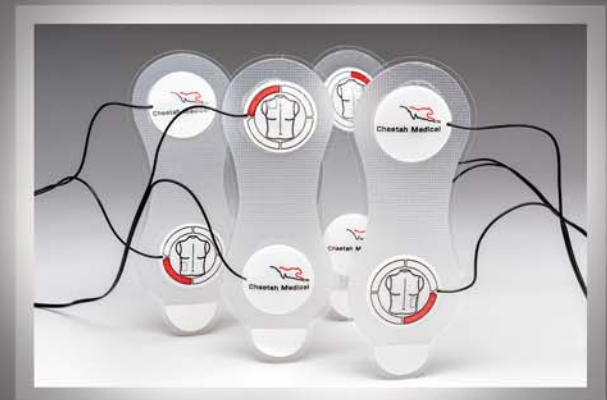


Approximately **50%** of your patients **are at risk** of volume overload. **Do you know which ones?**



Don't guess at volume status. Be certain with the **StarlingTM SV** Noninvasive Hemodynamic Monitoring System.

- 100% noninvasive, easy to use, no patient discomfort
- Eliminates risk of infection and vascular damage associated with older, invasive technologies requiring arterial or central lines
- Independently validated vs. pulmonary artery catheter
- Accuracy not affected by vasopressors, inotropes and shock states
- Provides real time, continuous information on Cardiac Index, Cardiac Output, StrokeVolume Index, Stroke Volume, Total Peripheral Resistance and other important parameters



STARLING™ SV



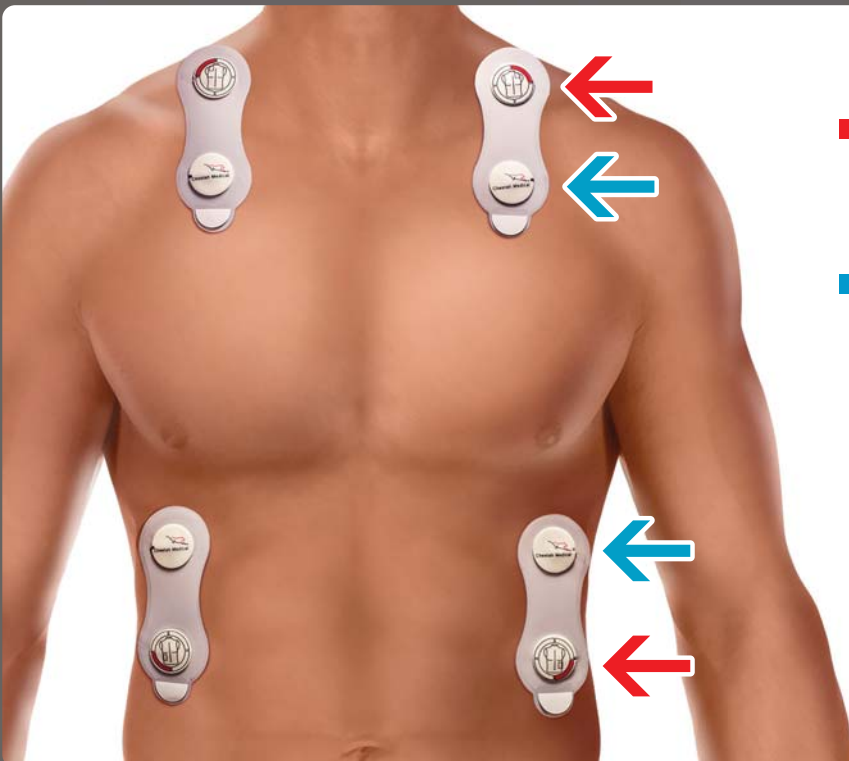
Noninvasive, Real Time Hemodynamic Data for Real Time Clinical Decision Making

No matter the site of care or the clinical challenge, effective hemodynamic measurement and management is integral to achieving an optimal clinical outcome. Until now, the only choices for obtaining accurate, continuous hemodynamic measurements were invasive technologies that carry their own set of risks.

With the Starling™ SV, the clinician has all the important parameters continuously at his/her fingertips. Clinical status and the effect of fluids can be monitored at any time and treatment modified accordingly.

Cheetah Medical Technology

All Cheetah Medical's monitoring platforms use the unique, patented Bioreactance® technology to take measurements continuously and precisely, and it requires only four, easy to place sensors. The sensors can be placed anywhere on the chest or back as long as two are positioned above and below the heart.



- An electric current of known frequency is applied across the thorax between the outer pair of sensors.
- A signal is recorded between the inner pair of sensors.

As the heart expands and contracts, a time delay, or phase shift, is created in the current by blood flow.

The monitor then uses this phase shift as a base-line for stroke volume measurement.

Proven, Noninvasive Bioreactance Technology

Cheetah Medical's Bioreactance® technology has been proven to be faster and more accurate in comparison to invasive technologies such as the pulmonary artery catheter and esophageal doppler.

Validated Technology

Author	Journal	Year	Title	Summary
Keren, H et al	Am J Physiol Heart Ci	2007	Evaluation of a noninvasive continuous cardiac output monitoring system based on thoracic bioreactance.	Shown high CO correlations with PAC (r=.90) in 27 patients & transonic doppler in 9 animals (r=.87)
Marik PE, et al	Chest	2013	The use of bioreactance and carotid Doppler to determine volume responsiveness and blood flow redistribution following passive leg raising in hemodynamically unstable patients	The PLR was validated with sensitivity of 95%, specificity of 100%, with Bioreactance, compared to a sensitivity of 94% and a specificity of 86% for carotid doppler.
Raval NY, et al/	J Clin Monit Comput/	2008	Multicenter evaluation of noninvasive cardiac output measurement by bioreactance technique	CO measurements made simultaneously between Bioreactance & TD in CCU, ICU & cardiac catheterization labs. Bioreactance results highly correlated with TD in the ICU (r=.78). N=70
Rich JD, et al	Eur Respir	2013	Noninvasive cardiac output measurements in patients with pulmonary hypertension	Performed with more precision than Swan TD in vasodilator challenge (p<0.001) N=20
Squara, P et al	Intensive Care Med	2007	Noninvasive cardiac output monitoring (CHEETAH NICOM): a clinical validation	Demonstrated had a 93% sensitivity and 93% specificity for detecting directional changes. and correlated highly with thermodilution (r=.82). N=110
Squara, P et al	Critical Care	2009	Comparison of monitoring performance of Bioreactance vs. pulse contour during lung recruitment maneuvers	Bioreactance & PICCO had equivalent CO & SV monitoring capabilities, including the ability to detect directional changes in CO. N=20
Waldron NH, et al	Anesth Analg	2014	CHEETAH NICOM versus EDM guided goal directed fluid therapy in the perioperative period	Consistent & significant correlation of baseline SV between monitors in 234 fluid challenges. Additionally, Bioreactance had fewer missing data points. N=61

Fluid Management Makes a Clinical Difference

Author	Journal	Year	Title	Summary
Marik PE, et al	Annals of intensive care	2011	Hemodynamic parameters to guide fluid therapy	Dynamic measures of volume responsiveness are recommended to ensure appropriate fluid administration.
Powell-Tuck J	British Medical Journal	2009	Intravenous fluids in adults undergoing surgery; British Consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients	Concern has arisen from a high incidence of postoperative sodium and water overload. Evidence suggests that more accurate fluid therapy would improve outcomes.
The Task Force of the European Society of Intensive Care Medicine	Intensive Care Medicine	2014	Consensus on circulatory shock and hemodynamic monitoring.	Dynamic over static variables should be used to predict fluid responsiveness

Bioreactance vs. Bioimpedance

Author	Journal	Year	Title	Summary
Cheung H, et al	J Anesthesia	2014	Correlation of non-invasive cardiac output monitoring (CHEETAH NICOM) and thermodilution in patients undergoing off-pump coronary artery bypass surgery	Compares Bioreactance, bioimpedance and the PAC. Bioreactance was found to correlate with the PAC (r=0.77, p <0.001)
Jakovljevic DG, et al	J Clin Monit Comput	2012	Comparison of cardiac output determined by bioimpedance and bioreactance methods at rest and during exercise	In contrast with bioimpedance, bioreactance cardiac outputs are similar to those estimated from measured oxygen consumption. N=12

STARLING™ SV

The STARLING™ SV

Has a sensitivity of 94% and specificity of 100% for predicting fluid responsiveness in critical care situations ¹

Predicts fluid responsiveness similarly to esophageal Doppler and other invasive modalities ²

May assist in reducing hospital length of stay ³

1

3



1

Graphic representation of baseline vs. fluid challenge

2

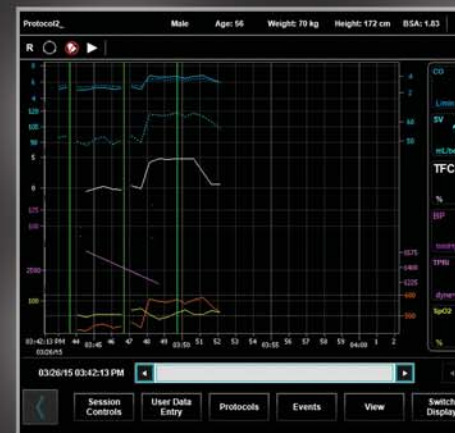
Indicates where patient is on the Starling curve



Dashboard Display

Real time, continuous beat to beat data

Displays results in real time for CI, HR, NIBP, SVI and SV



1. Marik PE, et al. Chest, 2013

2. Waldron NH, et al. Anesth Analg 2014; 118:966-75.

3. Dunham et al. J Trauma Acute Care Surg. 2012

Easy to Use ... Robust ... Flexible
and, of Course ... 100% Noninvasive

The STARLING™ SV offers

2

A portable and lightweight (H: 8.7", W: 11.4", D: 7.4", 9.5 lbs)
10.4" touch screen monitor

Setup wizard which walks the clinician through an easy, step
by step protocol for executing the PLR or bolus test

First results in approximately 70 seconds

User friendly interface provides easy to read graphics and
numbers with responsive touch control

Monitor fits on a table or IV pole

Open platform facilitates connection to EMR

Battery operation



Customizable screen parameters to help you focus on what's important

on an approximated

3

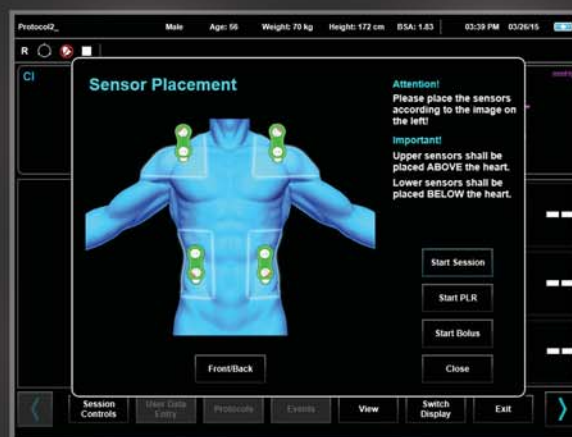
Measures response range, baseline through
challenge for CI, HR, MAP, TPRI, SVI, DO2I & TFC



Trend Display

Displays parameters
graphically

Displays graphical results of
all saved or ongoing
measurements – SV, SVI, CO,
CI, HR, NIBP, (SBP, DBP &
MAP), TPRI, TPR



Sensor Placement Display

Shows correct sensor
placement

Glowing green sensors
indicate proper sensor
connection while glowing
red sensors indicate an issue
with the connection

STARLING™ SV



Emergency Department (ED)

Frequently, the staff has no history. The patient may have suffered severe trauma and may be unconscious or incoherent. The right clinical decisions can make the difference between life and death. The STARLING SV sensors are easy to apply and can “travel” with the patient. Approximately 70 seconds after the sensors have been applied, hemodynamic data is available.

No more waiting for a technician to arrive or a result to come back in a critical situation. ED personnel use the Starling SV for:

- Helping distinguish between: Septic, Cardiogenic or Hypovolemic shock
- Determining if your patient is a fluid responder in trauma situations
- Guiding fluid resuscitation in sepsis without overloading the patient



Medical ICU (MICU)

With the physiological parameters continuously available through the STARLING SV, clinicians can:

- Guide fluid resuscitation in septic shock
- Directly monitor the response of cardiac output changes due to therapeutic intervention in cases of cardiogenic shock
- Manage CRRT/Hemodialysis by monitoring cardiac output changes in response to fluid removal
- Determine if low urine output is related to low cardiac output

No matter where the patient is in the hospital, STARLING SV's real time data improves diagnostic precision, facilitates effective hemodynamic treatment and enables efficient use of the clinician's time.



Operating Room (OR)

The anesthesiologist and rest of the surgical team can, in real time:

- Pay special attention to the needs of compromised patients, e.g., cardiac patients with an ejection fraction < 25%
- Treat promptly to prevent an intraoperative crisis in surgical procedures with high fluid shifts, e.g., robotic prostatectomy
- Diagnose and treat complex hypotensive situations due to:
 - Combinations of blood loss
 - Changes in PVR (regional anesthesia)
 - Decreased venous return (laproscopic insufflation/patient positioning)



Surgical ICU (SICU)

Patients often emerge from surgery with an indeterminate volume status due to significant fluid shifts intraoperatively. An optimum recovery is facilitated by establishing adequate perfusion as soon as possible. STARLING SV is especially useful in:

- Post-Op bleeding where you can trend significant changes in circulating volume (Stroke Volume/CO)
- Providing real-time status of a patient's fluid responsiveness vs "static" pressure measurements (CVP)
- Shock patients by allowing you to titrate therapy to optimize hemodynamics and tissue perfusion



Other Patient Settings in the Hospital

With critical information being available approximately 70 seconds after the sensors are placed, the portable STARLING SV is ideal for a rapid response to an emerging crisis in any patient setting within the hospital.

STARLING™ SV : A Clinically and Economically Sound Decision

How does the Starling™ SV compare to alternative modalities?

	STARLING SV	Pulse Contour	Thermo Dilution
Severe vasoconstriction i.e. shock (septic, cardiogenic) ¹	+	-	+
Arrhythmia ^{1,2}	+	-	+/-
Arterio-spasm ¹	+	-	+
Pulmonary Hypertension ²	+	+	+/-
Noninvasive	+	-	-

What is the economic impact of using the Starling™ SV for managing volume?

With healthcare expenses continuing to rise, the pressure has never been greater on hospitals to pro-actively manage costs. As a result, hospitals throughout the US are evaluating new ways to improve patient outcomes while simultaneously containing or avoiding costs.

An Economic Analysis Tool was created by Adi Renbaum, MBA and Thomas Hopkins, MD MBA to demonstrate a new approach to business intelligence in healthcare, providing clinicians and executives with the tools they need to simultaneously improve patient care and avoid costs. The Economic Analysis Tool can be used as part of a personalized and predictive model that can be leveraged to evaluate the cost effectiveness of purchasing noninvasive hemodynamic monitoring equipment.



For a more detailed analysis of how the 100% noninvasive Starling SV can positively impact your institution's economics, visit <http://cheetah-medical.com/tools/economic-analysis>.

1. Edwards Life Sciences: <http://www.edwards.com/products/mininvasive/Pages/flotracfaq.aspx>

2. Rich Jonathan D, Archers SL, rich S, Noninvasive cardiac output measurement in patients with pulmonary hypertension Eur Respir J 2013; 42: 125-133

ORDERING INFORMATION

Product Description	Code
Starling SV Noninvasive Cardiac Output & Hemodynamic Monitoring System, with 3.7m patient cable, power cord	CMM-ST5
Cheetah Sensors™ (25 Box), Pre-attached Leadwires	CMS25
Cheetah Sensors™ (50 Box), Pre-attached Leadwires	CMS50



Cheetah Medical, Inc.

600 SE Maritime Ave Suite 220
Vancouver, WA 98661 USA
Toll free: (+1) 866-751-9097
Tel: (+1) 360-828-8685
www.CheetahMedical.com

FINANCING

Financing is available for the STARLING SV.

Please contact your Cheetah Hemodynamic Sales Specialist for more information.

The Starling SV is a trademark of Cheetah Medical, Inc.

R-MRK-017 rev1



www.CheetahMedical.com