EmpowerCTA®+ Contrast (Injector) System Training

1. General Overview

- The EmpowerCTA®+ Injector System is an injector from Bracco. It can be utilized to inject iodinated contrast only or contrast followed by a saline chase.

- The Extravasation Detection Accessory (EDA) is an auxiliary device, which assists users in the detection of possible extravasations. It is not intended as a substitute for observation and intervention by a trained healthcare professional. This is an optional item which can be purchased separately.

- EmpowerCTA®+ Injector System Components
  - Injector: It consists of two components: Injector Head and Injector Controller.
  - Computer (remote/monitor): It is a touch panel PC to input control parameters used by the Injector. This is used at the tech console work area.
  - Power Supply: It provides power to the Injector only and acts a conduit.
  - for the communications between the Injector and Remote Control.
  - EDA: It is an auxiliary device for detection of possible extravasations.

- EmpowerCTA®+ Injector System Safety Features
  - Extravasation: Extravasation Detection Accessory (EDA)
  - Air in Syringe: User must Auto Initialize each syringe use.
  - Air Bubbles: Tilt Sensor
  - Purge Line: Purging the contrast/saline (bleeding the line)

- Ease of programming the EmpowerCTA®+ System by body name or sub-folders.

2. Injector

- Injector is composed of two main components:
  - Injector Head which is used for loading and unloading syringes.
  - Injector Controller (remote) which provides the user control of the actions of the Injector Head.
    - Using the Injector controller interface can start the injection.
- The Power switch is located on the side of Injector Controller.
- Injector Head Overview
- Two syringes interface for loading contrast and saline.
- Injector head controls are displayed for loading and unloading the syringes.
  - Teflon coating to aid in the removal of dried contrast.
- Injector Control Panel Buttons & Lights
  - Auto Initialize (10 ml/sec)
  - Fast Forward (double arrows) (10 ml/sec)
  - Slow Forward (single arrow) (1 ml/sec)
  - Fast Reverse (double arrows) (10 ml/sec)

- Slow Reverse (single arrow) (1 ml/sec)
- Replace Syringe **(Check valves(tubing) should be removed)**
- Manual Button (allows manual placement of Injector piston)
- Contrast and Saline buttons (allow user to freely select which syringe is active, colored coded and labeled with LEDS on the Injector)
- Auto Load: Once the syringes have been inserted and the doors closed, the piston (ram) will automatically drive the syringe plunger up to the load position. Contrast and Saline plungers simultaneously move up into the load position.
  - Note: This feature can be turned on or off by pressing the blue touch pad on the far-right hand side of the injector head remote **(Auto On/Off).**

- ARM / RUN Indicator Lights
  - Light Blinks When Ram is moving
  - Light is Solid (on) when System is Armed or In Pause Mode

- Syringe Warmer (Contrast Syringe only)
  - Maintains Contrast Temperatures.
    - Note: the syringe warmer will not heat cold contrast
  - Easily removed for cleaning purposes

- Rotating the Injector Head Properly & Position for injection
  - Tilting the Injector (tilts either way R or L)
  - Control Panel Swivels for Easy Viewing

- CT Syringes:
  - Syringe(s) should be removed from the packaging using aseptic technique.
  - Place the Syringe(s) in the Injector head (no keying required)

3. Loading the Syringe with Contrast

- **Injector Position**- Place Injector in LOAD Position (Injector head in the upright position and the injector syringe position indicator on the injector Controller)

- **Auto Initialize** is a safety feature which automatically purges air from the syringe to avoid injecting a syringe full of air.
  - When the Auto Initialize Button is pressed, the LED starts flashing, as the injector ram is moving. This feature is hands free which enables the technologist time to prepare the contrast for loading.

- Place Fill Tube, Transfer Set or Spikes - (show how to position fill tube spikes to load the Injector). Discuss safety when using spikes.

- **Manual or Protocol Fill** (Single or Dual)
  - The Auto/ Manual Protocol Fill Steps will fill 7 ml extra over the set contrast protocol and 25 ml extra over the set saline protocol.
  - Use Auto purge and line purge features to purge the line.

- **Proto Fill**, when a protocol is selected either Contrast only or both Contrast and Saline, pressing this button will automatically fill the syringes for the amount indicated.

- **Auto Purge**, when the transfer tubing is connected to the syringe, the plunger will load 15ml of Contrast, push the air back up into the contrast bottle and then fill the indicated amount plus 7 ml over the set protocol. This same process is done on the saline side. **This feature can be turned on/off.**

- Attach "Y connectors" and/or coiled tubing for contrast/saline injections.

- **Line Purge** Button will remove the air from the coiled tubing.

- Auto Fill Button vs Manual Buttons

4. Loading the Syringe with Saline

- Load/place syringe in the injector head. Close the syringe door.

- Auto Initialize Button, if activated, will start the movement of the plunger. The LED starts flashing, as the injector ram is moving. It is hands free which enables the technologist time to prepare saline using aseptic techniques.

- Many techniques are available to load saline. It can be done using the fill tube (unit dose bottle of saline) or transfer set for IV bag (vented spike helps to remove saline from bag).

- Place Fill Tube, transfer set or spikes on syringe.

- Auto Fill (dual/single)
  - Show the manual / proto fill for dual syringes.
  - The Fill Button allows one-handed syringe filling.

- Saline Filling into the Syringe (**= Auto Load and Auto Purge)**

- Attach connecting coiled tube onto each syringe (spin/turn the syringe until it engages the luer. Do not over tighten)

- Removal of the tubing at the end of the exam by spin/turning the syringe to loosen for disposal.
  - This action must be done prior to removing and discarding the used syringes.

- **Purge Line Button** is used to remove the air from both syringes.
  - The contrast is (purged) bled to the "Y" and Saline is advanced for the remainder of the tubing.
  - Take note that air needs to be fully removed from both syringes.

- Tilting Injector Head 15 degrees below horizontal in order to activate the RUN indicator and administer contrast/saline protocol.

- Note: Differences in the available/active Buttons for when the Injector Head is tilted in LOAD Position (vertical) vs tiled down for injecting contrast/saline.
  - IMPORTANT: the ARM Button **WILL NOT** Come ON in the Upright Position
  - The injector must be 15 Degrees below horizontal for the Tilt Sensor to allow the RUN button to display. The is a safety feature to prevent air from being injected from the syringe.

5. Extravasation Detection Accessory (optional item)

- EDA Patch
  - When to Use the EDA Patch and When Not to (i.e., tape)
  - Sensitivity
- Insert the Patch into the EDA Clip
  - Do not remove EDA Patch from pouch until patient is ready (non-latex gel coated patch)
  - Remove Patch from Packaging.
  - Fold Down Tab and Orient the Patch with the Clip
  - Depress the Clip and Listen for the Audible Click
- How to Place Patch on the Patient
  - Proper Orientation of the Patch "Sweet Spot" with the tip of the Angiocath
  - Notice the Injector Control Display and the Remote will relate the status of the Patch.
    - Out of Range, In Range and No Baseline
  - Secure the EDA Cable with the Strap
  - All steps are recorded on the remote.
  - Position the patient in the desired position before arming the injector (i.e., arms down by their side, arms above the head). This will prevent the arm indicator of being disengaged.
- Minimize Contact with the Patch
  - Apply steady pressure.
  - How **NOT** to palpate
  - Palpate (feel) then remove the hand, then palpate again (no "jumping" around)
  - Note: Aggressive palpation will affect impedance (i.e., "Out of Range" prior to injection, false positives during injection)
- EDA Patch Placement Using the Black Dot Method
  - Note the relationship of patch to the end of the angiocath for correct patch placement.
  - The Location of the angiocath end is marked with a black dot.
  - Place the patch over the black dot.
- Possible EDA Messages
  - EDA Enabled – In Range
  - EDA Enabled – No Baseline
  - EDA Enabled – Out of Range
- EDA User-Disabled
  - The EDA will only become **active** when the patch is securely fastened into the EDA clip and applied to a patient.

6. Computer

- Note the different parts of the computer.
- Enter the flow fate and volume.
- Change a phase to saline.
- Note the elapsed time display.
- Pause the injector at the: Injector Head and Monitor/Remote
- Saline first is available for test injection by using the Saline Advance feature to test the patency of the vein.
  - This is why an extra 25 ml of Saline was drawn up.
  - Testing the vein is still done by manual technique prior to hooking the patient up to the injector.

- Saline will be injected first since the line is purged with saline.
- Contrast/Saline will be injected according to the protocol selected.
- Injection parameters are Contrast /Saline or Contrast, Contrast /Saline
- Pausing the Injector can occur at the Injector Head and at the console.
- Adjusting flow rates once an injection has started can be done without stopping and selecting a different protocol.

- Volume injected / volume remaining for Contrast and Saline syringes and total injection curation.

7. Program Screen

- Entering a protocol
  - 100 Programs (protocols) can be stored.
  - Highlight program name.
  - Press anatomical identifier.
  - Select body part.
  - Program name
  - Keyboard appears.
  - Type in name (IE: Chest)
  - Select flow rate.
  - Select volume.
  - If using Saline press 2C and repeat steps (H & I)
  - Press saves.
- Sort by anatomical Identifier sub folders
- Save a protocol.
- Copy (Save As) a protocol such that it can be changed.
- Delete a protocol.
- SETUP Area (These features can be Enable or Disenabled
  - Service password protected for use by ACIST Service personnel only.
  - Print feature is using a Dymo Printer.
    - Adjusting Volume
    - Enable/Disabling the Voice message/beep (Note: The voice is only heard at the console)
    - Test injection parameters
    - Restoring system to factory default
    - Delay scanning.
    - Injector sync features (if purchased)
    - Pressure limits units (psi, Kpa, or bars)
    - Service password protected for use by ACIST Service personnel only.

8. Pressure Limiting Feature

- Default is 300 PSI; max PSI is 325
- When Pressure limiting occurs the user will be notified by an audible tone
- Pressure limiting will occur when the flow rate delivered is reduced by more than 25% of the set flow rate.
- When the delivered flow rate falls below 0.1 ml/sec for 5 seconds. The system will declare an OVER PRESSURE and pause the injection.
- Pressure limits can be stored in a saved protocol.
- Programmable range is 40-325 psi in increments of 1 psi.
- Needle cannula sizes should be used according to the designated manufacturing flow rate.

9. Arm the Injector

- Green ARM Indicator

10. RUN/START/Stop the Injector

- Using the Pendant Switch
- Using the Computer
- Using the Remote at the injector head

11. Change the Flow Rate

- At the Injector Controller
- At the Computer/Console/Remote

12. Pause the Injection

- Using Pendant Switch
- At the Injector Control Panel
- At the Computer/Console/Remote

Note: If there is a manual pause put in place this is not on a clock/timer, the technologist has to manually press the RUN button at the desired time. At the time paused, the injector will count down and resume injection.

13. Run Mode

- Programming a Delay to Scan
- Delay to Scan verbal instructions “Start the scanner”.
- EDA Verbal instructions “Check for possible extravasation.”
- Explain circumstances of when to STOP an Injection.
- Discuss the Empower Sync features (if available)

Note: The synchronization allows the injector to be interfaced with the scanner and at the desired peak (bolus) and/or delayed time, the injector automatically triggers the scanner to start.

14. Saline Jump Feature

- This feature allows the technologist to jump from delivering contrast to saline (i.e. the pulmonary vessels are opacified and there is no need to give any more contrast; jump over and push saline. This allows for less delivery of contrast to the patient.

15. Over PSI Alarm

- Over pressure situations occur when:
  - Kink in Coiled Tubing
  - One-way valve is closed.
  - Angiocath is placed against the vessel wall or a valve.

- Needless system might not allow for a higher flow rate.
- Any devices that are not rated for Power Infusion.

16. Fault Codes

- Record Fault Code
- Power injector down, wait 10 seconds, power system back-up.
- If problem does not clear, Call Service **1-888-670-7701**

17. Help Button

- Press the ACIST logo or HELP button in the upper right-hand corner of the remote,
- The system manual is built into the injector system.
- A CD with the manual is provided for each customer.

18. Printer

- The Dymo label writer 400 or 450 is the only compatible printer to be used with the injector. http://global.dymo.com/enUS/Products/LabelWriter_400.html
- Information Available
  - Patient Name
  - GFR
  - Contrast Name
  - Contrast Lot Number
  - Contrast Volume Injected

19. Nexo or Nexo Dose CT – Injector Contrast Reporting Information System

- This information can be networked from the injectors to an administrator's desk and is an optional item and purchased separately.
- The **VIEWER Option**: is a feature which shows how much contrast/saline is used and/or wasted along with the injection parameters for each patient.
- If purchased this must be coordinated with both Bracco and customer's, IT departments.
- All data is stored at the end of the injection for each patient and could help with any trends within the department and to assist with some quality or budgetary concerns.

- The system tracks:
  - Contrast wasted and the volume injected.
  - The number of syringes used.
  - Flow rates and extravasations that may have occurred or if the patch was not used.

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