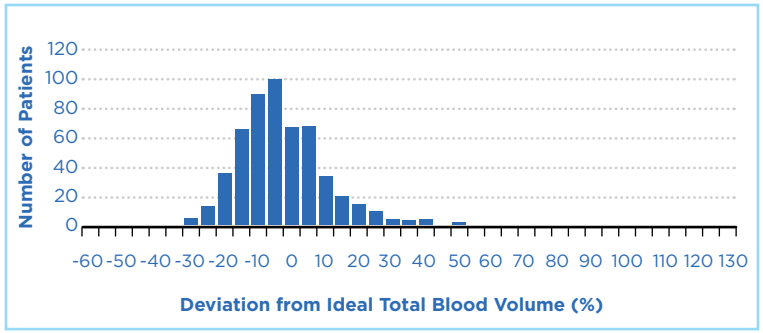
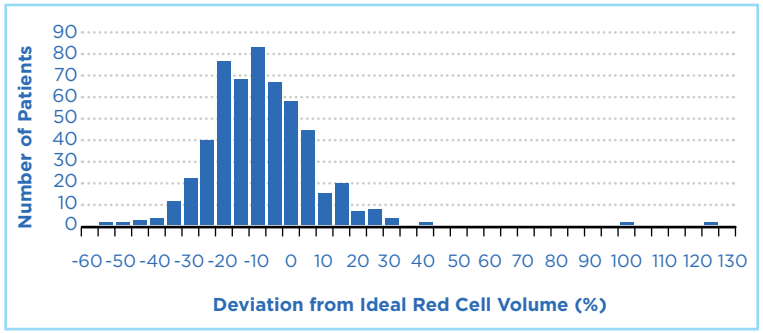
In syncope of unclear etiology, identify the hidden drivers

to enable individualized care guided by direct blood volume analysis (BVA)

Hypovolemia and anemia have been shown prevalent in syncope, a condition marked by heterogeneity in both total blood volume (TBV) and red blood cell volume (RBCV)[1]*

- Among 539 prospectively studied noncardiac syncope patients, 44.7% had low TBV (n=241), 11.6% high TBV (n=63), 58.6% (n=306) true anemia, including 43 patients with RBCV deficits of -30% or worse, and 7.6% polycythemia (n=41)





Only direct BVA accurately quantifies TBV and RBCV to guide optimal treatment

- Serum hematocrit (Hct) was normal or high in 102 of the 306 patients with true anemia†
  - Hct was poorly correlated with RBCV (r^2=0.325) as well as TBV (r^2=0.028)
- Tilt table test results showed no correlation with TBV or RBCV
- Ongoing treatment (n=46) often was inappropriate or inadequate; a third of those already on midodrine were hypovolemic, placing them at risk for hypoperfusion in response to vasoconstriction, and almost half of those on fludrocortisone were hypovolemic

*N=539 patients undergoing evaluation for syncope/presyncope of unclear etiology at the Cleveland Clinic. 337 were female and 202 male with an average age of 46 ± 24 years (age range, 16-88 years). At the time of evaluation, patients had no history of acute myocardial infarction, acute stroke, active congestive heart failure, severe valvular heart disease, or critical arrhythmias, and were not receiving dialysis. Medications varied from none to several and included fludrocortisone, midodrine, beta blockers, nitrates, antihypertensives, and antidiabetic agents.

†True anemia was defined as an RBCV deficit vs the patient-specific ideal at -10% or worse. Hct was considered "normal or high" at ≥38% for women and ≥41% for men.

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Actionable results that inform patient care

Individualized care guided by BVA for non-cardiac syncope: an overview[2]

HYPOVOLEMIC
TBV <-8%

Syncope is likely related to low blood volume.

- Is the patient on medication that may lower TBV?
  - **Yes** → Reduce or discontinue
  - **No** → Is the volume deficit primarily in PV or in RBCV?
    - **PV** → Is the patient on PV-raising medication, eg, fludrocortisone?
      - **Yes** → Nonresponse may indicate hypoalbuminemia or renal salt wasting syndrome; evaluate and manage
      - **No** → Consider fludrocortisone
    - **RBCV** → Treat anemia

NORMOVOLEMIC
TBV -8% to +11%

TBV or RBCV may or may not be a factor. Maintaining slightly higher TBV may be optimal for some patients to avoid syncopal episodes. If present, anemia may need to be treated.

- Does the patient have true anemia (an RBCV deficit of -10% or greater)?
  - **Yes** → Treat anemia → If syncope does not resolve, consider midodrine
  - **No** → Is the patient on medication that may impair vasomotor tone or lower TBV?
    - **Yes** → Reduce or discontinue
    - **No** → Consider midodrine

HYPERVOLEMIC
TBV >+11%

Syncope is likely related to autonomic dysfunction.

- Is the patient on medication that may impair vasomotor tone?
  - **Yes** → Reduce or discontinue
  - **No** → Consider midodrine → If syncope does not resolve, consider increasing midodrine dosage or adding fludrocortisone

If syncope still does not resolve, conduct additional testing, including repeat BVA to establish treatment response, and evaluate further.

TBV: total blood volume. **RBCV:** red blood cell volume. **PV:** plasma volume. | *Source: Data on file. Daxor Corporation.*

> "Accurately identifying volume status can help a physician choose pharmacological treatments that are more likely to address the underlying causes of an individual patient's syncope."
>
> — Fetnat Fouad-Tarazi, M.D., et al[1]

Solve the puzzle of syncope etiology

- Provides total blood and red blood cell volume along with calculated patient-specific ideals*
- Actionable results—quantifies the excess or deficit with **98% accuracy**
- Confidently identify and address anemia, regardless of plasma expansion or depletion
- Non-invasive, single-venipuncture technique†
- Over 40,000 tests performed in over 75 hospitals
- Fully reimbursed by Medicare

*Derived from Metropolitan Life height, weight, and gender data in a uniquely accurate, validated methodology.[3,4]

†A ^{131}I labeled albumin tracer injection (≤25 microcuries: no requirement for thyroid blockade[5]) is followed by 5 blood draws 5-6 minutes apart. The Daxor BVA-100 measures plasma dilution in successive samples and performs a regression analysis to arrive at the total blood volume. BVA delivers results within approximately 90 minutes, subject to institutional procedural variance; preliminary results may be obtained in <30 minutes.

References: 1. Fouad-Tarazi F, et al. Blood volume measurement as a tool in diagnosing syncope. *Am J Med Sci* 2007;334(1):53-56. **2.** Data on file, Daxor Corporation. **3.** Feldschuh J, et al. Prediction of the normal blood volume—relation of blood volume to body habitus. *Circulation* 1977;56(4):605-612. **4.** Feldschuh J, et al. The importance of correct norms in blood volume measurement. *Am J Med Sci* 2007;334(1):41-46. **5.** Volumex® [package insert]. Daxor Corporation, New York, NY; 2005.

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