

## MARKER SET DESCRIPTION

Below is a detailed description of motion capture marker placement used during data collection for the fourth Grand Challenge Competition to Predict In Vivo Knee Loads:

**1. *Right Heel***

Located on back of shoe – at approximate toe height.  
First marker used to define a hindfoot marker triad.

**2. *Right Midfoot Superior***

Marker should be placed on top of foot over shoe laces.  
Second marker used to define a hindfoot marker triad.

**3. *Right Midfoot Lateral***

Marker should be placed close to floor between heel and midfoot superior markers.  
Third marker used to define a hindfoot marker triad.

**4. *Right Toe***

Aligned with Right Heel marker to represent anterior-posterior axis of foot.  
Marker should be placed at front edge of shoetop above second toe.

**5. *Left Heel***

Located on back of shoe – at approximate toe height.  
First marker used to define a hindfoot marker triad.

**6. *Left Midfoot Superior***

Marker should be placed on top of foot over shoe laces.  
Second marker used to define a hindfoot marker triad.

**7. *Left Midfoot Lateral***

Marker should be placed close to floor between heel and midfoot superior markers.  
Third marker used to define a hindfoot marker triad.

**8. *Left Toe***

Aligned with Left Heel marker to represent anterior-posterior axis of foot.  
Marker should be placed at front edge of shoetop above second toe.

**9. *Right Toe Lateral***

On toe axis: should remain stationary during seated heel rise with toes on the floor.

**10. *Right Toe Medial***

On toe axis: should remain stationary during seated heel rise with toes on the floor.

**11. *Left Toe Lateral***

On toe axis: should remain stationary during seated heel rise with toes on the floor.

**12. *Left Toe Medial***

On toe axis: should remain stationary during seated heel rise with toes on the floor.

**13. *Right Ankle Lateral (Static Trial only)***

Confirm marker location over lateral malleolus of right ankle.

**14. *Right Ankle Medial (Static Trial only)***

Confirm marker location over medial malleolus of right ankle.

**15. *Left Ankle Lateral (Static Trial only)***

Confirm marker location over lateral malleolus of left ankle.

**16. *Left Ankle Medial (Static Trial only)***

Confirm marker location over medial malleolus of left ankle.

**17. *Right Shank Superior***

Confirm marker location over superior anterior bony surface of the tibia.

**18. Right Shank Inferior**

Confirm marker location over inferior anterior bony surface of the tibia.

**19. Right Shank Lateral**

Confirm marker location over lateral aspect of shank midway between superior and inferior markers.

**20. Left Shank Superior**

Confirm marker location over superior anterior bony surface of the tibia.

**21. Left Shank Inferior**

Confirm marker location over inferior anterior bony surface of the tibia.

**22. Left Shank Lateral**

Confirm marker location over lateral aspect of shank midway between superior and inferior markers.

**23. Right Knee Lateral (Static Trial only)**

Confirm marker location over lateral epicondyle of right femur.

**24. Right Knee Medial (Static Trial only)**

Confirm marker location over medial epicondyle of right femur.

**25. Right Patella**

Confirm marker location over the center of the right patella.

**26. Left Knee Lateral (Static Trial only)**

Confirm marker location over lateral epicondyle of left femur.

**27. Left Knee Medial (Static Trial only)**

Confirm marker location over medial epicondyle of left femur.

**28. Left Patella**

Confirm marker location over the center of the right patella.

**29. Right Thigh Superior**

Confirm marker location over mid anterior surface of the thigh.

**30. Right Thigh Inferior**

Confirm marker location over distal anterior surface of the thigh.

**31. Right Thigh Lateral**

Confirm marker location over lateral aspect of thigh midway between superior and inferior markers.

**32. Left Thigh Superior**

Confirm marker location over mid anterior surface of the thigh.

**33. Left Thigh Inferior**

Confirm marker location over distal anterior surface of the thigh.

**34. Left Thigh Lateral**

Confirm marker location over lateral aspect of thigh midway between superior and inferior markers.

**35. Right ASIS**

Confirm marker location on bony ASIS protrusion.

**36. Left ASIS**

Confirm marker location on bony ASIS protrusion.

**37. Right PSIS**

Confirm marker location on bony PSIS protrusion.

**38. Left PSIS**

Confirm marker location on bony PSIS protrusion

**39. Lumbar**

Confirm location in the small of the back at the approximate L4-L5 level.  
Placement should be at the point where back curves inward the most.  
Used to approximate the lower back joint location.

**40. Thoracic**

Confirm location on the upper back at the approximate T10 level.  
Placement should be at the point where back curves outward the most.  
Used to approximate the upper back joint location.

**41. Right Shoulder**

Confirm location on right acromium.

**42. Left Shoulder**

Confirm location on left acromium.

**43. Right Shoulder Center (Virtual Marker)**

Virtual marker approximating the shoulder joint location.

**44. Left Shoulder Center (Virtual Marker)**

Virtual marker approximating the shoulder joint location.

**45. Neck**

Confirm location in the upper middle of the back on the spinous process of C7.

**46. Sternum**

Confirm location on the sternal notch

**47. Xiphoid**

Confirm location on the Xiphoid process.

**48. Right Elbow**

Confirm location on lateral epicondyle of right elbow.

**49. Right Elbow Medial (Static Trial only)**

Confirm location on medial epicondyle of right elbow.

**50. Left Elbow**

Confirm location on lateral epicondyle of left elbow.

**51. Left Elbow Medial (Static Trial only)**

Confirm location on medial epicondyle of left elbow.

**52. Right Wrist**

Confirm location on the dorsal side of the right hand in the center of the wrist.

**53. Left Wrist**

Confirm location on the dorsal side of the left hand in the center of the wrist.

**54. Right Radius**

Confirm location on the dorsal side of the right hand on the radius.

**55. Left Radius**

Confirm location on the dorsal side of the left hand on the radius.

**56. Right Ulna**

Confirm location on the dorsal side of the right hand on the ulna.

**57. Left Ulna**

Confirm location on the dorsal side of the left hand on the ulna.

**58. Sacral (Virtual Marker)**

Virtual marker created from the intersection of Left and Right PSIS markers.

**59. Right Pole Top**

Marker placed on the top of the right walking pole.

**60. *Left Pole Top***

Marker placed on the top of the left walking pole.

**61. *Right Pole Base Medial***

Marker placed on the base of the right walking pole on the medial side.

**62. *Left Pole Base Medial***

Marker placed on the base of the left walking pole on the medial side.

**63. *Right Pole Base Lateral***

Marker placed on the base of the right walking pole on the lateral side.

**64. *Left Pole Base Lateral***

Marker placed on the base of the left walking pole on the lateral side.