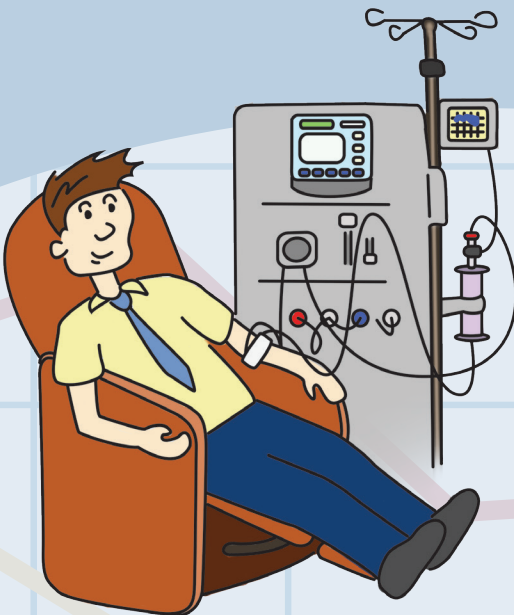
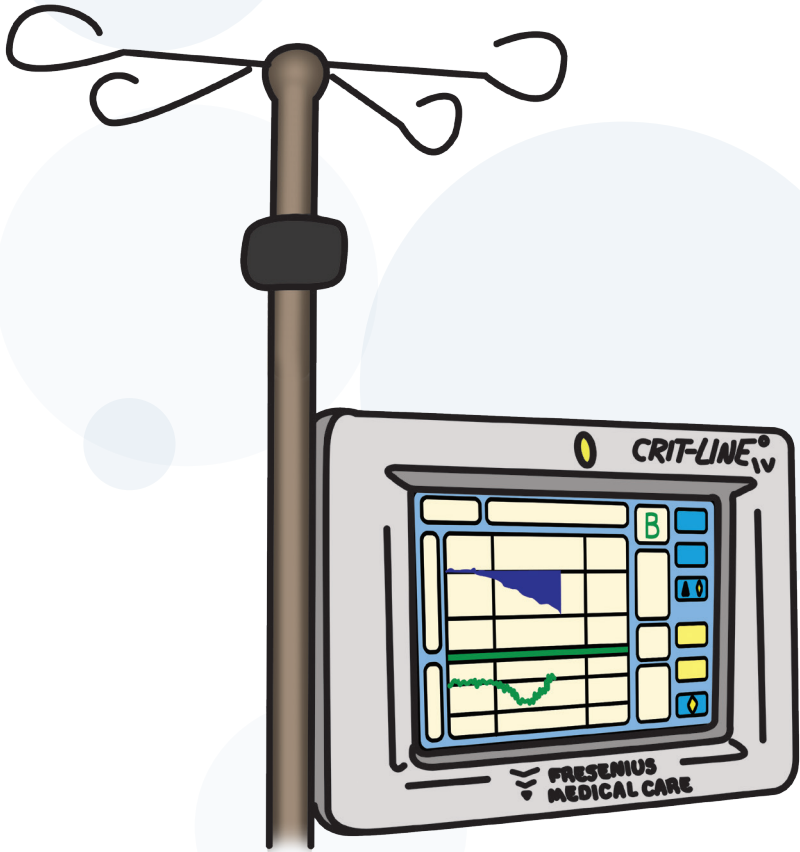




Understanding Your Fluid Status During Dialysis and the Crit-Line® IV Monitor

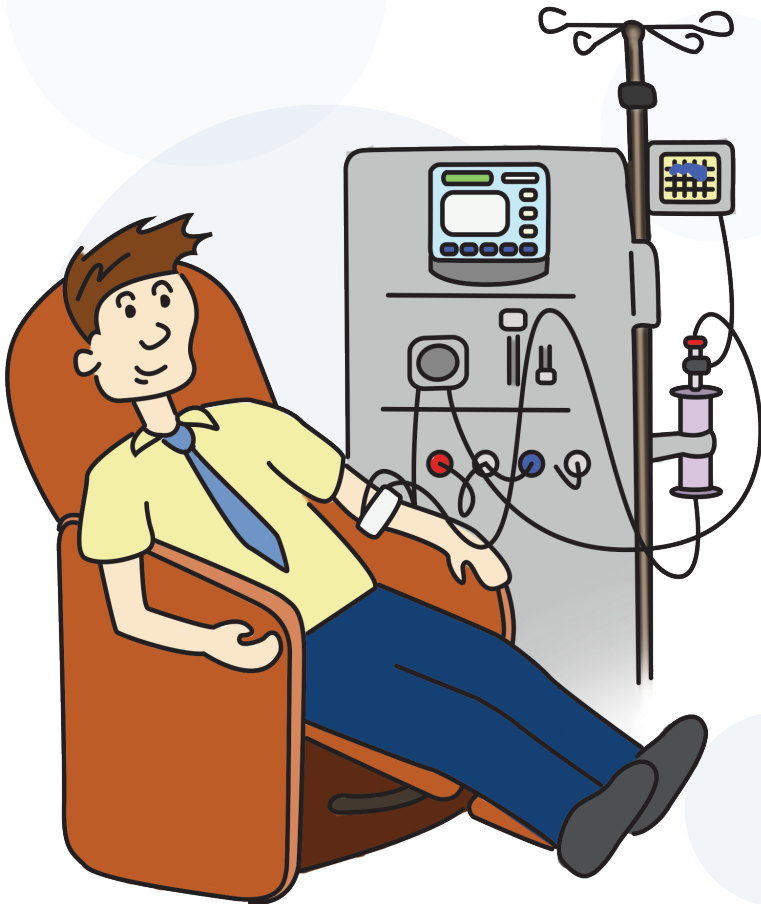


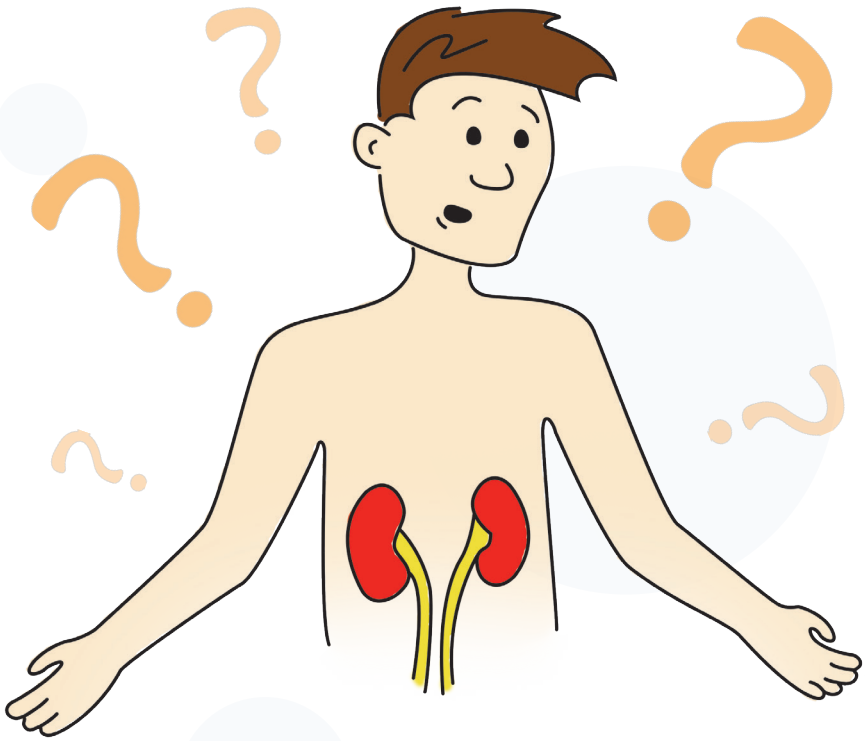
CRIT-LINE®
Where Therapy and Diagnostics Meet **IV**



Understanding Your Fluid Status During Hemodialysis

Welcome to understanding your fluid status during hemodialysis. This book was written to help you understand what happens inside your body when your kidneys can no longer produce urine and excess fluid must be removed by dialysis. Keep in mind that it is important to discuss any questions you may have with your doctor or a member of your dialysis healthcare team. Let's start by learning a little bit about how your body manages fluid.



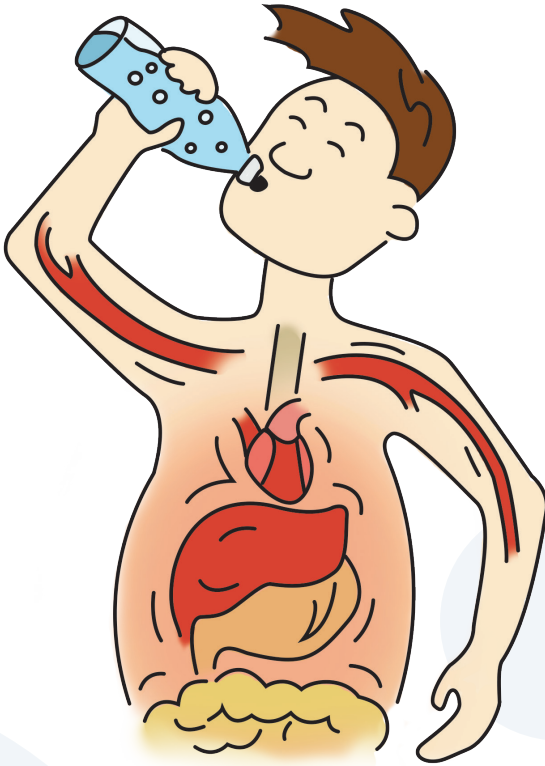


What Do My Kidneys Do?

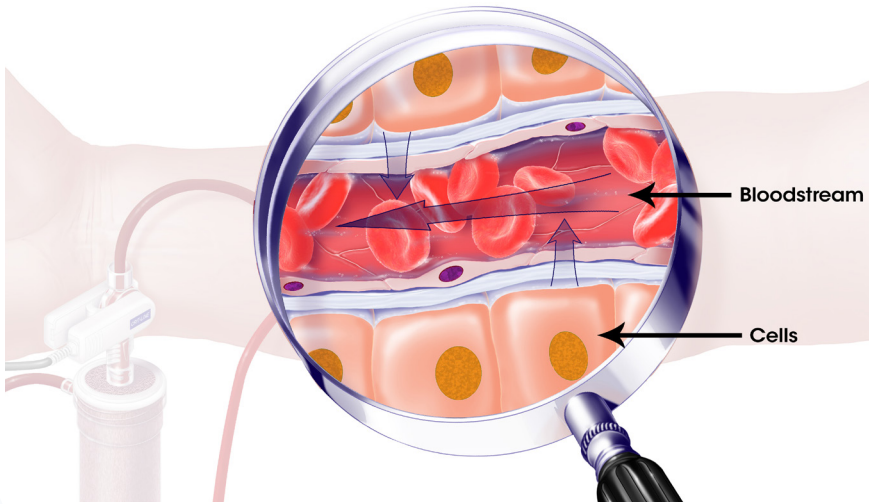
The kidneys remove toxins and regulate fluid balance and nutrient levels. The toxins and fluid the kidneys take out of the blood become urine. Urine is stored in the bladder until it can be passed out of the body. With impaired kidney function, a person needs dialysis or a kidney transplant to live.

Where Does the Fluid Go?

When you drink, the fluid goes to your stomach and intestines and is quickly absorbed into your bloodstream. There is always a balance between the fluid in the bloodstream, tissues and cells. Excessive fluid that is not excreted by the kidneys will accumulate in the body's bloodstream, tissues, cells and organs.



A View Inside Your Bloodstream



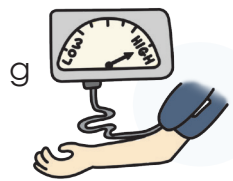
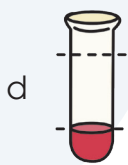
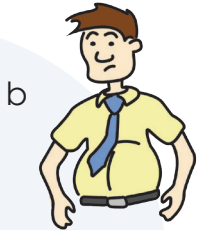
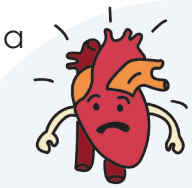
Does Dialysis Help Remove This Extra Fluid?

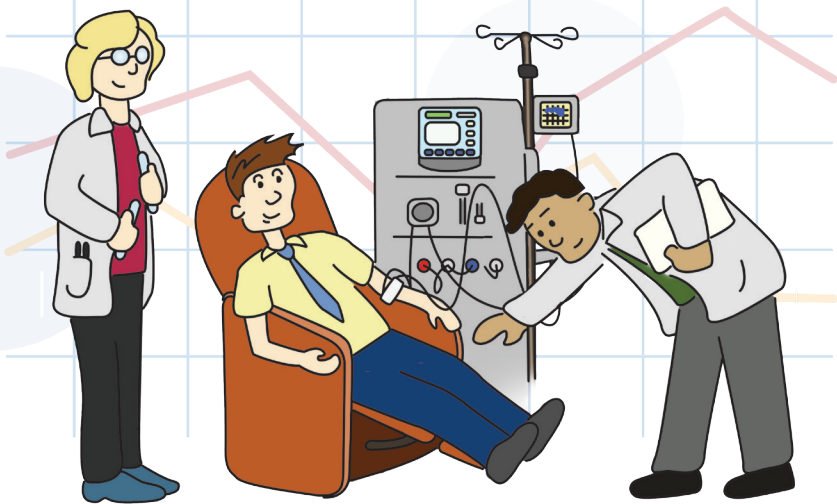
Yes, during dialysis, the toxins and extra fluid move, or shift, from the cells and tissues into the bloodstream, then into the dialyzer where they are removed. The shift in fluid from tissues into the blood is called plasma refill. The speed at which the fluid shifts is called the plasma refill rate (PRR).

How Will I Know If I Have Too Much Fluid in My Body?

Too much fluid in your body can cause many different symptoms. Let's see if you recognize any of these symptoms. Match the symptoms with the pictures below:

1. Difficulty breathing ____
2. High or low blood pressure ____
3. Edema or puffiness ____
4. Extended belly ____
5. No symptoms ____
6. Lower percent of red blood cells, or hematocrit (Hct) than usual ____
7. Lack of energy ____
8. Heart problems ____

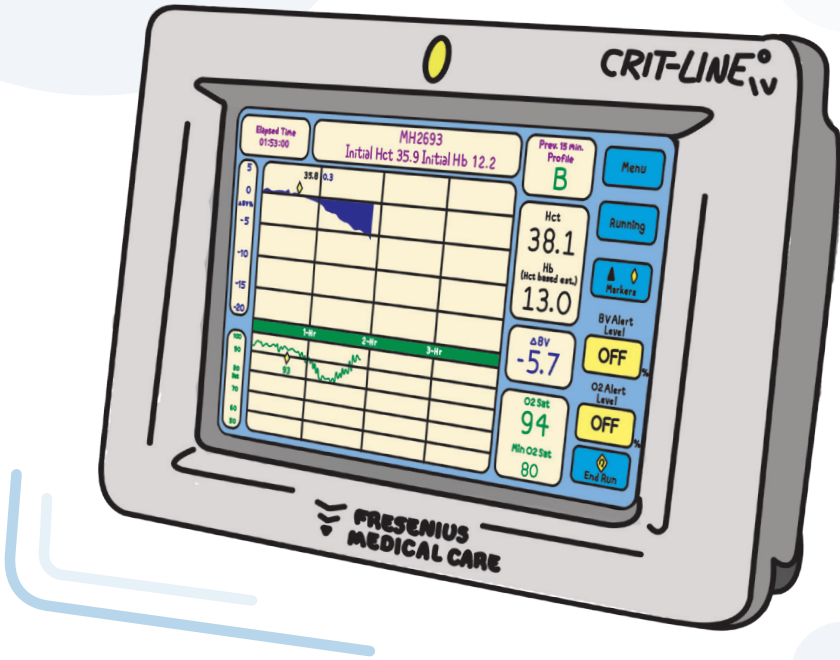




How Does My Healthcare Team Evaluate the Fluid in My Body?

Your healthcare team can use a variety of methods to determine if you have excess fluid levels in your body. They may include:

- Observing your before (pre) and after (post) dialysis body weight for fluid changes
- Checking for swelling or edema in your tissues
- Monitoring your blood pressure
- Checking your lab values
- Using the Crit-Line IV monitor
- Performing a full clinical exam



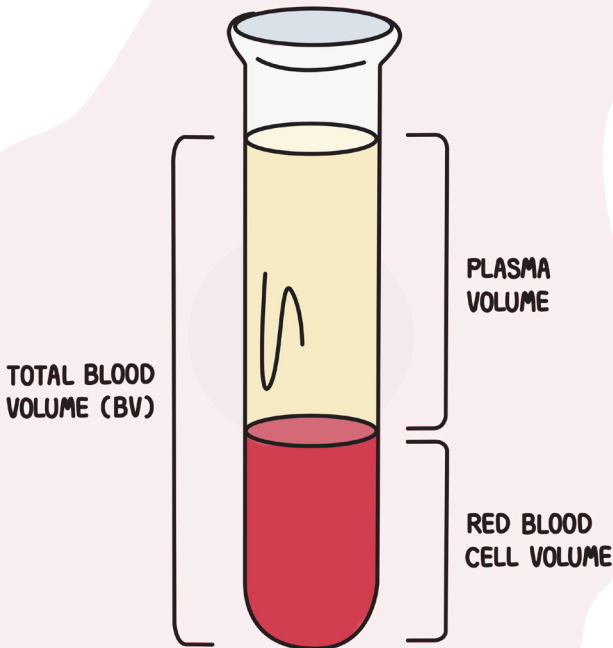
Blood Volume Monitoring: How the Crit-Line IV Monitor Can Help

The Crit-Line IV monitor is a medical device that allows your healthcare team to assess how well your body is responding to the fluid removal rate during dialysis. It is like looking through a magnifying glass into your bloodstream while you are dialyzing. It can help your healthcare team determine if they are removing fluid from you too fast or too slow. This is called blood volume monitoring.

Hematocrit

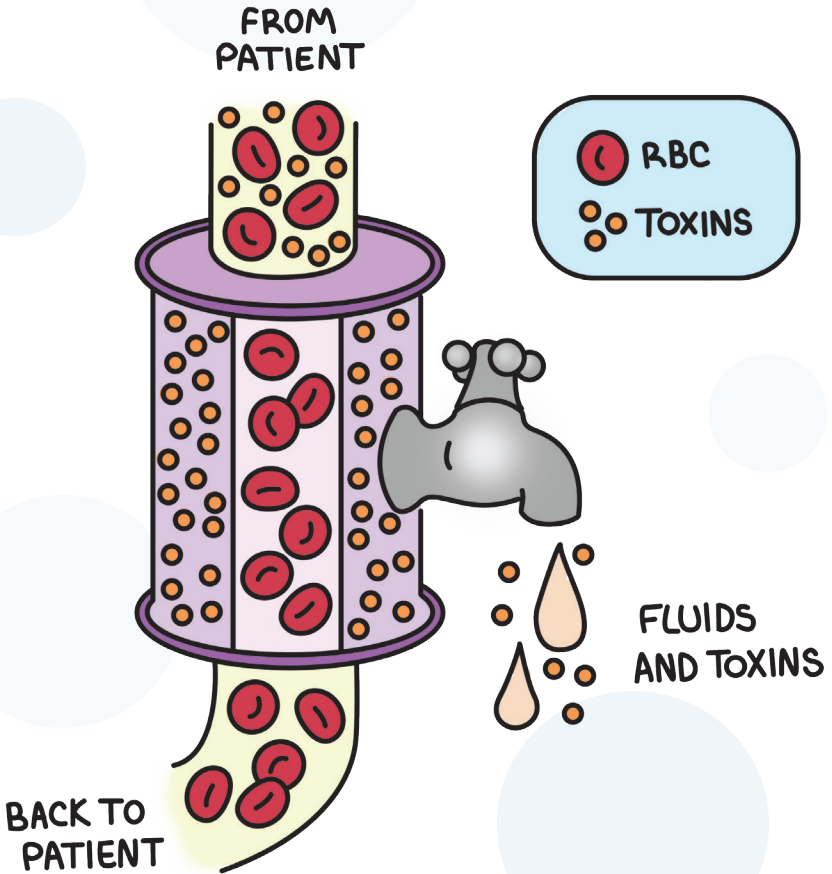
In order to understand how the Crit-Line IV monitor works, you need to understand the relationship between hematocrit (Hct) and blood volume change. Hematocrit is the percentage of red blood cells in your bloodstream compared to your total blood volume.

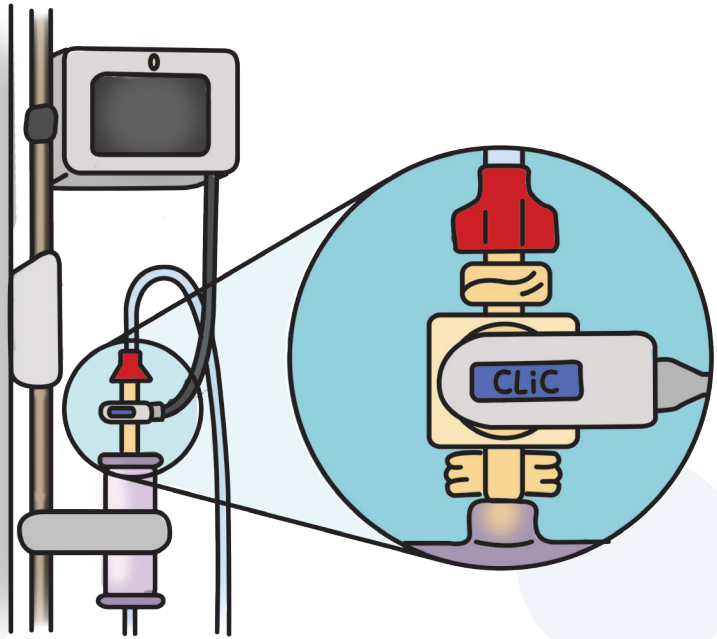
Having this information in real time allows proactive interventions to be made by your healthcare team based on the amount of fluid your body is able to shift, or refill, into the bloodstream from your tissues at any given time during your treatment.



Red Blood Cells in Your Bloodstream

Your bloodstream is made of red blood cells (RBC), other cells and plasma. Fluid, nutrients and toxins are in the plasma. The dialyzer has little holes that filter out extra fluid and toxins. The red blood cells are too large to pass through the dialyzer holes. As the fluid is removed, the percentage of red blood cells in your bloodstream, or hematocrit, increases.





Take a Look Inside Your Bloodstream with the Crit-Line IV Monitor

The Crit-Line IV sensor clip locks into place around the blood chamber that is attached to the arterial side of the dialyzer. The sensor clip should be attached after blood has been passing through the chamber for at least three minutes and stay on until the end of your treatment.

How Does the Crit-Line IV Monitor Work?

The Crit-Line IV sensor clip uses a special, harmless light to detect the percentage of RBC in your bloodstream. It helps your healthcare team see into your bloodstream to monitor Hct, oxygen and blood volume changes.

The Crit-Line IV monitor screen shows how your blood volume is changing in real time. The bottom of the screen shows the current numbers for your Hct, hemoglobin, blood volume change, oxygen saturation level.





Know Your ABCs!

Knowing your ABCs can help your healthcare team evaluate your dialysis treatment.

The profiles that appear on the Crit-Line IV screen are categorized as Profile A, Profile B and Profile C. As your dialysis treatment progresses, you will see your profile displayed on the screen.

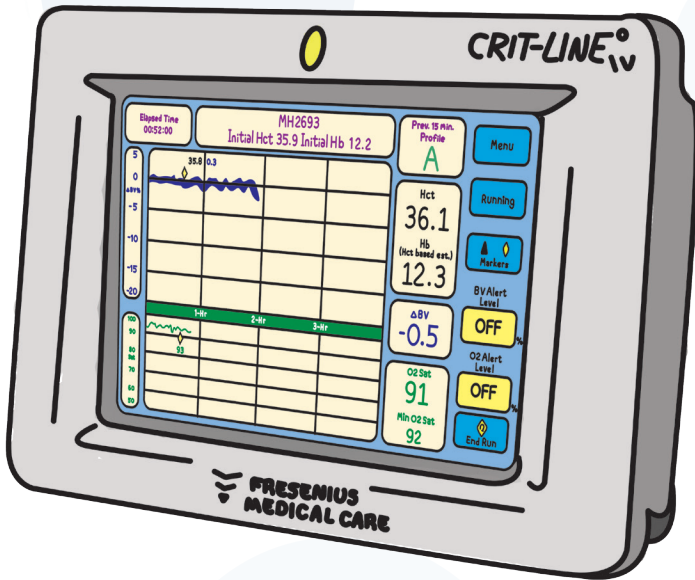
Here is what Profile A, Profile B and Profile C mean.

Let's Learn About Our ABCs . . .



Profile A

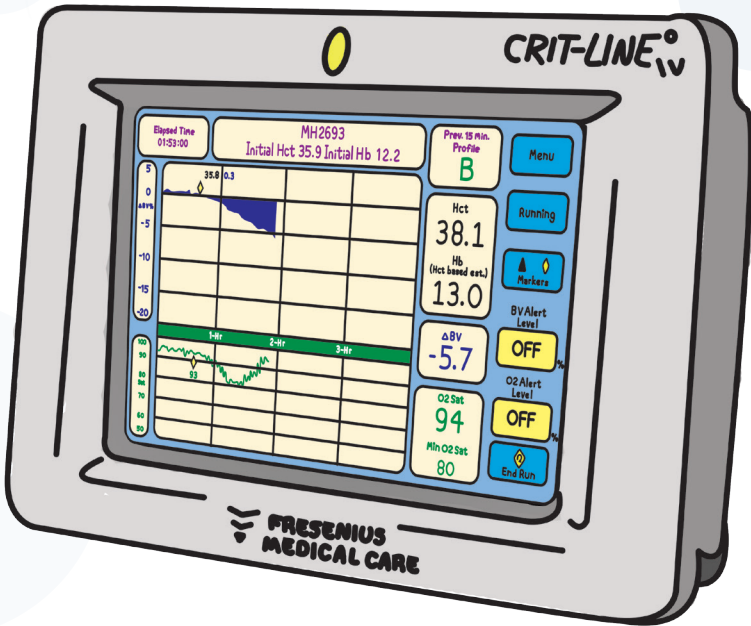
In this example, the graph is flat or turning upward slightly. This happens because your plasma refill rate is the same or faster than your ultrafiltration rate. Your hematocrit remains the same or becomes lower.





Profile B

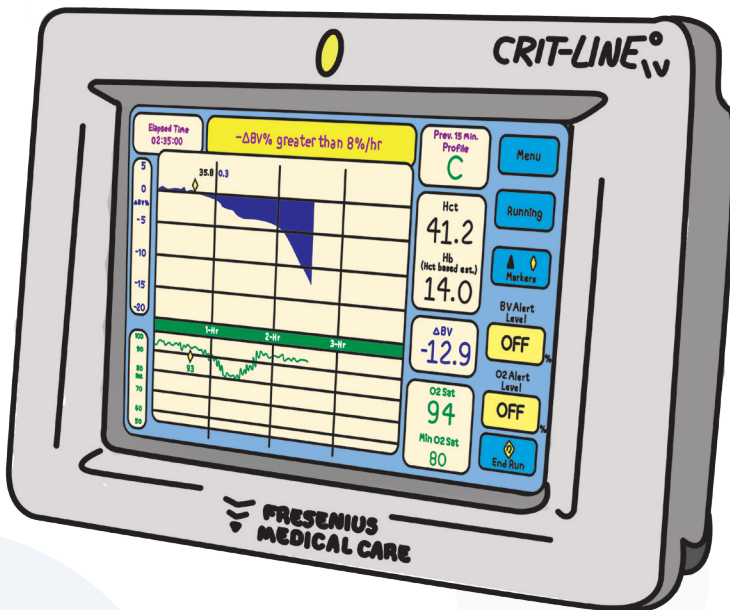
In this example, the graph is gently sloping downwards. This happens when fluid is being removed from your bloodstream at a slightly faster rate than your plasma refill rate. A gentle slope is often targeted as a good compromise between efficient fluid removal and risk of adverse symptoms on dialysis.





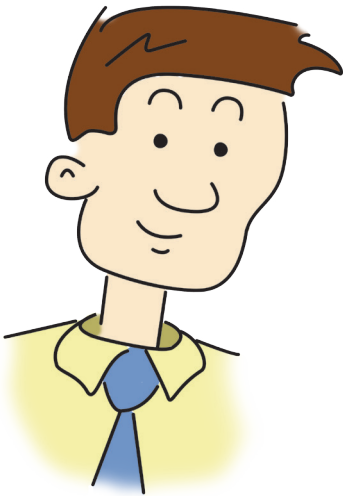
Profile C

Here, the graph curves downward very quickly. This can happen when the ultrafiltration rate is too fast and fluid is being removed too quickly compared to your plasma refill rate. Your Hct will also increase very quickly. This can lead to “crashing”. It is important to understand that each person has a different tolerance for fluid removal and you should discuss this with your healthcare team.



Your Dialysis Caregivers May Use the Following to Treat or Prevent Crashing:

- Blood volume monitoring
- Slowing down the ultrafiltration rate or stopping ultrafiltration
- Longer dialysis treatment
- Temperature control
- Medication adjustment
- Saline bolus
- Other protocols per your dialysis clinic



By knowing your ABCs, you will have a better chance of understanding what is happening in your bloodstream during your dialysis treatments.



Glossary

Blood pressure

Blood pressure is the measure of the force of blood pushing against blood vessel walls.

Bloodstream

The blood circulating through the body.

Blood volume

The total volume of blood cells, other constituents and plasma.

Crashing

A combination of symptoms that may occur if excess fluid is removed too quickly. Symptoms can include low blood pressure, dizziness and fainting.

Edema

Swelling caused by excess fluid in your body's tissues.

Hematocrit

The volume percentage (%) of red blood cells in the blood.

Kidneys

Bean-shaped organs that serve several essential regulatory roles in your body. Kidney function includes toxin removal and maintenance of fluid balance.

Kidney transplant

The organ transplant of a kidney into a patient with end-stage renal disease.

Oxygen saturation

The amount of oxygen that is dissolved in your bloodstream.

Plasma

The liquid portion of the blood, mainly consisting of water.

Plasma refill rate

The rate that fluid moves, or shifts, from cells and tissues into the bloodstream.

Red blood cells

The blood cells that carry oxygen.

Saline bolus

A rapid infusion of intravenous salt (sodium chloride) solution that is usually administered to correct a life-threatening condition, such as “crashing”.

Ultrafiltration

The removal of water/fluid across a semipermeable membrane like a dialyzer.

Ultrafiltration rate

The rate at which fluid is removed from your body during dialysis.

Urine

A liquid by-product of the body excreted by the kidneys.

Indications for Use: The Crit-Line IV monitor is used to non-invasively measure hematocrit, oxygen saturation and percent change in blood volume. The sensor clip measures hematocrit, percent change in blood volume and oxygen saturation in real time for application in the treatment of dialysis patients with the intended purpose of providing a more effective treatment for both the dialysis patient and the clinician. Based on the data that the monitor provides, the clinician/nurse, under physician direction, intervenes (i.e. increases or decreases the rate at which fluid is removed from the blood) in order to remove the maximum amount of fluid from the dialysis patient without the patient experiencing the common complications of dialysis which include nausea, cramping and vomiting. The Crit-Line blood chamber is a sterile, single use, disposable, optical cuvette designed for use with the Crit-Line sensor clip during acute and chronic hemodialysis therapy to non-invasively measure hematocrit, percent change in blood volume and oxygen saturation. The blood chamber is connected between the arterial bloodline and the dialyzer within the extracorporeal circuit during the hemodialysis treatment.

Caution: Federal (US) law restricts this device to sale by or on the order of a physician.

Note: Read the Instructions for Use for safe and proper use of this device. For a complete description of hazards, contraindications, side effects and precautions, see full package labeling available at www.fmcna.com.

CRIT-LINE[®]

Where Therapy and Diagnostics Meet *IV*



**FRESENIUS
MEDICAL CARE**

RENAL TECHNOLOGIES

Fresenius Renal Technologies, a division of Fresenius Medical Care North America
920 Winter Street • Waltham, MA 02451 • www.fmcna-crit-line.com

Customer Service: 1-800-323-5188 • **Technical Support:** 1-800-227-2572