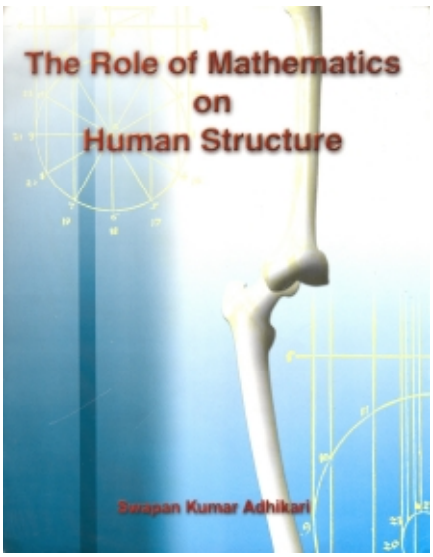
IJMS
Vol 32, No 4, December 2007

Book Review

The Role of Mathematics on Human Structure

Swapan Kumar Adhikari,
West Bengal, India, Depali Publication, 2003, pp 156,
ISBN 8190164309



This book explores the mathematical view of selected body systems and organs and as claimed by its author, “it has an objective to facilitate modern treatment with mathematical precision.”

The author, Dr. Adhikari has PhD in mathematics and is the Head of the Institution and Department of Mathematics, Ghusuri Uchcha Madhyamic Vidyalaya, West Bengal, India. The motivation of the author in writing this book has been the mathematical views and ideas of Leonardo DaVinci and Rene Descartes on structural anatomy and physiological principles, respectively. He expects the physicians, medical surgeons and research workers to use his book in calculating physiological movements.

The book comprises of 14 chapters, which shall be approached as follows: The first chapter is the preface and the second devotes to the introduction of Leonardo Da Vinci as the “anatomist of great ability.” The third chapter is devoted to “physiological concepts of Rene Descartes” on human physiology, followed by detailed mathematical explanation of his concept of pineal gland throughout the fourth chapter. The fifth chapter focuses on "the mechanism of movements of heart.” In this chapter, the author introduces the thermo-dynamical movement as the cause of contraction and expansion due to the variation of heat carried by blood into the heart. In the sixth chapter, the author expresses the causes of cervical and cartilage deformations on a mathematical basis. The traction weights for different injury levels are tabulated at the end of this chapter. Throughout the seventh chapter, he analyzes the structure and mechanism involving in the skeletal shoulder-joint and its efficiency through mathematical processes.

The effectiveness of vertebral column, causes of secondary curvatures in skeleton and the application of forces of the upper part of body on different parts of pelvis and its distribution are explained briefly in the eighth and ninth chapters, again by mathematical deductions. In the tenth chapter, the author tries to find the applied forces on the femur and shows the related capacity of absorbing stress and strain by the shaft of femur due to its spiral or helical formations; the role of spiralic grains of lateral and medial condyles of femur on transition of body weight to the tibial condyles is discussed throughout the eleventh chapter. The twelfth chapter locates and represents the point of concentration of weight within the head of femur through the acetabulum and the next chapter expresses the structure of acetabular-joint and the mathematical deduction of the role of ligaments in different forms of movements of the femur at the hip-joint. The last chapter is just an alphabetical index to the pages of the previous chapters.

The author expects physicians, medical surgeons and research workers to follow the precise mathematical deductions used to model the human anatomy and physiology in this book, while the least necessity was to have two introductory chapters explaining mathematical and biomechanical terms and

principles. This book seems to be more suitable for biomechanical and rehabilitation engineers in obtaining initial ideas to model and design the implants. Pathologists and physiotherapists could also benefit from the book in realizing the cause of fractures and applying suitable treatment methods.

Leonardo's ideas stated in combined Latin and English phrases are confusing and useless in chapter 2. The utilized fonts, inappropriate capitalization and low tone illustrations need more attentions. Lengthy complimentary data and information in parenthesis could have been substituted by footnotes.

It was expected that concepts of bioelectricity, especially those of ion movement across the cell membrane, the Hodgkin and Huxley formulas and the muscle contraction in defining the heart movement, be covered in chapter 5. The book also lacks the solution of appropriate selected numerical examples for the derived mathematical expressions which would result in a more practical advantage.

But in all, the author has successfully correlated some body structures and physiological movements with mathematical deductions for an audience with a good command of mathematics throughout his book; although he does not furnish solved numerical examples quite enough. Rather than orthopedic surgeons, artificial organ designers could benefit from the derived formulas. It would be even more logical to summarize and replace long historical reviews by introductory chapters on principles of mathematics and biomechanics. At last, the book benefits "facilitating modern treatment with mathematical precision."

Correspondence:
S. Hasan Abbasi-Jahromi PhD,
Department of Medical Physics and
Biomedical Engineer,
Shiraz University of Medical Sciences,
Shiraz, Iran.
Tel/Fax: +98 711 62991896
Email: sh.abbasij@gmail.com