Corrected Formula for the Calculation of the Electrical Heart Axis

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The calculation of the heart axis in the frontal plane can be performed with the combination of any two leads. The use of combination of bipolar (I, II, III) and unipolar leads (aVR, aVL and aVF) can produce wrong results. Calculation of the electrical axis from leads I and aVF without correction (sometimes used in ECG recorders): $EA = \pm Arctan\,(aVF/I)$ results in lower values (in our study: $34° \pm 4°$, $n = 48$) as compared to the values obtained with formula that uses leads I and II: $EA = \pm Arctan\,((2 \ast II - I)/(Sqr(3) \ast I))$ (axis = $37° \pm 3°$, $n=48$; $p<0.005$, paired t-test with Bonferroni correction) or with corrected formula which uses leads I and aVF: $EA = \pm Arctan\,((2 \ast aVF)/(Sqr(3) \ast I))$ (axis = $37° \pm 4°$, $n=48$; $p<0.005$, paired t-test with Bonferroni correction). The correction factor $2/Sqr(3)$ is required because the unipolar and bipolar leads have different strengths. Although the difference rarely reach clinical significance, our results suggests that the ECG recorders should be proofed on formulas used for the calculation of the electrical axis.

Key words: computer data processing; computer use training; diagnosis, computer-assisted; ECG; electrocardiography; heart; software

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