

CONTENTS

INTRODUCTION	8
1 THERMOREGULATION	12
1.1 Biological Principles	12
1.1.1 Body Shell and Body Core	13
1.1.2 Heat Production and Metabolic Rate	14
1.1.3 Temperature Ranges	15
1.1.4 Heat Production and Heat Transfer	17
1.1.5 Principals of Thermoregulation	25
1.2 Thermoregulation During Physical Activity	35
1.2.1 Core Temperature and Athletic Performance	35
1.2.2 Critical Core Temperature	40
1.2.3 Dehydration	43
1.3 Influencing Factors	45
1.3.1 Personal Influencing Parameters	45
1.3.2 Non-Personal Influencing Parameters	47
1.4 Measuring Sites of Skin and Core Temperature	52
1.4.1 Skin Temperature	52
1.4.2 Core Temperature	53
1.4.3 Rectal Temperature	54
1.4.4 Sublingual and Esophageal Temperature	55
1.4.5 Axillary Temperature	55
1.4.6 Tympanic Temperature	55
1.4.7 Intestinal Temperature	56

2	CRYO AND COLD APPLICATION	60
2.1	Introduction	60
2.1.1	History of Cold Application and Therapy	60
2.1.2	Cold Mediators	62
2.1.3	Terminology	73
2.2	Effects of Cold Air Application	77
2.2.1	Precooling Through Cold Air Application	78
2.2.2	Simultaneous Cooling Through Cold Air Application	87
2.2.3	Precooling Through Whole body Cryo Application (WBCA, -110°C)	89
2.2.4	Partial-Body Cold Air Application (-30°C)	102
2.3	Effects of Cold Water Application	112
2.3.1	Effects of Cold Water Application on Core Body Temperature	112
2.3.2	Effects of WBCWA (Whole body Cold Water Application) on Cycle Performance	113
2.3.3	Effects of Cold Water Application on Running Endurance	119
2.3.4	Effects of Partial-Body Cold Water Application on Physiological Parameters	121
2.3.5	Cold Air Simultaneous Cooling Vs. Cold Water Precooling	125
2.3.6	Conclusions of Cold Water Cooling	126
3	THE WARM-UP AS A THERMOREGULATORY PREPARATION	132
3.1	Literature Review on Warming Up	135
3.2	Terminology	136
3.2.1	Definition	137
3.2.2	Aspects of Differentiation	137
3.3	Physiological Effects of a Warm-Up	140

3.4	Effects on Athletic Performance	147
3.4.1	Short-Term Demands	147
3.4.2	Mid-Term Demands	151
3.4.3	Long-Term Demands	153
3.5	Optimal Preparation Design	155
3.5.1	Optimal Load Intensity	155
3.5.2	Optimal Load Duration	156
3.5.3	On the Optimal Rest Period	156
3.5.4	Optimal Specifics	157
3.5.5	Conclusion	158
3.6	Overall Conclusion	160
4	GENERALIZATION AND DIFFERENTIATION	166
4.1	Sex Specifics	167
4.2	Performance Level	168
4.3	Ability Specifics	170
4.4	Performance Effect and Cold Application Duration	172
4.5	Performance-Related Effect and Cold Application Temperature	174
4.6	Performance-Related Effects and Timing of the Cold Application	177
4.7	Conclusion	178
5	SUMMARY AND PROSPECTS	184
	BIBLIOGRAPHY	192
	CREDITS	218