

## 【Special lecture II】

### **Biomechanics: Analysis of Human Movements**

#### **-Shoulder movements and impingement-**

*Toshimasa Yanai*

*Faculty of Sports Sciences, Waseda University, Japan*

After introduced by Neer (1972), the impingement syndrome has been a widely recognized chronic subacromial (shoulder) pathology. Neer explained a cause of the subacromial pathology as the consequence of repeated impingement of the subacromial structures under the coraco-acromial arch that would occur in the course of normal arm elevation. The impingement syndrome is known to affect the shoulders of the athletes who participate in overhead sporting activities. Through clinical and sports research, the mechanism has become clear, explaining why shoulder impingement syndrome is a common orthopedic problem in some overhead sporting activities such as baseball pitching and swimming whereas it is not in other overhead sporting activities such as cricket bowling and softball pitching. In this presentation, the kinetic and kinematic data obtained from front-crawl swimming, baseball pitching and tennis serve will be presented to explore the reason that shoulder impingement syndrome is a common problem in these overhead sporting activities. In addition, why some athletes participating in a given overhead sporting activities develops shoulder impingement syndrome whereas other athletes participating in the same activities does not will be explained on the basis of the kinetic and kinematic analyses. The findings from a series of studies provide a scientific basis to build rehabilitation / conditioning strategies for preventing the shoulder impingement syndrome among the athletes participating in overhead sporting activities.