

Chapter 2

Biophysiologic Aspects of Hydrotherapy

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1. At the conclusion of this chapter, readers should be able to describe the physical principles of water that create physiologic change during immersion.
2. Readers should understand and describe the physiologic changes occurring during immersion, and in particular the cardiorespiratory, neurologic, and endocrine changes.
3. Readers should be able to relate these changes to the physical principles of water, and to extrapolate them into the clinical environments used in aquatic therapy.
4. Readers should be able to reference these changes with existing literature.

Since the earliest recorded history, water has always been believed to promote healing, and has therefore been widely used in the management of medical ailments. As noted in Chapter 1, natural springs and water therapies became a central focus of many health-promoting establishments. Healers from all backgrounds have noted the effects of water on various medical problems. Through observation, centuries of trial and error, and scientific methodology, traditions of healing through aquatic treatments have evolved. Water has been found to exert a great many biological effects. Over recent decades, the therapeutic external application of water, usually through immersion of part or all of the body for the purpose of obtaining these biological effects came to be called *medical hydrology*.

Since the first edition of this textbook was published in 1997, there has been a resurgence of research into the rehabilitative applications and health benefits of aquatic activity. The foundations of this recent work began actually in the 1960's, when it was recognized that aquatic immersion is an ideal method of studying cardiac, pulmonary, and renal responses to sudden changes in blood volume, an essential part of understanding how humans maintain normal function during physiologic change. The second circumstance was the recognition that aquatic immersion is an ideal environment to mimic weightlessness. As man prepared to enter the space environment, scientists needed to better understand the effects that space might have on the human organism. Critical basic science research was performed on essentially all biological systems during aquatic immersion, so that the necessary understanding of physiology could be gained in preparation for man's first true total escape from gravity. Thus, as we prepared to send man into space, the ultimate technologic environment, we found answers in what was our first environment: thermoneutral total body immersion. As a consequence of these two driving forces to understand human physiology, aquatic rehabilitation has a wealth of basic science research as a foundation, indeed a better and broader foundation than many other rehabilitative techniques.