517
II.4.6.6 Conclusion ............................. 519
References ................................. 519

II.4.7 Hormonal Male Contraception
D.J. Handelsman, G.M.H. Waites .... 520
II.4.7.1 Introduction ............................ 520
II.4.7.2 Androgens Alone as Hormonal
Contraceptives .............................. 521
II.4.7.3 Pharmacokinetic Considerations .... 521
II.4.7.4 Safety .................................. 521
II.4.7.5 Combination Regimens as Hormonal
Contraceptives .............................. 521
II.4.7.6 Efficacy of Combination Regimens .... 522
II.4.7.7 Gonadotrophin Blockade: GnRH
Analogues ................................. 522
II.4.7.8 Immunoneutralization as a Contraceptive
Approach ................................. 522
References ................................. 522

II.4.8 Treatment of Gender Dysphoria
L.J.G. Gooren .............................. 524
II.4.8.1 Real Life Test .......................... 524
II.4.8.2 Hormonal Sex Reassignment ........ 525
II.4.8.3 Side-Effects of Hormonal Sex
Reassignment ......................... 526
II.4.8.4 Juvenile Gender Dysphoria .......... 527
References ................................. 527
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.4.9</td>
<td>Treatment of Sexual Dysfunction</td>
<td>528</td>
</tr>
<tr>
<td>II.4.9.1</td>
<td>Erectile Dysfunction</td>
<td>528</td>
</tr>
<tr>
<td>II.4.9.2</td>
<td>Retarded Ejaculation</td>
<td>531</td>
</tr>
<tr>
<td>II.4.9.3</td>
<td>Rapid Ejaculation</td>
<td>531</td>
</tr>
<tr>
<td>II.4.9.4</td>
<td>Testosterone Treatment</td>
<td>531</td>
</tr>
<tr>
<td>II.4.9.5</td>
<td>Pubertal Development</td>
<td>532</td>
</tr>
<tr>
<td>II.4.9.6</td>
<td>Sexual Function and Ageing</td>
<td>532</td>
</tr>
<tr>
<td>II.4.9.7</td>
<td>Hyperprolactinaemia</td>
<td>532</td>
</tr>
<tr>
<td>II.4.9.8</td>
<td>Paraphilias and their Pharmacologic Treatment</td>
<td>533</td>
</tr>
<tr>
<td>II.4.10</td>
<td>Therapeutic Options for Benign Prostate Hyperplasia (BPH) and Prostatic Cancer</td>
<td>539</td>
</tr>
<tr>
<td>II.4.10.1</td>
<td>Diagnosis</td>
<td>536</td>
</tr>
<tr>
<td>II.4.10.2</td>
<td>Management of BPH</td>
<td>539</td>
</tr>
<tr>
<td>II.4.10.3</td>
<td>Watchful Waiting</td>
<td>539</td>
</tr>
<tr>
<td>II.4.10.4</td>
<td>Pharmacologic Therapy</td>
<td>539</td>
</tr>
<tr>
<td>II.4.10.5</td>
<td>Minimally Invasive Therapies</td>
<td>541</td>
</tr>
<tr>
<td>II.4.10.6</td>
<td>Surgical Treatment</td>
<td>542</td>
</tr>
<tr>
<td>II.4.10.7</td>
<td>Complications of Surgical Treatments</td>
<td>542</td>
</tr>
<tr>
<td>II.4.10.8</td>
<td>Therapeutic Options for Prostate Cancer</td>
<td>543</td>
</tr>
<tr>
<td>II.4.10.9</td>
<td>Management of Localized Prostate Cancer</td>
<td>544</td>
</tr>
<tr>
<td>II.4.10.10</td>
<td>Management of Locally Advanced Prostate Cancer and Metastatic Disease</td>
<td>546</td>
</tr>
<tr>
<td>II.4.10.11</td>
<td>Treatment of Hormone Relapsed Prostate Cancer</td>
<td>547</td>
</tr>
<tr>
<td>II.4.11</td>
<td>Partial Androgen Deficiency of the Ageing Male (PADAM) and Testosterone Supplementation: Use, Misuse or Abuse?</td>
<td>551</td>
</tr>
<tr>
<td>II.4.11.1</td>
<td>Introduction</td>
<td>551</td>
</tr>
<tr>
<td>II.4.11.2</td>
<td>Who is to Benefit from T Replacement?</td>
<td>551</td>
</tr>
<tr>
<td>II.4.11.3</td>
<td>What is the Target Population?</td>
<td>551</td>
</tr>
<tr>
<td>II.4.11.4</td>
<td>What is the Expected Benefit from T Replacement in Elderly Men?</td>
<td>552</td>
</tr>
<tr>
<td>II.4.11.5</td>
<td>What are the Risks/Side-Effects of T Replacement?</td>
<td>553</td>
</tr>
<tr>
<td>II.4.11.6</td>
<td>What Type of T Replacement Should be Used in Elderly Men?</td>
<td>554</td>
</tr>
<tr>
<td>II.4.11.7</td>
<td>How Long Should we Administer T in the Elderly?</td>
<td>554</td>
</tr>
<tr>
<td>II.4.11.8</td>
<td>Conclusions and Research Agenda</td>
<td>554</td>
</tr>
<tr>
<td>II.4.12</td>
<td>Abuse of Androgens</td>
<td>555</td>
</tr>
<tr>
<td>II.4.12.1</td>
<td>Introduction</td>
<td>555</td>
</tr>
<tr>
<td>II.4.12.2</td>
<td>Anabolic-Androgenic Steroids</td>
<td>555</td>
</tr>
<tr>
<td>II.4.12.3</td>
<td>Patterns of Abuse</td>
<td>557</td>
</tr>
<tr>
<td>II.4.13</td>
<td>Exotic Hormones</td>
<td>561</td>
</tr>
<tr>
<td>II.4.13.1</td>
<td>Introduction</td>
<td>561</td>
</tr>
<tr>
<td>II.4.13.2</td>
<td>Hormonal Changes in Ageing Men</td>
<td>561</td>
</tr>
<tr>
<td>II.4.13.3</td>
<td>Treatment Options</td>
<td>562</td>
</tr>
<tr>
<td>II.4.13.4</td>
<td>Conclusion</td>
<td>563</td>
</tr>
<tr>
<td>II.4.14</td>
<td>Anti-Ageing Nutrition and Food Supplements</td>
<td>565</td>
</tr>
<tr>
<td>II.4.14.1</td>
<td>Introduction</td>
<td>565</td>
</tr>
<tr>
<td>II.4.14.2</td>
<td>Components of Nutriceuticals</td>
<td>569</td>
</tr>
<tr>
<td>II.4.15</td>
<td>Nutriceuticals and Food Supplements in the Treatment of the Infertile Man</td>
<td>572</td>
</tr>
<tr>
<td>II.4.15.1</td>
<td>Introduction</td>
<td>572</td>
</tr>
<tr>
<td>II.4.15.2</td>
<td>Role of Life Style and Nutritional Factors</td>
<td>572</td>
</tr>
<tr>
<td>II.4.15.3</td>
<td>Pivotal Role of Inhibin B</td>
<td>573</td>
</tr>
<tr>
<td>II.4.15.4</td>
<td>Food Supplementation</td>
<td>573</td>
</tr>
<tr>
<td>II.4.15.5</td>
<td>Conclusions</td>
<td>575</td>
</tr>
<tr>
<td>II.4.16</td>
<td>Assisted Reproductive Techniques</td>
<td>578</td>
</tr>
<tr>
<td>II.4.16.1</td>
<td>IUI and Male Infertility</td>
<td>579</td>
</tr>
<tr>
<td>II.4.16.2</td>
<td>Male Infertility: IUI Versus IVF/ICSI</td>
<td>579</td>
</tr>
<tr>
<td>II.4.16.3</td>
<td>IVF and ICSI</td>
<td>581</td>
</tr>
<tr>
<td>II.4.16.4</td>
<td>Azoosperma: MESA, PESA, TESA and TESA</td>
<td>581</td>
</tr>
<tr>
<td>II.4.16.5</td>
<td>ART: Prevention of Multiple Pregnancies</td>
<td>583</td>
</tr>
<tr>
<td>II.4.16.6</td>
<td>Conclusion</td>
<td>583</td>
</tr>
<tr>
<td>II.4.17</td>
<td>Cryopreservation of Spermatozoa and Testicular Tissue Including Autotransplantation of Germinal Epithelium</td>
<td>585</td>
</tr>
<tr>
<td>II.4.17.1</td>
<td>Introduction</td>
<td>586</td>
</tr>
<tr>
<td>II.4.17.2</td>
<td>Basic Principles of Cryobiology</td>
<td>586</td>
</tr>
<tr>
<td>II.4.17.3</td>
<td>Indications for Human Sperm</td>
<td>586</td>
</tr>
<tr>
<td>II.4.17.4</td>
<td>Cryopreservation</td>
<td>586</td>
</tr>
<tr>
<td>II.4.17.5</td>
<td>Sperm Preparation Techniques Before Cryopreservation</td>
<td>587</td>
</tr>
<tr>
<td>II.4.17.6</td>
<td>Fertilization Rates with Cryopreserved Spermatozoa</td>
<td>588</td>
</tr>
<tr>
<td>II.4.17.7</td>
<td>Cryobanking of Semen for Fertility Protection From Radiation or Cytotoxic Treatment</td>
<td>588</td>
</tr>
<tr>
<td>II.4.17.8</td>
<td>Autotransplantation of Germinal Epithelium</td>
<td>589</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>589</td>
</tr>
<tr>
<td>Chapter</td>
<td>Title</td>
<td>Authors</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>II.4.18</td>
<td>Current Research and Future Prospects for Gene Therapy in Andrology</td>
<td>Kojima, Sasaki, Kohri</td>
</tr>
<tr>
<td>II.4.19</td>
<td>Behavioural Therapy and Counselling</td>
<td>E.A. Jannini, A. Lenzi, G. Wagner</td>
</tr>
<tr>
<td>II.4.20</td>
<td>Donor Insemination, Egg and Embryo Donation</td>
<td>Kovacs, Trounson, Dawson</td>
</tr>
<tr>
<td>II.4.21</td>
<td>Aesthetic Andrology: Surgical Interventions</td>
<td>Ponchietti</td>
</tr>
<tr>
<td>II.4.22</td>
<td>Aesthetic Andrology: Skin Care for Men – Male Cosmetics and Cosmetic Dermatologic Procedures</td>
<td>Müller, Schill</td>
</tr>
</tbody>
</table>

Subject Index: 635
Andrology for the Clinician
Schill, W.-B.; Comhaire, F.H.; Hargreave, T.B. (Eds.)
2006, XXV, 645 p. 275 illus., 250 illus. in color.,
Hardcover
ISBN: 978-3-540-23171-4