QUICK SETUP OF THE CHEETAH STARLING SV

1 Turn On The Cheetah Medical Monitor

Press the power button until the system turns on.

2 Place & Connect Sensors

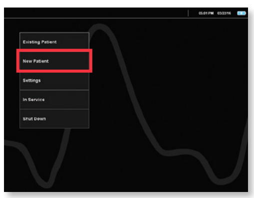
Place sensors on patient's body and attach to patient cable according to their color.

The CHEETAH Sensors should be positioned around the heart. The exact location is flexible. See sensor package for more information. The Starling SV is 100% non-invasive.

Cheetah Sensors

3 Main Menu Screen

Select **New Patient.**

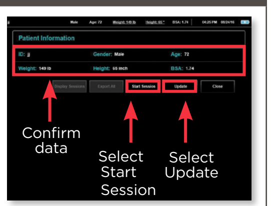


4 Enter Patient Details

Input: ID, Age, Height, Weight and Gender.
Select **Finish.**

5 Review Data & Start Test

Confirm data accuracy,
Select **Update** to correct data.
Select **Start Session** then Confirm Sensor Placement.



CHEETAH Sensors should be replaced after 48 hours of use. Perform a re-calibration after sensor replacement and once daily.

DETERMINE FLUID RESPONSIVENESS

PASSIVE LEG RAISE (PLR)

Passive Leg Raise (PLR) Dynamic Assessment

Conduct a reversible fluid challenge in order to determine fluid responsiveness.

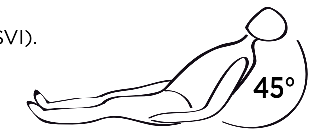
Select **Dynamic Assessments: PLR**

The PLR protocol instructions will be displayed and guide you through the process.

Baseline: Semi-Recumbent position

Collect 3 minutes of stable data for average baseline Stroke Volume Index (SVI).

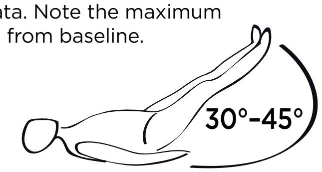
When stable baseline is achieved, the PLR Challenge can be initiated.



Challenge: Leg Raise

Collect 3 minutes of data. Note the maximum % change in SVI (ΔSVI) from baseline.

Follow recommended methods and guidelines for leg raise (e.g., auto-pivot bed motion, wedge cushion/pillow).



Interpretation: ΔSVI ≥10% Patient likely to be Fluid Responsive

SVI is likely to increase in response to IV fluids.[1,2]

Patient on the ascending portion of the Frank-Starling Curve.

Starling SV display of a positive Passive Leg Raise Test

Interpretation: ΔSVI <10% Patient Not Likely to be Fluid Responsive

SVI is not likely to increase in response to IV fluids.

Patient on the flat portion of the Frank-Starling Curve.[1]

Starling SV display of a negative Passive Leg Raise Test

DETERMINE FLUID RESPONSIVENESS

FLUID BOLUS (FB) CHALLENGE

Fluid Bolus (FB) Dynamic Assessment

Conduct a fluid bolus challenge in order to determine fluid responsiveness.

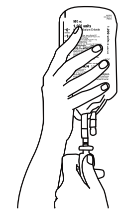
Select **Dynamic Assessments: Bolus**

The Bolus protocol instructions will be displayed and guide you through the process.

Baseline: Prepare for Bolus

For optimal results insure stable hemodynamics for 3 minutes prior to the bolus.

When a stable baseline is achieved, the Bolus Challenge can be initiated.[1]



Challenge: Bolus

Administer Bolus according to your clinical standards/protocols.

250cc (3-5cc/kg) over 3-5 minutes.

Note maximum % change of SVI (ΔSVI) from baseline.

2 minutes of challenge data required for results.

Interpretation: ΔSVI ≥10% Patient likely to be Fluid Responsive

SVI is likely to increase in response to IV fluids.[2,3]

Patient on the ascending portion of the Frank-Starling Curve.

Starling SV display of a positive Fluid Bolus Test

Interpretation: ΔSVI <10% Patient Not Likely to be Fluid Responsive

SVI is not likely to increase in response to IV fluids.

Patient on the flat portion of the Frank-Starling Curve.[2]

Starling SV display of a negative Fluid Bolus Test

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1. Cecconi M, Parsons AK, Rhodes A. What is a fluid challenge? Curr Opin Crit Care. 2011; (17)3;290-5 2. Monnet X, Teboul JL. Passive leg raising. Intensive Care Med 2008;34;659-63 3. Marik P, Monnet X, Teboul JL. Hemodynamic parameters to guide fluid therapy. Annals of Intensive Care 2011

PATIENT SELECTION TOOL

Patient Type
• Shock States/Low Blood Pressure: Sepsis, Low Vascular Tone, Low Cardiac Output, Hypovolemia, Neurogenic Shock[1]
• Patients treated with Inotropes, Vasopressors or Vasodilators.[1]
• Surgical Patients: Perioperative Volume Management, Goal Directed Therapy, Enhanced Recovery After Surgery (ERAS)[2]
• Emergency/Trauma Patients[3]
• Other Critical Care Conditions: Acute Respiratory Distress (ARDS),[4] Sub-Arachnoid Hemorrhage (SAH),[5] Acute Kidney Injury (AKI),[6] and Congestive Heart Failure (CHF)[7]
• Patients undergoing Continuous Renal Replacement Therapy (CRRT) or patients undergoing hemodialysis[8]
ONLY ~50% OF HEMODYNAMICALLY UNSTABLE PATIENTS WILL RESPOND TO FLUID BY INCREASING CARDIAC OUTPUT AND PERFUSION.[9]

CLINICAL SHOCK STATES[10]

Parameter	Normal Adult Range[11]	Cardiogenic Shock	Septic Shock	Hypovolemic Shock
BP (MAP)	> 65	↓	↓	↓
Heart Rate (HR)	60–100	↑	↑	↑
Cardiac Index (CI)	2.5–4.0 l/min/m²	↓	early ↑ late ↓	early ↑ late ↓
Total Peripheral Resistance Index (TPRI)	1970–2390 dynes • sec/cm⁵/m²	↑	↓	↑
Common Stroke Volume Response (ΔSVI) to Dynamic Assessment		ΔSVI <10%	ΔSVI ≥10%	ΔSVI ≥10%
ΔSVI ≥10% Predictive of 15% increase in CO with 500cc[12]				

Dynamic Assessments Directly Challenge the Heart with Volume to Measure its Response:
Passive Leg Raise (PLR) Maneuver — Translocation of 250-300cc of blood from lower extremities into the heart[13]
Fluid Bolus Challenge (FB) — Rapid Infusion of 250cc of fluid over 3-5 minutes[13]

NORMAL HEMODYNAMIC PARAMETERS

Parameter	Equation	Normal Adult Range[11]
Stroke Volume (SV)	CO/HR x 1000	60 – 100 ml/beat
Stroke Volume Index (SVI)	SV/BSA	33 – 47 ml/m²/beat
ΔStroke Volume Index (ΔSVI)	Change in SV after Dynamic Assessment	<10% Unlikely to be Fluid Responsive[13] ≥10% Likely to be Fluid Responsive[13]
Cardiac Output (CO)	HR x SV/1000	4.0 – 8.0 l/min
Cardiac Index (CI)	CO/BSA	2.5 – 4.0 l/min/m²
Mean Arterial Pressure (MAP)	(SBP + (2 x DBP))/3	70 – 105 mmHg
Total Peripheral Resistance (TPR)	80 x (MAP)/CO	800 – 1200 dynes • sec/cm⁵
Total Peripheral Resistance Index (TPRI)	80 x (MAP)/CI	1970 – 2390 dynes • sec/cm⁵/m²
ΔSVI ≥10% Predictive of 15% increase in CO with 500cc[12]		

Dynamic Assessments Directly Challenge the Heart with Volume to Measure its Response:
Passive Leg Raise (PLR) Maneuver — Translocation of 250-300cc of blood from lower extremities into the heart[13]Fluid Bolus Challenge (FB) — Rapid Infusion of 250cc of fluid over 3-5 minutes[13]

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