

Contents

1 History of Doping and Doping Control	1
Rudhard Klaus Müller	
2 Biochemical and Physiological Aspects of Endogenous Androgens	25
Andrew T. Kicman	
3 Phase-II Metabolism of Androgens and Its Relevance for Doping Control Analysis	65
Tiia Kuuranne	
4 Detecting the Administration of Endogenous Anabolic Androgenic Steroids	77
Christiane Ayotte	
5 Synthetic Anabolic Agents: Steroids and Nonsteroidal Selective Androgen Receptor Modulators	99
Mario Thevis and Wilhelm Schänzer	
6 Nandrolone: A Multi-Faceted Doping Agent	127
Peter Hemmersbach and Joachim Große	
7 Designer Steroids	155
Ray Kazlauskas	
8 Growth Hormone	187
Martin Bidlingmaier and Christian J. Strasburger	
9 Mass Spectrometry-Based Analysis of IGF-1 and hGH	201
Mario Thevis, Michael Bredehöft, Maxie Kohler, and Wilhelm Schänzer	

10	Insulin	209
	Mario Thevis, Andreas Thomas, and Wilhelm Schänzer	
11	β-Adrenergic Stimulation	227
	Peter Van Eenoo and Frans T. Delbeke	
12	Erythropoietin and Analogs	251
	Christian Reichel and Günter Gmeiner	
13	Blood Transfusion in Sports	295
	Sylvain Giraud, Pierre-Edouard Sottas, Neil Robinson, and Martial Saugy	
14	The Athlete's Biological Passport and Indirect Markers of Blood Doping	305
	Pierre-Edouard Sottas, Neil Robinson, and Martial Saugy	
15	Masking and Manipulation	327
	Rosa Ventura and Jordi Segura	
16	Hormonal Growth Promoting Agents in Food Producing Animals	355
	Rainer W. Stephany	
17	Some Aspects of Doping and Medication Control in Equine Sports	369
	Ed Houghton and Steve Maynard	
18	Androgenic Anabolic Steroid Abuse and the Cardiovascular System	411
	Paul Vanberg and Dan Atar	
19	Side Effects of Anabolic Androgenic Steroids: Pathological Findings and Structure–Activity Relationships	459
	Andreas Büttner and Detlef Thieme	
20	Gene Doping	485
	Hassan M. E. Azzazy	
21	Science and the Rules Governing Anti-Doping Violations	513
	Larry D. Bowers	
	Index	533