



Blood Volume Analysis (BVA) Clinical Case Study

Secondary Polycythemia Due To Congestive Heart Failure

History:

This fifty-eight year old, 67" height, 327lbs. Caucasian male complains of chronic shortness of breath. His past medical history includes a cerebral vascular accident (left side effected) within the past month, atrial fibrillation with left bundle branch block, diabetes mellitus and hypertension. His medication includes coumadin, K-Dur, Lopressor (β -blocker) 60mg, Capoten (ACE inhibitor) 12.5mg, Lanoxin 0.25mg, and Lasix 40mg. (Diuretic) The patient's blood pressure was 130/93. The patient has 2+ pitting lower extremity edema. The symptoms of his CVA have completely resolved. Patient referred to evaluate his symptoms, therapy and recent hematocrit of 52% for Polycythemia vera.

BVA Results:

Blood Vol.	10449cc	Ideal Blood Vol.	6753cc	Excess	3695cc	Devtn.	54.7%
Red Cell Vol.	4990cc	Ideal Red Cell Vol.	2738cc	Excess	2251cc	Devtn.	82.2%
Plasma Vol.	5459cc	Ideal Plasma Vol.	4015cc	Excess	1444cc	Devtn.	36.0%

Normal
0 to 8%

Mild
8 to 16%

Moderate
16 to 24%

Severe
24 to 32%

Extreme
>32%

Hematocrit: 52 %

Clinical Findings:

This patient is extremely hypervolemic with extreme red cell and plasma volume excess. A major differential in this case is the differentiation of Polycythemia vera from secondary Polycythemia vera due to congestive heart failure or hypoxemia. Polycythemia vera can be associated with extreme increase in red cell volume and increase in total blood volume. It is usually not associated with an expanded plasma volume. These findings coupled with the patient's atrial fibrillation and left bundle branch block are much more suggestive for secondary Polycythemia vera related to heart failure or hypoxemia. The patient is morbidly obese and a likely candidate for periods of hypoxia related to decreased pulmonary function. The severity of the patient's blood volume disturbance is masked by his mildly elevated hematocrit of 52%. The patient should be treated with therapeutic phlebotomy as soon as possible. Diuretic therapy should be immediately discontinued. Despite the patient's lower extremity peripheral edema, diuretic therapy would cause further hemoconcentration. Due to the patient's history of stroke, hemoconcentration must be avoided. This patient should be given an appropriate weight reduction diet. Strenuous exercise should be avoided until the patient has lost a significant amount of weight.

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 1.65%. The slope was 0.00287 and is normal. Therefore, the results are technically acceptable.