# ANATOMIC LANDMARKS

## TABLE OF CONTENTS

## 1. Background and rationale

For efficiency and consistency, the following anatomic landmarks will be identified and marked on participants at an anatomical landmark station prior to the peripheral neuropathy, vibration perception threshold, pain sensitivity, and knee x-ray examinations:

Center of patella (knee cap)
- Pain sensitivity (touch, brush, temporal summation, pinprick, pressure)

Tibial tuberosity (TT)
- Pain sensitivity (touch, brush, pinprick, pressure)
- Vibration perception threshold
- Full limb x-ray

Lateral head of fibula
- GAITrite

Distal radial-ulnar joint
- Pain sensitivity exams (touch, brush, temporal summation pinprick, pressure)

Radial styloid (right only)
- Vibration perception threshold

Marking will be done with a black magic marker or other appropriate marking device at an anatomic landmarking station before the participant begins examinations requiring the anatomical marking. The nine locations (right/left patella, tibial tuberosity, lateral head of fibula, radial styloid, and right only radial-ulnar joint will be marked with an "X" so examiners performing the examinations can easily identify the correct locations on the study participant. The right/left patella and tibial tuberosity will be marked with a 1 to 1½ inch "X" and the lateral head of the fibula, radial styloid, radial-ulnar joint will be marked with a ½ inch "X."

In addition, an *X-spot* radio-opaque adhesive marker with a 1 mm lead sphere will be placed on the marked right/left tibial tuberosity just prior to the full limb x-ray.

## 2. Equipment and supplies

- Magic marker (black) or other appropriate marking tool
- *X-spot* radio-opaque adhesive marker
- Color labels./stickers (see Gait Assessment operations manual)

## 3. Safety issues and exclusions

### 3.1 Safety issues

Magic Marker (or other appropriate marking tool)

- Take care when marking the anatomical landmark sites, especially if there is skin irritation, rash, or a wound in the area.

*X-spot* radio-opaque adhesive marker

- Participants with sensitivity to adhesives may develop skin irritation from the adhesive-backed *X-spot* marker. Remove the *X-spot* marker from the participant's leg immediately after the x-ray exam is completed.

### 3.2 Exclusions

Participants with a lower extremity amputation may not have a tibial tuberosity or patella to mark and will therefore be excluded from marking that location.

## 4. Participant preparation

The participant should be wearing shorts to allow easy access to all of the anatomic sites for landmarking. Before you begin, have the participant seated in a comfortable chair with their feet placed flat on the floor. A good time to perform the landmarking is when the participant is seated in a chair just prior to blood collection. Marking of all sites should be done while the participant is seated. It is essential that the tibial tuberosity is marked while the participant is seated to insure proper placement of the *X-spot* radio-marker which will be applied bilaterally on top of the X mark which identifies the tibial tuberosity just prior to knee x-ray. The pain sensitivity, vibration perception threshold and x-ray examinations are done with the participant standing or lying on an exam table with the leg extended.

## 5. Identification and marking of anatomical sites

### 5.1 Center of patella

Locate the midline and center of the patella (knee cap) by placing fingers and thumb all around the patella (see Appendix 1, Figure 1). The examiner identifies the superior, inferior, medial, and lateral borders of the patella and marks the center of the patella with an "X."

### 5.2 Tibial tuberosity

The participant needs to be seated in a chair with their feet flat on the ground and their shorts on so the examiner can feel boney landmarks. As the examiner runs their hand from the top of the knee slowly down the front of the leg, they will feel the kneecap (patella) at the top and then a flat ropey like structure (the patellar tendon). Just below (inferior to) the tendon is a hard boney prominence, the tibial tuberosity (also called the tibial tubercle) (see Appendix 1). In some people this boney prominence is large, extending an inch or so from side to side or from its top to bottom. With the participant seated mark the "X" at the top of the tibial tuberosity, just where it joins with the patellar tendon. If the tuberosity extends from side to side, please mark the middle, where the tendon joins the bone. Do this first for one leg and then for the other leg. An *X-spot* radio-opaque marker will be placed on the marked location of the right and left tibial tuberosity just prior to the full limb x-ray.

### 5.3 Lateral head of fibula

The participant will be seated when you identify and mark the head of the fibula. The fibula bone is on the lateral side of the lower leg. The lateral head of the fibula is on the outside of leg, lateral with the tibial tuberosity and just below the tibial plateau (see Appendix 1). A colored sticker will be placed over the marked lateral head of fibula at the beginning of the gait assessment exam.

### 5.4 Distal radial-ulnar joint

Mark the dorsal side of the distal radial-ulnar joint. The joint is the space in between the two boney prominences of the wrist. The distal ulnar styloid process is easy to identify, it is the large boney prominence on the dorsal small finger side of the wrist). The dorsal distal radial-ulnar joint is the space between the ulna and radius bones (see Appendix 2).

### 5.5 Radial styloid

The radial styloid of the right wrist will be marked. If the right wrist is excluded (see VPT & Pain Sensitivity Exclusions form), the left wrist should be marked. The styloid of the distal radius is the boney prominence on the thumb side of the wrist (see Appendix 2).

## 6. Quality assurance

### 6.1 Training and certification

Experience in musculoskeletal examinations is preferred but not required. Training includes

- Read and study manual
- Attend MOST training session on techniques (or observe administration by experienced examiner)
- Practice on other staff or volunteers

- Discuss problems and questions with local expert or QC officer

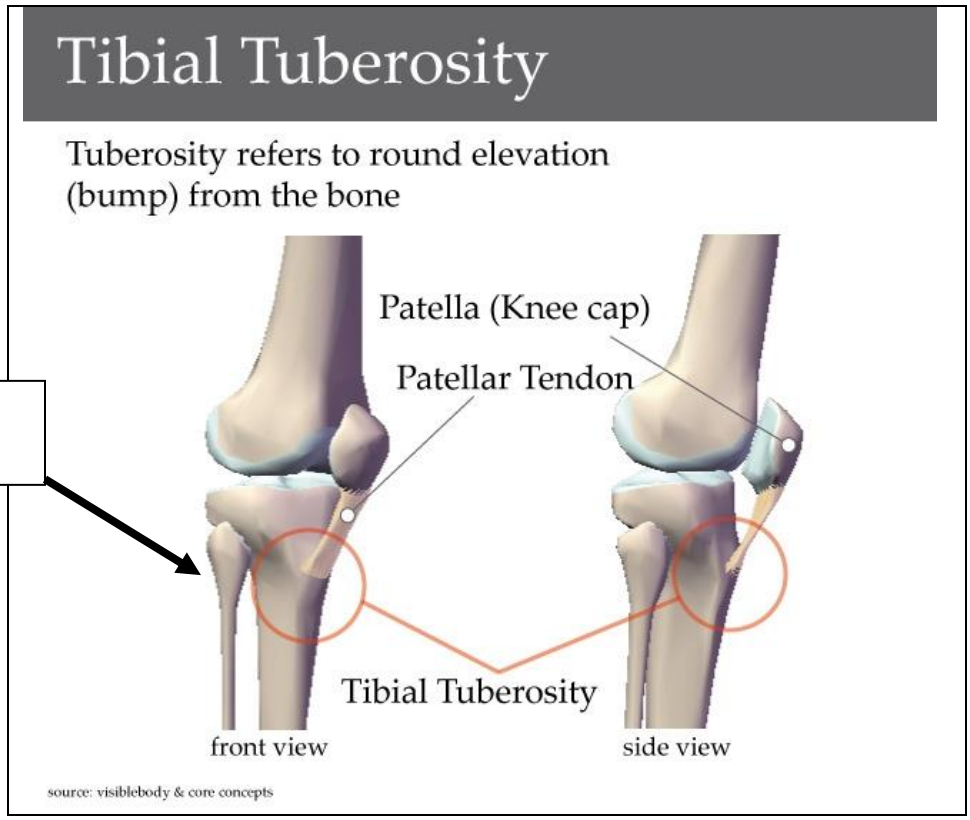
### 6.2 Certification requirements

- Complete training requirements
- Conduct exam on two volunteers:
  - According to protocol, as demonstrated by completed QC checklist

### 6.3 Quality assurance checklist

☐ All nine anatomic sites found and marked properly
☐ Tibial tuberosity location is marked with participant seated.
☐ Radio-opaque *X-spot* marker identified on the first five full leg x-rays sent to the X-ray Reading Center

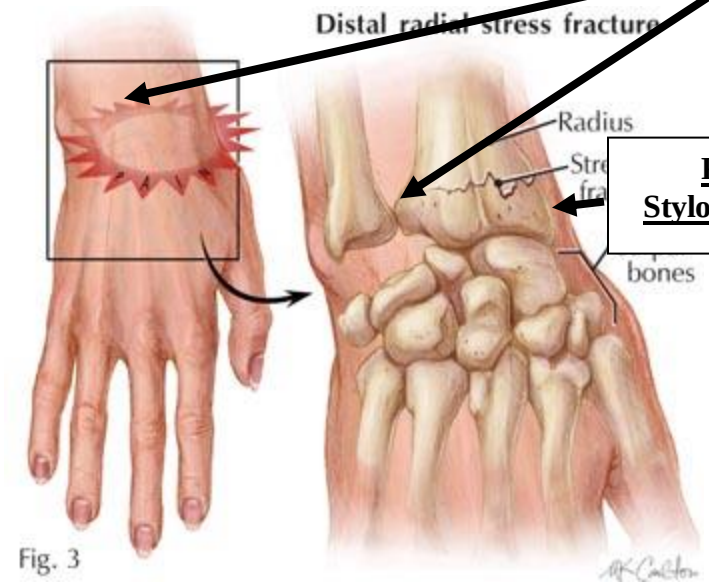
## Appendix 1 Patella, Tibial Tuberosity, Head of Fibula




**Fibula**
**Lateral Head**

## Appendix 2 Radial-Ulnar Joint and Radial Styloid

**Distal Radial Ulnar Joint**
Space in between the two bony prominences of the wrist (ulna and radius)




**Radial Styloid Process**


**Radial Styloid Process**