

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. 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

Performance Standards

1) Select the flexion film

a. Set magnification to 100%. Select the arrow tool

- i. **Draw the Anterior axial line (AAL):** Line along the anterior border of the C2 body and dens extending into the cranial space. If the bone curves or scallops, draw the *most easily reproducible line possible*

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 Condyle-axial interval (CAI):** Linear perpendicular distance between cephalad extension of the anterior axial line and the anterior border of the occipital condyle (the same point must be seen between each x-ray). Positive value when condyle is anterior to the AAL, negative value when condyle is posterior to the AAL.
- ii. **Perform the following measurement of the Atlanto-axial interval (AAI):** Linear distance between the ALL and the posterior border of the anterior C1 arch. If the posterior cortex of the anterior arch of C1 is irregular in contour,

then choose the smallest distance available based on a single reproducible landmark.

- c. **Record on data sheet $CAI_{flexion}$ and $AAI_{flexion}$**
- 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 Anterior axial line (AAL):** Line along the anterior border of the C2 body and dens extending into the cranial space. If the bone curves or scallops, draw the *most easily reproducible line possible*
- 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 Condyle-axial interval (CAI):** Linear perpendicular distance between cephalad extension of the anterior axial line and the anterior border of the occipital condyle (the same point must be seen between each x-ray). Positive value when condyle is anterior to the AAL, negative value when condyle is posterior to the AAL.
 - ii. **Perform the following measurement of the Atlanto-axial interval (AAI):** Linear distance between the ALL and the posterior border of the anterior C1 arch. If the posterior cortex of the anterior arch of C1 is irregular in contour, then choose the smallest distance available based on a single reproducible landmark.
- c. **Record on data sheet $CAI_{extension}$ and $AAI_{extension}$**
- d. **Clear all reference lines and measurements from film when complete**