

# SOP: Cerebral Ultrasound

Version	Author(s)	Date	Changes	Approved by
1.0	Cornelia Hagmann Manon Benders	29.5.2012	Initial Version	Gorm Greisen
1.1	Cornelia Hagmann	18.6.2012	Minor changes	Gorm Greisen
1.2	Cornelia Hagmann Manon Benders Anne Mette Plomgaard	29.8.2012	Minor changes	Gorm Greisen
1.3	Cornelia Hagmann Manon Benders Anne Mette Plomgaard	20.9.2012	Minor changes	Gorm Greisen
1.4	Anne Mette Plomgaard	16.11.2012	Minor changes New eCRF in appendix A	Gorm Greisen
1.5	Anne Mette Plomgaard	21.02.2013	Minor changes Upload within one month	Gorm Greisen
2.0	Anne Mette Plomgaard	10.04.2013	Changes <ul style="list-style-type: none"> <li>• Appendix A deleted. Instead, read the eCRF for cUS before conducting the cUS.</li> <li>• Anonymise only if required by local law</li> </ul>	Gorm Greisen

## CONTENT

<b>1.0</b>	<b>Timing of cUS.....</b>	<b>1</b>
<b>2.0</b>	<b>Which views to take.....</b>	<b>2</b>
<b>3.0</b>	<b>Cerebral measurements.....</b>	<b>4</b>
<b>4.0</b>	<b>Bassan score .....</b>	<b>5</b>
<b>5.0</b>	<b>Saving and transferring the data.....</b>	<b>6</b>

## 1.0 Timing of cUS

First scan	Day 1
2nd scan	Day 4 (day 3-5)
3rd scan	Day 7 (day 6-8)
4th scan	Day 14 (day 13-15)
5th scan	Day 35 (day 34-36)
Optional	Every other week if possible
Last scan	At term equivalent age (38-44weeks)

***Before conducting the first cUS of a SafeBoosC patient, we recommend that you read the eCRF for cUS. This way you will know exactly which data you have to fill in, in addition to the measurements described below.***

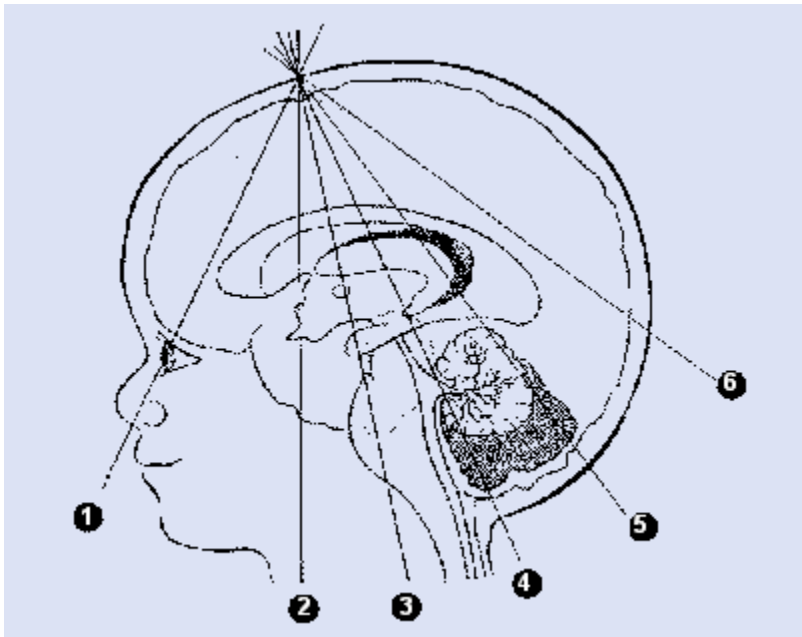
## 2.0 Which views to take?

always	Anterior fontanel, mastoid view
optional	Posterior fontanel for grade II haemorrhage

### Do not forget to

- a. Label images right and left
- b. Fill in eCRF
- c. If there is any pathology, please take additional views/images.

### 2.1 Anterior fontanel: coronal views



#### 1. **C1: frontal lobes**

The most anterior coronal section contains mostly frontal lobe. The orbital ridge of the skull forms the boundary of this image with a lemon-shaped profile.

#### 2. **C2: Anterior frontal horns of the lateral ventricles**

The frontal horns of the lateral ventricles appear as slitlike structures, placed either side of the midline and the corpus callosum is just clearly defined. The cavum septum pellucidum is seen and can be very large in preterm babies and lies between the lateral ventricles. Subtle diffuse echogenicity of the basal ganglia can be seen.

#### 3. **C3: Level of the third ventricle**

This view is taken at the level of the third ventricle. The connections between the lateral and the third ventricle (the foramen of Monro) can be seen in real time.

*Measurements:*

- a. Ventricular index (VI)
- b. Anterior horn width (AHW)
- c. Width of third ventricle

d. Interhemispheric fissure

**4. C4: Level of the cerebellum**

The quadrigeminal cisterns also appear echoreflectant, like the interpeduncular cisterns. This results in the characteristic overall appearance of this plane, that of a Christmas tree. The vermis of the cerebellum appears brighter than the cerebellar hemispheres which are bounded by the tentorium cerebelli.

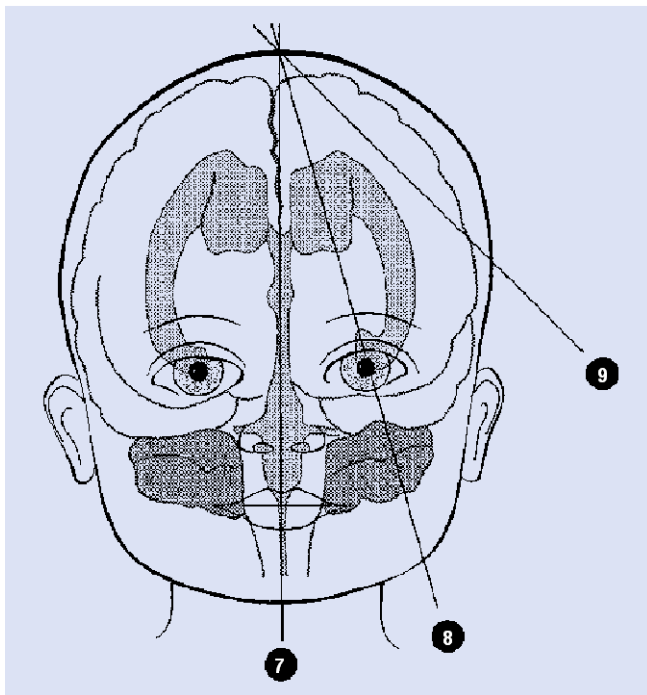
**5. C5: Level of the trigone**

This view is through the trigone of the lateral ventricles, which dominates this plane of the posterior sections. The glomus of the choroid plexus often fills the cavity of the lateral ventricles in this position, and is particularly large in preterm babies.

**6. C6: Level of the occipital lobes**

Posteriorly the occipital cortex and the occipital lobes can be imaged, beyond the posterior horns of the lateral ventricles.

## 2.2 Anterior fontanel: sagittal view



**7. S1: midline sagittal**

This view is through the third and fourth ventricles. In the midline the cerebellum vermis forms a highly echogenic landmark in the posterior fossa. Inferior to the cerebellum is the echo-free zone of the cisterna magna. The corpus callosum can be seen from the anterior to posterior direction in the midline view, bounded by the callosal sulcus which forms a clear echo boundary.

*Measurements:*

e. Depth of fourth ventricle

**8. S2. angled parasagittal**

This section is dominated by the C shape of the lateral ventricle.

*Measurements:*

- f. Thalamo-occipital diameter (TOD)

**9. S3. Tangential parasagittal**

The Sylvian fissure and the insula are the landmarks in this view

**Mastoid view**

**10. coronal view**

View through cerebellum, note that the cerebellar hemisphere further away from the probe shows fewer details than the hemisphere close to the probe

**2.3 Posterior fontanel (optional)**

**(Coronal view)**

Occipital horns of the lateral ventricles and the cerebellar hemispheres with the vermis are seen.

**(Parasagittal view)**

Through the Analogue to the parasagittal view anterior fontanel with the occipital and temporal horn of the lateral ventricles seen.

**3.0 Cerebral measurements**

We *strongly* recommend that all measurements are conducted bedside.

(If you find the entire ventricular system completely normal, you will be able to answer “considered normal” for all measurements in the eCRF.)

**a. Ventricular index (VI)**

The length of a horizontal line drawn between the midline and the outer border of the lateral ventricle, which is seen as an abrupt end of an echogenic line (Fig. 1 and 2)

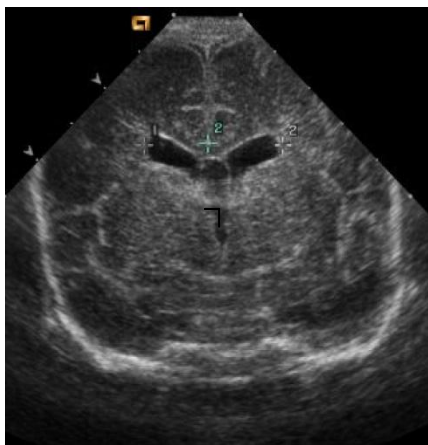


Fig.1.

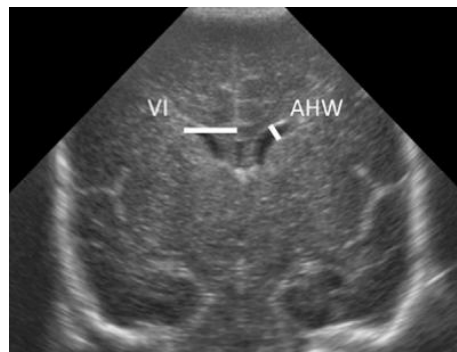


Fig.2.

**b. Anterior horn width (AHW)**

The width of the anterior horn of the lateral ventricles is measured in C3 with the plane of the scan at the level of the inter ventricular foramina of Monro (just anterior to the choroid plexus in the third ventricle) (Fig.2.)

**c. Width of third ventricle**

The width of the third ventricle is measured at the inner edge to the inner edge of third ventricle at its maximum width.

**d. Interhemispheric fissure**

The maximum width between the hemispheres, measured from the surface of the opposite gyri.

**e. Depth of the fourth ventricle**

The distance between the posterior border of the pons and the anterior border of the vermis at the maximum depth of the fourth ventricle

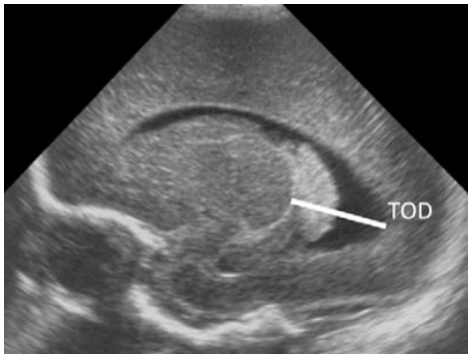


Fig.3.

**f. Thalamo-occipital diameter (TOD)**

The TOD is measured in a parasagittal plane that is angled laterally more posteriorly than anteriorly so that the entire length of the lateral ventricle is seen. It is measured from the most posterior part of the thalamus to the most posterior angle of the occipital ventricular horn (Fig.3.).

## 4.0 Bassan score

This score on the presence (score of 1) or absence (score of 0) of 3 factors that previously have been associated separately with severe PVHI:

1. Bilateral PVHI
2. Midline shift
3. Extent of PVHI (ie, echogenicity involving 2 or more territories [based on the worse side if bi- lateral]).

A cUS study that shows PVHI with none of these features received a score of 0, whereas a study that showed all 3 features received a score of 3.

## 5.0 Saving and transferring the data

***The data should be downloaded from the ultrasound machine in DICOM format.***

Always keep a local copy of the cUS images on a DVD or USB. In this copy it must be possible to identify the child.

The cUS images must be sent to CTU (Copenhagen Trial Unit) with FTP (File Transfer Protocol) within one month after the last cUS examination. The eCRF should be filled in immediately (or ASAP) after conducting the cUS. (See SOP: Data transfer to the Copenhagen Trial Unit)

**Important:**

You only need to remove the identity information in the images if this is required by local law.

