

Table S1 ISB coordinate system definitions

Coordinate system	Markers	Coordinate system origin	Coordinate system sign convention
Thorax	Xiphoid process, Suprasternal notch, C7, T8	Suprasternal notch	Anterior (+X), Posterior (-X); Superior (+Y), Inferior (-Y); Lateral (+Z), Medial (-Z)
Scapula	Inferior angle of the scapula, Acromial angle, Trigonum spinae	Acromial angle	
Humerus	Medial epicondyle, Lateral epicondyle	Glenohumeral joint, which is estimated using sphere-fitting model	
Forearm	Medial epicondyle, Lateral epicondyle, Ulnar styloid, Radial styloid, Dorsum of the hand	Ulnar styloid	

ISB, International Society of Biomechanics.

Table S2 Vector definitions for thorax and humerus coordinate systems

Vectors	Description of vector definition	Direction of vector
Thorax coordinate system		
Y_T	Line connecting midpoint between PX and T8 with midpoint between IJ and C7	Pointing superiorly
Z_T	Line perpendicular to the plane formed by IJ and C7, and midpoint between PX and T8	Pointing laterally
X_T	Common line perpendicular to the Z_T and Y_T axes	Pointing anteriorly
Humerus coordinate system		
Y_H	Line connecting GH and midpoint of EL, EM, and GH. This gives the longitudinal axis of the humerus.	Pointing to GH
Z_H	Line perpendicular to the Y_H and X_H axis	Pointing laterally
X_H	Line perpendicular to the plane formed by EL, EM, and GH	Pointing anteriorly

C7, spinous process of 7th cervical vertebra; EL, lateral epicondyle; EM, medial epicondyle; GH, glenohumeral rotation center; IJ, Incisura Jugularis (Suprasternal notch); PX, xiphoid process; T8, spinous process of 8th thoracic vertebra.