CT Brain Perfusion

Purpose

CT Brain Perfusion generates qualitative and quantitative information about changes in image intensity over time. The application calculates and displays quantitative color maps of cerebral blood flow (CBF), cerebral blood volume (CBV), mean transit time (MTT) and time-to-peak (TTP), and provides summary maps, which may help physicians in determining areas of reduced cerebral blood flow compared to the contra lateral hemisphere.

Benefits

- Perfusion and summary maps can be generated automatically and sent to PACS for convenient reviewing.
- The default parameters and thresholds used to create the summary maps may be edited by the user according to the physician's preference.
- Automatic motion correction that can be further refined manually if needed.
- Quality indicators ("traffic lights") point at possible acquisition faults that may affect the results.
- Pre-defined ROI templates for systematic and reproducible quantitative regional results

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Workflow

To process CT Brain Perfusion exams:

1. From the **Patient Directory**, select a brain study and click 

2. The system displays the **Initialization Warning** dialog box. Read the message and click **OK** to continue.
3. A traffic light algorithm automatically initiates to assess the quality and suitability of the study acquisition for the Brain Perfusion analysis. The algorithm checks several parameters and provides alerts using a traffic light system  for warnings.
   - A yellow light indicates that the acquisition is of mildly insufficient quality
   - A red light indicates that the acquisition has inadequate quality.
   - For more details on a particular warning, click 

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4. If there are no warnings, this dialog box does not display.

The **Data Validation** dialog box reappears with non-severe and severe data warnings as you progress through the workflow.

5. Review each warning and then select one of the following:
   - To save the warnings, click 

, then click either
     - 

to bypass the warnings, or
     - 

to close the application and return to the Patient Directory
6. Click  (Play) to review the image and check for **Presence of Motion**.
   - If motion is still present, click  (**3D motion correction**).
   - If patient motion can be defined to one or more time points those frames can be removed by clicking  (**Remove displayed point**). Up to 8 time points can be removed with no more than 2 consecutive points removed.
7. Click  (**Show mask**) to view the **Cerebral Mask**. The Cerebral Mask is an overlay that shows the volume identified as the brain by the Brain Perfusion application. Check the brain mask and verify that all brain tissue is included in the mask.
8. Verify the location of the cerebral mirror line and adjust it as needed.

9. To adjust the mirror line on individual slices, at the top of the **Control Panel** select the **Edit mirror slice-by-slice** check box. The application places an automatic artery.
10. Do one of the following:
    - To use the automatically identified artery, in the main viewport point to **Artery 1?** and select **Use for Calculation**.
    - In step **4. Artery Selection**, click  (**Draw**), and draw additional artery ROIs. Then point to the artery for calculation and select **Use for Calculation**.

Note You can draw up to ten arteries.

11. Under **5. Vein Selection**, click  (**Detect Vein**) to access the slice where the automatic vein is identified.
12. Do one of the following:
    - To use the automatically identified vein, in the main viewport point to the vein and select **Use for Calculation**.
    - In step **4. Vein Selection**, click  (**Draw**), and draw additional vein ROIs. Then point to the vein for calculation and select **Use for Calculation**.

Note You have the ability to draw up to twelve veins.

Important Artery and Vein must be verified and identified for **Use for Calculation** before moving to the next workflow step.

13. Click  next to Vessel Definition to move to 2, **Perfusion Maps**.

Note The **Data Validation** dialog box reappears with non-severe and severe data warnings. Refer to Step 3 for instructions about this dialog box. If there are no warnings, this dialog box does not display.

14. In the top left viewport, the purple overlay identifies all major cerebral vessels that will be excluded from the perfusion parameters calculation. Under **Verify Vessel Removal**, verify that the vessels being excluded are correct and adjust the **Vessel's threshold** as needed.
15. Under **Measure Tissue ROI**, click  (**Draw tissue ROI**) to manually measure perfusion values within a selected region. The results from the ROIs display below the axial image and show CBV, CBF, MTT, and TTP. Permeability is also an option when applicable.

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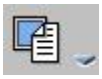
16. The Summary Map displays the relationship between areas of reduced blood flow and areas of reduced blood volume. It summarizes information from all four perfusion maps into a single map. Under **Apply Summary Map**, do one of the following:

    - To display the Left Hemisphere Summary Map, click  (**Display Summary Maps on Left Side of Mirror Line**).
    - To hide all summary maps, click to clear  or  (**Display Summary Maps on Left/Right Side of Mirror Line**).
    - To display the Right Hemisphere Summary Map, click  (**Display Summary Maps on Right Side of Mirror Line**).

17. Do one or more of the following:

    - To save a key image(s), click the  (drop-down arrow) in the left **Navigation** pane and select **Key Images**. Then select a single image and right-click  , or press **CTRL** on the keyboard, select multiple images, and click  .
    - To save the ROIs, click  (**Save results as…**).
    - To save the images, click  (**Save selected image as**) and select the way you want to save the images.
    - To save tables in non-DICOM format, click  (**Save all tables as…**).
    - To bookmark the images, click  (**Bookmark**) and set the bookmark in the **Save Bookmark** dialog box.
    - To send the final images to the reporting package, click  (**Send selected images to report**).
    - To save a whole screen image batch of all slices with maps click  (**Save batch as**).
    - To save a customized batch, click the drop-down next to **Stroke Perfusion Results** and select **Batch**. Then select the batch content, sort the batch content, and select whether to split the batch to series.

      After the image batches are prescribed click  (**Save batch as**).

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