

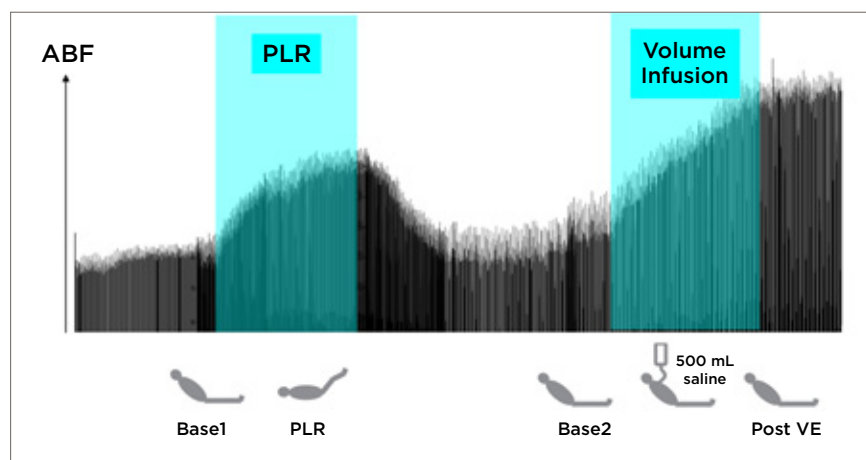
Cheetah Medical™ Education presents — FAST FLUID FACTS

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GETTING TO KNOW THE PLR

Let's talk about a passive leg raise, or PLR. It's a well studied test and when assessed using stroke volume, the PLR has excellent sensitivity and specificity for determining fluid responsiveness.¹



This picture shows what happens during a Passive Leg Raise. Here, blood flow out of the aorta (Aortic Blood Flow/ABF) is measured by ECHO for each heartbeat. Each black line is the stroke volume for one heart beat.²

Raising the legs in an average size adult returns roughly 250mL of blood to the heart very quickly. In this fluid responsive person, we see that stroke volume increases with this additional blood. This rise

in stroke volume (more than 10%) has been shown to be highly predictive of what the heart will do when a fluid bolus is actually given. In this patient, we see that as the legs are put back down, the fluid redistributes and SV (Aortic Blood Flow) returns to normal. When a fluid bolus of 500mL NS is given, we see the sustained rise in Stroke Volume (ABF) as predicted.²

This is the essence of PLR and a dynamic measure — challenging the heart with a small amount of fluid and observing the response.

The PLR has been extensively studied (multiple studies and two large meta-analyses of 1,000 and 2,200 patients) — it is a very good diagnostic test as evidenced by the statistics (ROC/Sensitivity/Specificity).^{1,2,3}

As a diagnostic test it outperforms other tests we use everyday — serum creatinine for renal function, and thyroid function tests.^{4,5} It's performance rivals troponin tests that we use to diagnose myocardial infarcts.⁶

So just to reinforce... A dynamic measure is challenging the heart with a small amount of fluid and seeing the heart's response. With all of our other technology (CVP, PA, Echo, etc.) this is what we've been trying to assess and understand. Today with Cheetah's bedside stroke volume, **we can now look directly** — no more guessing!

continued



Remember: Hypotension and a clinical assessment alone are very poor diagnostic tests to determine if your patient will respond to fluids.³

Resuscitation should ideally be guided with a measurement of stroke volume **because studies show that only ~50% of hemodynamically unstable patients will respond to fluids.**³ If your patient is not fluid responsive, this should raise questions about the value of further fluid for that patient.

In fact, using stroke volume to guide IV fluid management in the ICU and OR has been shown to reduce renal failure, pulmonary complications, surgical wound infections as well as length of stay.^{7,8}

When we get fluid right it changes outcomes, and a passive leg raise is an excellent test to determine if fluid will be effective or not!

References:

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6. Troponin
7. Latham HE et al. Stroke volume guided resuscitation in severe sepsis and septic shock improves outcomes. Journal of Critical Care 2017; 42: 42-46.
8. Calvo-Vecino JM et al. Effect of goal-directed haemodynamic therapy on postoperative complications in low-moderate risk surgical patients: a multicentre randomised controlled trial (FEDORA trial). BJA 2018; 120(4): 734-744

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R-MRK-114 Rev.1



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