Physics, Pharmacology and Physiology for Anaesthetists
Key concepts for the FRCA

Second edition

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It was with great sadness that we learned of the death of Dr Mark duBoulay shortly after the first edition of this book had gone to print. He is missed by many.

MC & EP

For Anna, Harvey and Fraser,
a wonderful family

MC

For Mum and Dad. Thank you for everything.

EP
## Contents

Acknowledgements ............................... page xii
Preface ......................................... xiii
Foreword to the second edition
Professor Peter Hutton ....................... xv
Foreword to the first edition
Dr Tom E. Peck ................................. xvii

Introduction .................................. 1

**Section 1 · Mathematical principles**  
5
Mathematical relationships .......................... 7
Exponential relationships and logarithms ......... 9
Integration and differentiation ......................... 16
Physical measurement and calibration .......... 19
The SI units ..................................... 23
Non-SI units and conversion factors ............. 26
Signal to noise ratio ................................ 27

**Section 2 · Physical principles**  
29
Simple mechanics .................................. 31
The gas laws ...................................... 34
Laminar flow ...................................... 36
Turbulent flow ..................................... 37
Bernoulli, Venturi and Coanda .................... 38
Heat and temperature ............................. 40
Humidity ......................................... 43
Latent heat ........................................ 46
Isotherms ......................................... 48
Mechanisms of heat loss ........................... 50
Solubility and diffusion ............................ 53
Osmosis and colligative properties ............... 55
Principles of surface tension ....................... 57
Resistors and resistance ........................... 59
Capacitors and capacitance ......................... 60
Inductors and inductance ........................... 63
Wheatstone bridge .................................. 65
Resonance and damping ............................ 66
Cleaning, disinfection and sterilization .......... 70
Contents

Section 3 · Principles of special equipment 73
Magnetic resonance imaging 75
Refraction and fibre optics 79
Laser principles 81
Surgical diathermy 84
Medical ultrasound 87
The Doppler effect 89
Oesophageal doppler 90
Cardiac output measurement 92
Goal-directed fluid therapy 97
Defibrillators 98
Breathing systems 100
Ventilator profiles 103
Pulse oximetry 109
Capnography 112
Absorption of carbon dioxide 117
Neuromuscular blockade monitoring 119
Thromboelastography 124

Section 4 · Pharmacological principles 127
Atomic structure 129
Oxidation and reduction 131
Chemical bonds 132
Inorganic and organic chemistry 135
Isomerism 138
Enzyme kinetics 141
G-proteins and second messengers 144
The Meyer–Overton hypothesis 146
The concentration and second gas effects 148
Drug interactions 150
Adverse drug reactions 151
Pharmacogenetics 153

Section 5 · Pharmacodynamics 155
Drug–receptor interaction 157
Affinity, efficacy and potency 160
Agonism and antagonism 164
Hysteresis 170
Tachyphylaxis and tolerance 171
Drug dependence 173
## Contents

### Section 6: Pharmacokinetics

- Absorption, distribution and redistribution 177
- First-pass metabolism and bioavailability 179
- Volume of distribution 181
- Clearance 183
- Time constant and half life 185
- Non-compartmental modelling 187
- Compartmental modelling 188
- Physiological modelling 193
- Context-sensitive half time 194
- Target controlled infusions 196

### Section 7: Respiratory physiology

- Lung volumes 203
- Spirometry 205
- Flow–volume loops 207
- The alveolar gas equation 211
- The shunt equation 212
- Pulmonary vascular resistance 214
- Distribution of pulmonary blood flow 216
- Ventilation/perfusion mismatch 218
- Dead space 219
- Fowler’s method 220
- The Bohr equation 221
- Oxygen delivery and transport 223
- Classification of hypoxia 226
- The oxyhaemoglobin dissociation curve 228
- Carriage of carbon dioxide 230
- Work of breathing 232
- Control and effects of ventilation 233
- Compliance and resistance 236

### Section 8: Cardiovascular physiology

- Einthoven’s triangle and axis 241
- Cardiac action potentials 244
- The cardiac cycle 246
- Electrocardiographic changes 249
- Pressure and flow calculations 254
- Central venous pressure 257
- Pulmonary capillary wedge pressure 258
- The Frank–Starling relationship 260
- Venous return and capillary dynamics 262
## Contents

Ventricular pressure–volume relationship 267  
Systemic and pulmonary vascular resistance 272  
The Valsalva manoeuvre 274  
Control of heart rate 276  
Materno-fetal and neonatal circulations 278  
Shock 280  

**Section 9 · Renal physiology** 281  
Acid–base balance 283  
Buffers and the anion gap 285  
Glomerular filtration rate and tubulo–glomerular feedback 289  
Autoregulation and renal vascular resistance 291  
The loop of Henle 293  
Glucose handling 295  
Sodium handling 296  
Potassium handling 297  

**Section 10 · Neurophysiology** 299  
Action potentials 301  
Muscle structure and function 305  
Muscle reflexes 308  
The Monro–Kelly doctrine 310  
Cerebral blood flow 313  
Flow–metabolism coupling 316  
Formation and circulation of cerebrospinal fluid 319  
Pain 320  

**Section 11 · Applied sciences** 323  
The stress response 325  
Cardiopulmonary exercise testing 328  
Pregnancy 331  
Paediatrics 337  
Ageing 340  
Obesity 344  

**Section 12 · Statistical principles** 347  
Types of data 349  
Indices of central tendency and variability 351  
Types of distribution 355  
Methods of data analysis 357  
Error and outcome prediction 366  
Receiver operating characteristic curve 369
## Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical trials</td>
<td>370</td>
</tr>
<tr>
<td>Evidence-based medicine</td>
<td>374</td>
</tr>
<tr>
<td>Kaplan Meier curves</td>
<td>376</td>
</tr>
<tr>
<td>Appendix</td>
<td>377</td>
</tr>
<tr>
<td>Index</td>
<td>404</td>
</tr>
</tbody>
</table>
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Professor Peter Hutton PhD FRCA FRCP FIMechE
Anaesthetics Department, University Hospital Birmingham, Birmingham, UK

In addition we are grateful for permission to reprint the illustration on page 197 from Oxford University Press, and the illustrations on pages 296 and 297 from International Thomson Publishing Services Ltd., Cheriton House, North Way, Andover, UK.
Preface

In the years since the first edition of this book was published much has changed in the world of anaesthesia. Some of these changes relate to the way we practise as professionals and the way in which the evidence is shaping our knowledge in new areas. Other changes relate to the way in which anaesthetists in the United Kingdom progress through their training programmes. It is natural for the world around us to change in this way but, of course, it means that we have to continually reassess our practice, our knowledge and how that knowledge may best be applied.

Fortunately, the fundamental basic science principles that underpin much of anaesthesia have not changed to such an extent and so it is unlikely that you will suddenly be faced with the challenge of revising a newly discovered law of physics for the examination.

Where practice has changed, and where these changes have been incorporated into the syllabus of the Royal College, we have tried to reflect this in the latest edition. The second edition introduces applied physiology, more physical principles, fundamental biochemistry and many additional pages of information both in the body of the book and in the larger appendix. The layout and principles remain the same in that we hope you can use this book as a useful companion to explain some principles in a different way or to remind you of things that you will have read elsewhere. One thing that remains constant is that the FRCA examination is hard but fair. If you dedicate yourself to learning, absorbing and using all the information you need to be successful in the examination then you will emerge with the skills required to flourish in your profession. It is worth it and we hope this book can help you along the way.

Good luck in the examinations, by the time you read this the end is already in sight!
Foreword to the second edition

An understanding of physics, pharmacology and physiology is central to high-quality patient care. Grasping the key concepts is not optional: it is an essential cornerstone underpinning the frequent judgements that have to be made in everyday clinical practice.

Today, information is available from many sources: books, journals, the internet and podcasts. However, some of this is not written for the postgraduate student and a proportion is unfiltered and of uncertain provenance. Sorting the wheat from the chaff can be both time-consuming and frustrating, and not infrequently leaves the explorer less, rather than more, focused in their awareness of what really counts.

This book, written by two enthusiasts whose own experiences of postgraduate examinations is still within recent memory, is a considerable contribution to the resources of those preparing for postgraduate examinations in anaesthesia and intensive care. In terms of key subject areas, I cannot find anything included within it that is not essential and I can think of nothing excluded which is.

The text is clear and concise: the diagrams are immediately comprehensible but do not lack detail; the general presentation reflects good examination technique. The authors themselves recognize the need for more detailed companion texts where deeper study is necessary and have not tried to misrepresent their book’s place in the wider armamentarium of the examinee.

What all examinees need as they study for, and approach, postgraduate examinations is a single reliable source of pre-prepared essential information that they can both carry with them and refer to with confidence. This book meets these two needs admirably. In addition, the text style demonstrates the way to convey information quickly but without unnecessary embellishment – the ideal method for a candidate to adopt.

In summary, I think this is a valuable second edition of a text that has already received a considerable following. The authors have done an excellent job; postgraduate trainees have available a book that ‘does what it says on the can’; and examiners can look forward to future answers with that frequently elusive ‘high signal to noise ratio’.

All I can do now is to wish both the authors and the readers the very best in their personal efforts to provide high-quality care for patients. This after all, is what medicine is all about.

Professor Peter Hutton PhD FRCA FRCP FiMechE
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Honorary Professor, University of Birmingham
Foreword to the first edition

Many things are currently in a state of flux within the world of medical education and training, and the way in which candidates approach examinations is no exception. Gone are the days when large weighty works are the first port of call from which to start the learning experience. Trainees know that there are more efficient ways to get their heads around the concepts that are required in order to make sense of the facts.

It is said that a picture says a thousand words and this extends to diagrams as well. However, diagrams can be a double-edged sword for trainees unless they are accompanied by the relevant level of detail. Failure to label the axis, or to get the scale so wrong that the curve becomes contradictory is at best confusing. This book will give back the edge to the examination candidate if they digest its contents. It is crammed full of precise, clear and well-labelled diagrams. In addition, the explanations are well structured and leave the reader with a clear understanding of the main point of the diagram and any additional information where required. It is also crammed full of definitions and derivations that are very accessible.

It has been pitched at those studying for the primary FRCA examination and I have no doubt that they will find it a useful resource. Due to its size, it is never going to have the last word, but it is not trying to achieve that. I am sure that it will also be a useful resource for those preparing for the final FRCA and also for those preparing teaching material for these groups.

Doctors Cross and Plunkett are to be congratulated on preparing such a clear and useful book – I shall be recommending it to others.

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