

Medical Reference Cards

github.com/alping/medical-reference-cards

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**.

C-ABCDE

C Catastrophic bleeding / Cardiac arrest

A Airways

Check airway
Thorax movement
See, listen, feel
Paradox. breathing?
Stridor?

1. Chin lift/Jaw thrust
2. Naso/Oropharyngeal airway
3. Suction
4. Laryngeal mask airway
5. Intubation
6. Coniotomy

B Breathing

Respiratory rate
Thorax movement
Auscultation
Cyanosis

1. Oxygen
2. Ventilation
3. Decompression
4. Chest tube

C Circulation

Colour (Pale)
Cold/Sweaty
Pulse (Rad / Fem / Car)
Abdomen/Pelvis

1. Tilt bed
2. Fluids (PVC, IO, CVC)
3. Vasoactive drugs
(Adrenalin IM)

D Disability

AVPU/GCS
Pupils
Movement of extrem.

1. Support ABC
2. Glucose
3. Antidote

E Exposure

Check whole body
Prevent hypothermia
Prevent further injury

1. Log roll
2. Warm blankets
3. Warm fluids

SBAR

S Situation

Own name, title, and unit

Patients name, sex, and age

Patients social security / identification number

Describe situation briefly

I'm contacting you to...

B Background

Previous and current illness

Relevant medical history

Allergies

Contagiousness

A Assessment

A: Airway

B: Breathing, saturation

C: Heart rate, blood pressure

D: Consciousness, pain, oriented to time / place / person

E: Temperature, skin, colour, abdomen, urine production

Brief assessment

R Recommendation

Immediate action (Care, monitoring, transfer, treatment)

Further examinations (Radiology)

Time frame (How often...? How long...? Next contact...?)

Confirmation of communication

Questions / Agreement

Lab reference (Swe)

| Sys. | Component | Subgroup | Ref. interval | Unit |
|------|----------------|-------------------|---------------|--------|
| P/S | ALAT | Male | 0,15 – 1,1 | µkat/L |
| | | Female | 0,15 – 0,75 | µkat/L |
| P/S | ALP | | 0,60 – 1,8 | µkat/L |
| P/S | Amylas | | 0,40 – 2,0 | µkat/L |
| P/S | Albumin | 18 – 40 y. | 36 – 48 | g/L |
| | | 41 – 70 y. | 36 – 45 | g/L |
| | | >70 y. | 34 – 45 | g/L |
| P/S | ASAT | Male | 0,25 – 0,75 | µkat/L |
| | | Female | 0,25 – 0,60 | µkat/L |
| P/S | Bilirubin | | 5 – 25 | µmol/L |
| P/S | Calcium | | 2,15 – 2,50 | mmol/L |
| P/S | CK | Male 18 – 50 y. | 0,80 – 6,7 | µkat/L |
| | | Male >50 y. | 0,70 – 4,7 | µkat/L |
| | | Female | 0,60 – 3,5 | µkat/L |
| P/S | Fosfat | Female | 0,80 – 1,5 | mmol/L |
| | | Male 18 – 50 y. | 0,70 – 1,6 | mmol/L |
| | | Male >50 y. | 0,75 – 1,4 | mmol/L |
| fP | Glukos | | 4,2 – 6,3 | mmol/L |
| P/S | GT | Male 18 – 40 y. | 0,15 – 1,3 | µkat/L |
| | | Male >40 y. | 0,20 – 1,9 | µkat/L |
| | | Female 18 – 40 y. | 0,15 – 0,75 | µkat/L |
| | | Female >40 y. | 0,15 – 1,2 | µkat/L |
| P/S | Järn | | 9 – 34 | µmol/L |
| P/S | Järnmättnad | Male | 0,15 – 0,60 | |
| | | Female 18 – 50 y. | 0,10 – 0,50 | |
| | | Female >50 y. | 0,15 – 0,50 | |
| P | Kalium | | 3,5 – 4,4 | mmol/L |
| S | Kalium | | 3,6 – 4,6 | mmol/L |
| P/S | Kolesterol | 18 – 30 y. | 2,9 – 6,1 | mmol/L |
| | | 31 – 50 y. | 3,3 – 6,9 | mmol/L |
| | | >50 y. | 3,9 – 7,8 | mmol/L |
| P/S | HDL-Kolesterol | Female | 1,0 – 2,7 | mmol/L |
| | | Male | 0,80 – 2,1 | mmol/L |

Lab reference (Swe)

| Sys. | Component | Subgroup | Ref. interval | Unit |
|------|-----------------------|-------------------|---------------|---------------------|
| P/S | LDL-Kolesterol | 18 – 30 y. | 1,2 – 4,3 | mmol/L |
| | | 31 – 50 y. | 1,4 – 4,7 | mmol/L |
| | | >50 y. | 2,0 – 5,3 | mmol/L |
| P/S | Kreatinin | Male | 60 – 105 | µmol/L |
| | | Female | 45 – 90 | µmol/L |
| P/S | LD | 18 – 70 y. | 1,8 – 3,4 | µkat/L |
| | | >70 y. | 1,9 – 4,2 | µkat/L |
| P/S | Magnesium | | 0,70 – 0,95 | mmol/L |
| P/S | Natrium | | 137 – 145 | mmol/L |
| P/S | Pankreasamylas | | 0,15 – 1,10 | µkat/L |
| P/S | Protein | | 64 – 79 | g/L |
| P/S | TIBC | | 47 – 80 | µmol/L |
| P/S | Triglycerider | | 0,45 – 2,6 | mmol/L |
| P/S | Urat | Male | 230 – 480 | µmol/L |
| | | Female 18 – 50 y. | 155 – 350 | µmol/L |
| | | Female >50 y. | 155 – 400 | µmol/L |
| P/S | Urea | Male 18 – 50 y. | 3,2 – 8,1 | mmol/L |
| | | Male >50 y. | 3,5 – 8,2 | mmol/L |
| | | Female 18 – 50 y. | 2,6 – 6,4 | mmol/L |
| B | Hemoglobin | Female | 117 – 153 | g/L |
| | | Male | 134 – 170 | g/L |
| B | EVF | Female | 0,350 – 0,458 | |
| | | Male | 0,393 – 0,501 | |
| B | Erytrocyter | Female | 3,94 – 5,16 | 10 ¹² /L |
| | | Male | 4,25 – 5,71 | 10 ¹² /L |
| B | MCV | | 82 – 98 | fL |
| Erc | MCH | | 27,1 – 33,3 | pg |
| Erc | MCHC | | 317 – 357 | g/L |
| B | Leukocyter | | 3,5 – 8,8 | 10 ⁹ /L |
| B | Trombocyter | Female | 165 – 387 | 10 ⁹ /L |
| | | Male | 145 – 348 | 10 ⁹ /L |

CHA2DS2VAS

| | | |
|----------|-------------------------------------|----------|
| C | Cardiac - Heart failure | 1 |
| H | Hypertension | 1 |
| A | Age ≥ 75 years | 2 |
| D | Diabetes | 1 |
| S | Stroke/TIA/embolism | 2 |
| V | Vascular Atherosclerotic disease | 1 |
| A | Age 65-74 | 1 |
| S | Sex - Female* | 1 |

*No indication for antithrombotic treatment if only risk factor

**AF and score $\geq 2 \rightarrow$ Antithrombotic treatment
IF low-medium risk of bleeding (HAS-BLED <3)**

See local guidelines for specific antithrombotic drugs

Example of initial Warfarin treatment, 2.5mgx1 p.o.

Day 1: 2-4 | Day 2: 2-3 | Day 3: 1-4 (dep. on INR)

HAS-BLED

| | | |
|----------|--|------------|
| H | Hypertension >160 mmHg | 1 |
| A | Abnormal liver or kidney function* | 1-2 |
| S | Stroke | 1 |
| B | Bleeding Previous tendency or anaemia | 1 |
| L | Labile INR High/unstable INR or <60% time in therapeutic range | 1 |
| E | Elderly (>65 years) | 1 |
| D | Drugs E.g. ASA, NSAID or high alcohol consumption | 1-2 |

* Kidney: Creatinine >200, dialysis, or transplant
Liver: Chronic liver disease, Bilirubin 2x ref, or
ALAT/ASAT/ALP 3x ref.

High risk of bleeding if ≥ 3 points

Neurological exam.

The whole time

Psychiatric: Wakefulness, oriented to time/place/self

Motor: Facial expressions, general

Dysarthria, dysphasia, right or left handed

Higher cortical functions: Apraxia, spatial function, neglect

Standing

Walk across the room

Walk on toes/heels

Squat and rise

Sight and hearing

Sitting

Face: Symmetry, ptosis, corneal reflex

Pupils: Size, reaction to light

Eye movements: Nystagmus, diplopia

Sight: Donder's test

Mouth and throat: Symmetry, swallow reflex, gingival hyperplasia, cranial nerve XII

Sensitivity to light touch, vibration, temperature, and pain

Motoric function for cranial nerve V, VII, XI

Reflexes in arms and legs

Grasset's test

Auscultation of lungs

Palpate lymph nodes

(Smell and taste)

Lying down

Neck stiffness

Muscle strength: proximal + distal, in arms and legs

Muscle tone, atrophies, fasciculation, tremor,

Heel-knee test

Dysdiadochokinesis

Abdominal reflexes

Barré's test

Babinski's sign

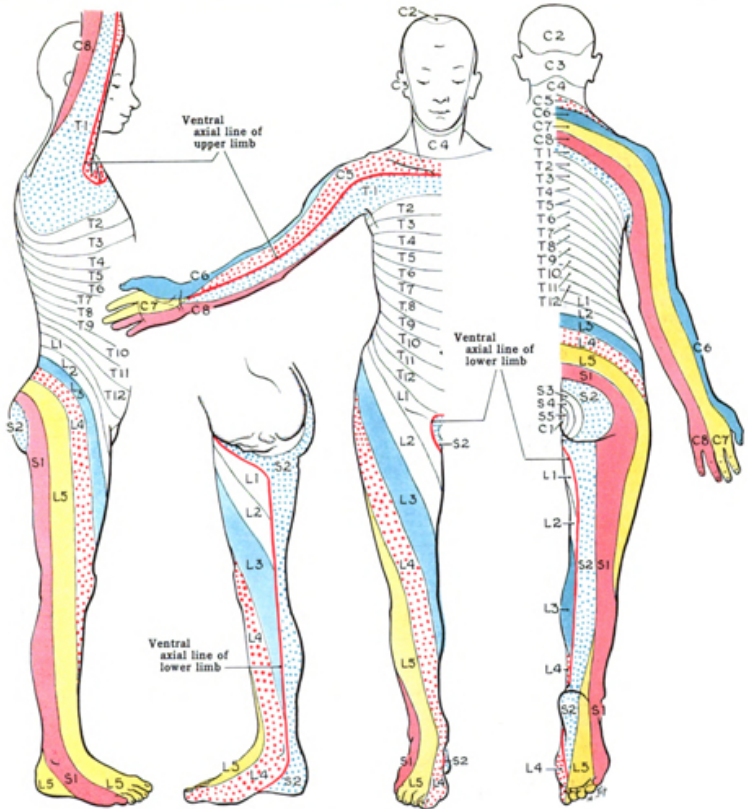
Fundus examination

(Primitive reflexes: Grasping reflex, palmomental, glabellar, sucking)

Glasgow Coma Scale

| | Response | Score |
|----------------------|-------------------------------------|-------|
| Eye opening response | Spontaneously | 4 |
| | To speech | 3 |
| | To pain | 2 |
| | No response | 1 |
| Best verbal response | Oriented to time, place, and person | 5 |
| | Confused | 4 |
| | Inappropriate words | 3 |
| | Incomprehensible sounds | 2 |
| | No response | 1 |
| Best motor response | Obeys commands | 6 |
| | Moves to localized pain | 5 |
| | Flexion withdrawal from pain | 4 |
| | Abnormal flexion (decorticate) | 3 |
| | Abnormal extension (decerebrate) | 2 |
| | No response | 1 |
| Total score | Best response | 15 |
| | Comatose patient | ≤8 |
| | Totally unresponsive | 3 |

Dermatomes



Myotomes

| Segment | Function |
|--------------|--|
| C1/C2 | Neck flexion/extension |
| C3 | Neck lateral flexion |
| C4 | Shoulder elevation |
| C5 | Shoulder abduction |
| C6 | Elbow flexion/wrist extension |
| C7 | Elbow extension/wrist flexion |
| C8 | Finger flexion |
| T1 | Finger abduction |
| L2 | Hip flexion |
| L3 | Knee extension |
| L4 | Ankle dorsi-flexion |
| L5 | Great toe extension |
| S1 | Ankle plantar-flexion/ankle eversion/ hip extension |
| S2 | Knee flexion |
| S3–S4 | Anal wink |

Distal Status - Hand

Inspection

Hematomas / Wounds

Malalignment / Tonus

Palpation

Fossa tabatière

Distal radioulnar joint

Circulation

Allen's test – Ulnar / Radial loss of circulation

Capillary refill Dig I-V

Passive movement (tendons)

Finger extension, each separately

Flexor digitorum superficialis et profundus, separately

Neurology

1. *Radialis* 2. *Medianus* 3. *Ulnaris*

Sensory

1. Dig I, radially
2. Dig II, distal of PIP
3. Dig V, ulnar side

1. Extension of fingers
2. Opposition, Dig I & V
3. F.spread / Dig V flex.

Motor

Stability

Dig I, MCP, UCL, Distal radioulnar joint

Watson's test – Instability, scaphioidum - lunatum

Specific tests

Tinel's and Phalen's tests: carpal tunnel syndrome

Finkelstein's test: Morbus de Quervain

Pain in wrist should result in plain film x-ray

- Orthopedics -

- **Empty** -

Ottawa Ankle Rule

1 Pain around the malleolus AND

Palpation tenderness over the dorsal ridge of the lateral or medial malleus

OR

Inability of the foot to support four steps

2 Pain around the mid part of the foot AND

Palpation tenderness over the base of the 5th metatarsal bone OR the Navicular bone

OR

Inability of the foot to support four steps

X-ray of foot and lower leg if 1 or 2 are met

Otherwise: Elastic wrap, tape, possibly orthosis, information (proprioceptive exercises e.g. stand on one leg while brushing teeth)

Acute care (PRICE)

Protection, Rest, Ice, Compression, Elevation

Only applicable on adults (>18 years) with isolated injury

Well's DVT Score

| Sign | Point |
|---|-------|
| Active cancer last 6 months | 1p |
| Paralysis, paresis, newly casted | 1p |
| Immobilized >3 d. or large surgery last 4 w. | 1p |
| Localized tenderness along the deep venous system | 1p |
| Whole leg swelling | 1p |
| Calf circumference >3 cm, compared to asymptomatic side | 1p |
| Pitting oedema on symptomatic side | 1p |
| Collateral flow in superficial veins (non-varicose) | 1p |
| Similar likelihood of alternative diagnosis | -2p |

Low points <2 + negative D-dimer

= low probability for DVT

High points $\geq 2 \rightarrow$ Ultrasound whole leg

Risk of false negative D-dimer when symptoms >1w or anticoagulation therapy

Normal Physiology

| Age | RR (/min) | HR (/min) | SBP (mmHg) |
|--------|-----------|-----------|------------|
| 0-1 m | 30-60 | 110-160 | 65-90 |
| 1-12 m | 30-40 | 110-160 | 70-90 |
| 1-2 y | 25-35 | 100-150 | 85-95 |
| 2-5 y | 25-30 | 95-140 | 80-110 |
| 5-12 y | 20-25 | 80-120 | 90-110 |
| >12 y | 15-20 | 60-100 | 100-120 |

| Age | ♀ W. (kg) | ♀ H. (cm) | ♂ W. (kg) | ♂ H. (cm) |
|------|-----------|-----------|-----------|-----------|
| 0 m | 2.8-4.2 | 46-54 | 2.9-4.4 | 47-55 |
| 3 m | 4.6-7.0 | 56-64 | 4.8-7.5 | 57-66 |
| 6 m | 6.0-9.3 | 62-71 | 6.4-10 | 63-73 |
| 1 y | 8.0-12 | 70-80 | 8.5-13 | 71-82 |
| 5 y | 15-25 | 102-120 | 15.5-25 | 110-112 |
| 18 y | 46-80 | 156-180 | 55-94 | 167-194 |

| Age (m) | 1-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 |
|---------------|-----|-----|-----|-----|------|-------|
| W. gain (g/w) | 175 | 150 | 125 | 100 | 75 | 50 |

| W. (kg) | Fluids (ml/kg/24h) |
|---------|--------------------|
| 2-8 | 150 |
| 6-10 | 115-120 |
| 10-10 | 100 |
| 10-20 | 50 |
| >20 | 20 |

| A. (y) | ml/kg/hour |
|---------------------|------------|
| 0-1 | 2-4 |
| >1 | 1-2 |
| ▲ Urine / Oliguri ▼ | |
| 0-1 | <1 |
| >1 | <0.5 |

Normal Physiology

| Months | Gross motor | Fine motor | Cogn. & Comm. |
|--------|---|--|--|
| 1-2 | Lift head when prone | - | Smile in resp. to face/voice, visual preference for human face |
| 2-3 | Head steady in sitting | - | - |
| 3-4 | Lift head & chest w. ext. arms | Grasp rattle | Sustain contact, displeasure if soc. contact broken, "aah, ngah" |
| 5-6 | Roll over | Transfer objects hand to hand | Monosyllabic babble |
| 6-7 | Sit with support | - | Polysyllabic babble, vowel sounds, enjoys mirrors |
| 7-8 | Sit without support, crawl | Thumb-finger grasp | Suspicious/afraid of strangers |
| 9-10 | Pull to standing pos., walk holding furniture | Pincer grip, bang objects together. | Play peek-a-boo, wave bye-bye, respond to own name |
| 12-18 | Walk alone | Turn pages in book, scribble, build 2-cube tower | Speak a few words |
| 4 yrs. | Walk on a straight line, jump on one leg | Button clothes | Answer questions, understand prepositions |