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 14

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** [IMPC_XRY_001_001](#) | v1.0  
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**simpleParameter**

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

**Description:** skull_shape

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

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**Zygomatic bone** [IMPC_XRY_002_001](#) | v1.0  
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**simpleParameter**

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

**Description:** zygomatic_bone

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

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**Maxilla/Pre-maxilla** [IMPC_XRY_003_001](#) | v1.1  
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**simpleParameter**

- **Req. Analysis:** false  
- **Req. Upload:** true  
- **Is Annotated:** true
**Description**: maxilla

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

**Mandibles** IMPC_XRY_004_001 | v1.0

**simpleParameter**

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

**Description**: mandibles

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

**Teeth** IMPC_XRY_005_001 | v1.0

**simpleParameter**

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

**Description**: teeth

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

**Scapulae** IMPC_XRY_006_001 | v1.0

**simpleParameter**

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

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

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**Clavicle** IMPC_XRY_007_001 | v1.0

*simpleParameter*

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

**Description:** clavicle

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

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**Number of ribs right** IMPC_XRY_008_001 | v1.0

*simpleParameter*

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

**Description:** number_of_ribs_right

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**Number of ribs left** IMPC_XRY_009_001 | v1.0

*simpleParameter*

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

**Description:** number_of_ribs_left
Shape of ribs  IMPC_XRY_010_001 | v1.0

simpleParameter


Description: shape_of_ribs

Options: imageOnly, normal, abnormal, unobservable,

Fusion of ribs  IMPC_XRY_011_001 | v1.0

simpleParameter


Description: fusion_of_ribs

Options: imageOnly, fused, not fused, unobservable,

Pelvis  IMPC_XRY_012_001 | v1.0

simpleParameter


Description: pelvis

Options: imageOnly, normal, abnormal, unobservable,

Number of cervical vertebrae  IMPC_XRY_013_001 | v1.0
**Number of cervical vertebrae**  
IMPC_XRY_014_001 | v1.0

**Number of thoracic vertebrae**  
IMPC_XRY_015_001 | v1.0

**Number of lumbar vertebrae**  
IMPC_XRY_016_001 | v1.0

**Number of pelvic vertebrae**  
IMPC_XRY_016_001 | v1.0
**Number of caudal vertebrae** IMPC_XRY_017_001 | v1.1

*simpleParameter*

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

*Description:* number_of_caudal_vertebrae

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**Shape of vertebrae** IMPC_XRY_018_001 | v1.0

*simpleParameter*

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

*Description:* shape_of_vertebrae

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

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**Fusion of vertebrae** IMPC_XRY_019_001 | v1.0

*simpleParameter*

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

*Description:* fusion_of_vertebrae

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

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**Processes on vertebrae** IMPC_XRY_020_001 | v1.0
simpleParameter

**Description:** processes_on_vertebrae

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

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**Humerus** IMPC_XRY_021_001 | v1.0

simpleParameter

**Description:** humerus

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

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**Radius** IMPC_XRY_022_001 | v1.0

simpleParameter

**Description:** radius

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

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**Ulna** IMPC_XRY_023_001 | v1.0

simpleParameter
Description: ulna
Options: imageOnly, normal, abnormal, unobservable,

Femur IMPC_XRY_024_001 | v1.0

Description: femur
Options: imageOnly, normal, abnormal, unobservable,

Tibia IMPC_XRY_025_001 | v1.0

Description: tibia
Options: imageOnly, normal, abnormal, unobservable,

Fibula IMPC_XRY_026_001 | v1.0

Description: fibula
Options: imageOnly, normal, abnormal, unobservable,
Description: fibula

Options: imageOnly, normal, abnormal, unobservable,

Joints IMPC_XRY_027_001 | v1.0

simpleParameter


Description: joints

Options: imageOnly, normal, abnormal, unobservable,

Number of digits IMPC_XRY_028_001 | v1.0

simpleParameter


Description: number_of_digits

Syndactylism IMPC_XRY_029_001 | v1.0

simpleParameter


Description: syndactylism

Options: imageOnly, Syndactylism, no syndactylism, unobservable,
Brachydactyly  IMPC_XRY_030_001  |  v1.1

**simpleParameter**

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

**Description:** completeness_of_digits

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

Digit integrity  IMPC_XRY_031_001  |  v1.0

**simpleParameter**

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

**Description:** digit_integrity

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

Comment on XRay image  IMPC_XRY_032_001  |  v1.1

**simpleParameter**

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

**Description:** comment_on_xray_image
**Tibia length** IMPC_XRY_033_001 | v1.1

simpleParameter

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

**Unit Measured:** mm

**Description:** tibia_length

**XRay Images Whole Body Dorso Ventral** IMPC_XRY_034_001 | v1.3

seriesMediaParameter

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

**Description:** xray_images

**Increments:** Minimum 1

**Alive** IMPC_XRY_035_001 | v1.0

simpleParameter

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

**Description:** alive

**Xray equipment ID** IMPC_XRY_036_001 | v1.1

procedureMetadata
Xray equipment manufacturer

**Description:** xray_equipment_name

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

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Xray equipment model

**Description:** xray_equipment_model

**Options:** MX-20-DC12, MX-20-DC4, R_mCT (Micro-CT), MX-20, MS-FX Pro, UltraFocus 100, UltraFocus DXA, PathVision,

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Settings time of exposure

**Description:** xray_equipment_manufacturer

**Options:** IMPC_XRY_038_001 | v1.4

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**Options:** IMPC_XRY_039_001 | v1.1

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Unit Measured: s

Description: settings_time_of_exposure

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**Settings level** IMPC_XRY_040_001 | v1.1

procedureMetadata


Description: settings_level

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**Experimenter ID (scan)** IMPC_XRY_041_001 | v1.1

procedureMetadata


Description: experimenter_scan_

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**Experimenter ID (analysis)** IMPC_XRY_042_001 | v1.1

procedureMetadata


Description: experimenter_analysis_
Voltage settings  IMPC_XRY_043_001  | v1.1

Description: voltage_settings

Scanner equipment ID  IMPC_XRY_044_001  | v1.1

Description: scanner_equipment_name

Scanner equipment manufacturer  IMPC_XRY_045_001  | v1.1

Description: scanner_equipment_manufacturer

Scanner equipment model  IMPC_XRY_046_001  | v1.1

Description: scanner_equipment_model
Description: scanner_equipment_model

Date Xray equipment last calibrated  IMPC_XRY_047_001 | v1.3

procedureMetadata

XRay Images Whole Body Lateral Orientation  IMPC_XRY_048_001 | v1.2

seriesMediaParameter
Increments: Minimum 1

XRay Images Forepaw  IMPC_XRY_049_001 | v1.1

seriesMediaParameter
Increments: Minimum 1

XRay Images Skull Lateral Orientation  IMPC_XRY_050_001 | v1.2
XRay Images Skull Dorso Ventral Orientation IMPC_XRY_05
1_001 | v1.2

XRay Images Hind Leg and Hip IMPC_XRY_052_001 | v1.1

Date Scanner equipment last calibrated IMPC_XRY_053_001 | v1.1
**Free Ontology**  IMPC_XRY_054_001 | v1.0

*simpleParameter*


**Shape of spine**  IMPC_XRY_055_001 | v1.1

*simpleParameter*


Options: normal, abnormal, imageOnly, unobservable,

**Scoliosis**  IMPC_XRY_056_001 | v1.2

*simpleParameter*


Options: yes, no, imageOnly, unobservable,

**Kyphosis**  IMPC_XRY_057_001 | v1.1

*simpleParameter*


Options: yes, no, imageOnly, unobservable,
Lordosis IMPC_XRY_058_001 | v1.1

simpleParameter


Options: yes, no, imageOnly, unobservable,

Shape of ribcage IMPC_XRY_059_001 | v1.1

simpleParameter


Options: normal, abnormal, imageOnly, unobservable,

Transitional vertebrae IMPC_XRY_060_001 | v1.1

simpleParameter


Options: yes, no, imageOnly, unobservable,

Fusion of processes IMPC_XRY_061_001 | v1.1

simpleParameter
**Polysyndactylism** IMPC_XRY_062_001 | v1.1

**Cervical processes** IMPC_XRY_063_001 | v1.1

**Thoracic processes** IMPC_XRY_064_001 | v1.1
Lumbar processes IMPC_XRY_065_001 | v1.1

simpleParameter


Options: normal, abnormal, imageOnly, unobservable,

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Sacral processes IMPC_XRY_066_001 | v1.0

simpleParameter


Options: normal, abnormal, imageOnly, unobservable,

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Caudal processes IMPC_XRY_067_001 | v1.0

simpleParameter


Options: normal, abnormal, imageOnly, unobservable,

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Missing cranial rib IMPC_XRY_068_001 | v1.0

simpleParameter

Rib morphology  IMPC_XRY_069_001 | v1.0

simpleParameter


Options: unobservable, imageOnly, normal, abnormal,

Cervical vertebrae morphology  IMPC_XRY_070_001 | v1.0

simpleParameter


Options: imageOnly, normal, unobservable, abnormal,

Thoracic vertebrae morphology  IMPC_XRY_071_001 | v1.0

simpleParameter


Options: imageOnly, abnormal, normal, unobservable,
**Lumbar vertebrae morphology** IMPC_XRY_072_001 | v1.0

simpleParameter

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

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**Pelvic vertebrae morphology** IMPC_XRY_073_001 | v1.0

simpleParameter

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

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**Caudal vertebrae morphology** IMPC_XRY_074_001 | v1.0

simpleParameter

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