

# X-ray HMGULA\_XRY\_001

## Purpose

Construct and analyse digital X-ray images in immobilised mice using a Faxitron X-Ray system or NTB digital X-ray scanner.

## Experimental Design

- **Minimum number of animals** : 4M + 4F
- **Age at test**: Week 61

## Procedure

Perform steps 3.1 and 3.2 unless the mouse is coming from DEXA analysis

3.1 Anesthetize the mice.

3.2 Monitor the animal carefully until unconsciousness by ensuring the mouse is adequately sedated.

3.3 Mount the anesthetized mouse onto an X-ray permeable plate. Curve the tail along the left side of the mouse. (Note: this will enable identification of the X-ray as a dorsal or ventral image.)

Faxitron X-ray system

3.3.1 Insert the plate into the Faxitron X-ray system.

3.3.2 Take an image using the software that is supplied by the X-ray scanner.

3.3.3 Set the machine to a voltage of 25kV with an integration time of 40ms.

3.3.4 Take an image using the iX-Pect software that is supplied by the X-ray scanner.

NTB digital X-ray scanner

3.4 Remove the mouse once the image is captured. Place the mouse on a heated mat, set at 37°C, in a cage and monitor closely until consciousness is fully regained.

3.5 Analyze the image.

3.6 Or continue with ABR.

# Notes

The protocol described herein employs anaesthesia using intraperitoneal (IP) administration; however, anaesthesia using isoflurane is also suitable.

[Digit integrity IMPC\\_XRY\\_031\\_001](#) *Definition:* The state of being whole and undivided.

## Parameters and Metadata

### Skull shape HMGULA\_XRY\_001\_001 | v1.0

simpleParameter

Req. Analysis: false                      Req. Upload: true                      Is Annotated: true

Description: skull\_shape

Options: normal, abnormal, imageOnly, unobservable,

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### Zygomatic bone HMGULA\_XRY\_002\_001 | v1.0

simpleParameter

Req. Analysis: false                      Req. Upload: true                      Is Annotated: true

Description: zygomatic\_bone

Options: normal, abnormal, imageOnly, unobservable,

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### Maxilla/Pre-maxilla HMGULA\_XRY\_003\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** maxilla

**Options:** normal, abnormal, imageOnly, unobservable,

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## **Mandibles** HMGULA\_XRY\_004\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** mandibles

**Options:** normal, abnormal, imageOnly, unobservable,

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## **Teeth** HMGULA\_XRY\_005\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** teeth

**Options:** normal, abnormal, imageOnly, unobservable,

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## **Scapulae** HMGULA\_XRY\_006\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** scapulae

**Options:** normal, abnormal, imageOnly, unobservable,

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## Clavicle HMGULA\_XRY\_007\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** clavicle

**Options:** normal, abnormal, imageOnly, unobservable,

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## Number of ribs right HMGULA\_XRY\_008\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Description:** number\_of\_ribs\_right

---

## Number of ribs left HMGULA\_XRY\_009\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Description:** number\_of\_ribs\_left

---

## Shape of ribs HMGULA\_XRY\_010\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** shape\_of\_ribs

**Options:** normal, abnormal, imageOnly, unobservable,

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## Fusion of ribs HMGULA\_XRY\_011\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** fusion\_of\_ribs

**Options:** not fused, fused, imageOnly, unobservable,

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## Pelvis HMGULA\_XRY\_012\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** pelvis

**Options:** normal, abnormal, imageOnly, unobservable,

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**Number of cervical vertebrae** HMGULA\_XRY\_013\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Description:** number\_of\_cervical\_vertebrae

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**Number of thoracic vertebrae** HMGULA\_XRY\_014\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Description:** number\_of\_thoracic\_vertebrae

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**Number of lumbar vertebrae** HMGULA\_XRY\_015\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Description:** number\_of\_lumbar\_vertebrae

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**Number of pelvic vertebrae** HMGULA\_XRY\_016\_001 | v1.0

simpleParameter

**Req. Analysis:** false      **Req. Upload:** false      **Is Annotated:** true

**Description:** number\_of\_pelvic\_vertebrae

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**Number of caudal vertebrae** HMGULA\_XRY\_017\_001 | v1.0

simpleParameter

**Req. Analysis:** false      **Req. Upload:** false      **Is Annotated:** true

**Description:** number\_of\_caudal\_vertebrae

---

**Shape of vertebrae** HMGULA\_XRY\_018\_001 | v1.0

simpleParameter

**Req. Analysis:** false      **Req. Upload:** true      **Is Annotated:** true

**Description:** shape\_of\_vertebrae

**Options:** normal, abnormal, imageOnly, unobservable,

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## Fusion of vertebrae HMGULA\_XRY\_019\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** fusion\_of\_vertebrae

**Options:** yes, no, imageOnly, unobservable,

---

## Processes on vertebrae HMGULA\_XRY\_020\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** processes\_on\_vertebrae

**Options:** normal, abnormal, imageOnly, unobservable,

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## Humerus HMGULA\_XRY\_021\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** humerus

**Options:** normal, abnormal, imageOnly, unobservable,



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## Radius HMGULA\_XRY\_022\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** radius

**Options:** normal, abnormal, imageOnly, unobservable,

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## Ulna HMGULA\_XRY\_023\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** ulna

**Options:** normal, abnormal, imageOnly, unobservable,

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## Femur HMGULA\_XRY\_024\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** femur

**Options:** normal, abnormal, imageOnly, unobservable,

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## **Tibia** HMGULA\_XRY\_025\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** tibia

**Options:** normal, abnormal, imageOnly, unobservable,

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## **Fibula** HMGULA\_XRY\_026\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** fibula

**Options:** normal, abnormal, imageOnly, unobservable,

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## **Joints** HMGULA\_XRY\_027\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** joints

**Options:** normal, abnormal, imageOnly, unobservable,

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## Number of digits HMGULA\_XRY\_028\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Description:** number\_of\_digits

---

## Syndactylism HMGULA\_XRY\_029\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** syndactylism

**Options:** no syndactylism, Syndactylism, imageOnly, unobservable,

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## Brachydactyly HMGULA\_XRY\_030\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** completeness\_of\_digits

**Options:** yes, no, imageOnly, unobservable,

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## Digit integrity HMGULA\_XRY\_031\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** true

**Description:** digit\_integrity

**Options:** yes, no, imageOnly, unobservable,

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## Comment on XRay image HMGULA\_XRY\_032\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

**Description:** comment\_on\_xray\_image

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## Tibia length HMGULA\_XRY\_033\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Unit Measured:** mm

**Description:** tibia\_length

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# XRay Images Whole Body Dorso Ventral HMGULA\_XRY\_034\_001

| v1.0

seriesMediaParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: false

Description: xray\_images

Increments: Minimum 1

---

# Alive HMGULA\_XRY\_035\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: false

Description: alive

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# Xray equipment ID HMGULA\_XRY\_036\_001 | v1.0

procedureMetadata

Req. Analysis: false

Req. Upload: true

Is Annotated: false

Description: xray\_equipment\_name

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# Xray equipment manufacturer HMGULA\_XRY\_037\_001 | v1.0

procedureMetadata

Req. Analysis: true                      Req. Upload: false                      Is Annotated: false

Description: xray\_equipment\_manufacturer

Options: Faxitron X-Ray Corporation, Rigaku Corporation (Micro-CT), Bruker, Faxitron Bioptics LLC,

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# Xray equipment model HMGULA\_XRY\_038\_001 | v1.0

procedureMetadata

Req. Analysis: true                      Req. Upload: false                      Is Annotated: false

Description: xray\_equipment\_model

Options: MX-20-DC12, MX-20-DC4, R\_mCT (Micro-CT), MX-20, MS-FX Pro, UltraFocus 100, UltraFocus DXA,

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# Settings time of exposure HMGULA\_XRY\_039\_001 | v1.0

procedureMetadata

Req. Analysis: false                      Req. Upload: true                      Is Annotated: false

Unit Measured: s

Description: settings\_time\_of\_exposure

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# Settings level HMGULA\_XRY\_040\_001 | v1.0

procedureMetadata

Req. Analysis: false      Req. Upload: true      Is Annotated: false

Description: settings\_level

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# Experimenter ID (scan) HMGULA\_XRY\_041\_001 | v1.0

procedureMetadata

Req. Analysis: false      Req. Upload: true      Is Annotated: false

Description: experimenter\_scan\_

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# Experimenter ID (analysis) HMGULA\_XRY\_042\_001 | v1.0

procedureMetadata

Req. Analysis: false      Req. Upload: true      Is Annotated: false

Description: experimenter\_analysis\_

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# Voltage settings HMGULA\_XRY\_043\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** true

**Is Annotated:** false

**Description:** voltage\_settings

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## Scanner equipment ID HMGULA\_XRY\_044\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

**Description:** scanner\_equipment\_name

---

## Scanner equipment manufacturer HMGULA\_XRY\_045\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

**Description:** scanner\_equipment\_manufacturer

---

## Scanner equipment model HMGULA\_XRY\_046\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

**Description:** scanner\_equipment\_model



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## Date Xray equipment last calibrated HMGULA\_XRY\_047\_001 | v1.0

procedureMetadata

Req. Analysis: false

Req. Upload: false

Is Annotated: false

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## XRay Images Whole Body Lateral Orientation HMGULA\_XRY\_048\_001 | v1.0

seriesMediaParameter

Req. Analysis: false

Req. Upload: true

Is Annotated: false

Increments: Minimum 1

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## XRay Images Forepaw HMGULA\_XRY\_049\_001 | v1.0

seriesMediaParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: false

Increments: Minimum 1

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**XRay Images Skull Lateral Orientation** HMGULA\_XRY\_050\_001 | v1.0

seriesMediaParameter

Req. Analysis: false      Req. Upload: false      Is Annotated: false

Increments: Minimum 1

**XRay Images Skull Dorso Ventral Orientation** HMGULA\_XRY\_051\_001 | v1.0

seriesMediaParameter

Req. Analysis: false      Req. Upload: false      Is Annotated: false

Increments: Minimum 1

**XRay Images Hind Leg and Hip** HMGULA\_XRY\_052\_001 | v1.0

seriesMediaParameter

Req. Analysis: false      Req. Upload: false      Is Annotated: false

Increments: Minimum 1

**Date Scanner equipment last calibrated** HMGULA\_XRY\_053\_001 | v1.0

procedureMetadata

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

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**Free Ontology** HMGULA\_XRY\_054\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

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**Shape of spine** HMGULA\_XRY\_055\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, imageOnly, unobservable,

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**Scoliosis** HMGULA\_XRY\_056\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** yes, no, imageOnly, unobservable,

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## Kyphosis HMGULA\_XRY\_057\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: true

Options: yes, no, imageOnly, unobservable,

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## Lordosis HMGULA\_XRY\_058\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: true

Options: yes, no, imageOnly, unobservable,

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## Shape of ribcage HMGULA\_XRY\_059\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: true

Options: normal, abnormal, imageOnly, unobservable,

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## Transitional vertebrae HMGULA\_XRY\_060\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** yes, no, imageOnly, unobservable,

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## **Fusion of processes** HMGULA\_XRY\_061\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** yes, no, imageOnly, unobservable,

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## **Polysyndactylism** HMGULA\_XRY\_062\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** yes, no, imageOnly, unobservable,

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## **Cervical processes** HMGULA\_XRY\_063\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, imageOnly, unobservable,

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## Thoracic processes HMGULA\_XRY\_064\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, imageOnly, unobservable,

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## Lumbar processes HMGULA\_XRY\_065\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, imageOnly, unobservable,

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## Sacral processes HMGULA\_XRY\_066\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, imageOnly, unobservable,

---

## Caudal processes HMGULA\_XRY\_067\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, imageOnly, unobservable,

---

## Missing cranial rib HMGULA\_XRY\_068\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** false

**Options:** Yes, No,

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## Rib morphology HMGULA\_XRY\_069\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, imageOnly, abnormal, unobservable,

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## Cervical vertebrae morphology HMGULA\_XRY\_070\_001 | v1.0

simpleParameter

**Req. Analysis:** false

**Req. Upload:** false

**Is Annotated:** true

**Options:** normal, abnormal, unobservable, imageOnly,

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**Thoracic vertebrae morphology** HMGULA\_XRY\_071\_001 | v1.0

simpleParameter

**Req. Analysis:** false      **Req. Upload:** false      **Is Annotated:** true

**Options:** unobservable, normal, abnormal, imageOnly,

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**Lumbar vertebrae morphology** HMGULA\_XRY\_072\_001 | v1.0

simpleParameter

**Req. Analysis:** false      **Req. Upload:** false      **Is Annotated:** true

**Options:** normal, unobservable, abnormal, imageOnly,

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**Pelvic vertebrae morphology** HMGULA\_XRY\_073\_001 | v1.0

simpleParameter

**Req. Analysis:** false      **Req. Upload:** false      **Is Annotated:** true

**Options:** abnormal, normal, unobservable, imageOnly,

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# Caudal vertebrae morphology HMGULA\_XRY\_074\_001 | v1.0

simpleParameter

Req. Analysis: false

Req. Upload: false

Is Annotated: true

Options: imageOnly, abnormal, unobservable, normal,

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