

Adrenal Venous Sampling

Introduction: Primary aldosteronism (PA) is more common than previously thought. Up to 15% of all hypertension is due to PA. PA can be caused by bilateral or unilateral hyperplasia, an adenoma, or by mutations in genes coding for enzymes involved in aldosterone (AS) synthesis. **Adrenal venous sampling (AVS)** is a procedure used to diagnose the **source** of the excess aldosterone (i.e. whether it is uni- or bilateral). Why is this important? Because unilateral PA is treated surgically, whereas bilateral PA is managed medically. AVS is, by far, the most reliable way of establishing the source of excess AS.

The procedure: With AVS, the difference between left and right adrenal AS excretion is measured by sampling blood from each **adrenal vein (AV)**. This is more complicated than it sounds, mostly for anatomical reasons. The **right adrenal vein** is very short and originates directly from the **inferior vena cava (IVC)**, making it very difficult to cannulate. The **left AV** originates from a common trunk with the inferior phrenic vein (IPV), which, in turn, originates from the left renal vein. The common trunk is easier to cannulate than the left AV itself, but dilution from the IPV must then be compensated for when interpreting the AS level (in the common trunk, left AV blood is mixed with IPV blood, which obviously has a lower AS concentration).

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Execution: The **right AV**, **IVC**, and **left AV** are cannulated, and blood is sampled for analysis of **AS** and **cortisol** levels. The AVs are catheterized through the percutaneous femoral vein approach. Gentle contrast injections are used to verify the position of the catheter tip.

- Why is blood sampled from the IVC? Why is the cortisol level analyzed? Aren't we only interested in the AS levels? These questions are answered in the interpretation section.

Interpretation: Ultimately, we're interested in whether there's a significant difference between AS levels in the two adrenal veins. So why cannulate the IVC? Because comparing the right AV and IVC cortisol levels tells us whether or not the difficult cannulation was successful – the cortisol level should be **≥3 higher** in the right AV. If this is the case, we can trust subsequent measurements.

Before AS levels are compared, we must account for dilution. This is done by dividing the AS level with the cortisol level in each AV – the ratio will be the same regardless of dilution. These **corrected** values (A/C ratios) are the ones used in the final comparison.

If the A/C ratio of one adrenal vein is ≥ 4 times higher than that of the other, the source of AS is unilateral and should be treated **surgically**.