EKG TECH BASICS · ONE-PAGER

Electrode and Lead Placement

Limb and chest landmarks, counting from the angle of Louis, telemetry and Mason-Likar layouts, right-sided, posterior and 15-lead recordings, children, amputations, dextrocardia, and what to write when placement is not standard

19 sources + more detail
ekgtechbasics.com/sheets/ekg-lead-placement.html
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1 Limb electrodes (resting 12-lead)

ELECTRODE	AHA COLOR (US)	IEC COLOR	SITE
RA	White	Red	Right forearm, just above the wrist
LA	Black	Yellow	Left forearm, just above the wrist
RL (ground, reference)	Green	Black	Right lower leg, just above the ankle
LL	Red	Green	Left lower leg, just above the ankle

Rest the limbs on the bed, patient semi-reclined at about 45°. Move a limb electrode up the limb only for an amputation, a significant tremor or skin that cannot take an electrode, and then keep the opposite limb at the same level (RL, the ground, can move alone).

2 Chest electrodes V1 to V6

LEAD	SITE
V1	4th intercostal space, right sternal border
V2	4th intercostal space, left sternal border
V3	Midway between V2 and V4
V4	5th intercostal space, left midclavicular line
V5	Left anterior axillary line, level with V4
V6	Left midaxillary line, level with V4 and V5

1. Run a finger down the sternum to the bony ridge: the angle of Louis (sternal angle). The 2nd rib joins here.
2. Slide down and to the patient's right into the 2nd intercostal space; count down to the 4th. V1 goes at the sternal edge.
3. Count again on the left for V2: the two sides can be offset.
4. V4 in the 5th space in line with the middle of the clavicle; then V3 halfway between V2 and V4.
5. V5 and V6 on a horizontal line from V4. Do not follow the rib space as it curves up toward the armpit.

EXAM TIP The classic errors: V1 and V2 too high (2nd or 3rd space) and V4 to V6 too low. High V1 and V2 can fake an rSr' pattern, T-wave inversion or ST elevation. Getting V1 right makes the rest more likely to be right.

3 Monitoring and stress layouts

SYSTEM	ELECTRODE SITES	WHAT YOU CAN DISPLAY
3-electrode telemetry	RA and LA just below each clavicle; LL on the lower left rib cage	I, II or III only (lead II shows P waves well)
5-electrode telemetry	Add RL on the lower right rib cage and one chest electrode at a V site (often V1)	I, II and III plus the one V lead you placed
Mason-Likar 12-lead (stress test, 12-lead Holter or monitoring)	Arms in the hollows below the clavicles; legs on the lower torso above the iliac crests; V1 to V6 at standard sites	12 leads, but not equal to a resting 12-lead

SAFETY Torso limb sites shift the axis to the right, make II, III and aVF taller, and can hide old inferior Q waves or create false ones in aVL. Label every such tracing 'torso limb leads' and record the stress baseline in the same layout; never compare it with a standard resting ECG as if they were alike.

4 Extra and modified leads

ORDER	PLACEMENT	ON A 12-CHANNEL CART
Right-sided (V3R to V6R)	Mirror image of V3 to V6 on the right chest; V4R = right 5th space, midclavicular line	Keep V1 and V2; move V3 to V6 to the right; relabel R
Posterior (V7 to V9)	Level with V4 to V6: V7 left posterior axillary line, V8 left midscapular line (scapula tip), V9 left paraspinal	Record the 12-lead first, then move V4 to V6 to V7 to V9 and record again
15-lead	One described set: V4R, V8 and V9 added	Second tracing with moved electrodes, each relabeled; follow the order
Dextrocardia	Standard tracing, then V3 to V6 moved to the right chest (V3R to V6R); V1, V2 and limbs unchanged	Annotate clearly; swap the arm wires only if the provider or protocol prefers it, and label the swap
Infant (under 1 year)	Same sites as adults; many protocols record V4R instead of V3	Label which channel holds V4R

5 Patients who need a change

SITUATION	WHAT TO DO
Breast over V4 to V6	Explain, ask, lift the breast (patient, or you with the back of the hand) and place on the chest wall beneath
Sagging or large chest, barrel chest	Find the clavicle midpoint and count spaces; the nipple is not a landmark; keep V5 and V6 level with V4
Amputation	Lowest point of the residual limb; the opposite limb at the same level; reuse the same sites next time
Rash, wound, cast or dressing	Nearest intact skin on the same limb. Still on the forearm or lower leg: nothing else changes. Higher up: put the opposite electrode at the same level and label it. RL (ground) can move alone
Tremor (for example, Parkinson disease)	Hands tucked under the thighs or buttocks first; move limb electrodes up only if the tremor stays
Cannot lie back, or stays in a wheelchair	Record seated with chest sites unchanged; note the position
Pacemaker or ICD	Standard sites; record with the filter off so pacing spikes show; note the device

6 Document every change

- Which electrodes moved and where: 'torso limb leads', 'LA on upper arm', 'V3R to V6R', 'V4 to V6 recorded as V7 to V9'.
- Patient position if not semi-reclined (seated, upright, in wheelchair).
- Filter switched on, gain changed, or tracing limited by tremor or movement.
- Symptoms at the time of recording, then report urgent-looking findings to the nurse or provider.

EXAM TIP Exam pattern: inferior ST elevation, provider wants the right ventricle: V4R. Tall R and ST depression in V1 to V3: posterior leads. Inverted lead I with normal R-wave progression: arm leads reversed; with poor progression: think dextrocardia. Any nonstandard site: label it so a change is not read as disease.

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