

Instructions to reviewers

Hardware and software standards

- 1) All measurements performed on Osirix
- 2) Selected images are viewed on the following settings:
 - a. Magnification:
 - i. 100% for reference lines
 - ii. 300% for measurements

General measurement principles

- 1) All measurements performed to outer cortex of defined landmark
- 2) In the case of a rotated film with duplicate visible cortices, measurement is performed to the most apparent/dense line
- 3) Reference line drawn with arrow tool
- 4) Measurement performed with length tool to nearest 0.1 mm

Definitions of specific radiographic landmarks

- 1) **Basion:** most *inferior point* of extension of the clivus. When the inferior clivus is a horizontal line, the basion is the most posterior point on that line.
- 2) **Posterior inferior cortex of axis** most *inferior point* of the posterior cortex of the axis (C2)
- 3) **Junction of C2 pars with the posterior cortex of the odontoid/C2 body (JPO):** Intersection of the superior cortex of the C2 pars interarticularis with the posterior cortex of the odontoid process.
- 4) **Anterior cortex of the posterior ring of atlas (ACPRA):** The most anterior point of the anterior cortex of the posterior ring of atlas (C1)

Performance Standards

- 1) **Select the flexion film**
 - a. **Set magnification to 100%. Select the arrow tool**
 - i. **Draw the atlantoplanar line:** Horizontal line drawn through the inferior aspect of the anterior and posterior rings of atlas (C1)

- ii. **Draw the posterior axial line:** Vertical line connecting the posterior inferior cortex of C2 body to junction point of C2 pars with posterior cortex of C2 body/odontoid
- b. **Set magnification to 300% and center the cranio-cervical junction in the field. Select the length tool.**
 - i. **Perform the following measurement of the basion-axial interval (BAI):** Linear perpendicular distance between cephalad extension of the posterior axial line and basion. Positive value when basion is anterior to the PAL, negative value when basion is posterior to the PAL
 - ii. **Perform the following measurement of neural canal width (NCW):** Linear distance between the ACPRA and PAL immediately above and parallel to the APL.
- c. **Record on data sheet $BAI_{flexion}$ and $NCW_{flexion}$**
- d. **Clear all reference lines and measurements from film when complete**

2) Select the extension film

- a. **Set magnification to 100%. Select the arrow tool**
 - i. **Draw the atlantoplanar line:** Horizontal line drawn through the inferior aspect of the anterior and posterior rings of atlas (C1)
 - ii. **Draw the posterior axial line:** Vertical line connecting the posterior inferior cortex of C2 body to junction point of C2 pars with posterior cortex of C2 body/odontoid
- b. **Set magnification to 300% and center the cranio-cervical junction in the field. Select the length tool.**
 - i. **Perform the following measurement of the basion-axial interval (BAI):** Linear perpendicular distance between cephalad extension of the posterior axial line and basion. Positive value when basion is anterior to the PAL, negative value when basion is posterior to the PAL
 - ii. **Perform the following measurement of neural canal width (NCW):** Linear distance between the ACPRA and PAL immediately above and parallel to the APL.

- c. Record on data sheet $BAI_{\text{extension}}$ and $NCW_{\text{extension}}$**
- d. Clear all reference lines and measurements from film when complete**