



## Blood Volume Analysis (BVA) Clinical Case Study

### Congestive Heart Failure & Dialysis Dialysis Complicated by Hypotensive Episode Elevated BNP Consistent with Cardiac Failure

#### History:

This seventy-eight year old male, 68" height and 145lbs. was admitted for hypotension during dialysis. He has repeatedly had dialysis stopped due to hypotension and not resumed because of assumed hypovolemia. His past medical history includes hypertension, cardiomyopathy, and chronic renal failure. The patient's medications include Candesartan 16 mg. (Vasodialator) and Diltiazem 120 mg (Vasodialator). The patient's blood pressure today was 113/88. The patient was referred to evaluate his hypotension during dialysis.

#### BVA Results:

<b>Blood Vol.</b>	5295cc	<b>Ideal Blood Vol.</b>	4553cc	<b>Excess</b>	714cc	<b>Devtn.</b>	<b>16.3%</b>
<b>Red Cell Vol.</b>	1784cc	<b>Ideal Red Cell Vol.</b>	1846cc	<b>Deficit</b>	62cc	<b>Devtn.</b>	<b>-3.3%</b>
<b>Plasma Vol.</b>	3510cc	<b>Ideal Plasma Vol.</b>	2707cc	<b>Excess</b>	803cc	<b>Devtn.</b>	<b>29.7%</b>

**Normal**  
0 to 8%

**Mild**  
8 to 16%

**Moderate**  
16 to 24%

**Severe**  
24 to 32%

**Extreme**  
>32%

Hematocrit: 35%      BNP: >1300 (NYHA Class IV)

#### Clinical Analysis:

This patient shows a mild to moderate blood volume expansion. This hypervolemia is secondary to expanded plasma fluid volume. Red cell volume is within normal limits. The results are consistent with volume overload. The patient's hypotension (during dialysis) in the presence of hypervolemia suggests autonomic dysfunction. In addition, it was recommended the patient be dialyzed at a slower rate for longer periods of time to achieve adequate fluid loss without precipitation of hypotension. The patient has a pseudoanemia secondary to plasma volume expansion. Patient's elevated BNP is consistent with LV dysfunction but does not necessarily reflect volume status.

#### Technical Analysis:

Technical analysis consists of an evaluation of five separate blood volume collection points with mathematical evaluation of consistency. Technical evaluation is reported as acceptable or unacceptable. All five individual sampling points, tested in duplicate, were internally consistent with no significant deviations. The standard deviation was 2.52% (upper limit). Four of the five samples were used. Therefore, the results are technically acceptable.