Trauma Biomechanics

Accidental injury in traffic and sports

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Preface

Injury is a leading cause of death, hospitalisation and disability world-wide. The World Health Organization predicts that unintentional injuries arising from road traffic incidents will rise to take third place in the rank order of international disease burden by the year 2030. Although these statistics and the associated economic costs are staggering, the effect of unintentional injury and death from trauma is more apparent, and more disturbing, when seen personally. By a young age, nearly everyone in the world, regardless of region, wealth or education, has had a relative or someone that they know killed or disabled in an "accident". The quality of life and financial effects on the injured person and their families and friends are plainly evident and clearly devastating. Many unintentional injuries are in reality not accidents; they could be prevented with changes in policy, education, or through improved safety devices. Arrayed against these preventable injuries, a diverse group of injury prevention researchers and practitioners work to decrease the incidence of unintentional injury.

In trauma biomechanics, the principles of mechanics are used to understand how injuries happen at the level of the bones, joints, organs and tissues of the body. This knowledge is central in the development, characterization and improvement of safety devices such as helmets and seat belts and in the safe design of vehicles and equipment used for transportation, occupation and recreation. The field of trauma biomechanics is highly interdisciplinary, with engineers and physicists being centrally involved with medical practitioners and many other experts. This book, Trauma Biomechanics, is organized as a short primer of this subject and it provides a logical overview of the field. It is written to be accessible to a range of students or practitioners, while still providing considerable detail in each section. Each chapter contains plentiful and up-to-date references to guide readers who require more information on a particular topic.

In contrast to the relative abundance of texts that describe basic biomechanics, sports biomechanics, gait analysis and orthopaedic biomechanics this is one of only two or three texts focused on trauma

biomechanics that I am aware of. I have used a previous version of the book as a required text for a combined senior undergraduate- and graduate- level Mechanical Engineering class called the "Fundamentals of Injury Biomechanics" at the University of British Columbia. The students commented positively on the layout and accessibility of the book and they used it as a key reference in the assigned problems and project work in the class. I think the short primer structure of the book helped to make it accessible to the students. It is possible to start reading at the beginning of any chapter and quickly come up to speed with the most important basic knowledge about the anatomy, tolerance and injury prevention techniques for that region of the body. This is of great utility for students but also for people working in injury research contexts were they can be asked to rapidly switch their focus from injury in one area of the body or from one mechanism to another. This can occur not only while studying in university but also in many industrial and academic research contexts. For example, this is frequently required of people working on government-sponsored injury reconstruction teams or who are engaged in reconstructing injuries in the litigation context.

I recommend this book as a key basic resource for anyone interested in injury prevention. Everyone, from graduate students working in an academic injury biomechanics setting to engineers, physicists, clinicians, surgeons, kinesiologists, biologists, statisticians and social scientists working in the broad field of injury prevention, frequently has questions about how injuries happen in various parts of the body. This book is an essential and accessible resource to anyone with these questions.

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